



Chromosome numbers of some species of *Artemisia* L. from Altai region, South Siberia

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ABSTRACT

Chromosome numbers for 14 species of *Artemisia* L. (Asteraceae) from the Altai region (South Siberia) are reported. One species – *Artemisia compacta* Fisch. ex DC. is studied Caryologically for the first time. For 11 species there are first chromosome counts from Altai.

Keywords

chromosome numbers, *Artemisia*, Asteraceae, vascular plants, Altai region, South Siberia, Russia

РЕЗЮМЕ

Коробков А.А., Котсеруба В.В., Пробатова Н.С.. Числа хромосом некоторых видов рода *Artemisia* L. с Алтая, Южная Сибирь

Сообщаются числа хромосом для 14 видов сосудистых растений из Алтайского региона Сибири. Для *Artemisia compacta* Fisch. ex DC. приводятся первые данные по числу хромосом. На Алтае впервые исследованы 11 видов.

Ключевые слова

числа хромосом, *Artemisia*, Asteraceae, сосудистые растения, Алтайский регион, Южная Сибирь, Россия

This paper continues the series of contributions to chromosome numbers (CN) study on *Artemisia* species in the flora of the Russian Federation (Korobkov et al. 2012a, 2012b, 2013; Probatova et al. 2008a, 2008b, 2010; Krivenko et al. 2013 etc.). Plants for this study were collected in the Altaiskii Krai and the Republic of Altai. Figure 1 shows the locations of data sampling points within this area.

An asterisk (*) before the species name indicates the first chromosome count for the species, (!) – first report from Altai region. Plants were collected mostly by A.A. Korobkov, who wrote comments as well. Chromosome counting was made by V.V. Kotseruba, English translation – by N.S. Probatova. Vouchers are deposited in LE (but some specimens – in ALTB).

1. (!) *Artemisia abrotanum* L., 2n = 18.

Russia, Altaiskii Krai, Loktevskii Raion, low shore of a salt lake, 2 Oct 1999, Korobkov 99–65: **40** (here and after: the number in bold after the sample code is the location point number shown on Fig. 1); Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, open birchwood, 6 Oct 1999, Korobkov 99–66: **48**; Russia, Altaiskii Krai, Loktevskii Raion, the highway Staroaleisk – Gornyak, the terrace of Solonovka River, near the bridge, 2 Oct 1999, Korobkov 99–67: **38**.

Distribution: Eurasia. The steppe and forest-steppe species. In the Altaiskii Krai, it occurs mostly along the lakesides of saline lakes and in river valleys, as well as in birchwoods and ditches on roadsides. The diploid CN 2n = 18, that was

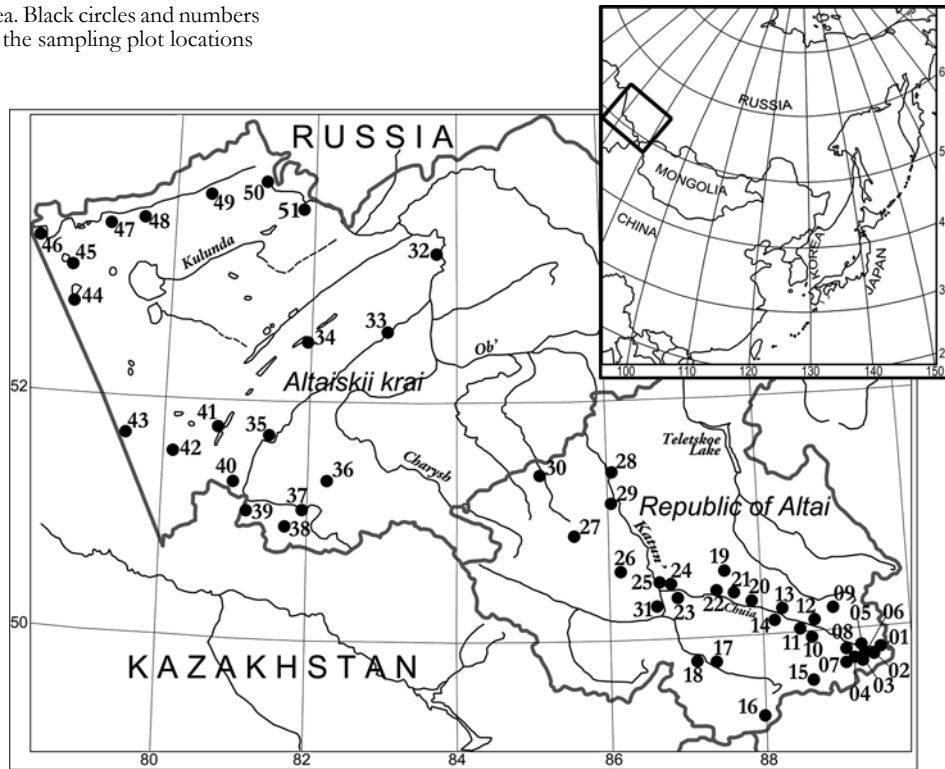
revealed in plants from Altai, is the most common within the whole area of species distribution. The tetraploid CN 2n = 36 was found once in Poland (Kreitschitz & Valles 2003). In European Russia 2n = 36 also exists in *A. abrotanum*, besides the common is diploid CN (it was found in Volga Region: two localities in Volgogradskaya Oblast') as well as 2n = 54 (6x) – in Samarskaya Oblast'. In the Novgorodskaya Oblast' we found 2n = 18 + 4B (unpublished data).

