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## A new *Kalidium* species (Amaranthaceae s. l.) from northern Central Asia

A. P. Sukhorukov<sup>1, 2, 4\*</sup>, M. A. Kushunina<sup>1, 2, 5</sup>, M. N. Lomonosova<sup>3</sup>

<sup>1</sup> Lomonosov Moscow State University, Leninskiye Gory St., 1/12, Moscow, 119234, Russian Federation

<sup>2</sup> Tomsk State University, Lenina Pr., 36, Tomsk, 634050, Russian Federation

<sup>3</sup> Central Siberian Botanical Garden, SB RAS, Zolotodolinskaya St., 101, Novosibirsk, 630090, Russian Federation.

ORCID iD: <https://orcid.org/0000-0003-0510-5349>

<sup>4</sup> E-mail: [sukhor@mail.ru](mailto:sukhor@mail.ru); ORCID iD: <https://orcid.org/0000-0003-2220-826X>

<sup>5</sup> ORCID iD: <https://orcid.org/0000-0003-2541-6494>

\* Corresponding author

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**Summary.** *Kalidium juniperinum* Sukhor. et Lomon. is described as a species new to science. It is similar to *K. foliatum* in having a short leaf blade but differs by the presence of numerous slender, prostrate, or ascending stems forming mats vs. the stout main upright stem; acuminate bracts slightly exceeding the flower cyme vs. obtuse bracts equal to the flower cyme; the exserted pericarp looking like a bulge on the one-seeded diaspore vs. not or slightly elevated top of the diaspore; shorter anthers; the geographic range in the highlands and mountainous steppe zone vs. Eurasian lowland (semi-)desert regions. *K. juniperinum* is recorded in Russia (West Siberia and Sayan Mountains), Eastern and Northern Kazakhstan, the Mongolian Altai, and NW China. The names *K. foliatum* α [var.] *glomeratum* Fenzl and *Kalidium foliatum* β [var.] *brevifolium* Fenzl are lectotypified and synonymized with *K. juniperinum*.

## Новый вид *Kalidium* (Amaranthaceae s. l.) из северной части Центральной Азии

А. П. Сухоруков<sup>1, 2</sup>, М. А. Кушунина<sup>1, 2</sup>, М. Н. Ломоносова<sup>3</sup>

<sup>1</sup> Московский государственный университет им. М. В. Ломоносова, ул. Ленинские Горы, д. 1/12, г. Москва, 119234, Россия

<sup>2</sup> Томский государственный университет, пр. Ленина, д. 36, г. Томск, 634050, Россия

<sup>3</sup> Центральный сибирский ботанический сад СО РАН, ул. Золотодолинская, д. 101, г. Новосибирск, 630090, Россия

**Ключевые слова:** новый вид, таксономия, Центральная Азия, Chenopodiaceae, *Kalidium*.

**Аннотация.** Описан новый вид *Kalidium juniperinum* Sukhor. et Lomon. Он схож с *K. foliatum* вследствие наличия короткой листовой пластинки, но отличается от последнего многочисленными тонкими, простёртыми или восходящими стеблями, формирующими дерновинки, остроконечными, немного превышающими цимы брактееми, несколько выступающей над околоцветником верхушкой перикарпия, менее крупными пыльниками и общим распространением в предгорьях и горностепных районах. *Kalidium foliatum*, напротив, характеризуется прямыми стеблями, тупыми, равными цимам брактееми, более крупными пыльниками и общим распространением преимущественно в полупустынях и пустынях Евразии. Описываемый вид распространён в России (Западная Сибирь и Саяны), северном и восточном Казахстане, западной и центральной Монголии и северо-западном Китае. Выбраны лектотипы *K. foliatum* α [var.] *glomeratum* Fenzl и *Kalidium foliatum* β [var.] *brevifolium* Fenzl; оба названия синонимизированы с *K. juniperinum*.

## Introduction

Recent molecular studies greatly improved our knowledge of the generic circumscription of many members of the Chenopodiaceae clade, Amaranthaceae s. l. (e. g., Schütze et al., 2003; Akhani et al., 2007; Kadereit et al., 2010; Kadereit, Freitag, 2011; Fuentes-Bazan et al., 2012; Uotila et al., 2021). At the same time, some taxonomic revisions of Chenopodiaceae in Asia have been undertaken based on existing molecular data. They mostly concern the Himalayan and Tibetan taxa (Uotila, 2013; Sukhorukov, Kushunina, 2014; Sukhorukov et al., 2019) that have been poorly studied. Some taxonomic improvements in Chenopodiaceae from Asiatic Russia and adjacent regions have also been made (Lomonosova et al., 2008; Sukhorukov et al., 2013; Uotila, Lomonosova, 2016; Lomonosova, Uotila, 2022). Nonetheless, several genera from temperate Asia are still insufficiently studied, such as *Bassia* All. (*Camphorosmioideae* A. J. Scott), *Chenopodium* L., *Chenopodiastrium* S. Fuentes, Uotila et Borsch (all *Chenopodioideae* Burnett), *Kalidium* Moq., and *Salicornia* L. (*Salicornioideae* Ulbr.). Here, we report a new species that belongs to the genus *Kalidium*.

