



Chromosome numbers in some species of Poaceae from Russia

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ABSTRACT

Chromosome numbers (CN) for 35 species and one hybrid in *Poaceae* from 9 genera: *Beckmannia*, *Brachypodium*, *Bromopsis*, *Catabrosa*, *Elymus*, *Elytrigia*, *Festuca*, *Milium*, *Poa*, from Russia are presented. For *Bromopsis austrosibirica* Peschkova, *Deschampsia baicalensis* Tzvelev, *D. submutica* (Trautv.) O.D. Nikif., *Festuca chionobia* T.V. Egorova et Sipliv., *F. daburica* (St.-Yves) V.I. Krecz. et Bobrov, *F. kolesnikovii* Tzvelev, *F. vylzaniae* (E. Alexeev) Tzvelev, *Poa kbokbrjakovii* Prob. and *P. krasnoborovii* Stepanov the CNs were revealed for the first time. The new CNs were obtained for *Bromopsis heterophylla* (Klokov) Holub, *Deschampsia obensis* Roshev., *Elytrigia trichophora* (Link) Nevski. Some species were studied first time: *Elymus kamoji* (Ohwi) S.L. Chen and *Catabrosa minor* (Bab.) Tzvelev – in Russia, *P. glauca* Vahl – in Amurskaya Oblast', *Festuca jacutica* Drobow – in Khabarovskii Krai, *Poa angustifolia* L. – in the North Koryakia, *Milium effusum* L. and *Deschampsia komarovii* V.N. Vassil. – in Kamchatka Peninsula. From the Commander Islands the hybrid *Poa alpigena* (Blytt) Lindm. × *P. arctica* R. Br. was studied. Besides, in the “tuft form” of *Festuca rubra* L., which is distributed along seacoast and islands of the Primorskii Krai, the CN was firstly revealed. *F. chionobia* obviously is the first pseudoviviparous species with the diploid CN ($2n = 14$).

Key words: chromosome numbers, vascular plants, Poaceae, flora, Russia

РЕЗЮМЕ

Пробатова Н.С., Селедец В.П., Баркалов В.Ю. Числа хромосом некоторых видов злаков (Poaceae) России

Приводятся числа хромосом ($2n$) для 35 видов и одного гибрида злаков из родов *Beckmannia*, *Brachypodium*, *Bromopsis*, *Catabrosa*, *Elymus*, *Elytrigia*, *Festuca*, *Milium*, *Poa* во флоре России. Впервые исследованы в кариологическом отношении *Bromopsis austrosibirica* Peschkova, *Deschampsia baicalensis* Tzvelev, *D. submutica* (Trautv.) O.D. Nikif., *Festuca chionobia* T.V. Egorova et Sipliv., *F. daburica* (St.-Yves) V.I. Krecz. et Bobrov, *F. kolesnikovii* Tzvelev, *F. vylzaniae* (E. Alexeev) Tzvelev, *Poa kbokbrjakovii* Prob., *P. krasnoborovii* Stepanov. Новые (не известные ранее) числа хромосом установлены у *Bromopsis heterophylla* (Klokov) Holub, *Deschampsia obensis* Roshev., *Elytrigia trichophora* (Link) Nevski. *Elymus kamoji* (Ohwi) S.L. Chen и *Catabrosa minor* (Bab.) Tzvelev исследованы впервые для России, *Poa glauca* Vahl – впервые для Амурской обл., *Festuca jacutica* Drobow – в Хабаровском крае, *Poa angustifolia* L. – в Северной Корякии, *Milium effusum* L. и *Deschampsia komarovii* V.N. Vassil. впервые исследованы на Камчатке. На Командорских островах изучен гибрид *Poa alpigena* (Blytt) Lindm. × *P. arctica* R. Br. Впервые установлено число хромосом у дернистой формы *Festuca rubra* L., которая встречается на морском побережье и островах в Приморском крае. Впервые выявлен псевдовивипарный таксон освяницы с диплоидным числом хромосом – *Festuca chionobia* ($2n = 14$).

Ключевые слова: числа хромосом, сосудистые растения, злаки, Poaceae, флора, Россия

Here we present results of chromosome number (CN) study of 35 Poaceae species from Russia, mainly from East Siberia and the Russian Far East (RFE), as well as from European Arctic, North Caucasus and Crimea (Fig. 1). Chromosome countings in some species were made by E.G. Rudyka (indicated by ER), on squashed preparations of root tips fixed with Carnoy's solution. We also include here some previous CN countings of A.P. Sokolovskaya (indicated by AS). The root tips were taken from living plants, or from seedlings obtained through herbarium specimens, which were collected in the field. Preparations were stained with iron hematoxylin. Voucher specimens are preserved in the Herbarium VLA, Vladivostok (some – in LE,

St. Petersburg). First CN data are indicated by asterisk (*). The number of the dot on the map follows the number of voucher specimen. Brief information on the affinity and distribution of the species studied is presented.