2. (!) *Artemisia commutata* Besser, 2n = 36.

Russia, Republic of Altai, Chermal'skii Raion, the left bank of the Katun' River, 20 km W of Edigan settlement, high terrace, the foot of the SW slope, rubbly placer, forb steppe community, 3 Oct 2009, Korobkov 10–38: **25**; Russia, Republic of Altai, Chermal'skii Raion, the valley of the Katun' River, near Chermal settlement, melkozem placer on the steep riverside slope, 3 Oct 2009, Korobkov 10–40: **28**; Russia, Altaiskii Krai, Burlinskii Raion, the basin of the Burlinskoe Lake, *Pinus* and *Betula* forest, at the roadside, 7 Oct 1999, Korobkov 99–99: **47**; Russia, Altaiskii Krai, Barnaul city, Yuzhnyi settlement, sandy hillock, at the edge of *Pinus* forest, 19 Sep 1999, Korobkov 99–100, 99–101, 99–130: **32**; Russia, Altaiskii Krai, Zmeyinogorskii Raion, the shore of the Kolyvanovskoe Lake, stony hillock, 1 Oct 1999, Korobkov 99–102, 99–106: **36**; Russia, Altaiskii Krai, Barnaul city, Yuzhnyi settlement, *Pinus* forest, roadside, 10 Oct 2009, Korobkov 10–41, 10–42: **32**.

Distribution: Asia. The steppe and forest-steppe species. It is widely distributed in Altaiskii Krai and in the north of

Figure 1 Study area. Black circles and numbers from 01 to 51 are the sampling plot locations



Republic of Altai, where it occurs in steppes, saline meadows, pine forests, birchwoods and on pebbles. Here the tetraploid $2n = 36$, which is common throughout the whole area of the species distribution, occurs (Kawatani & Ohno 1964; Agapova et al. 1990; Malakhova 1990; Malakhova & Markova 1994; Stepanov 1994; Samoilova 1990). In the Republic of Tyva, East Siberia and Mongolia, besides $2n = 36$, the diploid $2n = 18$ occurs (Hu et al. 1991; Pellicer et al. 2010; Korobkov et al. 2013). The significant morphological variability becomes apparent in this species by one and the same way in $2x$ and $4x$ populations, this allows us to consider such forms as ecological races. The most closely related to *A. commutata* is *A. dolosa* Krasch., the Altai high-mountain species.

3. **Artemisia compacta* Fisch. ex DC., $2n = 18$.

Russia, Republic of Altai, Kosh-Agachskii Raion, in vicinity of Tashanta, 19 Aug 1998, Shmakov, German, Antoniuk 99–56 (ALTB): **07**; Russia, Republic of Altai, Kosh-Agachskii Raion, right riverside of the Chegan-Uzun River, above Chegan-Uzun settlement, outcrops of speckled rocks, 22 Sep 1999, Korobkov 99–74, 99–75, 99–76: **13**.