## Material and Methods

The revision of herbarium specimens was undertaken at MHA, MSK, MW, MWG, LE, LECB, NS, NSK, and TK. Morphological evaluation of the new species was performed by A. P. Sukhorukov. Field work in Siberia and Eastern Kazakhstan was carried out by M. N. Lomonosova. Seeds were examined in the Laboratory of Electron Microscopy at Lomonosov Moscow State University under a JSM-6380 scanning electron microscope (JEOL Ltd., Japan) after sputter coating of the material with gold-palladium. Distribution maps are based on the specimens cited in the text and were prepared using the SimpleMappr online tool (<http://www.simplemappr.net>).

## Results and Discussion

*Kalidium* Moq. 1849, in DC., Prodr. 13(2): 146.

**Lectotype** (Scott, 1977: 372): *Kalidium foliatum* (Pall.) Moq.

= *Kalidiopsis* Aellen, 1967, Not. Roy. Bot. Gard. Edinb. 28: 31.

**Type:** *Kalidiopsis wagenitzii* Aellen (≡ *Kalidium wagenitzii* (Aellen) Freitag et G. Kadereit).

All *Kalidium* species are glabrous dwarf subshrubs or small shrubs with a decurrent leaf base and mostly reduced leaf blades; terete and succulent leaf blades up to 1.2 cm long are present in *K. foliatum* and *K. wagenitzii*. Cymes consist of three immersed flowers with united segments having 4–5 teeth; stamens: 1–2; fruits with a parenchymatous pericarp and a yellow or brownish thin seed coat with a finely papillate surface.

*Kalidium* used to comprise six species mostly occurring in the deserts of Irano-Turan, Turkey, and Central Asia (Kadereit et al., 2006; Sukhorukov, 2014): *Kalidium foliatum*, *K. caspicum* (L.) Ung.-Sternb., *K. cuspidatum* (Ung.-Sternb.) Grubov, *K. gracile* Fenzl, *K. schrenkianum* Bunge, and *K. wagenitzii*. Recently, a variety called *K. cuspidatum* var. *sinicum* A. J. Li (Kung et al., 1978: 102) was promoted to the species rank as *K. sinicum* (A. J. Li) H. C. Fu et Z.Y. Chu (Zhao et al., 2020). Below, we add an eighth species to the genus.

***Kalidium juniperinum*** Sukhor. et Lomon., sp. nov. (Fig. 1)

**Holotype:** “Russia, Tuva Republic, Kyzylsky distr., Cheder Lake, 51°25'N, 94°45'E, solonchak. 3 IX 1989. M. Lomonosova, O. Zhdanova, D. Shaulo 46” (MW! [MW0058504]; iso – NS00004851! MHA0371729! ALTB).

= *Kalidium foliatum* α [var.] *glomeratum* Fenzl, 1851, in Ledeb., Fl. Ross. 3: 770.

≡ *K. foliatum* β [var.] *gemmulatum* Ung.-Sternb., 1866, Vers. Syst. Salic: 98. nom. illegit.

**Lectotype** (designated here): “Flor. Orient. Altaica. 1839, Bunge” (LE!).

According to the protologue, “Hab. in Sibiriae altaicae regione orientali”.

= *Kalidium foliatum* β [var.] *brevifolium* Fenzl, 1851, in Ledeb., Fl. Ross. 3: 771.

**Lectotype** (designated here): [Russia] “Altai. 1826” [without collector] (LE!).

Note: *Kalidium foliatum* var. *brevifolium* from different places across the range of *K. foliatum* s. str., including the Altai Mts, has been described. Only one specimen has been found in LE with the label by E. Fenzl and originating from the Altai Mts. Because *K. juniperinum* has slightly shorter leaves than *K. foliatum* s. str., many specimens labeled by V. I. Grubov in LE as *K. foliatum* var. *brevifolium* now belong *K. juniperinum*.



Fig. 1. The holotype of *Kalidium juniperinum* Sukhor. et Lomon., sp. nov.