***Beckmannia borealis* (Tzvelev) Prob., $2n = 14$ (ER)**

Russia, the Far East, Kamchatka Peninsula, Bystrinskii Raion, Anavgai village, water-logged ground at the rivulet, 322 m alt., 9 Aug 2013, coll. V.V. Buryi 12597: **10**. Endemic of Russia. This species is distributed in the north and central parts of European Russia, in Altai and Yakutia, and it is a rare species in the Russian Far East (RFE), where it occurs

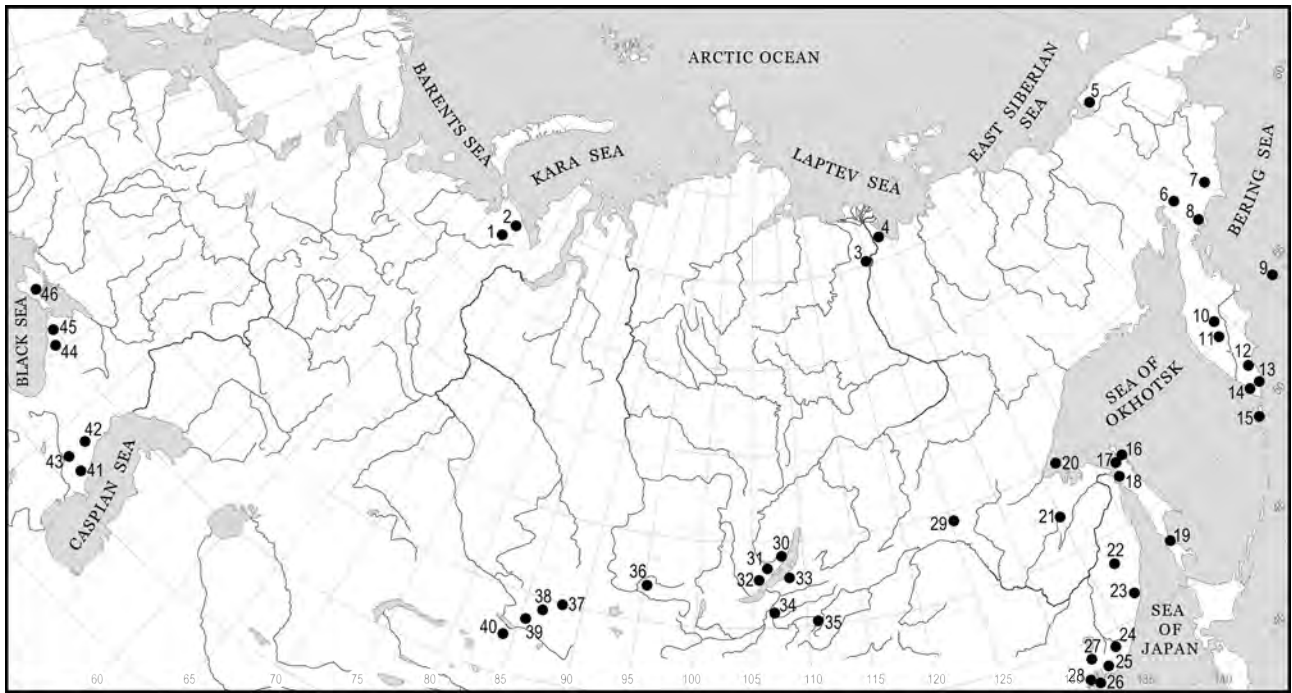


Figure 1 Study area. Dots with numbers from 1 to 44 are the sampling plot locations

in wet meadows of riversides in Kamchatka (mainly central) and Okhotia (near Magadan). This species is probably arisen from hybridization of *B. syzigachne* (Steud.) Fern. × *B. eruciformis* (L.) Host, but now the last species is absent in the RFE. The RFE populations of *B. borealis* possibly are relict. The CN of *B. borealis* was studied in Altai, Yakutia and Kamchatka (Probatova & Sokolovskaya 1980, 1984; Probatova & Seledets 2008). All the species of the small genus *Beckmannia* are diploids. $2n = 2x$.

Brachypodium spryginii (Tzvelev) Tzvelev (*B. sylvaticum* (Huds.) P. Beauv. subsp. *spryginii* Tzvelev), $2n = 18$ (ÉR)

Russia, North Caucasus, Krasnodarskii Krai, Abinskii Raion, 18 km S of Abinsk town, near Shapsugskaya village, the riverside forest along the Abin River (the Kuban' River basin), 1 Sep 2009, coll. N.S. Probatova & V.P. Seledets 11652: **44**. This species was described from Crimea and it is distributed also in the North Caucasus (west part, including the Kuban' River basin and the coast of the Black Sea). It is related to *B. sylvaticum* (Huds.) P. Beauv., where $2n = 18$ is also known by multiple authors. We present here the second CN counting for *B. spryginii* (the first was in Probatova, Kazanovsky, Rudyka et al. 2012). $2n = 2x$. The CN of species related to *B. sylvaticum* is constant ($x = 9$), however *Brachypodium* is polybasic genus.

Bromopsis australis (Zherebina) Tzvelev et Prob., $2n = 28$ (AS)

Russia, East Siberia, Republic of Buryatia, outskirts of Ulan-Ude city, meadow with steppe vegetation near airport, 12 Sep 1989, coll. N.S. Probatova & V.P. Seledets 6934: **34**. Earlier the specimen № 6934 was misidentified as «*Bromopsis inermis*» by Probatova, Sokolovskaya & Rudyka (1991). This steppe species was described from the south of Ural and was revealed in European Russia, North Caucasus, West and East (w) Siberia. It can be found in the RFE as well (as adventive), just like its closely relative *B. inermis* (Leys.) Holub (which is considered as forest species everywhere, but

alien in the RFE). Both species have variable ploidy: $2n = 28, 42, 56$ – many CN counts for *B. inermis*, but less – for *B. australis*: $2n = 28, 56$ (Tzvelev & Probatova 2010 a; Probatova et al. 2010). In the past these forest and steppe species probably were more isolated, but now *B. inermis*, which is younger and more active than *B. australis*, owing to human impact, widely extended its area of distribution to the south and they easily hybridize (Tzvelev & Probatova 2010 a). $2n = 4x, 6x$.