Distribution: Kazakhstan-South Siberia-North Mongolia. The desert and steppe petrophyte. It has a fragment of its area of distribution in high mountains of the SE Altai. The species occurs on saline soils of the slopes to lake depressions and on riversides in rocky steppes. The CN count was made in *A. compacta* for the first time.

4. (!) *Artemisia dolosa* Krasch., $2n = 18$.

Russia, Republic of Altai, Kosh-Agachskii Raion, between Ortolyk and Mukhor-Tarkhota villages, 18 Aug 1999, Kuprianov 99–54 (ALTB): **10**; Russia, Republic

of Altai, Kosh-Agachskii Raion, the upper course of the Kokorya River, a slope with steppe vegetation, 19 Sep 1999, Kuprianov 99–55 (ALTB): **09**; Russia, Republic of Altai, Ulaganskii Raion, the upper course of the Saryachik River, the riverside slope with steppe vegetation, 24 Sep 1999, Korobkov 99–90, 99–91: **19**; Russia, Republic of Altai, Ulaganskii Raion, near Chibit settlement, rubbly slope of a hillock, 21 Sep 1999, Korobkov 99–92, 99–93: **22**; Russia, Republic of Altai, Ongudaiskii Raion, the mouth of Chuya River, right riverside, rubbly slope, 25 Sep 1999, Korobkov 99–94: **25**; Russia, Republic of Altai, Kosh-Agachskii Raion, Chuiskaya steppe, the Yustyk River, SW of Kokorya settlement, the riverside alkaline meadow, 27 Aug 2006, Dyachenko & Shalimov 10–03 (ALTB): **08**.

Distribution: Siberia–Mongolia. In the Republic of Altai the species is distributed in south high-mountain areas, it occurs in rocky steppes, open *Larix* forests near the upper limit of the forest belt, on flood-plain pebbles. Earlier, CNs $2n = 18$ and $2n = 36$ were known in plants from Mongolia (Garsia et al. 2006) and from Republic of Tyva, East Siberia (Korobkov et al. 2013).

This is the first CN report from plants of Altai.

5. (!) *Artemisia frigida* Willd., $2n = 18$.

Russia, Republic of Altai, Chemaľskii Raion, the valley of the Katun' River, near Chemaľ settlement, steep stony slope, *Larix* forest with shrubs, on rocks, 3 Oct 2009, Korobkov 10–22: **28**; Russia, Republic of Altai, Chemaľskii Raion, 20 km W of Edigan settlement, the left bank of the Katun' River, near the bridge, the bottom of rocky slope, 4 Oct 2009, Korobkov 10–23: **29**; Russia, Altaiskii Krai, Mikhailovskii Raion, near Rakity settlement, the edge of the light *Pinus* forest, the old fallow land, 4 Oct 1999, Ko-

robkov 99–156, 99–159: **42**; Russia, Altaiskii Krai, Loktevskii Raion, in vicinity of Noven'koe settlement, the shore of saline lake, high sandy hillocks, *Artemisia* community with grasses, 2 Oct 1999, Korobkov 99–157, 99–206: **39**; Russia, Altaiskii Krai, Loktevskii Raion, the highway Staroaleysk – Gornyak, near the bridge on Solonovka River, steppe on the plain, 2 Oct 1999, Korobkov 99–207, 99–208: **38**; Russia, Altaiskii Krai, Mikhailovskii Raion, the lakeside of the saline lake Gornostaevo, near Nevodnoe settlement, the clearing in *Pinus* forest, meadow community, 4 Oct 1999, Korobkov 99–210: **43**.

