Russian Academy of Sciences
Far Eastern Branch
Botanical Garden-Institute
Institute of Biology and Soil Science

botanica pacifica

A JOURNAL OF PLANT SCIENCE AND CONSERVATION

VOLUME 2, NO. 1 2013

VLADIVOSTOK 2013

Botanica Pacifica

A JOURNAL OF PLANT SCIENCE AND CONSERVATION
VOLUME 2, NO. 1 2013

Издание зарегистрировано Федеральной службой по надзору в сфере связи, информационных технологий и массовых коммуникаций Министерства связи и массовых коммуникаций Российской Федерации за № ПИ № ФС 77–52771

Botanica Pacifica (BP) publishes peer-reviewed, significant research of interest to a wide audience of plant scientists in all areas of plant biology (structure, function, development, diversity, genetics, evolution, systematics), organization (molecular to ecosystem), and all plant groups and allied organisms (cyanobacteria, fungi, and lichens). Indexed by Russian Science Citation Index (http://elibrary.ru/title_about.asp?id=34460)

Botanica Pacifica (BP) публикует результаты исследований, прошедших независимую экспертизу и представляющих значительный интерес широкому кругу ботаников во всех областях науки о растениях (структура, функции, развитие, разнообразие, генетика, эволюция и систематика), на всех уровнях организации живого (от молекулярного до экосистемного), по всем группам растений и родственным организмам (цианобактерии, грибы и лишайники). Индексируется Российским индексом научного цитирования (http://elibrary.ru/title_about.asp?id=34460)

ISSN: 2226-4701

Journal Secretariat:

Botanica Pacifica
Botanical Garden-Institute FEB RAS
Makovskii Str. 142
Vladivostok 690024 RUSSIA

http://www.geobotanica.ru/bp

botanica.pacifica@icloud.com
krestov@biosoil.ru
v_bak@list.ru

Chromosome Numbers of Some Vascular Plant Species from the Islands of Peter the Great Bay (Sea of Japan)

Nina S. Probatova[1], Vitaly P. Seledets[2], Elvira G. Rudyka[1] & Ekaterina P. Kudryavtseva[2]

Nina S. Probatova [1, *]
probatova@ibss.dvo.ru

Vitaly P. Seledets [2]

Elvira Rudyka [1]

Ekaterina P. Kudryavtseva [2]

[1] Institute of Biology & Soil Science FEB RAS
Vladivostok 690022 Russia

[2] Pacific Geographical Institute FEB RAS
Vladivostok 690022 Russia

* corresponding author

Manuscript received: 28.02.2013
Review completed: 15.03.2013
Accepted for publication: 16.04.2013

ABSTRACT

Chromosome counts were made for 67 vascular plant species from the islands of Peter the Great Bay (Sea of Japan), including representatives of the families Alliaceae, Apiaceae, Asteraceae, Betulaceae, Brassicaceae, Campanulaceae, Caryophyllaceae, Convallariaceae, Crassulaceae, Cyperaceae, Fabaceae, Gentianaceae, Hemerocallidaceae, Lamiaceae, Liliaceae, Onagraceae, Poaceae, Polygonaceae, Ranunculaceae, Rosaceae, Rubiaceae, Valerianaceae, Violaceae. First chromosome information for *Dontostemon dentatus* (Bunge) Ledeb. is given. New cytotypes for *Neoussuria firma* (Siebold et Zucc.) Tzvel., *Eriophorum russeolum* Fries. were revealed. In many species first chromosome data for the islands of Peter the Great Bay are obtained. Alien species *Galium mollugo* L. is studied in the Russian Far East for the first time. Among species studied the diploids (2x) prevail.

Keywords

chromosome numbers, vascular plants, flora, islands of Peter the Great Bay, Russian Far East, Primorskii krai, Sea of Japan

РЕЗЮМЕ

Пробатова Н.С., Селедец В.П., Рудыка Э.В., Кудрявцева Е.П. Хромосомные числа видов сосудистых растений островов залива Петра Великого

Приводятся новые определения чисел хромосом для 67 видов сосудистых растений с островов залива Петра Великого (Японское море), из семейств: Alliaceae, Apiaceae, Asteraceae, Betulaceae, Brassicaceae, Campanulaceae, Caryophyllaceae, Convallariaceae, Crassulaceae, Cyperaceae, Fabaceae, Gentianaceae, Hemerocallidaceae, Lamiaceae, Liliaceae, Onagraceae, Orchidaceae, Poaceae, Polygonaceae, Ranunculaceae, Rosaceae, Rubiaceae, Valerianaceae, Violaceae. Впервые исследован *Dontostemon dentatus* (Bunge) Ledeb., новые цитотипы выявлены у *Neoussuria firma* (Siebold et Zucc.) Tzvel., *Eriophorum russeolum* Fries. Многие виды на островах залива Петра Великого изучены впервые. Адвентивный вид *Galium mollugo* L. впервые исследован на российском Дальнем Востоке. Среди исследованных видов преобладают диплоиды.