**Morphology.** Caespitose subshrubs with very low basal lignification, with several or numerous slender (1.0–1.5 mm in diameter), prostrate or ascending, rarely upright stems (main stem not pronounced), sometimes rooted at the base; leaves numerous, rather distant, clasping the stem, blades linear, 3–5(8) mm long, horizontally spreading or slightly recurved; inflorescence spike-like, bracteose, and short (usually not exceeding 15 mm); bracts acuminate, 2–3(4) mm long, slightly exceeding flower cyme; perianth 5-angled in central flowers and 4-angled in lateral flowers; 1–2 stamens, anthers

0.5–0.7 mm long; 2–3 styles; fruit top slightly protruding from the perianth and looking like a bulge on the diaspore; seeds ca. 1 mm in diameter, yellow or brownish, compressedly rounded, with tiny conical and cylindrical papillae-like outgrowths on the surface.

**Habitat.** Solonchaks and saline soils around lakes, on gravelly slopes and limestone, elev. 100 m a. s. l. (lowlands of Southern Siberia and steppes of Kazakhstan) to 1800 m a. s. l. (e. g., Altai Republic) in cold steppes (Fig. 2A, B).

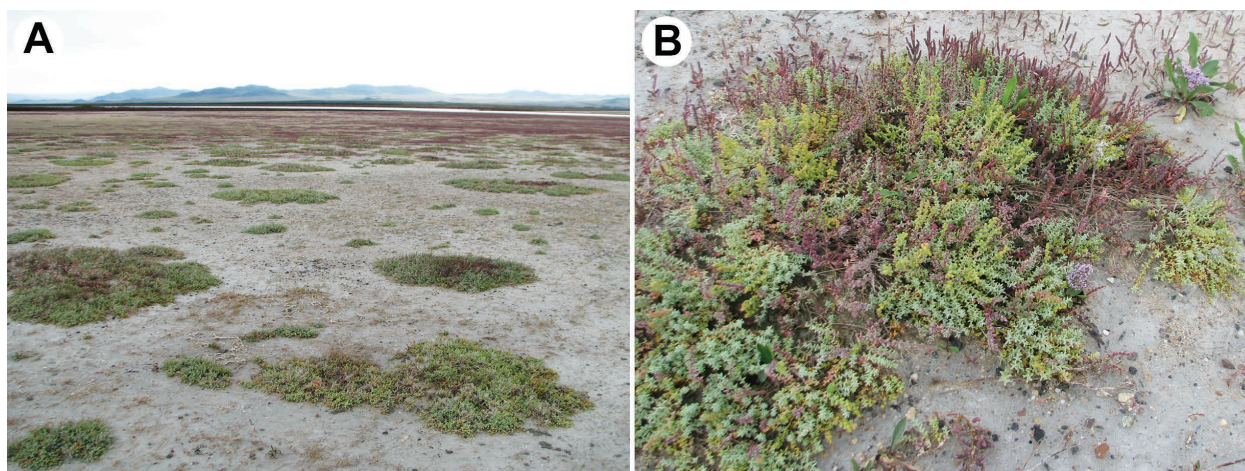


Fig. 2. A) A landscape with *Kalidium juniperinum*, B) general view of the plant. Photographer: E. A. Korolyuk (Tuva Rep., Cheder Lake, 31 VIII 2013).

**Chromosome number.**  $2n = 18$  (Lomonosova, Krasnikov, 1993, as *Kalidium foliatum*) based on two specimens: isotype (NS) and another specimen (“Tyva Rep., Piy-Khemsy distr., Beloe Lake. 11 IX 1989. M. Lomonosova et al. 101” [NS]).

**Relationships.** Until now, two *Kalidium* species have been known to possess well-developed leaf blades: *K. foliatum* and *K. wagenitzii*, found only in mountainous Central Anatolia, Turkey (Aellen, 1967, as *Kalidopsis wagenitzii*; Scott, 1977; Kadereit et al., 2006; Keser et al., 2020). *K. foliatum* from the Guryev Fort (Western Kazakhstan) has been described [Pallas (1771) as *Salicornia foliata* Pall.; see also Sytin (2014)]; this taxon is widely distributed in lowland deserts of Irano-Turan, the western part of Central Asia, and Southern Siberia (Grubov, 1966; Lomonosova, 1992). *K. juniperinum* is morphologically similar to *K. foliatum* but differs from the latter by the presence of numerous slender, prostrate or ascending stems forming mats vs. the stout main upright stem; acuminate bracts slightly exceeding the flower cyme vs. obtuse bracts equal to the flower cyme; the exerted pericarp looking like a bulge on the one-seeded diaspore (Fig. 3A)

vs. not or slightly elevated top of the diaspore (Fig. 3B); shorter anthers (0.5–0.7 vs. 0.8–1.0 mm); and occurrence in the highlands and mountainous steppe zone vs. Eurasian lowland (semi-)desert regions. Mountainous populations were previously known as *K. foliatum*  $\alpha$  [var.] *glomeratum* Fenzl (Fenzl, 1851) renamed by Ungern-Sternberg (1866) as *K. foliatum*  $\beta$  [var.] *gemmulatum* Ung.-Sternb. Both Fenzl and Ungern-Sternberg referred to the specimens collected in the “Chuya steppe” [Altai Republic, Russia] by Bunge (LE!) and Politov (n. v.).

