Botanica Pacifica. A journal of plant science and conservation. 2018. 7(1): 101–106
DOI: 10.17581/bp.2018.07109

Chromosome numbers for 12 species of *Artemisia* (Asteraceae) from the Altai region, West Siberia, Russia

Alexandr A. Korobkov[1]*, Violetta V. Kotseruba[1] & Nina S. Probatova[2*]

Alexandr A. Korobkov [1] *
e-mail: stereodon@yandex.ru
Violetta V. Kotseruba [1]
e-mail: viola.kotseruba@gmail.com
Nina S. Probatova [2]
e-mail: probatova@ibss.dvo.ru

[1] V.L. Komarov Botanical Institute RAS, Saint-Petersburg, Russia
[2] Federal Scientific Center of the East Asia Terrestrial Biodiversity FEB RAS, Vladivostok, Russia

* corresponding author

Manuscript received: 17.04.2018
Review completed: 24.04.2018
Accepted for publication: 08.05.2018
Published online: 12.05.2018

ABSTRACT

Chromosome numbers (CN) for 12 species of *Artemisia* L. (Asteraceae) from the Altai region of the West Siberia (Republic of Altai and Altaiskii Krai) are reported. New CNs, previously unknown for the species, were revealed in *A. latifolia* Ledeb. (2n = 108) and *A. macrantha* Ledeb. (2n = 54, 98). For 8 species there are first CN counts from Altai region. Brief comments on CNs and information on ecology and distribution of the species studied are given.

Keywords: chromosome numbers, *Artemisia*, Asteraceae, vascular plants, Altai region, West Siberia, Russia

РЕЗЮМЕ

Коробков А.А., Коцеруба В.В., Пробатова Н.С. Числа хромосом 12 видов рода *Artemisia* (Asteraceae) с Алтая, Западная Сибирь, Россия. Сообщаются числа хромосом для 12 видов сосудистых растений из Алтайского региона Западной Сибири (Республика Алтай и Алтайский край). Новые, не известные ранее числа хромосом установлены у *A. latifolia* Ledeb. (2n = 108) и *A. macrantha* Ledeb. (2n = 54, 98). В Алтайском регионе впервые исследованы 8 видов. Для рассматриваемых видов даны комментарии по числам хромосом, и краткая информация по экологии и распространению.

Ключевые слова: числа хромосом, *Artemisia*, Asteraceae, сосудистые растения, Алтайский регион, Западная Сибирь, Россия

This paper is the final contribution to chromosome number (CN) studies on *Artemisia* species in the flora of Altai region of Russia (Korobkov et al. 2014a, c). Plants were collected in the following territories of the Republic of Altai: Chemal'skii, Kosh-Agachskii, Mayminskii, Ongudayskii, Ulaganskii, Ust'Koksinskii, and in Altaiskii Krai: Aleyskii, Burlinskii, Khabarskii, Krasnogorskii, Loktevskii, Mikhailovskii, Pospelikhinskii, Rubtsovskii, Tretyakovskii and Zmeinogorskii, as well as near Barnaul city. Some specimens were provided by the colleagues from the South Siberian Botanical Garden of the Altaiskii State University (ALTB). Figure 1 shows the locations of data sampling points within this area.

CN counts were made on roots of seedlings germinated from achenes in Petri dishes. Squash preparations were obtained by classic method (Abramova 1988). The accuracy of CN counts was controlled by making several new preparations from the same herbarium specimen. Voucher specimens are deposited in the basic vascular plants collection of Herbarium LE (V.L. Komarov Botanical Institute, Saint-Petersburg), some specimens are in Barnaul city (ALTB).

The symbol (!) before the species name means the first report of CN for the species from the Altai region. Plants were determined and CNs commented by A.A. Korobkov. CN counting was made by V.V. Kotseruba, English translation - by N.S. Probatova.

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

Russia, Altaiskii Krai, Pospelikhinskii Raion, the floodplain of the Aley River, near Krasnoyarskoe settlement, the abandoned field along the forest edge, 1 Oct 1999, Korobkov 99-147: **22** (LE); Russia, Altaiskii Krai, Tretyakovskii Raion, N shore of the Gilevskoe water-storage basin, near Korotaikha settlement, along the margin of the tree-planting, forb meadow, 1 Oct 1999, Korobkov 99-148: **24**; Russia, Altaiskii Krai, the territory of Barnaul city, Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* belt forest, on riverside, 12 Oct 2009, Korobkov 10-21: **20** (LE).