Ключевые слова

числа хромосом, сосудистые растения, флора, острова залива Петра Великого, российский Дальний Восток, Приморский край, Японское море

The chromosome studies on vascular plants of the islands of Peter the Great Bay (PGB) (Table 1, Fig. 1) began about 40 years ago (see in: Agapova et al. 1990, 1993). Special papers on chromosome numbers (CN) of plants in the islands of PGB were published (Probatova & Sokolovskaya 1981, 1983, Probatova, Rudyka, Sokolovskaya 1998). Since that, many additional data on CN from the PGB islands appeared (Probatova & Sokolovskaya 1989, 1990, 1995, Sokolovskaya et al. 1989, Alexeev et al. 1990; and others). In the book entitled "Vascular plants of the islands of Peter the Great Bay, the Primorskii Krai" (Probatova, Seledets et al. 1998) the data on CN were first summarized as 204 species of vascular plants with CN from the PGB islands. In 2009, there were already 334 species with CN studied from these islands (Probatova et al. 2009).

Here we present some results of this study, which remained unpublished. Chromosome countings were made by E.G. Rudyka, in few specimens – by S. A. Shatalova (Sh) and A. A. Gnutikov (Gn), on squashed preparations of root tips fixed with Carnoy's solution. The root tips were taken from living plants

Table 1 Names of the islands in the Peter the Great Bay and their geographic positions

Island name	Code	Coordinates of midpoint	
		Latitude	Longitude
Reineke	**REI**	42°54'39"	131°43'49"
Russkii	**RUS**	43°00'00"	131°50'45"
Klykova	**KLY**	42°56'04"	131°46'53"
Popova	**POP**	42°57'42"	131°50'45"
Eleny	**ELE**	43°03'48"	131°49'59"
Putyatina	**PUT**	42°51'25"	132°25'47"
Stenina	**STE**	42°43'27"	131°30'34"
Lissii	**LIS**	42°45'36"	132°54'22"
De-Livrona	**DLI**	42°41'36"	131°22'04"
Gerassimova	**GER**	42°54'48"	131°27'59"
Durnovo	**DUR**	42°40'20"	131°21'42"
Naumova	**NAU**	42°56'47"	131°46'01"
Askold	**ASK**	42°45'50"	132°20'26"
Rechnoi	**REC**	43°16'45"	131°49'50"
Rikorda	**RIK**	42°52'41"	131°39'39"
Bolshoi Pelis	**BPE**	42°39'28"	131°27'36"
Maliy	**MAL**	42°48'23"	131°26'56"
Kekur Kentavr	**KEN**	42°40'42"	131°25'28"
Matveeva	**MAT**	42°40'02"	131°25'50"