All records of *K. foliatum* in Western and Central Siberia (Krylov, 1930; Gudoshnikov, 1971; Lomonosova, 1992; Silantyeva, 2013) seem to belong to *K. juniperinum*. Nevertheless, the plants collected in the lowlands of Zabaikalsky Territory and the Republic of Buryatia (LE!, NSK!, NS!) at fruiting match the “true” *K. foliatum* and represent the easternmost fragment of its range extending as far as Mongolian deserts and Dahurian steppes. According to our herbarium analyses, *K. juniperinum* is present in Mongolia in the north, whereas *K. foliatum* in the lowland Gobi Desert. The records from Kazakhstan lie within the Kazakh Upland.

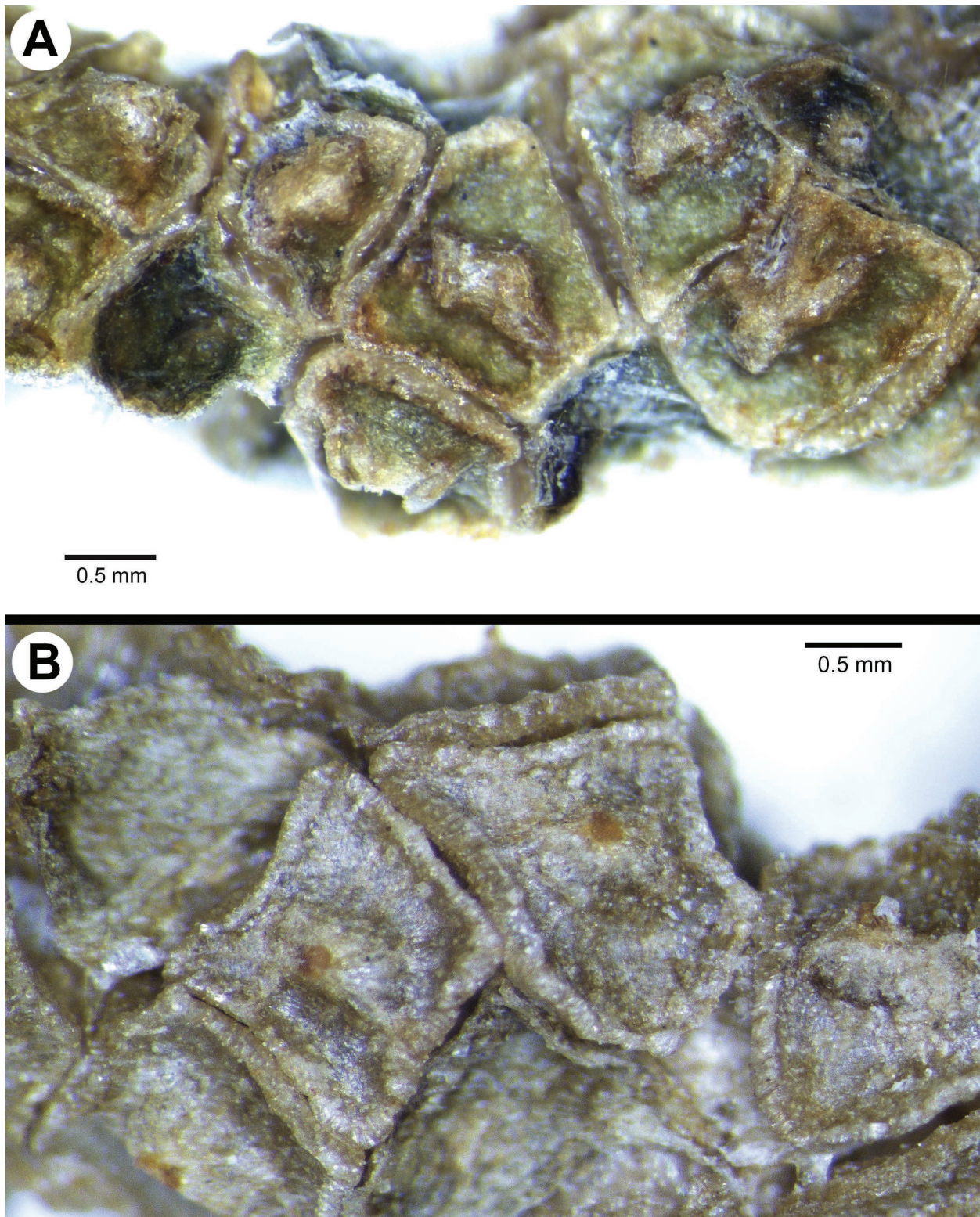


Fig. 3. Close-up view of flower cymes of *Kalidium juniperinum* (A) and of *K. foliatum* (B). Origin of the material: A: holotype (MW0058504); B: Orenburg prov., Sep 2020, A. Sukhorukov et al. (MW).