Distribution: Eurasia – N America. Steppe and forest-steppe species. In the Altai region it occurs in floodplain forests, among shrubs, in the bottoms and slopes of ravines, in meadows at the edges of deciduous forests and tree-plantings, near habitations and on roadsides.

A. absinthium has diploid CN 2n = 18 (x = 9) within the whole present area of the species distribution, in the natural and adventive groups of plants (Murin 1997, Kreischitz & Valles 2003, Korobkov & Kotseruba 2015). However in Poland one adult plant and 3 seedlings with tetraploid CN 2n = 36 in population of diploid plants were found (Kreischitz & Valles 2003).

(!) *Artemisia arenaria* DC., **2n = 36**

Russia, Altaiskii Krai, Loktevskii Raion, in vicinity of Noven'koe settlement, on the shores of saline lake, solitary plants on the slopes of high sandy hills, 2 Oct 1999, Korobkov 99-108: **25** (LE).

Distribution: SE Europe – S Siberia. The desert and steppe species. In European Russia and in Kazakhstan it occurs on sandy hillocks in the river valleys, on sand dunes and inter-dune depressions in broad sandy massifs, on broken and waved sand slopes of ridges. In Altaiskii Krai *A. arenaria* was found in the most typical ecotope – in the lake depression, on the non-matted slopes of high sandy hills. The tetraploid CN 2n = 36 was already known for *A. arenaria* from Kazakhstan (Filatova 1971) and from European Russia (Korobkov & Kotseruba 2015). Two very close species to *A. arenaria* from Kazakhstan – *A. albicerata* Krasch. and *A. quinqueloba* Trautv. are tetraploids as well (Filatova 1971, 1977). Diploid CN 2n = 18 for *A. arenaria* from China (Qiao et al. 1990) probably must be referred to some other species from series *Psammophillae* Pojark., because the typical *A. arenaria* was not reported for the flora of China (Ling Y.R. 1991).

(!) *Artemisia austriaca* Jacquem., **2n = 16**

Russia, Altaiskii Krai, Aleyskii Raion, the highway Barnaul – Aleysk, 30 km NE of Aleysk town, the valley of a stream, forb-grass steppe meadow, 30 Sep 1999, Korobkov 99-164, 99-218, 99-221: **21** (LE).

— 2n = 36

Russia, Altaiskii Krai, Zmeinogorskii Raion, the lakeside of Kolyvanovskoe Lake, in vicinity of Zmeinogorsk town, the stony–rubbly bar on the slope of a ridge, 1 Oct 1999, Korobkov 99-161: **23** (LE); Russia, Altaiskii Krai, Rubtsovskii Raion, the shore of bitter-saline lake at the border of Kazakhstan, forb-grass meadow along the edge of the tree-plantings, 3 Oct 1999, Korobkov 99-162: **26** (LE); Russia, Altaiskii Krai, Burlinskii Raion, the salt lake Bol'shoe Topol'noe, S sandy lakeside, forb +*Artemisia* plant community, 6 Oct 1999, Korobkov 99-163: **28** (LE); Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, birch forest, forb +*Artemisia* plant community at the forest edge, 6 Oct 1999, Korobkov 99-165: **29** (LE); Russia, Altaiskii Krai, Loktevskii Raion, in vicinity of Noven'koe settlement, sandy hillocks along the shore of the salt lake, grass + *Artemisia* sparse plant community, 2 Oct 1999, Korobkov 99-166: **25** (LE).

Distribution: Eurasia. The desert and steppe species, it widely spread in steppe regions of Altaiskii Krai. *A. austriaca* grows in abundance in steppe meadows, in forb–grass commuities along the tree plantings, in light birch forests, abandoned fields, pastures and near habitations.

A. austriaca shows significant variability of CNs on population and individual levels. The species is a representative of the plant groups which are able to active vegetative propagation and to formation of large diversity of chromosome races (Pellicer et al. 2007). The CNs 2n = 16 (x = 8) and 2n = 36 (x = 9) have been already known from S and E Europe (Kuzmanov et al. 1986, Ferakova 1997, Garcia et al. 2004) as well as from European Russia (Korobkov & Kotseruba 2015).

Artemisia dracunculus L., **2n = 18**

Russia, Republic of Altai, Kosh-Agachskii Raion, right riverside of the Chuya River, near Chegan-Uzun settlement, on the slope of the valley, 22 Sep 1999, Korobkov 99-117: **7** (LE).