****Bromopsis austrosibirica*** Peschkova, $2n = 28$ (AS)

Russia, East Siberia, Republic Sakha-Yakutia, Bulunskii Raion, left riverside of the Lena River, 30 km above Kiusiur settlement, near the mouth of the Tegeliakh River, steep slope, 4 Aug 1973, coll. N.S. Probatova & V.P. Seledets 3771: **3**. Occurs on forest edges and clearings in the river valleys. The Altai – East Siberian endemic species. It belongs to the group of *B. aggr. pumpelliana* (Scribn.) Holub. This is the first CN counting for *B. austrosibirica*. Most likely it has variable ploidy, like the species of this affinity. Further studies are needed. $2n = 4x$.

Bromopsis benekenii (Lange) Holub, $2n = 28$ (AS)

Russia, North Caucasus, Republic of Dagestan, Buinakskii Raion, 16 km W of Buinaksk town, near Manas-aul, 960 m alt., the foot of Gimrinskii mountain ridge, the tourist centre “Termenlik”, beech forest, 18 Jun 1979, coll. N.S. Probatova 5410: **42**. This forest species is distributed from Europe and Caucasus to West Siberia. The same CN $2n = 28$ was earlier revealed from Azerbaïdzhan (Sokolovskaya & Probatova 1979 – as *B. ramosa* ssp. *benekenii*), but the report of $2n = 42$ also exists in the literature (see in Agapova et al. 1993). $2n = 4x$.

Bromopsis heterophylla (Klokov) Holub, $2n = 56$ (AS)

Russia, Republic of Crimea, Ai-Petrinskaya yaila, on the slope, 13 Aug 1974, coll. V.V. Fedyaeva 3958: **46**. The

steppe species, distributed in the south-east of Europe, but described from Crimea. Probably it shows variable ploidy: before the newly revealed CN $2n = 56$, the diploid CN $2n = 14$ was known from Crimea (see Prokudin et al. 1977 – as “*B. cappadocica*”); however these cytotypes may belong to different taxa. $2n = 8x$.

***Bromopsis variegata* (M. Bieb.) Holub, $2n = 14$ (AS)**

Russia, North Caucasus, Republic of Dagestan, Gunibskii Raion, near Verkhni Gunib village, 1800 m alt., sandy-pebbly bank of the Gunibka River, 26 Jun 1979, coll. N.S. Probatova 5420: **41**. The species is distributed in the Russian Caucasus, in high mountains. The CN $2n = 14$ was known from Kabardino-Balkaria Republic (Sokolovskaya & Probatova 1979). $2n = 2x$.

***Catabrosa minor* (Bab.) Tzvelev (*C. aquatica* var. *minor* Bab.), $2n = 20$ (AS)**

Russia, European Arctic, Komi Republic, in vicinity of Vorkuta city, the farm (sovkhos) “Tsentral'nyi”, weedy place, 17 Jul 1967, coll. N.N. Tzvelev 63 (LE); A.P. Sokolovskaya 124: **2**. This specimen was misidentified as “*Catabrosa aquatica* s. str.” (Sokolovskaya 1970; Sokolovskaya & Probatova 1975). *C. minor* was collected by Tzvelev in the same expedition with Sokolovskaya, and she counted the CN on this specimen (but with her number 124). The correct name of this plant was determined much later (Tzvelev 2013). *C. minor* occurs near seacoasts in European Arctic, but in Komi Republic, near Vorkuta, it is adventive. The related widespread species *C. aquatica* (L.) P. Beauv. does not occur in the Arctic. $2n = 4x$.

*** *Deschampsia baicalensis* Tzvelev, $2n = 26$ (ER)**

Russia, East Siberia, Irkutskaya Oblast', Ol'khonskii Raion, W lakeside of Baikal Lake, the Khokhe-Nokhoitui Cape, 496 m alt., on bank of the swampy lakelet behind the lakeside barrage, 28 Jul 2005, coll. S.G. Kazanovsky 11600: **30**; Russia, East Siberia, Irkutskaya Oblast', Ol'khonskii Raion, near Chernorud settlement, the Kuchulga River, 464 m alt., former river-bed, the lowland sedge marsh, 1 Aug 2004, coll. S.G. Kazanovsky 11321: **31**. Sandy and muddy banks of river deltas. East Siberia (the Baikal Lake). Endemic. Probably the species was originated from hybridization between *D. turczaninowii* (Litv.) Roshev. and *D. sukatschewii* (Popl.) Roshev. This is the first chromosome count for the species. $2n = 2x$.

***Deschampsia glauca* Hartm., $2n = c. 26$ (AS)**

Russia, East Siberia, Republic of Sakha-Yakutia, lower course of the Lena River, in vicinity of the Tiksi Bay, on stony plots of riverside of a small river, 1 Aug 1948, coll. A.P. Sokolovskaya 129: **4**. Earlier this specimen was misidentified as “*D. caespitosa* subsp. *borealis*” by Sokolovskaya & Probatova (1975). In tundras, meadows, on pebbles and stony slopes, by the streams. East Europe (from Arctic to Ural – north and middle), West Siberia (Arctic, Ob' River – as adventive), East Siberia (Arctic, Putorana Mts., Lena and Kolyma – north), RFE (Arctic, Anadyr', Penzhina); Europe (Scandinavia), North America (Alaska). (Tzvelev & Probatova 2012). – $2n = 26, 48, 52$ (Zhukova & Tikhonova

1973; Zhukova & Petrovsky 1976; Yurtzev & Zhukova 1978; Petrovsky & Zhukova 1981: Chukotka, Wrangel Isl.). In the RFE this species becomes rare, the CN reports for southern parts of RFE probably belong to *D. paramushirensis*. $2n = 2x, 4x$.