Seed ultrasculpture of *Kalidium* is studied for the first time. Both *K. juniperinum* and *K. foliatum* have stout conical and cylindrical papillae-like outgrowths (Fig. 4), and the sculpture is very similar between these species.

**Conservation status.** In the northern part of its range, *K. juniperinum* clearly requires protection due to a scattered distribution and destruction of natural habitats, e. g., in the Omsk Region (Krasnaya kniga ..., 2015, as *K. foliatum*) and the Novosibirsk

Region (Krasnaya kniga ..., 2018, as *K. foliatum*). The distribution pattern of *K. juniperinum* in some regions, e. g., in China, is not known yet, but this species seems to be present in Xinjiang only.

Therefore, the species should be assigned to the DD (Data Deficient) category, according to the IUCN (2022).

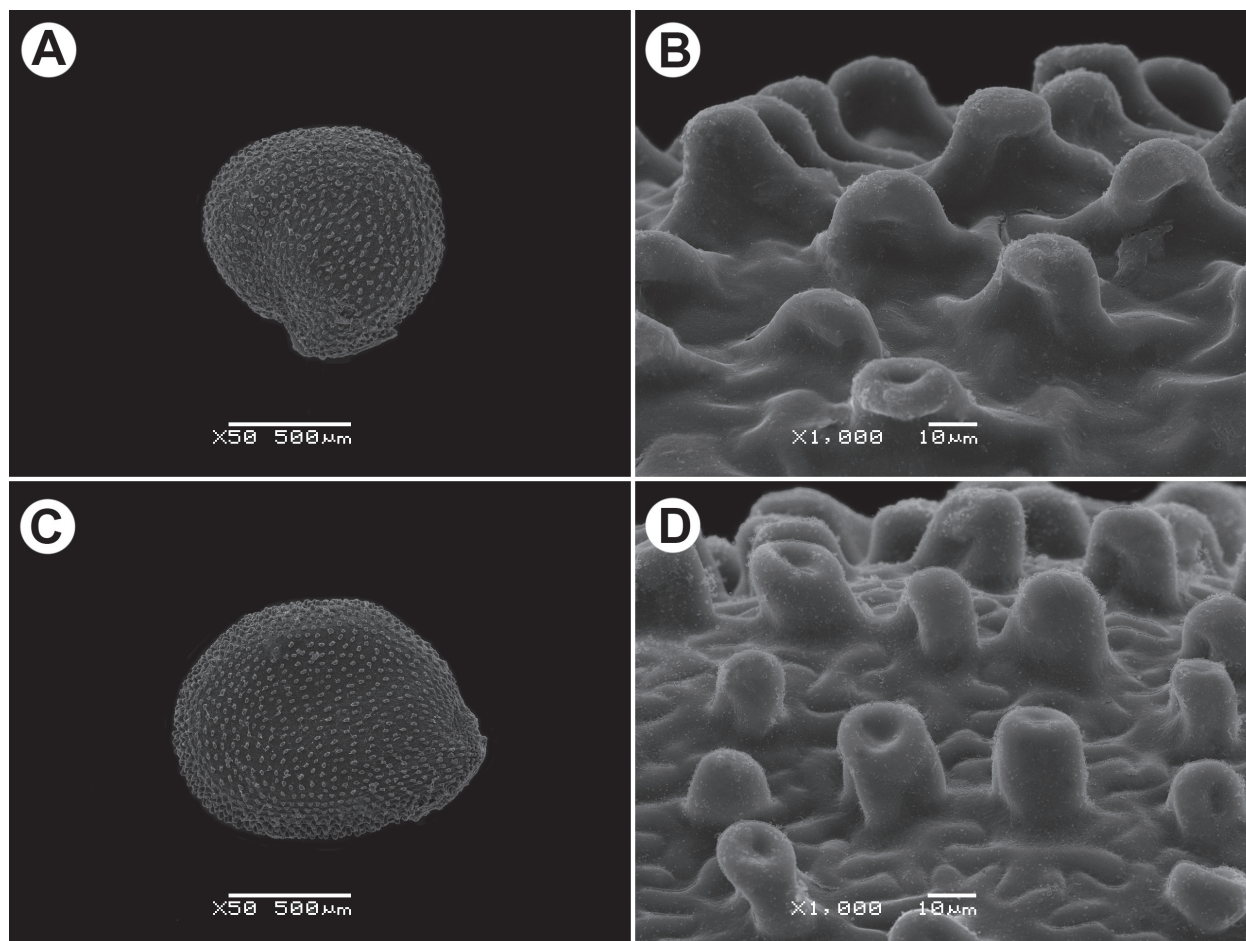


Fig. 4. Scanning electron micrographs of the seed surface of *Kalidium juniperinum* (A, B) and of *K. foliatum* (C, D). The seeds are from the central flower in the cyme. Magnification: 50× (A, C) and 200× (B, D). Origin of the material: A: holotype (MW0058504), B: Orenburg prov., Sep 2020, A. Sukhorukov et al. (MW).

**Specimens examined. RUSSIAN FEDERATION: Republic of Altai:** “Kosh-Agachsky distr., in deserto Tschujense. 1832. Bunge s. n.” (LE); *ibid.*, “nr Kosh-Agach vill. 11 IX 1936. B. K. Shishkin s. n.” (LE); *ibid.