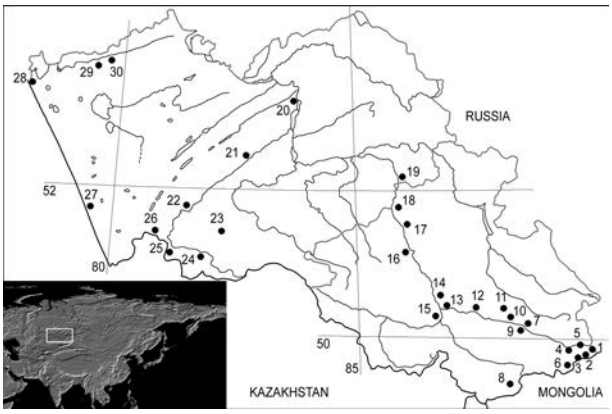

Figure 1 Study area. Dots with numbers from 1 to 30 are the sampling plot locations (according to numbering in the text)

— 2n = 36

Russia, Republic of Altai, Ongudaiskii Raion, right riverside of the Chuya River, near the mouth, in the dish between rubbly hillocks, 25 Sep 1999, Korobkov 99-116: **13** (LE); Russia, Republic of Altai, Ulaganskii Raion, near Chibit settlement, on the slope of a stream valley, 21 Sep 1999, Korobkov 99-121: **12** (LE); Russia, Republic of Altai, Chemal'skii Raion, left riverside of the Katun' River, near the bridge, 20 km E of Edigen settlement, high terrace, forb steppe with *Caragana*, 3 Oct 2009, Korobkov 10-37: **26** (LE); Russia, Republic of Altai, Ust'Koksinskii Raion, left riverside of the Koksu River, near the confluence with the Argut River, light Larix forest, at sawmill, 28 Aug 2010, Gnutikov 11-16:**15** (LE); Russia, Republic of Altai, Kosh-Agachskii Raion, in vicinity of Kokorya settlement, S slope of Bashtu Mt., on the scree, 17 Aug 2010, Gnutikov 11-19: **4** (LE); Russia, Altaiskii Krai, Burlinskii Raion, the main sandy lakeside of the lake Bol'shoe Topol'noe, *Artemisia* community on the edge of shrubs, 6 Oct 1999, Korobkov 99-118: **28** (LE); Russia, Altaiskii Krai, Mikhailovskii Raion, in vicinity of Nevodnoe settlement, the main lakeside of Gornostaevo Lake, grass-forb community, 4 Oct 1999, Korobkov 99-119: **27** (LE); Russia, Altaiskii Krai, Tretyakovskii Raion, N shore of the Gilevskoe water-storage basin, near Korotaikha settlement, flat slope, along the edge of trees planting, 1 Oct 1999, Korobkov 99-120: **24** (LE).

— 2n = 54

Russia, Altaiskii Krai, the territory of Barnaul city, Yuzhnyi settlement, the edge of Pinus belt forest, roadside, 19 Sep 1999, Korobkov 99-115: **20** (LE); Russia, Altaiskii Krai, Aleyskii Raion, the highway Barnaul – Aleysk, 30 km NE of Aleysk town, the valley of a stream, meadow, 30 Sep 1999, Korobkov 99-211: **21** (LE).

— 2n = 45, 54

Russia, Altaiskii Krai, the territory of Barnaul city, forb community at the edge of *Pinus* forest, 10 Oct 2009, Korobkov 10-36: **20** (LE).

Distribution: Eurasia – N America. Steppe and forest-steppe species. In the Republic of Altai and Altaiskii Krai *A. dracunculus* occurs in steppes and saline meadows, in grass-forb communities at the edges of steppe shrubs

and tree-plantings, in light *Betula* forests, on the slopes of ravines, at the edge of *Pinus* forests, in abandoned fields and near habitation. In the native populations of *A. dracunculus* the whole series of CNs was revealed: from diploids (2n = 2x =18) till decaploids (2n = 10x = 90) (Agapova et al. 1990, Shokhina et al. 2001, Kreischitz & Valles 2003). Our CN count 2n = 18 from the valley of Chuya River agree with earlier data (Krasnikov 1985, Shokhina et al. 2001) on the presence of diploid race in Gornyi Altai. Polyploid races of *A. dracunculus* are widely distributed in steppe and forest-steppe plains of Altaiskii Krai. Near Barnaul city we revealed aneuploidy (2n = 45, 54) in *A. dracunculus*: it was already known from Poland (Kreischitz & Valles 2003), as well as in Orenburgskaya Oblast', S Urals (Korobkov & Kotseruba 2015).