— **2n = 36.**

Russia, Republic of Altai, Kosh-Agachskii Raion, 34 km SE of Kosh-Agach settlement, Chuiskaya steppe, 22 Aug 1998, Shmakov, German, Antoniuk 99–45 (ALTB): **12**; Russia, Republic of Altai, Kosh-Agachskii Raion, right riverside of Chuya River, 5 km above Chegan-Uzun settlement, outcrops of speckled rocks, the rubbly-melkozem top of a hillock, 22 Sep 1999, Korobkov 99–152, 99–205: **13**; Russia, Republic of Altai, Ongudaiskii Raion, the right side of Chuya River, near the mouth, rubbly slope of a depression near the highway, 26 Sep 1999, Korobkov 99–153: **25**; Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River, near Chibit settlement, hilly terrace, the grass and forb steppe, 21 Sep 1999, Korobkov 99–154: **22**; Russia, Altaiskii Krai, Burlinskii Raion, the lake Bol'shoe Topol'noe (saline), S sandy lakeside, the dry slope of a terrace, 6 Oct 1999, Korobkov 99–151: **46**; Russia, Altaiskii Krai, Krutichinskii Raion, W lakeside of the Obskoe reservoir, in vicinity of Zakovryashino settlement, on loamy steep, 7 Oct 1999, Korobkov 99–155: **50**; Russia, Altaiskii Krai, Slavgorodskii Raion, W lakeside of the lake Burlinskoe (saline), near Slavgorod town, flat slope to the lake, 5 Oct 1999, Korobkov 99–158, 99–204: **45**; Russia, Altaiskii Krai, Slavgorodskii Raion, W lakeside of the lake Bol'shoe Yarovoe (bitter-saline), flat plain with hillocks, *Artemisia* community with grasses, 5 Oct 1999, Korobkov 99–209: **44**.

Distribution: Eurasia-North America. The steppe petrophyte, widely distributed in steppes, on rocky slopes, in open pine and deciduous small-leaved forests, in flat and mountain areas throughout Altai region. In Altai region the species is represented both by diploid ($2n = 18$) and tetraploid ($2n = 36$) cytotypes, which also occur in the wide transcontinental area of this species. As a whole, the most common are diploid plants. In Canada (Manitoba) di- and tetraploid CNs were revealed once in the same root tip (Stathevitsh & Wojtas 1988). In Siberia, the highest diversity of cytotypes within *A. frigida* was revealed in Baikal region, where $2x$, $4x$, and rarely $6x$ plants occur (Belyaeva & Siplivinsky 1977; Mendelak & Schweitzer 1986; Pellicer et al. 2010).

6. (!) *Artemisia glauca* Pall. ex Willd., $2n = 18$.

Russia, Republic of Altai, Kosh-Agachskii Raion, left riverside of the Yustyt River, at Sozontu Pass, 21 Aug 1998, Shmakov, German, Antoniuk 99–51 (ALTB): **06**; Russia, Republic of Altai, Kosh-Agachskii Raion, in vicinity of Tashanta village, 19 Aug 1998, Shmakov, German, Antoniuk

99–52 (ALTB): **07**; Russia, Republic of Altai, Kosh-Agachskii Raion, right riverside of the Chuya River, above Chegan-Uzun settlement, on the slope of depression, 22 Sep 1999, Korobkov 99–123: **13**; Russia, Republic of Altai, Kosh-Agachskii Raion, 810th km of Chuiskii road, right riverside of the Yustyt River, along the riverside, 16 Aug 2010, Gnutikov 11–18: **04**; Russia, Republic of Altai, Kosh-Agachskii Raion, near the lake Malye Boguty, 2500 m, on the gravel, 16 Aug 2011, Gnutikov 2013–66: **03**; Russia, Republic of Altai, Kosh-Agachskii Raion, the riverside of the Naryn-Gol River, 2485 m, on moist ground, 18 Aug 2011, Gnutikov 2013–67: **01**; Russia, Republic of Altai, Kosh-Agachskii Raion, the lake Kindyky-Kul', 2485 m, 18 Aug 2011, Gnutikov 2013–68: **02**; Russia, Altaiskii Krai, Slavgorodskii Raion, in vicinity of Slavgorod town, 5 Oct 1999, Korobkov 99–122: **44**; Russia, Altaiskii Krai, Aleiskii Raion, 30 km NE of Aleisk town, along the highway to Barnaul city, the valley of a stream, forb steppe community, 30 Sep 1999, Korobkov 99–124: **33**; Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, light birchwood, 6 Oct 1999, Korobkov 99–125: **48**; Russia, Altaiskii Krai, Burlinskii Raion, the lake Bol'shoe Topol'noe, S sandy lakeside, 6 Oct 1999, Korobkov 99–126: **46**.