*, “nr Kosh-Agach vill., 1860 m a. s. l. 28 VIII 1978. I. Krasnoborov, M. Lomonosova 2251” (NS); *ibid.*, “Chuya steppe, nr Aktal vill. 7 IX 1990. M. Lomonosova et al. 161” (NS); “Chuya Steppe, between Karashan Mount and Tebeler vill. 3 VIII 2002. I. Artemov 228” (NS).

**Altai Territory:** “Burlinsky distr., between Novogrigorovskoe and Mikhailovskoe vill., Bol’shoe Topol’noe Lake. 11 VI 1913. P. Krylov s. n.” (LE); *ibid.*, “Burlinskoe Lake. 24 IX 1995. A. Yu. Korolyuk 540” (NS); *ibid.*, “nr Bol’shoe Topol’noe Lake towards Mikhailovka vill. 6 X 1999. I. M. Krasnoborov 164” (NS); “Zavyalovsky distr., 12 VIII 1944. E. Vandaku-

rova s. n.” (NS); “Uglovsky distr., nr Uglovskoe vill. 18 VII 1956. E. Vandakurova, E. Lapshina s. n.” (NS).

**Republic of Khakassia:** “Ust’-Abakansky distr., nr Uibat River, 1880-1885. G. Andreev s. n.” (TK); *ibid.*, “nr Abakan town. 28 V 1927. V. Reverdatto s. n.” (TK); *ibid.*, “Charkovsky. 24 VI 1933. V. Golubintseva, T. Kurakina s. n.” (TK); *ibid.*, “nr Kapchaly vill., Krugloe Lake. 25 VI 1967. G. Zvereva, I. Neifeld s. n.” (LE, NS); *ibid.*, “Taloe Lake. 23 VII 1968. I. Neifeld, G. Vlasova s. n.” (LE, NS); *ibid.*, “nr Vesennee vill. 18 VII 1975. I. Neifeld, T. Sokolova s. n.” (NS, TK); “Altaysky distr., Novomikhailovka vill. 16 VIII 1968. A. Kuminova, N. Alekseeva s. n.” (NSK); “Shirinsky distr. VII 1939. L. Viktorov s. n.” (TK); “nr Artkul’ Lake. 8 VIII 1948. Cherepnin s. n.” (LE).