Artemisia glabella Kar. et Kir., **2n = 18**

Russia, Altaiskii Krai, the territory of Barnaul city, South Siberian Botanical Garden, introduction plot, 17 Sep 1999, Korobkov 99-130: **20** (LE).

Distribution: E Kazakhstan. Steppe rocky species. This CN 2n = 18 was revealed on plants from collection of S Siberian Botanical Garden in Barnaul. The origin of plants studied: Kazakhstan, Karagandinskaya Oblast', near Taldy village (Kuprijanov 1995). The polyploid CN in *A. glabella* was already known from the officinal plants collection in Karaganda (Probatova et al. 2010). All the species close to *A. glabella* from Siberia and Kazakhstan are diploids: *A. altaiensis* Krasch., *A. filatovae* Kupr., *A. martjanovii* Krasch. et Poljakov, *A. obtusiloba* Ledeb., *A. subviscosa* Turcz. ex Besser.

(!) *Artemisia latifolia* Ledeb., **2n = 54**

Russia, Altaiskii Krai, the territory of Barnaul city, near Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* belt forest, grass-forb meadow on the slope of narrow valley, 19 Sep 1999, Korobkov 99-184: **20** (LE).

— 2n = 72

Russia, Altaiskii Krai, the territory of Barnaul city, in vicinity of Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* belt forest, grass-forb meadow on the slope of depression, 19 Sep 1999, Korobkov 99-185, 99-186: **20** (LE).

— 2n = 108

Russia, Altaiskii Krai, the territory of Barnaul city, near Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* belt forest, on the slope of depression, forb meadow, 11 Sep 2009, Korobkov 10-10: **20** (LE).

Distribution: E Europe – S Siberia. The steppe and forest-steppe species. In Altaiskii Krai *A. latifolia* occurs in grass-forb meadows in *Pinus* forest edges and in light birch forests, among shrubs on the ravine slopes, in meadow steppes. Hexaploid CN 2n = 6x = 54 was already known for *A. latifolia* in Omskaya Oblast', in Orenburgskaya Oblast' as well as in Tyva Republic (Samojlova 1990, Korobkov et al 2013, Korobkov & Kotseruba 2015). The octoploid CN 2n = 8x = 72 has been revealed in *A. latifolia* from Tomskaya Oblast' (Malakhova & Markova 1994). The tetraploid CN 2n = 4x = 36 was reported for this species from Jenissey area, but without exact indication of the plant origin (Amel'chenko 1979). Aneuploid CN – 2n = 108 is reported here for the first time.

(!) *Artemisia macrantha* Ledeb., **2n = 54**

Russia, Republic of Altai, Ulaganskii Raion, SW foothills of the Kurai mountain ridge, 10 km N of Kurai settlement, S slope of a hill, forb-grass meadow at the edge of *Larix* forest, 23 Sep 1999, Korobkov 99-197, 99-198: **11** (LE); Russia, Altaiskii Krai, the territory of Barnaul city, in vicinity of Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* belt forest, forb meadow on the slope of small depression, 19 Sep 1999, Korobkov 99- 199: **20** (LE).

— 2n = 98

Russia, Altaiskii Krai, the territory of Barnaul city, near Yuzhnyi settlement, the Barnaul'skaya forest dacha, *Pinus* + *Betula* forest belts, grass-forb meadow among sparse birch trees, 17 Sep 1999, Korobkov 99-213: **20** (LE).

Distribution: E Europe – E Siberia. The forest and forest-steppe species. On the plains of Altai region *A. macrantha* can be found in grass-forb meadows at the edges and in glades of the pine and deciduous forests, among shrubs on ravine slopes, in steppe meadows; as to mountain areas the species occurs at the upper limit of deciduous forests, in forb meadows. *A. macrantha* demonstrates the considerable karyological polymorphism. The diploid (2n = 18) and tetraploid (2n = 36) CNs have been revealed in Omskaya Oblast' (Samojlova 1999). Polyploid races in *A. macrantha* are known from Tomskaya Oblast' (2n = 108) and Central Yakutia (2n = c.100) (Malakhova 1990, Probatova et al. 2010). Hexaploid CN 2n = 54, as well as aneuploid CN 2n = 98, we revealed in *A. macrantha* for the first time.