— **2n = 36.**

Russia, Altaiskii Krai, Barnaul city, near Yuzhnyi settlement, the edge of *Pinus* forest, meadow community, 10 Oct 2009, Korobkov 10–35: **32**.

Distribution: Eurasia (adventive in North America). The steppe and forest-steppe species. It can be found in steppes, meadow-steppe communities, on slopes of the river valleys, at the edges of open birchwoods and pine forests, expanding on the old fallow lands, and along the forest shelter belts. It is common both on plain and mountain areas of Altai region. In Altai and throughout the whole area of distribution of *A. glauca* the diploid ($2n = 18$) cytotype mainly occurs. The tetraploid cytotype of *A. glauca* ($2n = 36$) was collected once near Barnaul city, it was also found in the Omskaya Oblast' (Samoilova 1999) and in Republic of Tyva (Korobkov et al. 2013). V.P. Amel'chenko (1973) reported for *A. glauca* $2n = 16, 18, 32$ from Tyva and Krasnoyarskii Krai (East Siberia).

7. (!) *Artemisia laciniata* Willd., $2n = 18$.

Russia, Republic of Altai, Kosh-Agachskii Raion, the Dzhazator River, in vicinity of Bel'ashi village, sandy steppe, 20 Aug 1999, Kuprianov 99–35 (ALTB): **17**; Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River, near Chibit settlement, hilly terrace, the flat slope of depression, grass and forb meadow with shrubs, 21 Sep 1999, Korobkov 99–187, 99–188: **22**; Russia, Republic of Altai, Ulaganskii Raion, the highway Aktash – Ust'-Ulagan, the upper course of the Sary-Achik River, the bottom of S slope of a terrace, among shrubs, 24 Sep 1999, Korobkov 99–189, 99–194, 99–195: **21**; Russia, Republic of Altai, Shebalinskii Raion, Anuyskii Range, the riverside of the Kurzun River, near its confluence with Peschanaya River, mixed forest, forb meadow, 3 Sep 2006, Dyachenko & Shalimov 10–02 (ALTB): **30**; Russia, Republic of Altai, Ongudaiskii Raion, middle course of the Ursul River, 3 km W of Ten'ga settlement, *Larix* forest, 1 Sep 2006, Dyachenko & Shalimov 10–05 (ALTB): **27**; Russia, Altaiskii Krai,

Aleiskii Raion, in vicinity of the lake Monastyrskoe, 1 Sep 1998, Shmakov & Tikhonov 99–34 (ALTB): **34**; Russia, Altaiskii Krai, Pankrushikhinskii Raion, near Konevo settlement, the valley of the Burly River, *Pinus* and *Betula* forest, clearing, 7 Oct 1999, Korobkov 99–190: **49**.

Distribution: South Siberia-Far East. The forest-steppe species. This is a common species in the plain and mountain areas of Altai region. It can be found in steppes, saline meadows, in light small-leaved forests, among shrubs, on pebbles. In its whole area of distribution the species is represented only by diploid cytotype ($2n = 18$). Indications of $2n = 54$ (Korobkov 1972, 1981) are the results of plants misidentifications (see Agapova et al. 1990). In high mountains of SE Altai *A. laciniata* is replaced by *A. phaeolepis* Krasch., the closely related polyploid species.

8. (!) *Artemisia leucophylla* (Turcz. ex Besser) Pamp., $2n = 16$.

Russia, Republic of Altai, Ulaganskii Raion, near Kurai settlement, the slope of a hill, on dry pebbles of a stream, 23 Sep 1999, Korobkov 99–84, 99–226: **20**; Russia, Republic of Altai, Ulaganskii Raion, near Aktash settlement, on the roadside rubble, 25 Sep 1999, Korobkov 99–85: **21**; Russia, Republic of Altai, Kosh-Agachskii Raion, 810-th km of the Chuiskii road, left riverside of the Yustyt River, on the moist bank, 17 Aug 2010, Gnutikov 11–14: **04**; Russia, Republic of Altai, Kosh-Agachskii Raion, the riverside of the Yustyt River, 2230 m alt., on the rocks, 20 Aug 2011, Gnutikov 2013–69: **04**; Russia, Republic of Altai, Kosh-Agachskii Raion, the riverside of Burgazy River, 2000 m alt., the slope with steppe vegetation, 16 Aug 2011, Gnutikov 2013–70: **05**.