**Krasnoyarsk Territory:** “Minusinsky distr., 4 IX 1909. Volkov 49” (LE).

**Republic of Tuva:** “Kyzylsky distr., Cheder Lake, west bank. 5–8 VIII 1947. A. P. Samoylova, Firsova s. n.” (TK); *ibid.*, “nr Tselinny vill. 9 VII 1975. E. Korotkova, O. Ivanova 509 and 19 VII 1975 520” (MHA0371736, MHA0371737, LE, NS, TK); *ibid.*, “nr Tselinny vill., Cheder Lake. 29 VII 1978. I. Neifeld, S. Rozov s. n.” (LE); *ibid.* “Cheder Lake. 20 VII 1983. I. M. Krasnoborov” (NS); “Tes-Khemsy distr., Tannu-Ola Range. 17 IX 1953. A. Kalinina s. n.” (LE); *ibid.*, “nr Amdagyn-Khol Lake, 1200 m a. s. l. 4 VIII 1972. V. Khanminchun et al. 100404” (LE, NS); *ibid.*, “O-Shynaa vill. 5 IX 1989. M. Lomonosova, O. Zhdanova 58” (NS); “Tandinsky distr., Dus-Khol (Svatikovo) Lake. 29 VII 1947. A. Skvortsova s. n.” (NS); *ibid.* “29 VII 1947. A. P. Samoylova, L. M. Cherepnin s. n.” (TK); *ibid.*, “Mezhegei vill, Kara-Khol Lake. 27 VII 1977. I. Antipova, N. Enishevskaya s. n.” (NS); “Ulug-Khemsy distr., nr Bayan-Kol vill. 30 VI 1967. I. Krasnoborov s. n.” (LE, NS); “Ovyur-sky distr., Eastern Tannu-Ola Range, Kholu River. 24 VII 1969. V. Khrutsky s. n.” (MHA0371735); *ibid.*, “17 km from Ubsu-Nur Lake, nr Ak-Chira vill. 7 VIII 1973. S. Timokhina, L. Danilyuk 1386” (NS, LE, TK, MW0058498); *ibid.*, “nr Ak-Chira vill. 25 IX 2007. I. Artemov 4” (NS0041516); *ibid.*, “nr Irbitey vill. 25 IX 2007. D. Shaulo, A. Krasnikov 88” (NS0041514); “Erzinsky distr., Tes-Khem River basin, Tus-Khol Lake. 13 VIII 1945. K. A. Sobolevskaya s. n.” (NS, TK); *ibid.*, “18 VIII 1986. A. Laidyp s. n.” (NS); *ibid.*, “nr Shara-Nur Lake, 27 VII 2007. D. Shaulo 21” (NS0041515); “Piy-Khemsy distr., Beloe Lake. 11 IX 1989. M. Lomonosova et al. 101” (NS); “Chaa-kholsky distr., Ulug-Khem River, Atykhtash vill. 6 VIII 1909. B. Shishkin s. n.” (TK); “Ulug-Khem River basin, nr Chaa-Khol vill. 11 VII 1946. K. Sobolevskaya, K. Bulgakova s. n.” (NS).

**Novosibirsk Region:** [Baganovsky distr.] “nr Kuznetsovka vill. 16 VI 1955. E. Vandakurova, A. Serebrennikova s. n.” (NS); “Chistoozerny distr., nr Zhuravli vill. 30 VIII 1957. T. Vagina s. n.” (NS); “Bagansky distr., nr Bagan vill. 22 VII 1985. V. Grankina s. n.” (NS); *ibid.*, “13 km SW Novokrasnoe vill., Teniz Lake. 22 VI 1994. V. Smirnova, O. Kosterin s. n.” (NS); *ibid.*, “nr Tsvetnopolye vill. 30 VIII 1997. I. M. Krasnoborov 159 (81), 160 (82)” (NS); *ibid.*, “Natural monument «Solonchak steppe with lake complex». 27 VI 2011. O. A. Belozertseva s. n.” (NS0028404). “Kupinsky distr., nr Orlovka vill. 5 IX 1996. I. M. Krasnoborov O. S. Zhyrova 40” (NS0028402); *ibid.*, “Nikitinka vill., Krasnovishnevoe Lake. 30 VIII 1997. I. M. Krasnoborov 146 (948)” (NS0028403); “Karasuksy distr., nr Troitskoe vill. 3 VIII 2000. M. Lomonosova s. n.”

(NS); *ibid.*, “4 km SW of Anisimovka vill. 8 IX 2010. A. Grebenyuk et al. s. n.” (LE).

**Omsk Region:** “Cherlaksy distr., nr Medet vill. 21 VII 1996. I. V. Bekashova s. n.” (LE).

Note. Other records in the Omsk Region (Moskalsky and Okoneshnikovsky districts: Krasnaya kniga ..., 2015) belong to *K. juniperinum*.

**KAZAKHSTAN. Akmola Region [incl. Kokchetav Oblast]:** “between Akmolinsk town and Dengiz Lake. 13 VI 1905. B. M. Vasyutinsky 91” (LE); “right slope of Tobol River, nr Lvovsky vill. 27 VIII 1908. V. Bogdan” (3529 HFR); “Akmolinsky distr., nr Kulan-Utmes River. 12 VI 1914. S. S. Ganeshin 803” (LE); “Atbasar distr., nr Dengiz Lake. 24 VI 1914. S. S. Ganeshin 1085” (LE); “Kokchetav distr., nr Stavovskaya vill. 21 VI 1929. P. N. Ovchinnikov, A. V. Prozorovsky 258” (LE); *ibid.*, “Maisar Lake. 5 VIII 1930. M. Yarovoy 250” (LE); “Kellerovsky distr. 5 VII 1954. E. Leontyeva 252” (LE); *ibid.*, “Itamgan Lake. 3 IX 1954. Rachkovskaya 1302” (LE); *ibid.*, “Karasar Lake. 7 VII 1955. T. I. Isachenko et al. 3220” (LE); “Barankulsky distr., Kokshetau Mts. 7 VII 1958. Z. V. Karamysheva 6223” (LE).