***Deschampsia komarovii* V.N. Vassil., $2n = 26$ (ER)**

Russia, the Far East, Kamchatskii Krai, Kamchatka Peninsula, Bystrinskii Raion, the bottom of temporary lake, 884 m alt., 19 Aug 2013, V.V. Buryi 12598: **11**; Russia, Far East, Kamchatskii Krai, Kamchatka Peninsula, Elizovskii Raion, Mutnovskii Volcano, poorly matted slope, above the geysers plot “Dachnyi”, 20 Aug 2004, coll. A.N. Berkutenko & M.A. Polezhaeva 9670: **13**. Riverside and coastal meadows, sands and pebbles. RFE (Arctic, Kamchatka, Okhotia). Endemic. $2n = 26, 38, 42$ (Zhukova et al. 1973; Yurtzev & Zhukova 1978: Chukotka - east, Wrangel Isl.). $2n = 2x$ and aneuploids.

***Deschampsia macrothyrsa* (Tatew. et Ohwi) Kawano, $2n = 26$ (ER)**

Russia, the Far East, Sakhalin (north), Ekhabu Bay, SE of Vostochnyi settlement, on the bank of a brackish lake, 3 Aug 2001, coll. V.Yu. Barkalov 8606: **16**. Coastal boggy meadows, swamps. RFE: Sakhalin, the Kurils (south), reported from Okhotia (south); East Asia (Hokkaido). Described from Hokkaido. $2n = 26$ (Probatova 1984; Probatova et al. 2009: Sakhalin). $2n = 2x$.

***Deschampsia obensis* Roshev., * $2n = 26$ (AS)**

Russia, Komi Republic, Intinskii Raion, the farm (sovkhos) “Gorniyak”, the farm Yun'-Yaga, the Yun'-Yaga River, along sandbanks, 12 Jul 1967, coll. A.P. Sokolovskaya 77: **1**. Earlier this specimen was misidentified as “*D. caespitosa* subsp. *orientalis*” (Sokolovskaya & Probatova 1975). Sandy and pebble banks of river valleys in lower courses, poorly fixed and mobile sands of rivers and near seacoast. East Europe (Arctic, Kola Peninsula, Pechora River, Ural – north); West Siberia (Arctic and lower course of the Ob' River); East Siberia (Arctic); RFE (Arctic – west). Endemic. $2n = >42, >44, 52$ (Zhukova & Petrovsky 1975; Zhukova & Petrovsky 1980: Chukotka). $2n = 2x, 4x$.

***Deschampsia pamirica* Roshev., $2n = 26$ (AS)**

Russia, West Siberia, Altai, Chuyskaya steppe, Kosh-Agach, 1835 m alt., along the riverside, 25 Jul 1937, coll. A.P. Sokolovskaya & O.S. Strelkova 26: **38**; Russia, West Siberia, Altai, the Kuraiskii mountain ridge, Tabozhek canyon, 2300 m alt., on placer deposits, 30 Jul 1937, coll. A.P. Sokolovskaya & O.S. Strelkova 73: **37**; Russia, West Siberia, Altai, the Chegan-Uzun River, 2000 m alt., pebbles on the slope, 5 Aug 1937, coll. A.P. Sokolovskaya & O.S. Strelkova 125: **39**; Russia, West Siberia, Altai, Katunskie Belki, the Kazinikha Pass, 2400 m alt., 20 Aug 1937, coll. A.P. Sokolovskaya & O.S. Strelkova 165: **40**. Earlier all these specimens were misidentified as “*D. caespitosa* subsp. *koelerioides*” in Sokolovskaya & Probatova (1975). Saline meadows, sands and pebbles; in the middle and upper mountain belts. West Siberia (Altai), East Siberia (West Sayan); Middle and Central Asia. $2n = 2x$.

Deschampsia paramushirensis Honda (*D. cespitosa* (L.) P. Beauv. subsp. *orientalis* Hultén), **2n = 26** (AS, ER)

Russia, the Far East, Sakhalin (north), near the former settlement Muz'ma, N of Pomr' Bay, 10 Aug 2001, coll. V.Yu. Barkalov 8613: **18**; Russia, the Far East, the North Kurils, Paramushir Island, outskirts of Severo-Kuril'sk settlement, on pasture, 20 Aug 1971, coll. N.S. Probatova 3351: **16**; Russia, the Far East, Khabarovskii Krai, Tuguro-Chumikanskii Raion, the Shantarskie Islands, Feklistova Island, N coast, Lissya Bay, Lissje Lake, at the rivulet, 20 Aug 2010, coll. V.V. Bogatov 12326: **20**; Russia, the Far East, Sakhalin (north), outskirts of Moskalvo settlement, by the lake, Aug 2001, coll. V.Yu. Barkalov 8601: **17**. Earlier the specimen № 3351 was misidentified as "*D. cespitosa* s. str." (Sokolovskaya & Probatova 1975) and the specimen № 12326 as "*D. glauca*" (Probatova et al. 2014). Riverside and seaside meadows, sands and pebbles. RFE (Anadyr' River basin, North Koryakia, Kamchatka, Okhotia, Sakhalin – north, North Kurils); East Asia (Hokkaido). Some reports of various CNs for *D. paramushirensis* (also under other names, e.g., its synonym *D. cespitosa* subsp. *orientalis* – see in Agapova et al. 1993) hardly belong to this species, which obviously occurs in oceanic (coastal) regions of NE Asia. The revision of the whole material studied is needed. $2n = 2x$.