(!) *Artemisia obtusiloba* Ledeb., **2n = 36**

Russia, Republic of Altai, Kosh-Agachskii Raion, near the pass Sozontu, 21 Aug 1998, Shmakov & German 99-42: **2** (ALTB); Russia, Republic of Altai, Kosh-Agachskii Raion, the valley of Ulandryk River, near the outcome from the mountains, 22 Aug 1998, Shmakov & German 99-43, 99-44: **6** (ALTB); Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River near the mouth, the second floodplain terrace, 25 Sep 1999, Korobkov 99-128: **13** (LE); Russia, Republic of Altai, Ongudayskii Raion, right riverside of the Katun' River, near Inya settlement, the bottom of stony slope of a hill, 21 Sep 1999, Korobkov 99-129: **14** (LE).

Distribution: S Siberia-Mongolia. The mountain-steppe species. In Mountain Altai *A. obtusiloba* occurs on stony slopes in forb-meadow steppes and *Artemisia* + *Caragana* communities, on granite rocks, on screes, matted sands. The CN in *A. obtusiloba* (2n = 36) has been counted in Tyva Republic (Korobkov et al. 2013). In Altai region the CN for this species is revealed first time.

Artemisia rupestris L., **2n = 18**

Russia, Altaiskii Krai, Mikhailovskii Raion, in vicinity of Nevodnoe settlement, the shore of saline lake Gornostaevo, the ditch at the margin of *Pinus* forest, grass-forb plant community, 4 Oct 1999, Korobkov 99-138: **27** (LE); Russia, Altaiskii Krai, Khabarskii Raion, near Khabary settlement, stony slope to the lake, 6 Oct 1999, Korobkov 99-139: **29** (LE); Russia, Altaiskii Krai, Aleyskii Raion, the highway Barnaul – Aleysk, 30 km NE of Aleysk town, the valley of a stream, forb-grass meadow steppe, 30 Sep 1999, Korobkov 99-140: **21** (LE).

Distribution: Eurasia – N America. The forest-steppe species. In flat forest-steppe territories of Altaiskii Krai *A. rupestris* occurs in forb-sagebrush-grass steppes on solonetz, in floodplain forests, in light Larix forests, pine forests, on alkaline lands, pastures and abandoned fields. The diploid CN 2n = 18 (x = 9) is known for *A. rupestris* from Europe and from Siberia (Ehrenorfer 1964, Samojlova 1999). The aneuploid CN 2n = 16 for *A. rupestris* from Yenissey area (Amel'chenko 1979) still remains unconfirmed. The report of CN 2n = 18 from Republic of Altai, Kosh-Agachskii Raion (Krasnikov 1965) must be referred to *A. viridis* Willd., which is widely distributed in altitudes of the Altai highlands. To A. viridis probably belongs the polyploid CN from Altai, but the plants were misidentified as *A. rupestris* (Sokolovskaya & Strelkova 1948).

(!) *Artemisia sacrorum* Ledeb. (= *A. gmelinii* auct. non Weber ex Stechm.; *A. jawajomogy* Kitam.), **2n = 54**

Russia, Republic of Altai, Mayminskii Raion, the valley of Katun' River, near Ust'-Muny settlement, the bottom of W rubbly slope of a hill, 29 Sep 1999, Korobkov 99-182: **18** (LE); Russia, Altaiskii Krai, Krasnogorskii Raion, the right slope of the valley of Katun' River, at the border with Republic of Altai, W slope of a terrace, the sagebrush-shrubs community, 27 Sep 1999, Korobkov 99-181: **19** (LE); Russia, Altaiskii Krai, Khabarskii Raion, in vicinity of Ust'-Kurja settlement, the way slope, grass-forb community, 6 Oct 1999, Korobkov 99-183: **30** (LE).

— 2n = 36, 45, 54

Russia, Republic of Altai, Chemal'skii Raion, the valley of the Katun' River, near Chemal settlement, riverside rock outcrops, 3 Oct 2009, Korobkov 10-25: **17** (LE); Russia, Republic of Altai, Chemal'skii Raion, left riverside of the Katun' River, near the bridge, 20 km E of Edigen settlement, high terrace, forb steppe with Caragana, 4 Oct 2009, Korobkov 10-24, 10-27:**16** (LE); Russia, Altaiskii Krai, the territory of Barnaul city, near Yuzhnyi settlement, the edge of the *Pinus* belt forest, shrub-forb plant community,10 Oct 2009, Korobkov 10-28: **20** (LE).

Distribution: Asia. The steppe, forest-steppe species. In Altai region it occurs in the river valleys on riverside rocks and stony alluvial deposits, among shrubs on the ravine slopes, on high terraces in sagebrush-grass communities, on forest edges and on margins of pine forests. The hexaploid CN 2n = 54 is constant in *A. sacrorum* all along the continental part of its area of distribution, from Altai till the Sea of Okhotsk coast, including Primorskii Krai (where 2n = 54 – see Probatova 2014), as well as in Sakhalin and Hokkaido. The tetraploid race (2n = 36) exists in the natural populations in China (Yan et al., 1989) and as to Russia – in Republic of Khakassia (Probatova et al. 2010). There is a report (probably, an error) of 2n = 18, from "Vladivostok" (Hoshi et al. 2003). Mixoploid races with 2n = 52-54 are known from Hokkaido, Japan (Suzuka, 1950), and 2n = 45, 54 – in Russia, from Yenissei area in Krasnoyarskii Krai (Amel'chenko 1979).

Artemisia sericea Weber ex Stechm., **2n = 72**

Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River near Chibit settlement, hilly terrace, flat slope of depression, grass-forb meadow at the edge of shrubs community, 21 Sep 1999, Korobkov 99-167: **12** (LE); Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River, the bottom of abrupt SE slope of a hill, forb-shrubs plant community along the edge of Larix forest, 21 Sep 1999, Korobkov 99-219: **12** (LE); Russia, Altaiskii Krai, Tretyakovskii Raion, N shore of the Gilevskoe water-storage basin, near Korotaikha settlement, in shrubs along the margin of trees-planting, 1 Oct 1999, Korobkov 99-220: **24** (LE).

Distribution: Eurasia. The steppe and foreststeppe species. In the Republic of Altai A. sericea is present in grass-forb steppes on high terraces of the river valleys, in shrubs growing on the slopes of depressions, in meadows at the edges and skirts of the mountain larch forests. In steppe and forest-steppe areas of Altaiskii Krai *A. sericea* occurs in meadows with steppe elements, in grass-forb meadows along the margins of pine forests, on shrubby slopes of ravines, in light birch groves. The octoploid CN 2n = 72 was already known in *A. sericea* from natural populations in European Russia and Transbaikalia (Korobkov et al. 2014b, Korobkov & Kotseruba 2015). All along its geographical area, *A. sericea* demonstrates the high variability of polyploid CNs. The diploid CN 2n = 18, counted on Moscow material (Kawatani & Ohno 1964), was not confirmed by nobody else. Tetraploid plants of this species were collected near Krasnoyarsk city (Stepanov 1994).

Artemisia viridis Willd., **2n = 18**

Russia, Republic of Altai, Kosh-Agachskii Raion, eastern extremity of Severo-Chuyskii mountain range, 5 km NW of Chegan-Uzun settlement, 23 Aug 1998, Shmakov, German & Antonjuk 99-46: **9** (ALTB); Russia, Republic of Altai, Kosh-Agachskii Raion, near Boguty Lake, 20 Aug 1998, Shmakov, German & Antonjuk 99-47: **3** (ALTB); Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River near Chibit settlement, hilly terrace, on the slope of shallow depression, grass-forb steppe, 21 Sep 1999, Korobkov 99-135, 99-137: **12** (LE); Russia, Republic of Altai, Ulaganskii Raion, right riverside of the Chuya River near Kurai settlement, S slope of a hill, grass-forb upland steppe, 23 Sep 1999, Korobkov 99-136: **10** (LE); Russia, Republic of Altai, KoshAgachskii Raion, the plateau Ukok, 2255 m alt., on the shore of small lake, 28 Aug 2011, Gnutikov 2013-54, 2013-56, 2013-57: **8** (LE); Russia, Republic of Altai, KoshAgachskii Raion, 2476 m alt., on the shore of Naryn-Gol Lake, 18 Aug 2011, Gnutikov 2013-59: **1** (LE); Russia, Republic of Altai, Kosh-Agachskii Raion, 2000 m alt., the riverside of Bar-Burgazy River, slopes with steppe vegetation, 16 Aug 2011, Gnutikov 2013-60: **5** (LE); Russia, Republic of Altai, Kosh-Agachskii Raion, the lakeside of Naryn-Gol Lake, 2762 m alt., upper part of a canyon, slide-rocks, 20 Aug 2011, Gnutikov 2013-64: **1** (LE).