**Kostanay Region:** “nr Annenskoe [Annovka] vill. 22 VIII 1921. N.V. Pavlov s. n. 169” (LE).

**Karaganda Region:** “Karkaralinsk distr., Tokraunskaya volost. 26 VII 1910. S. E. Kucherovskaya 1759” (LE); “Shetsky distr., Akcha-tau. 20 VII 1938. A. Andrushko s. n.” (LE); [Aktogaisky distr.] “Zhaltas Mt. 6 VIII 1965. V. I. Vasilevich et al. 3134” (LE); “145 km NE of Karkaralinsk town. 7 VIII 1965. Z. V. Karamysheva et al. 3124” (LE); “70 km ENE of Koktas vill. 3 VI 1966. Z. V. Karamysheva et al. 4314” (LE); “11 km SSE of Karatal vill. 23 VI 1968. Z. V. Karamysheva et al. 261” (LE); “125 km NNW of Balkhash station. 23 VII 1968. Z. V. Karamysheva et al. 473” (LE); “Eastern Kazakhstaniyan distr., nr Kainar vill., 610 m a. s. l. 18 VIII 1984. E. E. Gogina, I. R. Volkovskaya s. n.” (MHA0371740).

**Pavlodar Region:** “Kul'dy-kul' Lake. 27 VII 1913. S. E. Kucherovskaya 1158” (LE); “Irtyshsky distr., Grabovo (Kosagash) vill. 29 VII 1913. S. E. Kucherovskaya” 777 (LE); “Uzun-Sor Lake. 27 VII 1954. anonymous s. n.” (MW0822670).

**East Kazakhstan Region [incl. Semipalatinsk Oblast]:** “Ust'-Kamenogorsk distr., Kara-tyube Lake. 7 VII 1914. V. Vasilevsky 197” (LE); *ibid.*, “Tarbagatai Mts., Zaisan. 8 VII 1914. V. Sapozhnikov s. n.” (LE); “Altaiskaya Gub., Borodulikhinsky distr., Kurort Aul. 22 VIII 1919. A. F. Borsukov s. n.” (NS); “Semipalatinsk prov., nr Kermankul' Lake. 1927. O. A. Enden 769” (LE); “Semipalatinsk distr., nr Kokony. 20 VIII 1928. M. M. Iljin et A. O. Heinrich-

son 684" (LE); "Semipalatinsk prov., Dzhaman-tuz Lake. 4 IX 1928. F. L. Zapryagaev 2357" (LE); "15 km SE of Semipalatinsk town. 8 IX 1928. I. Blumenthal 858" (LE); "Markakulsky distr., nr Chernyaevka vill. 11 VIII 1930. N. F. Goncharov, A. G. Borisova 1065" (LE); "16 km S of Semipalatinsk town. 30 VI 1964. V. I. Vasilevich et al. 371" (LE); "Chilikta valley, nr Chilikty vill. 18 VII 1965. V. I. Vasilevich et al. 2946" (LE); "Semipalatinsk prov., 40 km SW of Kainar vill. 13 VIII 1965. V. I. Vasilevich et al. 3168" (LE).

**Almaty Region:** "between Ush-Tobe and Ak-Dzhal towns. 12 VIII 1928. P. Ovchinnikov 2114" (LE); "nr Kumurchi [Komirshi] vill. 7 VIII 1935. B. Shishkin s. n." (LE).

**Aktobe Region:** "25 km SE of Irgiz town, Taldy-kul' Lake. 2 IX 1931. S. Gorshkova 230" (LE).

**KYRGYZSTAN:** "Naryn region, Pishpek distr., Kochkarka [Kochkor] River basin. 15 VII 1908. R. Yu. Rozhevits 1186" (LE).

**MONGOLIA:** "Mongolia borealis, Dzabkhan River bank. 17 VII 1896. E. Klementz s. n." (NS0007572); "Gobi, Orok-Nor Lake. 8 IX 1924. N. Pavlov 552" (MW0176498); "Kobdosky aimak, Buyant River. 18 VIII 1931. V. I. Baranov s. n." (LE); "Uvs aimak, 25 km SE of Davst vill., Ubsu-Nur Lake. 27 VIII 1978. I. Gubanov 4865" (LE, MW0176503); "Bayan-Ulgiy aimak, Tsengel somon, towards Ulgiy vill., alt. 1897 m a. s. l. 24 VIII 2006. M. Morenko 25" (MW0176516).

**CHINA:** "Xinjiang Uygur Autonomous Region, Khobuk valley, between Saur and Semistey Mts. 24 VI 1957. A. A. Yunatov, I-F. Yuan 250" (LE, NS0007574).



Fig. 5. The distribution map of *Kalidium juniperinum* on the basis of the specimens seen.

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