Distribution: East Europe, Asia. The forest species. In the high-mountain areas of SE Altai it can be found on river pebbles, rocks, rubbly placer at the bottom of the rocks and along roadsides. In the Siberian part of its area of distribution the CN $2n = 16$ often occurs, but sometimes the cytotypes with $2n = 16+1B$ and $2n = 18$ were revealed (see Agapova et al. 1990).

9. *Artemisia macrocephala* Jacquem. ex Besser, $2n = 18$.

Russia, Republic of Altai, Kosh-Agachskii Raion, Chui-skaya steppe, 34 km NE of Kosh-Agach settlement, 22 Aug 1998, Shmakov, German, Antoniuk 99–48 (ALTB): **12**; Russia, Republic of Altai, Kosh-Agachskii Raion, near Tashanta village, 19 Aug 1998, Shmakov, German, Antoniuk 99–49 (ALTB): **07**; Russia, Republic of Altai, Kosh-Agachskii Raion, right riverside of the Chegan-Uzun River, above the settlement Chegan-Uzun, rubbly plot in the flood-lands, pasture zone, 20 Sep 1999, Korobkov 99–141: **13**; Russia, Republic of Altai, Kosh-Agachskii Raion, the valley of Tarkhata River, above the frontier post, 24 Aug 2007, Smirnov & Zubov 10–07 (ALTB): **10**; Russia, Republic of Altai, Kosh-Agachskii Raion, 810-th km of the Chuiskii road, right riverside of the Yustyt River, on pebbly bank, 16 Aug 2010, Gnutikov 11–11: **04**; Russia, Republic of Altai, Ust'-Koksinskii Raion, left riverside of the Koks River, near its confluence with the Argut River, among shrubs on the stream bank, 28 Aug 2010, Gnutikov 11–12: **31**; Russia, Republic of Altai, Kosh-Agachskii Raion, the riverside of Bar-Burgazy River, 2000 alt., slope with steppe vegetation, 16 Aug 2011, Gnutikov 2013–58: **05**; Russia,

Republic of Altai, Kosh-Agachskii Raion, plateau Ukok, mountain range Tabyn-Bogdo-Ola, the riverside of the Severnaya Argamdzha River, 2233 m alt., 25 Aug 2011, Gnutikov 2013–61: **16**; Russia, Republic of Altai, Ongudaiskii Raion, left riverside of the Bol'shoi Il'gumen' River, 910 m alt, on the rocks, 2 Sep 2011, Gnutikov 2013–63: **26**.

Distribution: South Siberia – Mongolia – Central Asia. In high-mountain areas of SE Altai it grows on the screes, stony and sandy riversides, rubbly placer, at roadsides and in settlements. In Altai region the diploid race ($2n = 18$) occurs (Krasnikov & Shirina 2006), the same is throughout the whole area of species distribution (Podlech & Dieterle 1969; Amel'chenko 1979; Krogulevich & Rostovtseva 1984; Astanova 1989; Garcia et al. 2006). The tetraploid CN was revealed only once, from Dushanbe city (Kawatani & Ohno 1964). *A. macrocephala* is related to *A. sieversiana* Ehrh. ex Willd., *A. jacutica* Drob., *A. samoiedorum* Pamp., they are mostly Siberian, annual or perennial species.

10. (!) *Artemisia marschalliana* Spreng., $2n = 36$.

Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, lakeside, 6 Oct 1999, Korobkov 99–104: **48**; Russia, Altaiskii Krai, Egor'evskii Raion, S lakeside of the lake Gor'koe-Peresheyechnoe, sands at the edge of the *Pinus* forest, 3 Oct 1999, Korobkov 99–105: **41**; Russia, Altaiskii Krai, Loktevskii Raion, in vicinity of Noven'koe settlement, the slope of sandy hillock, 2 Oct 1999, Korobkov 99–107: **39**; Russia, Altaiskii Krai, Mikhailovskii Raion, near Rakity settlement, the plain, old fallow land, 4 Oct 1999, Korobkov 99–109: **42**; Russia, Altaiskii Krai, Slavgorodskii Raion, flat slope to the lake Burlinskoe, 5 Oct 1999, Korobkov 99–110: **45**.