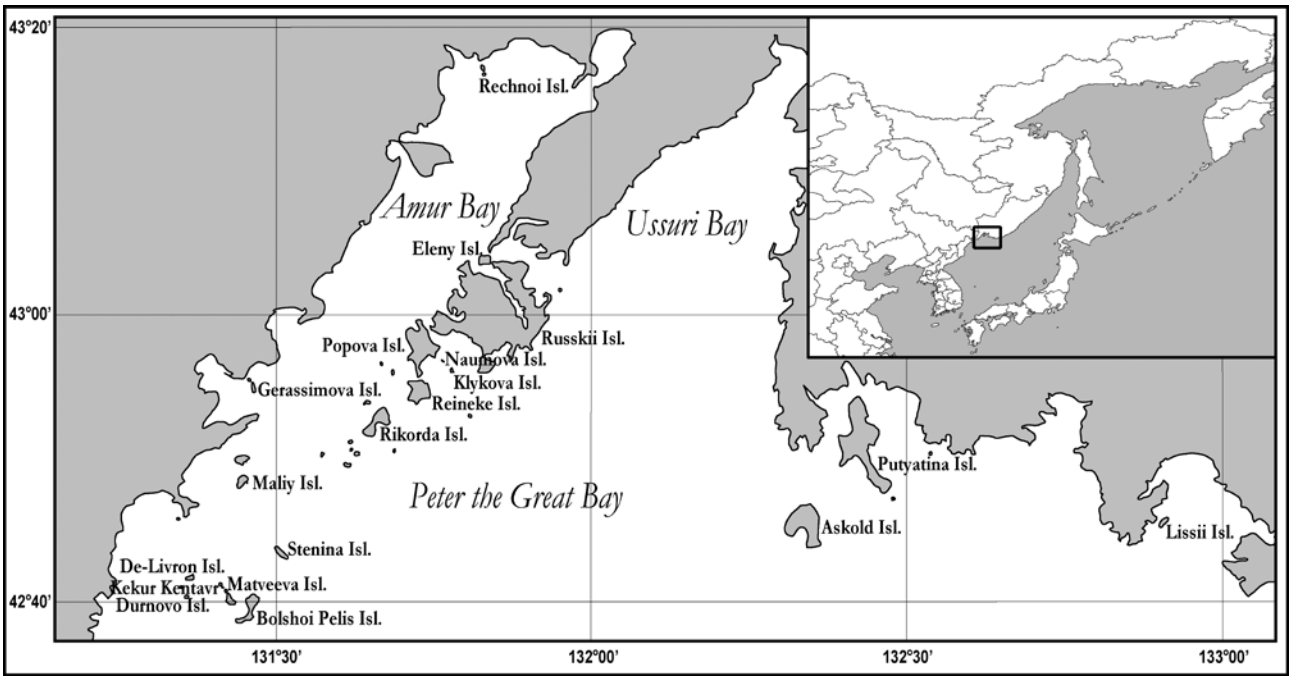

Figure 1 Sketch of the Islands in the Peter the Great Bay, Sea of Japan

or seedlings grown from seeds obtained in herbarium specimens, which were collected in the field by the authors. Preparations were stained with iron hematoxylin. Voucher specimens are preserved in the Herbarium VLA, Vladivostok. The paper, with English translation, was prepared by N. S. Probatova. First chromosome data for the species or new CN are indicated by **(*)**, first CN count from PGB islands – by **(!).** Alien (adventive) species are indicated by **(+)**. The ploidy levels are given. The information about distribution of the species studied on the islands was taken from Probatova, Seledets et al. (1998), Nedoluzhko & Denisov (2001), Chubar' et al. (2004).

ALLIACEAE

Allium macrostemon Bunge, **2n = 32.**

REI, S coast, wet meadow, 2 Oct 2001, Probatova & Seledets 8669. The species is not rare in the islands of PGB, but from **REI** it is reported for the first time. The CN 2n = 32 is known from many localities in the Primorskii Krai (PK). 2n = 4x. However, in **RUS** the CN 2n = 48 (6x) was revealed (Probatova, Rudyka & Sokolovskaya 1998).

(!) ***Allium ramosum*** L. (*A. odorum* L.), **2n = 32.**

REI, central part, 15 Sep 1995, Kudryavtseva 7609. The species is rare on PGB islands, and it is reported from **REI** for the first time. This is the first chromosome contribution for *A. ramosum* from these islands. The chromosome number 2n = 32 is known either from the continental part of the PK. 2n = 4x.

Allium spirale Willd. ex Schlecht., **2n = 32.**

KLY, 30 Jun 2000, Prosorova 8177, 8178; **RUS**, Boyarin Bay, northern cape, marine terrace, 24 Sep 1999, Probatova & Seledets 7933. The same CN for this species was obtained earlier from many islands of PGB: **POP**, **ELE**, **KLY**, **MAL**, **STE**, **BPE**, **KEN** (2n = 32, Probatova, Rudyka & Sokolovskaya 1998; Shatalova 2000; Probatova, Rudyka et al. 2008; Probatova, Seledets, Gnutikov et al. 2008), as well as from continental coast in the south of PK. One of the most common species of *Allium* in the islands of PGB, which prefers coastal slopes and rocks. The general area of distribution of *A. spirale* is still unclear. Unlike the close relative and more widely distributed, polymorphic species *A. senescens* L., *A. spirale* has the only one CN. 2n = 4x.