****Deschampsia submutica*** (Trautv.) O.D. Nikif., **2n = 26** (P.G. Zhukova – LE, VLA)

Russia, Far East, Chukotskii natsionalnyi okrug, E coast of the Chaunskaya Guba [Gulf], Apapelkhino settlement, 2 Sep 1965, V.V. Petrovsky & P.G. Zhukova 65–436: **5**. Sands and pebbles on riversides, wet meadows, among shrubs. East Europe (Arctic, Ural – north), West Siberia (Arctic, Ob' River basin – north), East Siberia (Arctic – south, Yenisei north, Lena and Kolyma), RFE (Chukotka – west). Endemic. $2n = 2x$.

Deschampsia sukatschewii (Popl.) Roshev., **2n = 26** (AS, ER)

Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, Baikal Lake, the mouth of the Bol'shaya Goloustnaya River, along the lakeside barrage at the lagoon lake, 4 Sep 2003, coll. V.V. Chepinoga & al. 9098: **32**; Russia, the Far East, North Koryakia, Olyutorskii Raion, 2.5 km S of Khailino settlement, on pebbles of a rivulet, 16 Aug 1970, coll. N.S. Probatova & V.P. Seledets 2655: **7**; Russia, the Far East, Sakhalin, Makarovskii Raion, near the railway station Pugachevo, on the railroad embankment, abundant, 15 Sep 1982, coll. N.S. Probatova, V.P. Seledets & al. 6270: **19**. The specimen № 2655 earlier was misidentified as "*D. caespitosa* subsp. *orientalis*" in Sokolovskaya & Probatova (1975). Sands and pebbles on riversides, forest clearings, forest edges; up to the middle mountain belt. East Europe (Arctic, Pechora and Mezen' rivers); West Siberia (Arctic, the Ob' River, Altai), East Siberia, RFE; Asia (Central – north) and E (northwest). $2n = 26, 28, 42, 42+1B, 52$ (see Agapova et al. 1993; Zhukova et al. 2009; Chepinoga et al. 2010; Probatova et al. 2014). Many of the multiple reports with various CN for *D. sukatschewii* (including under other names, e.g., *D. cespitosa* subsp. *orientalis*) hardly belong to this continental forest species, which occurs for certain in East Siberia and in the

south of continental Far East (the Amur River basin). The revision of the whole material studied as to CNs is needed. $2n = 2x, 4x$.

Elymus kamoji (Ohwi) S.L. Chen (*Agropyron tsukushiense* (Honda) Ohwi var. *transiens* (Hack.) Ohwi), **2n = 42** (ER)

Russia, the Far East, Primorskii Krai, Khassanskii Raion, Slavyanka town, a meadow near the sea front, 19 Aug 2012, coll. A.V. Agafonov 12719: **28**. East Asian species, described from the North-East China. It was revealed recently in the RFE (Primorskii Krai, Khassanskii Raion), firstly – from Ryazanovka settlement (Tzvelev & Probatova 2010 b). This is the second record of the species for Russia. The hexaploid CN $2n = 42$ is typical for two closely related East Asian species – *E. kamoji* (Nishikawa 2008) and *E. tsukushiensis* Honda, but uncommon in the section *Goulardia*. In the RFE *E. tsukushiensis* was found in Kunashir Isl., South Kurils ($2n = 42$ – Probatova et al. 2000). $2n = 6x$.

Elytrigia gracillima (Nevski) Nevski, **2n = 28** (AS)

Russia, North Caucasus, Republic of Dagestan, Gunibskii Raion, near Verkhni Gunib village, Khotochinskii mountain ridge, ca. 2000 m alt., on the rocks, 26 Jun 1979, coll. N.S. Probatova 5424: **43**. On limestone rocks and stony slopes, in lower and middle mountain belts. Caucasian species; described from Dagestan. This is the second CN counting from Russia, also from Dagestan ($2n = 28$ – Probatova & Sokolovskaya 1978). $2n = 4x$.

Elytrigia repens (L.) Nevski, **2n = 42** (ER)

Russia, the Far East, Primorskii Krai, Mikhailovskii Raion, outskirts of Novoshakhtinskii town, as a weed in vegetable garden, 27 Jul 2004, coll. V.T. Lapenko 11676: **27**. Meadows, forest clearings, on sands and pebbles, often as a weed. Holarctic. Everywhere in Russia, but alien in the RFE. Multiple CN data published, almost all of them – $2n = 42$. $2n = 6x$.

Elytrigia stipifolia (Czern. ex Nevski) Nevski, **2n = 28** (AS, ER)

Russia, North Caucasus, Republic of Dagestan, Gunibskii Raion, near Kharti-Kuni village, on the slope with *Pinus kochiana*, at the pass, 16 Jul 1975, coll. N.S. Probatova & V.P. Seledets 4058: **39**. Earlier this specimen was misidentified as "*Elytrigia tauri* subsp. *pertenuis*" in Probatova & Sokolovskaya (1978). On exposed chalk and limestone, in steppes, up to the lower mountain belt. East Europe, Caucasus. $2n = 28$ (see Prokudin et al. 1977). $2n = 4x$.