Distribution: S Siberia – Central and Middle Asia. The mountain steppe and rocky species. On uplands of the Altai Republic it occurs in grass-forb mountain steppes in the river valleys and lake depressions, on the slopes, on pebbles and rubbly placer. The diploid CN 2n = 18 was already known from Kyrgyzstan (Chuksanova et al. 1968, Probatova et al. 2010) and from Altai (see Annotation to *A. ruprestris*).

CONCLUSION

Flora of the Altai Region includes 46 species of *Artemisia*. Before the CNs were studied from Altai in *A. dracunculus*, *A. rupestris*, *A. gmelinii* Weber ex Stechm. and *A. macrocephala* Jacquem. ex Besser (Sokolovskaya & Strelkova 1948, Krasnikov 1985, Krasnikov & Shirina 2006). Now the CNs are known in 39 species of *Artemisia* from Russian Altai. From among, 19 species are represented by diploids (2n = 2x = 18, x = 9; 2n = 2x =16, x = 8); they comprise 8 mountain species (*A. macrocephala*, *A. viridis*, *A. caespitosa* Ledeb., *A. compacta* Fischer ex DC., *A. dolosa* Krasch., *A. leucophylla* (Turcz. ex Besser) Pamp., *A. rutifolia* Steph. ex Spreng., *A. schischkinii* Krasch.) and 9 steppe and forest-steppe species (*A. absinthium*, *A. abrotanum* L., *A. gracilescens* Krasch. & Iljin, *A. laciniata* Willd., *A. pauciflora* Weber ex Stechm., *A. pontica* L., *A. ruprestis*, *A. scoparia* Waldst. et Kit., *A. sublessingiana* Krasch. ex Poljakov), as well as two ruderal weeds – *A. sieversiana* Ehrh. ex Willd. and *A. vulgaris* L. The tetraploid CN (2n = 4x = 36, x = 9) was revealed in steppe species (*A. arenaria*, *A. commutata* Besser, *A. marschalliana* Spreng., *A. schrenkiana* Ledeb.) and in mountain species – *A. obtusiloba*. As to *A. altaiensis*, *A. argyrophylla* Ledeb. and *A. tanacetifolia* L., they are hexaploids (2n = 6x = 54, x = 9). The octoploid CN (2n = 8x = 72, x = 9) was found in *A. sericea* in mountain and lowland populations. Several species show combinations of cytotypes, such as *A. austriaca*, *A. gmelinii*, *A. frigida* Willd., *A. glauca* Pall. ex Willd., *A. phaeolepis* Krasch., each of them has di- and tetraploid cytotypes. *A. nitrosa* Weber ex Stechm., in addition to 2x and 4x, has mixoploid cells (2n = 34, 36). In mountain populations of *A. depauperata* Krasch. the diploid, triploid and tetraploid cytotypes occur. *A. dracunculus* has diploid, tetraploid and hexaploid cytotypes, as well as mixoploid with 2n = 45, 54. In mountain and lowland populations of *A. sacrorum* the hexaploid CN (2n = 54) is common, but in the valley of the Katun' River and in the suburbs of Barnaul city mixoploids were revealed (2n = 36, 45, 54). On the small territory of the pine forest belt near Barnaul city the 3 CNs were found in *A. latifolia*: 2n = 54, 72, 108. In mountain plants of *A.macrantha* 2n = 54 was revealed, while on forest edges and margins of pine forest near Barnaul the 2n = 54 and 2n = 108 were found. The CNs of *A. armeniaca* Lam., *A. annua* L., *A. bargusinensis* Spreng., *A multicaulis* Ledeb., *A. palustris* L., *A. pycnorhiza* Ledeb. and *A. salsoloides* Willd. are not studied yet in Altai Region, where they are rare species.

ACKNOWLEDGEMENTS

The authors are grateful to colleagues from the South Siberian Botanical Garden of the Altaisky State University for their help in the fieldwork, and to Alexandr A. Gnutikov (V.L. Komarov Botanical Institute RAS) for providing plant material from Republic of Altai.

The study was financially supported by the Russian Foundation for Basic Research (grant 160400052, to A.A. Korobkov).

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