APIACEAE

Heracleum dissectum Ledeb., **2n = 22.**

RUS, Shiguino, on the slope, 22 Aug 2011, Rudyka 11921. The species is common on the islands of PGB. Its CN was studied earlier from **KLY**: 2n = 22 (Probatova, Seledets, Gnutikov et al., 2008). 2n = 2x.

ASTERACEAE

Adenocaulon adhaerescens Maxim., **2n = 46.**

RUS, Shiguino, forest on the slope, 22 Aug 2011, Rudyka 11893. This is the second CN count from **RUS** (2n = 46, Probatova, Seledets & Rudyka 2008). This forest species expands on the islands of PGB, but it is not registered yet in the protected islands of the Far East Marine biosphere reserve. 2n = 2x.

Artemisia keiskeana Miq., **2n = 18.**

ELE, central part, oak forest, 19 Sep 1997, Probatova & Seledets 7435. The CN was also studied in **RUS** (2n = 18, Probatova, Rudyka et al. 2008). The species occurs in forests of southern PK. Rather common on the islands of PGB. 2n = 2x.

Artemisia littoricola Kitam., **2n = 36.**

LIS (Nakhodka Bay), 11 Sep 2002, Nechaev 8908; **RUS**, 13 Oct 2000, Rudyka 8457; **RUS**, Shiguino, sea coast, 22 Aug 2011, Rudyka 11894. The CN was reported earlier from **ELE** and **MAL** (2n = 36, Probatova, Seledets & Rudyka 2008; Probatova, Rudyka et al. 2008). Sea coastal species, very common in the islands of PGB, on coastal rocks. 2n = 4x.

(!) ***Artemisia selengensis*** Turcz. ex Bess., **2n = 36.**

ELE, Larionova Cape, at the bottom of coastal slope, among tall herbs, 19 Sep 1997, Probatova & Seledets 7579. First CN report from the islands of PGB. The CN in this species (2n = 36) is constant (Korobkov et al. 2012). The species is not common in PGB islands. 2n = 4x.

Aster ageratoides Turcz., **2n = 18.**

RUS, Shiguino, forest on the slope, 13 Sep 2012, Rudyka 12184. It was already studied on **RUS**, as well as on **POP** and **ELE** (2n = 18), but on **BPE** – 2n = 18 + 0 – 2B (Probatova & Sokolovskaya 1981; Shatalova 2000; Probatova, Seledets & Rudyka 2008). In the continental coast of PK the CN of this species was the same. Common species of *Aster* on the islands of PGB, in forests. 2n = 2x. However, in Japan this species is known as very polymorphic, also in CN (Nishikawa 2008).

Carduus crispus L., **2n = 16+0-2B.**

LIS, at the bottom of a slope, on coastal pebbles, 11 Sep 2002, Nechaev 9328. In this species the following CN were revealed on the islands of PGB: 2n = 16 – from **RUS**, **KLY** and **DLI**, and 2n = 18 from **POP** (Probatova & Sokolovskaya 1981, Shatalova 2000, Probatova, Seledets, Gnutikov et al. 2008). 2n = 2x. The species is not rare in the islands.

Carpesium triste Maxim., **2n = 40.**

RUS, Shiguino, forest on the slope, 13 Sep 2012, Rudyka 12186. The CN of this forest species was also studied from **POP** (2n = 40, Probatova & Sokolovskaya 1981). 2n = 4x.

Chorisis repens (L.) DC., **2n = 16.**

GER, N part, seaside, on pebbles, 20 Sep 2004, Burundukova 9525. The CN was also revealed from **POP** and **DUR** (2n = 16, Probatova & Sokolovskaya 1981). 2n = 2x. Coastal species, very common in the PGB islands.

Crepidiastrum denticulatum (Houtt) Pak et Kawano (*Paraixeris denticulata* (Houtt) Nakai), **2n = 10.**

GER, western bay, at the bottom of a slope, 20 Sep 2004, Burundukova 9519. Earlier the CN data were obtained from **RUS** and **ELE** (2n = 10, Probatova, Rudyka et al. 2008). 2n = 2x. Forest edges, rocks.

Heteropappus saxomarinus Kom., **2n = 18** (Sh.).

ELE, Larionova Cape, rubbly slope, 19 Sep 1997, Probatova & Seledets 7823. Earlier the CN data were revealed from **RUS** and **POP** (2n = 18, Probatova & Sokolovskaya 1983, Probatova, Rudyka et al. 2008). 2n = 2x. Coastal species, common on the PGB islands.