Distribution: East Europe – South Siberia. The steppe and forest-steppe species. On flat left riversides of the Altaiskii Krai it occurs in dry stony steppes, pine forests, psammophyte communities, on slopes of the river valleys, and on the old fallow lands. The CN from Altai is reported here for the first time. The tetraploid cytotype ($2n = 36$) was known from Krasnoyarskii Krai (Amel'chenko 1979) and from Daghestan (Probatova et al. 2010). Besides, the diploid CN ($2n = 18$) is known within *A. marschalliana*, from Volgogradskaya Oblast' and from Kazakhstan (Pellicer et al. 2007; Probatova et al. 2010).

11. (!) *Artemisia pontica* L., $2n = 18$.

Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, forb meadow in the light *Betula* forest, 6 Oct 1999, Korobkov 99–200: **48**; Russia, Altaiskii Krai, Tretiakovskii Raion, N lakeside of the Guil'evskoe reservoir, near Korotaikha settlement, meadow at the edge of the forest shelter belt, 1 Oct 1999, Korobkov 99–201: **37**; Russia, Altaiskii Krai, Aleiskii Raion, the highway Barnaul – Aleisk, 30 km NE of Aleisk town, the valley of a stream, the grass and forb meadow-steppe community, 30 Sep 1999, Korobkov 99–202: **33**.

Distribution: Europe – South Siberia. The steppe and forest-steppe species. In the Altaiskii Krai it grows in meadow-steppe, upland and saline meadows, in light birchwoods, at the edges of pine forests, on the old fallow lands. The diploid

CN ($2n = 18$) from Altai region is reported here for the first time, but the same CN was known for *A. pontica* in many localities of the species area of distribution (Kawatani & Ohno 1964; Urbanska 1959; Kuzmanov et al. 1987; Mendelak & Schweitzer 1986; Majovsky et al. 1987; Samoilova 1999; Probatova et al. 2010). *A. pontica* is adventive in North America (SE Canada), and there the CN $2n = 18$ was also revealed (Morton 1981). From the Omskaya Oblast' (West Siberia) two CNs – $2n = 18$ and 32 were reported (Samoilova 1999), but the last CN is doubtful.

12. (!) *Artemisia scoparia* Waldst. et Kit., $2n = 16$.

Russia, Republic of Altai, Ongudaiskii Raion, right riverside of the Chuya River, near the mouth, rubbly hillocks at the riverside, 25 Sep 1999, Korobkov 99–113: **25**; Russia, Republic of Altai, Chemalskii Raion, left riverside of the Katun' River, 20 km W of Edigan settlement, near the bridge, high terrace, forb steppe with *Caragana*, 3 Oct 2009, Korobkov 10–33: **29**; Russia, Republic of Altai, Chemalskii Raion, the valley of Katun' River, in vicinity of Chemal settlement, roadside, forb meadow community, 3 Oct 2009, Korobkov 10–34: **28**; Russia, Altaiskii Krai, Barnaul city, Yuzhnyi settlement, old fallow land at the edge of pine forest, 19 Sep 1999, Korobkov 99–111: **32**; Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, flat slope of a hillock, at the edge of shrubs community, 6 Oct 1999, Korobkov 99–112: **48**; Russia, Altaiskii Krai, Pospelikhinskii Raion, near Krasnoyarskoe settlement, sandy flood-land of the Alei River, 1 Oct 1999, Korobkov 99–114: **35**.

— $2n = 18$.

Russia, Republic of Altai, Ongudaiskii Raion, left riverside of the Chuya River, the settlement Belyi Bom, 980 m alt., on rocks, 30 Aug 2010, Gnutikov 11–17: **23**.

Distribution: Eurasia. The desert, steppe and forest-steppe species. In Altai region it occurs in floodplain meadows, light pine forests, at the field edges, in forest shelter belts, roadsides and settlements. Multiple CN counts (over 40) throughout the area of the species distribution revealed $2n = 16$ ($x = 8$); however, sometimes $2n = 18$ ($x = 9$) occur (Mehra & Remandan 1969; Yan et al. 1989; Qiao et al. 1990; Joohnson & Brandham 1997). In Siberian plants of *A. scoparia* the CN $2n = 32$ was registered once (Amel'chenko 1979). Besides $2n = 16$, the cytotype with $2n = 36$ was reported, from Liubl'ana (Kawatani & Ohno 1964).