Elytrigia trichophora (Link) Nevski, ***2n = 28** (ER)

Russia, North Caucasus, Krasnodarskii Krai, Novorossiyskii Raion, in vicinity of Raevskaya settlement, Volchye Vorota Pass, rubbly marl placer, 3 Sep 2009, coll. N.S. Probatova & V.P. Seledets 11612: **45**. In steppes, stony slopes, among shrubs, up to lower mountain belt. East Europe, Caucasus, Central Asia. $2n = 42$ (see Prokudin et al. 1977; Sokolovskaya & Probatova 1978). New cytotype for the species. $2n = 4x, 6x$.

****Festuca chionobia*** T.V. Egorova et Sipliv. (*F. auriculata* subsp. *chionobia* (T.V. Egorova et Sipliv.) Tzvelev), **2n = 14** (ER)

Russia, the Far East, Khabarovskii Krai, Nanaiskii Raion, Sikhote-Alin' mountain range, the Tardoki-Yani Mt., upper

course of Sukhaya Pad' stream (the Anjuj River basin), 1900 m alt., alpine belt, stony dwarfshrub-mossy tundra, 29 Aug 2012, coll. V.Yu. Barkalov 12189: **22**. Mountain tundras and meadows. Baikal Siberia, RFE. Endemic. Described from the Baikal'skii mountain ridge. In RFE it occurs mainly in high altitudes of Sikhote-Alin' and also in the mountains of the Upper Amur River basin. The species belongs to *F. aggr. auriculata* Drobow. For *F. auriculata* there are many CN reports of $2n = 14$ only, from Chukotka, Wrangel Isl. and East Siberia (see Agapova et al., 1993). Another related species is *F. mollissima* V.I. Krecz. et Bobrov, also with $2n = 14$ (many CN counts from Primorskii Krai; see in Probatova, 2014). *F. chionobia* is a pseudoviviparous species. (Fig. 2). This is the first CN counting for *F. chionobia*. Obviously it is the first pseudoviviparous species with diploid CN $2n = 14$. Other festucoid grasses with pseudoviviparity (*Deschampsia*, *Festuca*, *Poa*) are polyploids and aneuploids: see the review of Sarapul'tsev (2001).

* *Festuca dahurica* (St.-Yves) V.I. Krecz. et Bobrov, **$2n = 14$** (ER)

Russia, East Siberia, Republic of Buryatia, Mukhorshibirskii Raion, near Olon-Sheber Lake, on sands, 3 Jul 2010, coll. A.A. Gnutikov & Yu.A. Gnutikova 12259: **35**. Mostly Chinese species; occurs on rocks and steppes. In Russia it is distributed in the south of Transbaikalia. Its CN was revealed for the first time. $2n = 2x$.

Festuca jacutica Drobow, **$2n = 14$** (ER)

Russia, the Far East, Khabarovskii Krai, Poliny Ossipenko Raion, the valley of the Nylan River (left tributary of the Amgun' River), middle course, stony outcrops with limestone "Mramornye skaly" on the right riverside, fissures in the rocks, 25 Jul 2012, coll. M.V. Kriukova & L.A. Antonova 12680: **21**. In light forests, among shrubs, on stony slopes and rocks. East Siberia, RFE (Kolyma, Okhotia, the Amur River basin); Northeast China. Described from Yakutia. $2n = 14$ (Yurtzev & Zhukova 1982; Probatova & Sokolovskaya 1984). First CN data from Khabarovskii Krai. $2n = 2x$.

* *Festuca kolesnikovii* Tzvelev, **$2n = 14$** (ER)

Russia, the Far East, Primorskii Krai, Terneiskii Raion, Sikhote-Alinskii biosphere reserve, locality Blagodatnoe, marine terrace, dry meadow with steppe features, 25 Jun 2003, coll. I.A. Nesterova 9023: **23**; Russia, the Far East, Primorskii Krai, Peter the Great Bay, Lissy Island (opposite Nakhodka city), 11 Sep 2002, coll. V.A. Nechaev 8901: **25**. On coastal rocks, stony slopes and pebbles. RFE: Primorskii Krai (east macroslope of Sikhote-Alin' mountain ridge). Endemic. Most probably this species has hybrid origin: *F. aggr. ovina* L. × *F. aggr. auriculata* Drobow. First CN data for the species. $2n = 2x$.

Festuca mollissima V.I. Krecz. et Bobrov, **$2n = 14$** (ER)

Russia, the Far East, Primorskii Krai, Partizanskii Raion, Alexeevskii mountain ridge, Olkhovaya Mt., on the spots of fine-grain soil, 1600 m alt., 10 Sep 2010, coll. V. Yu. Barkalov 11667: **24**. On stony slopes and rocks, sometimes on coastal sands and pebbles, up to the middle mountain belt. RFE (Okhotia – Amgun', Amur (east), Primorskii Krai

(east); Korean Peninsula. **$2n = 14$** (Probatova & Sokolovskaya 1984; Alexeev et al. 1987). $2n = 2x$.

Festuca rubra L., **$2n = 42$** (ER)

Russia, the Far East, Primorskii Krai, Peter the Great Bay, Rechnoi Island (Amurskii Gulf), on coastal rocks, 14 Aug 2010, coll. V.A. Nechaev 11659: **26**. Extremely polymorphous species, widely distributed throughout the world, with multiple CN data. In *F. rubra* most common is the CN $2n = 42$ (6x), which was revealed throughout Russia as well, including the RFE; rarely $2n = 56$ is reported. The specimen from Rechnoi Island represents the "tuft form" of *Festuca rubra* L. which is common on seacoastal rocks and stony slopes of marine terraces in continental part and in the islands of the Primorskii Krai (s.); its CN was firstly revealed. $2n = 6x$.