Kalimeris incisa (Fisch.) DC., **2n = 18.**

RUS, Shiguino, forest on the slope, 13 Sep 2012, Rudyka 11915. The species was also studied from **ELE** (2n = 18, Probatova, Seledets & Rudyka 2008). 2n = 2x. This forest species obviously is not common on the islands, perhaps, neglected on many of them.

+*Leontodon autumnalis* L., **2n = 12.**

REI, roadside near the settlement, 2 Oct 2001, Probatova & Seledets 8646. The species was also studied from **RUS** (2n = 12, Probatova, Rudyka & Sokolovskaya 1998). 2n = 2x. This adventive species was not reperted from **REI** before. It is not expanded widely on the PGB islands.

(!)+ *Phalacroloma septentrionale* (Fern. et Wieg.) Tzvel., **2n = 18.**

RUS, Shiguino, near the path, 22 Aug 2011, Rudyka 11917. 2n = 2x. However, this species is known to be variable in CN, so further studies in the islands are needed. It is hitherto known from **RUS** only.

(!)+ *Phalacroloma strigosum* (Muehl. ex Willd.) Tzvel., **2n = 27.**

REI, on the way to the central part of the island, roadside, 26 Aug 1999, Probatova & Seledets 8120. 2n = 3x. This weedy species is also known to be variable in CN, so further studies in the islands are needed. Not common on the PGB islands.

(!)+ *Taraxacum officinale* Wigg., **2n = 16.**

RUS, Rynda Bay, supralittoral zone, 7 Oct 2004, Seledets 9567 (9746). The same CN was recently revealed in the PK, near Nakhodka (Probatova et al. 2013). 2n = 2x. However, this species is known to be polymorphic in CN.

BETULACEAE

(!) *Betula davurica* Pall., **2n = 56.**

REI, central part of the island, oak forest, 15 Sep 1995, Kudryavtseva 7695. 2n = 4x. The first species of *Betula* with CN studied on the PGB islands.

BRASSICACEAE

(!)* *Dontostemon dentatus* (Bunge) Ledeb., **2n = 14.**

REI, central part of the island, rubbly deposits, 15 Sep 1995, Kudryavtseva 7580. Very common on PGB islands, but CN of the species was not studied before. 2n = 2x.

CAMPANULACEAE

(!) *Campanula cephalotes* Nakai, **2n = 34.**

RUS, the watershed of the Voyevoda and Boyarin Bays, forest edge, 24 Sep 1999, Probatova & Seledets 7961. Common species on the islands. The CN of this forest species was reported from the Kedrovaya Pad' nature reserve, south of PK (2n = 34, Probatova, Rudyka et al. 2008). 2n = 2x.

CARYOPHYLLACEAE

Cucubalus japonicus (Miq.) Worosch., **2n = 24.**

LIS, 10 Sep 2002, Nechaev 9335. The species was also studied from **RUS** and **REI** (2n = 24, Rudyka 1995; Probatova, Seledets & Rudyka 2008). 2n = 2x. Common species on the islands.

Dianthus amurensis Jacques, **2n = 30 (Sh.).**

ELE, Larionova Cape, coastal rocks, 19 Sep 1997, Probatova & Seledets 7421; **RUS**, Shiguino, stony slope, 22 Aug 2011, Rudyka 12075. The same CN was revealed in **RUS** and **MAL** (Probatova & Sokolovskaya 1983; Probatova, Seledets, Gnutikov et al. 2008). 2n = 2x. Very common species in the islands, on rocky slopes.

Dianthus barbatus L., **2n = 30.**

LIS, coastal rocks, 11 Sep 2002, Nechaev 9327. The same CN was revealed in **REI** (Probatova & Sokolovskaya 1981). 2n = 2x. Not common on the islands.

(!) *Neoussuria firma* (Siebold et Zucc.) Tzvel. (*Melandrium firmum* (Siebold et Zucc.) Rohrb.), ***2n = 24.**

LIS, on rocks in the forest, 11 Sep 2002, Nechaev 9336. 2n = 2x. This species was known as polyploid in the Amur River basin (2n = 48, Probatova & Sokolovskaya 1995).