13. (!) *Artemisia sieversiana* Ehrh. ex Willd., $2n = 18$.

Russia, Republic of Altai, Ongudaiskii Raion, right riverside of the Chuya River, 10 km of its mouth, 19 Aug 1998, Shmakov, Antonyuk, German 99–41 (ALTB): **24**; Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River, near Chibit settlement, hilly terrace, shrubs community on the slope of depression, 21 Sep 1999, Korobkov 99–143: **22**; Russia, Republic of Altai, Ongudaiskii Raion, right riverside of the Chuya River, near its mouth, rubbly slope of depression, 25 Sep 1999, Korobkov 99–144: **25**; Russia, Altaiskii Krai, Barnaul city, Yuzhnyi settlement, the Barnaul forest experimental station, the belt *Pinus* and *Betula* forest, on the slope of sand-pit, 17 Sep 1999, Korobkov 99–142: **32**; Russia, Altaiskii Krai, Aleiskii

Raion, the highway Barnaul – Aleisk, 30 km NE of Aleisk town, the valley of a stream, the meadow-steppe vegetation, 30 Sep 1999, Korobkov 99–145: **33**; Russia, Altaiskii Krai, Burlinskii Raion, the lake Bol'shoe Topol'noe, S sandy lake-side, 6 Oct 1999, Korobkov 99–146: **46**.

Distribution: East Europe – Siberia – East Asia. Mainly steppe and forest-steppe species. In Altai region *A. sieversiana* occurs everywhere, in steppes, meadows, on shores, saline lands, old and latest fallow lands, at the field edges and roadsides. Actively expands on abandoned lands.

A. sieversiana belongs to the group of constant diploid ($2n = 18$) annual and perennial monocarpic species, with *A. jacutica* Drob. and *A. macrocephala*.

14. (!) *Artemisia vulgaris* L., $2n = 16$.

Russia, Republic of Altai, Ulaganskii Raion, near Chibit settlement, at the roadside, 21 Sep 1999, Korobkov 99–86: **22**; Russia, Republic of Altai, Chemal'skii Raion, left riverside of the Katun' River, 20 km W of Edigan settlement, near the bridge, high terrace, herb-bunchgrass steppe with *Caragana*, 3 Oct 2009, Korobkov 10–29, 10–31: **29**; Russia, Republic of Altai, Kosh-Agachskii Raion, steppe Samakha, 1555 m alt., slide-rocks, 27 Aug 2010, Gnutikov 11–13: **18**; Russia, Altaiskii Krai, Pospelikhinskii Raion, near Krasnoyarskoe settlement, the flood-land of the Alei River, the *Populus* and *Salix* open forest, 1 Oct 1999, Korobkov 99–87: **35**; Russia, Altaiskii Krai, Barnaul city, Yuzhnyi settlement, the belt *Pinus* forest, at the roadside, 17 Sep 1999, Korobkov 99–88: **32**; Russia, Altaiskii Krai, Kamenskii Raion, the bank of Kulundinskii canal, 7 Oct 1999, Korobkov 99–89: **51**; Russia, Altaiskii Krai, Barnaul city, near Yuzhnyi settlement, *Pinus* forest, at the roadside, sparse forb community, 10 Oct 2009, Korobkov 10–30, 10–32: **32**.

Distribution: Eurasia – North America. Multi-zonal ruderal species. In Altai it occurs at the forest edges, in forest shelter belts, among shrubs, on fallow lands, at the field edges, roadsides and settlements. The species occurs on areas with disturbed natural vegetation.

In Altai and throughout Russia the CN $2n = 16$ ($x = 8$) constantly occurs, as well as in Europe and North America. Only one report of $2n = 36$ is known from Belarus (Semenko 1989), it seems to be doubtful. *A. vulgaris* is related to Siberian and Far East species with $2n = 16$ – *A. leucophylla*, *A. rubripes* Nakai, *A. sylvatica* Maxim.

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