* *Festuca vylzaniae* (E. Alexeev) Tzvelev, **$2n = 28$** (ER)

Russia, East Siberia, Republic of Buryatia, Pribaikal'skii Raion, coast of Baikal Lake, in vicinity of Turka settlement, on sands, 3 Jul 2010, coll. A.A. Gnutikov 12236: **33**. Endemic of the Baikal Lake region. Sandy-steppe species. This is the first CN count for the species. $2n = 4x$.

Milium effusum L., **$2n = 28$** (ER)

Russia, the Far East, Kamchatskii Krai, Kamchatka Peninsula, Verkhne-Opal'skie hot springs, $t = 42^{\circ}\text{C}$, on the slope, in *Filipendula kamtschatica* community, 3 Aug 2013, coll. O.A. Chernyagina & L. Shtreker 12457: **14**. In forest edges and clearings, tall herbs communities, among shrubs. European Russia, Caucasus, West and East Siberia, RFE (up to Kamchatka in the north). Almost Holarctic. $2n = 28$ (multiple CN reports from throughout Russia, and from various subregions of the RFE). First CN count from Kamchatka. $2n = 4x$.

Poa alpigena (Blytt) Lindm. × *P. arctica* R. Br., **$2n = 42$** (ER)

Russia, the Far East, Kamchatskii Krai, Aleutskii Raion, Commander Islands, Bering Island, upper course of the Vodopadnaya River, wet forb meadow along the lakeside, 15 Aug 1999, coll. O.A. Mochalova 8085: **9**. Both widely distributed Holarctic species *P. alpigena* and *P. arctica* are common plants in the Kamchatskii Krai, they occur in meadows, among riverside shrubs, on sands and pebbles of river valleys, on roadsides. Such hybrid is not rare, the plants have some pubescence in lower part of the lemma between veins or along veins, but at the same time they look like *P. alpigena*. $2n = 6x$.

Poa angustifolia L., **$2n = 70$** (AS)

Russia, the Far East, Kamchatskii Krai, Koryakskii Natsional'nyi Okrug, Oliutorskii Raion, near Korf settlement, marine spit, middle part, grass community on sands, 17 Sep 1970, coll. N.S. Probatova & V.P. Seledets 3100: **8**. Earlier this specimen was misidentified as "*Poa alpigena*" in Sokolovskaya & Probatova (1973). Dry meadows, riverside and coastal sands and pebbles, roadsides. European Russia, Caucasus, West and East Siberia, RFE (but alien on the north, in Sakhalin and in the Kurils); Eurasian. In the North Koryakia *P. angustifolia* is alien. $2n = 56, 63-64, 70-72$ (from some regions of Russia, including RFE). $2n = 8x, 9x, 10x$.