CHENOPODIACEAE

(!) *Chenopodium glaucum* L., **2n = 18.**

POP, near Stark settlement, supralittoral zone, 12 Sep 1997, Probatova & Seledets 7594. 2n = 2x. Rather common species on the islands, but often neglected.

CONVALLARIACEAE

Polygonatum odoratum (Mill.) Druce, **2n = 20.**

RUS, Shiguino, forest on the slope of a hill, 22 Aug 2011, Rudyka 11885. Before it was studied from **POP**, **KLY**, **NAU** (2n = 20, Probatova & Sokolovskaya 1981; Probatova, Seledets, Gnutikov et al. 2008). 2n = 2x. Very common on the islands.

CRASSULACEAE

(!) *Aizopsis aizoon* (L.) Grulich (*Sedum aizoon* L.), **2n = 32.**

RUS, Shiguino, the slope of a hill, 22 Aug 2011, Rudyka 11897. Very common on the islands. 2n = 4x (?). However,

this species is polymorphic: from the PK and from the Amur River basin the CN 2n = 64 was also known (Probatova & Sokolovskaya 1995).

Aizopsis litoralis (Kom.) S. Gontch. (*Sedum litorale* Kom.; *S. maximoviczii* auct.), **2n = 32.**

MAL, coastal rocks, 3 Jul 2007, Seledets 10763. 2n = 4x (?). However, this species is also polymorphic: from **RUS** it showed 2n = 64 (Probatova, Rudyka & Sokolovskaya 1998). Coastal species, very common on the islands.

CYPERACEAE

(!) *Eriophorum russeolum* Fries, ***2n = 54.**

ELE, near Larionova Cape, small sphagnum bog, 19 Sep 1997, Probatova & Seledets 7423. 2n = 2x. Rare on the islands.

FABACEAE

(!) *Kummerowia striata* (Thunb.) Schindl., **2n = 20.**

ELE, oak forest on the slope, along the path, 19 Sep 1997, Probatova & Seledets 7569; **REI**, roadside in the settlement, 15 Sep 1995, Kudryavtseva 7570. This species is known to be polymorphic: the CN 2n = 22 was revealed on continental coast of PGB (Sokolovskaya et al. 1989). 2n = 2x.

(!) *Melilotus suaveolens* Ledeb., **2n = 16.**

ELE, central part, tall herbs community near the abandoned building, 19 Sep 1997, Probatova & Seledets 7571. 2n = 2x. The most common species of *Melilotus* on the islands.

Oxytropis ruthenica Vass., **2n = 16.**

RUS, 2 km NW of Vyatlina Cape, marine terrace, on rubbles, 24 Sep 1999, Rudyka 7957; **REI**, Sep 2001, Rykunov 8632. Coastal species, rare on the islands. Endemic. The CN was known from **POP** and **ASK** (2n = 16, see in: Agapova et al. 1990). 2n = 2x.

(!)+ *Trifolium repens* L., **2n = 32.**

RUS, Novik Bay, 2 km E of Podnozhye, coastal zone, 17 Oct 1998, Probatova & Seledets 7816 (Sh.); **REI**, pasture near the settlement, 26 Aug 1999, Probatova & Seledets 7893. 2n = 4x. The species is spreading on the PGB islands.

Vicia amurensis Oett., **2n = 12.**

RUS, 2 km NW of Vyatlina Cape, meadow with shrubs, 24 Sep 1999, Probatova & Seledets 8150. Earlier this species was studied from **ELE** and **BPE** (2n = 12, Rudyka 1988; Shatalova 2000). 2n = 2x.

(!) *Vicia ramuliflora* (Maxim.) Ohwi (*V. baicalensis* auct.),
2n = 12.

ELE, in forest, 19 Sep 1997, Probatova & Seledets 7548. 2n = 2x. The species is known on few islands of PGB.

GENTIANACEAE

(!) *Gentiana triflora* Pall., **2n = 26.**

RUS, the watershed of the Voyevoda and Boyarin Bays, deciduous forest edge, 24 Sep 1999, Probatova & Seledets 7932. 2n = 2x. The species is known on few islands of PGB.

HEMEROCALLIDACEAE

(!) *Hemerocallis middendorffii* Trautv. et C.A. Mey., **2n = 22.**

RUS, Shiguino, lower part of the slope, 22 Aug 2011, Rudyka 11895. 2n = 2x. Common species on the islands of PGB.

LAMIACEAE

(!) *Elsholtzia pseudocristata* