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Chromosome numbers of some vascular plants from North of Russian Far East: Magadan Region, Chukotka Autonomous Area

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ABSTRACT

Chromosome numbers for 17 species of 15 genera from 10 families were studied on the material of the North of the Russian Far East. Chromosome numbers for 3 species was counted for the first time (endemic species of North coast of Sea of Okhotsk: *Minuartia tricostata*, *Saxifraga derbekii* and *Pedicularis ochotensis*). Chromosome numbers in 4 species were first counted on the material from Magadan Region. Brief information on the distribution of the studied species is provided.

Keywords: chromosome numbers, vascular plants, Far East, Russia

РЕЗЮМЕ

Андриянова Е.А. Числа хромосом некоторых видов сосудистых растений Севера российского Дальнего Востока: Магаданская область и Чукотский автономный округ. Приводятся числа хромосом для 17 видов из 15 родов и 10 семейств, полученные на материале с севера Дальнего Востока. Впервые определены числа хромосом для 3 видов (эндемичных для северного побережья Охотского моря *Minuartia tricostata*, *Saxifraga derbekii* и *Pedicularis ochotensis*). Определение чисел хромосом 4 видов впервые выполнено на территории Магаданской области. Даны краткие сведения по распространению изученных видов.

Ключевые слова: числа хромосом, сосудистые растения, Дальний Восток, Россия

This paper continues our contributions to chromosome counts of the vascular plants of the North of the Russian Far East. Root tips of plants were collected from seedlings in laboratory for the most species. Root tips of 5 species (*Callitriche palustris*, *Dicentra peregrina*, *Claytoniella vassilievii*, *Thalictrum alpinum*, *Ranunculus repens*) were collected from living plants in nature. Chromosome counts were performed by direct count in root meristem on squashed preparations of root tips. The root tips were pretreated with colchicine (0.02 %), fixed with mixture of alcohol and acetic acid (3:1), and stained with iron acetic hematoxylin. The locations of data sampling points are showed on the map (Fig. 1).

Chromosome counts in the literature were checked using the international databases: "Index to plant chromosome numbers" (Goldblatt & Jonson 1979) and "The Chromosome Counts Database" (Rice et al. 2015). First chromosome data for species are indicated with an asterisk (*). First chromosome counts from the Magadan Region are indicated by (!). All herbarium specimens are deposited in Herbarium of the Institute of Biological Problems of the North FEB RAS (MAG).

ASTERACEAE

(!) *Arctanthemum arcticum* (L.) Tzvel., **2n=18**

Magadan Region, Olskii District, Ola lagoon, Sikulun Island, on the pebble, 59°33'39.88"N 151°20'20.68"E, 04 Sept 2013, coll. E. Andriyanova A13151a: **1**. Distribution:

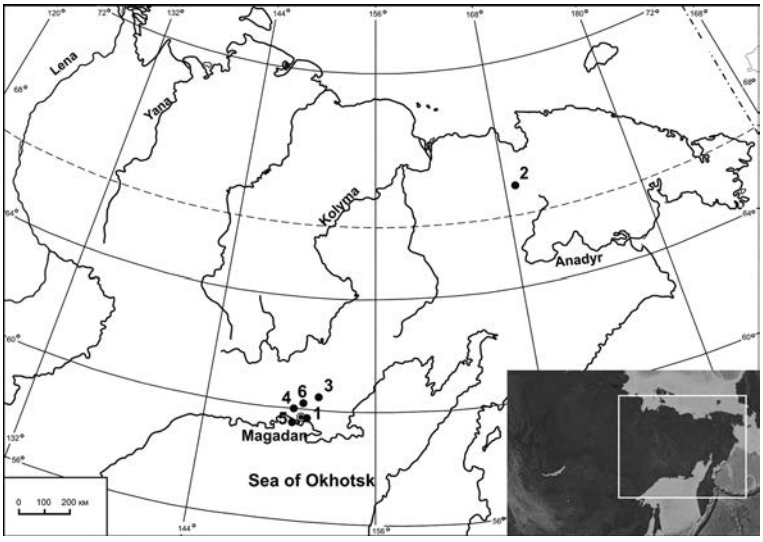

Figure 1 Study area. Dots with numbers from 1 to 6 are the sampling plot locations (according to numbering in the text)

seacoasts of Northeastern Eurasia and North America. *Arctanthemum arcticum* is polyploid complex consisting of diploid (2n=18), tetraploid (2n=36), oktaploid (2n=72) and decaploid (2n=90). 2n=18 is a most common chromosome number for this species. In the Russian Far East only 2n=18 is known (Sokolovskaya 1968, Zhukova & Tikhonova 1971, Volkova et al. 2003, Probatova et al. 2008a).

Crepis nana Richards., **2n=14**

Chukotka Autonomous Area, Bilibinskii Raion, the vicinity of Kekura Mountains, middle course of Khrebtovyi River, pebble near the river, 67°04'05.18"N, 166°22'11.10"E, 19 Jul 2015, coll. E. Andriyanova A15175: **2**. Distribution: Siberia, Russian Far East, Mongolia, North America. All previously chromosome counts for this species from different territories show the same chromosome number (Fedorov (ed.) 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

Endocellion glaciale (Ledeb.) Toman, **2n=60**

Chukotka Autonomous Area, Bilibinskii Raion, middle course of Khrebtoviy Stream, on pebble, 67°02'45.94"N, 166°36'26.87"E, 15 Jul 2015, coll. E. Andriyanova A15215: **2**. Distribution: East Siberia, North of Russian Far East. The same chromosome number for the species (2n=60) is reported from Chukotka (Zhukova et al. 1973, Zhukova & Petrovskii 1975). 2n=120 is given by Krogulevich (1976) for Putorana territory 2n=56 and 2n=112 are known from Arctic region of Eurasia (Fedorov 1969, Zhukova & Petrovskii 1971).

CALLITRICHACEAE

Callitriche palustris L., **2n=20**

Magadan Region, Khasynskii District, in vicinity of Talaya settlement, in the non-freezing stream, on the bottom, 61°07'52.41"N, 152°23'11.13"E, 05 May 2017, coll. E. Andriyanova A17002: **3**. Distribution: all continents except South America and Antarctica. 2n=20 is a most common chromosome number for this species in different parts of the area of distribution (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

CARYOPHYLLACEAE

******Minuartia tricostata*** Khokhr., **2n=32**

Magadan Region, Olskii District, in vicinity of Magadan, watershed of Dukcha and Omchik Rivers, fellfield on plateau, 08 Aug 2017, 59°42'28.05"N, 150°41'8.68"E, coll. E. Andriyanova A17193: **1**. Distribution: endemic species of North coast of Sea of Okhotsk, known only from 2 locations in Magadan Region: one in vicinity of Magadan (about 1 km square) and second on the Khmitevskogo peninsula, in 140 km from first location (Mochalova 2013). Chromosome number for this species is given for the first time.

CRUCIFERAE

Cardamine bellidifolia L., **2n=16**

Chukotka Autonomous Area, Bilibinskii Raion, the vicinity of Kekura mountains, near Privalnyi Stream mouse, mixed-grass shrub tundra, 67°05'22.78"N, 166°28'39.59"E, 16 Jul 2015, A15274a: **2**. Distribution: North parts of Eurasia and North America. This species has constant chromosome number confirmed from many localities (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

FABACEAE

Astragalus frigidus (L.) A. Gray, **2n=16**

Chukotka Autonomous Area, Bilibinskii Raion, middle course of Khrebtoviy Stream, on pebble, 67°02'45.94"N, 166°36'26.87"E, 15 Jul 2015, coll. E. Andriyanova A15220: **2**. Distribution: North part of Eurasia. The same data reported in all contributions except one (Sokolovskaya et al. 1989).

(!) ***Oxytropis ajanensis*** (Regel et Til.) Bunge, **2n=16**

Chukotka Autonomous Area, Bilibinskii Raion, in vicinity of Kekura mountains, upper course of Karalveem River, mixed-grass shrub tundra, 67°00'48.07"N, 166°38'40.61"E, 22 Jul 2015, coll. E. Andriyanova A15146: **2**. Distribution: endemic of the Russian Far East. This is the second chromosome count for the species. The same chromosome number is known from vicinity of Ajan settlement (Pavlova et al. 1989).

Oxytropis exserta Jurtz., **2n=16**

Magadan Region, Olskii District, in vicinity of Ola settlement, near the road, on the pebble, 59°34'22.98"N, 151°13'29.20"E, 22 Jun 2014, coll. E. Andriyanova A14001: **1**; Magadan Region, Olskii District, middle course of Arman River near mouse of Khilgalin Stream, pebble spit, 60°07'N 150°13'E, 02 Jul 2012, Mochalova O. M12010: **4**. Distribution: endemic of the Russian Far East. All previously recorded chromosome counts for this species showed the same chromosome number (Goldblatt & Jonson 1979, Probatova et al. 2008, Rice et al. 2015).

Oxytropis evenorum Jurtz. et Khokhr., **2n=96**

Magadan Region, Olskii District, Nedorazumenia Island, dry meadow on the slope, 59°35'39.26"N, 150°25'04.91"E, 12 Aug 2014, coll E. Andriyanova A14023: **5**. Distribution: Russian Far East, East part of Yakutia. The 3 ploidy levels are known for this species: diploid 2n=32 from Yakutia (Probatova et al. 2011), tetraploid 2n=48 from North coast of Sea of Okhotsk (Probatova et al. 2006) and upper course of Omolon River (East part of Magadan Region) and octaploid 2n=96 from North Korjakia and vicinity of Okhotsk (Pavlova et al. 1989).

PAPAVERACEAE

(!) ***Dicentra peregrina*** (J. Rudolph) Makino, **2n=16**

Magadan Region, Olsky District, upper course Oksa River, hill to the left to the river, on the scree slope, 59°39'43.12"N, 150°31'36.76"E, 20 May 2016, coll. E. Andriyanova A16009: **1**. Distribution: Russian Far East and Japan. This species has stable chromosome number confirmed earlier on the material from all studied populations (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

PORTULACACEAE

Claytoniella vassilievii (Kuzen.) Jurtz., **2n=40**

Magadan Region, Khasynskii District, upper course of Ola River, Olskoye Plateau, wet fell-field on a gentle slope, 60°39'04.11"N, 151°17'28.91"E, 29 Jun 2015, coll E. Andri-

yanova A15058: **6**. Distribution: endemic of North of Russian Far East. Two cytotypes are known for this species: most common is 2n=60 from same places in Chukotka Autonomous Area (Yurtsev & Zhukova 1972, Petrovskii & Zhukova 1981) and rare cytotype 2n=40 (Yurtsev & Zhukova 1972). The both chromosome numbers are known from one locality, Olskoye Plateau: 2n=40 (our data, Yurtsev & Zhukova 1972) and 2n=60 (Probatova et al. 2012). Probably, the two chromosome races are distributed in nearby places, as we could see for *Ranunculus gmelinii* (Andriyanova et al. 2018).

RANUNCULACEAE

(!) *Thalictrum alpinum* L., **2n=14**

Magadan Region, Khasynskii District, upper course of Ola River, Olskoye Plateau, wet fell-field on a gentle slope, 60°39'14.36"N, 151°17'19.54"E, 29 Jun 2015, coll. E. Andriyanova A15050; Chukotskii Avtonomnyi Okrug, Bilibinskii Raion, the vicinity of Kekura mountains, mixed-grass shrub tundra, 67°02'12.99"N 166°33'49.31"E, 21 Jul 2015, coll. E. Andriyanova A15271: **2**; Distribution: tundra zone or mountains in Europe and North America. 2n=14 is most common chromosome number for this species (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

Pulsatilla multifida (G. Pritz.) Juz., **2n=16**

Chukotka Autonomous Area, Bilibinskii Raion, the vicinity of Kekura mountains, upper course of Karalveem River, mixed-grass shrub tundra, 67°00'48.07"N, 166°38'40.61"E, 22 Jul 2015, coll. E. Andriyanova A15264: **2**. Distribution: North parts of Eurasia and North America. Only diploid cytotype 2n=16 is known for this species from many sites of area in Eurasia (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

Ranunculus repens L., **2n=32**

Magadan Region, Khasynskii District, in vicinity of Talaya settlement, in the non-freezing stream, on the bottom, 61°07'52.41"N, 152°23'11.13"E, 30 Apr 2017, coll. E. Andriyanova A17001: **3**. Distribution: Eurasia and North America. 2n=32 is a most common chromosome number for this species in different parts of the area of distribution (Fedorov 1969, Goldblatt & Jonson 1979, Rice et al. 2015).

SAXIFRAGACEAE

******Saxifraga derbekii*** Sipl., **2n=26**

Magadan Region, in vicinity of Magadan, near Dukcha River mouth, on the rocks near sea, 59°33'33.40"N, 150°55'41.65"E, 26 Jun 2017, coll. E. Andriyanova A17021: **1**. Distribution: endemic species of North coast of Sea of Okhotsk. Chromosome number for this species is given for the first time (Fig. 2).

SCROPHULARIACEAE

******Pedicularis ochotensis*** Khokhr., **2n=16**

Magadan Region, Olskii District, upper course of the Oksa River, on the hill's slope, on scree slope, 59°39'41.74"N, 59°39'41.74"E, 24 Jul 2012, coll. O. Mochalova. M12031: **1**. Distribution: East Siberia and Russian Far East. Chromosome number for this species is given for the first time (Fig. 2).

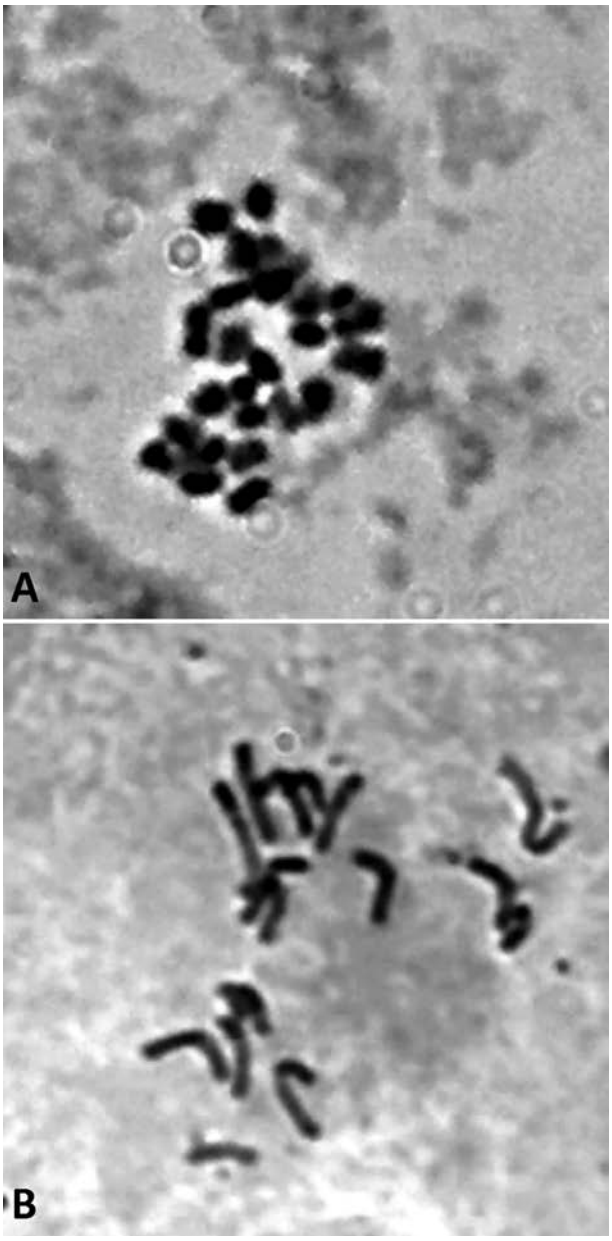

Figure 2 Mitotic metaphases: A – *Saxifraga derbekii*, 2n=26; B – *Pedicularis ochotensis*, 2n=16

CONCLUSIONS

Chromosome numbers for 17 species of 15 genera from 10 families were studied on the material of the North of the Russian Far East. Our data confirmed the previous data with common chromosome number for most part of studied species. Chromosome numbers for 3 species (two endemic species of North Coast of Sea of Okhotsk *Minuartia tricostata*, *Saxifraga derbekii*, and *Pedicularis ochotensis* – endemics of East Siberia and Russian Far East) are given for the first time.

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