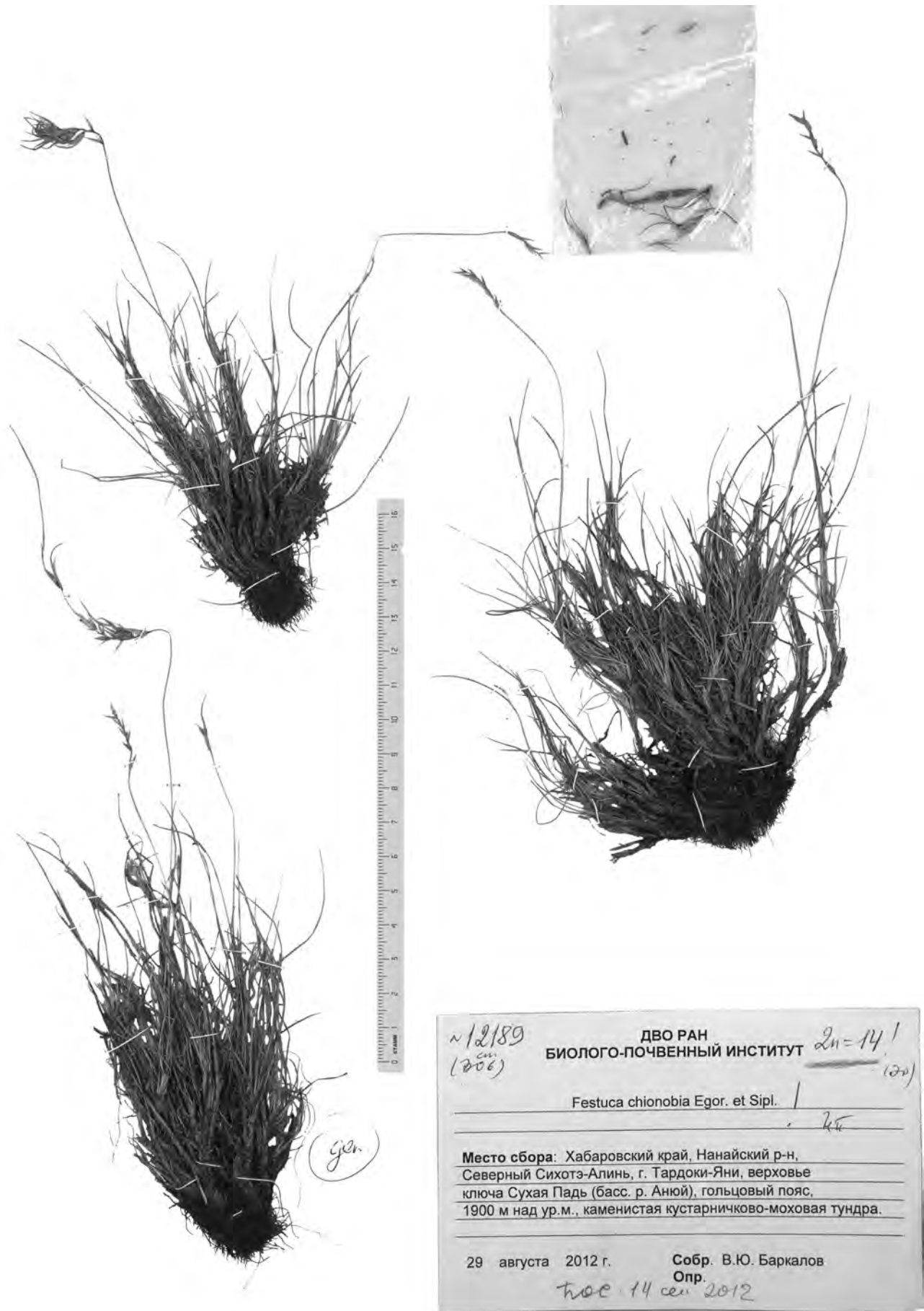


Figure 2 Specimen of pseudoviviparous *Festuca chionobia* with diploid CN $2n = 14$, collected in study area 22 (see Fig. 1).

***Poa glauca* Vahl, 2n = 42 (ER)**

Russia, the Far East, Amurskaya Oblast', Zeyskii nature reserve, E part of Tukuringra mountain ridge, alpine zone, 15 Jul 2011, coll. T.N. Veklich 12102: **29**. Mountain tundras, rocks, screes, dry pebbles in the Arctic and alpine zone of mountains. European Russia, Caucasus, West Siberia, East Siberia, RFE; Holarctic. 2n = 42, c.48, 48, 49, 50, 56, 62, 63, 70 (multiple CN reports from Russia and elsewhere). The CN of the species is studied in Amurskaya Oblast' (the Upper Amur River basin) for the first time. 2n = 6x, etc.

***Poa kamczatensis* Prob., 2n = 56 (ER)**

Russia, the Far East, Kamchatskii Krai, Kamchatka Peninsula, near Petropavlovsk-Kamchatskii city, Bab'ya Bay, the slope of marine terrace, on rocks, 1 Aug 2014, coll. O.A. Chernyagina & V.Yu. Neshataeva 12713: **12**. On rubbly slopes of marine terraces, on rocks and screes usually of coastal hills, up to the lower mountain belt. RFE (Kamchatka – south, Okhotia (near Magadan). Endemic. 2n = 49, 56 (Sokolovskaya et al. 1985). *P. kamczatensis* is relative to *P. almasovii* Golub: most probably, these species were originated from the same (or close) species of sections *Malacanthae* and *Stenopoa*. Now they both belong to section *Poastena*. 2n = 7x, 8x.

*** *Poa khokhrjakovii* Prob., 2n = c. 70 (AS)**

Russia, the Far East, Kamchatskii Krai, Koryakskii national'nyi okrug, Penzhinskii Raion, 3 km S of Kamenskoe settlement, rubbly slope of a hill, the upper one third, 22 Jul 1971, coll. N.S. Probatova & V.P. Seledets 3291: **6**. Dry stony slopes, in the middle and upper mountain belts. RFE (the basins of Penzhina, Omolon, Kolyma rivers). Endemic. Closely relative to *P. malacantha* Kom., but differs by narrow leaf blades, loose tufts with acute subterranean shoots, the sheaths of old leaves thin, light (and not thick, brownish), panicle branches very thin, smooth, lemmas almost glabrous between veins. First CN count for the species. 2n = 10x.

*** *Poa krasnoborovii* Stepanov, 2n = 42 (ER)**

Russia, East Siberia, Krasnoyarskii Krai, Ermakovskii Raion, the Us River above the mouth of the Tsap River and below the Verkh'naya Buyba River, the *Pinus* and *Picea* forest plots on the riverside, 19 Aug 2010, coll. N.V. Stepanov 12490: **36**. This species, perhaps endemic, is concerned with coniferous forests of the West Sayan Mts, where it occurs in tallgrass clearings. The species belongs to the *Poa pratensis* group, plants are tall, leaf blades up to 8 mm width, more or less rigid, ligules up to 5 mm, panicles up to 25 sm, oblong, their branches rather long, spikelets up to 8.5 mm. This is the first CN count for the species. 2n = 6x.

CONCLUSION

The 35 species presented here demonstrate the diversity of CNs: different ploidy levels, a series of basic CN numbers (2x – 10x; x = 7, 9, 13). The diploids prevail (14 species, ca. 40 %), but only 7 species among them are primary diploids (2n = 14, x = 7), namely in *Festuca*, *Bromopsis*, *Beckmannia*. Also there are species with variable ploidy (sometimes – expected), especially in *Poa* and in some *Deschampsia*. This

phenomenon obviously indicates progressive species. The tetraploid CNs (2n = 4x) show the evolutionary optimal ploidy level for species in their taxonomic groups. The hexaploid CN (2n = 6x) may indicate the hybrid origin of the taxa. 9 species were studied caryologically for the first time, besides for 3 species the new CN data were obtained. Further CN studies on the *Poaceae* family in Russia are in process.

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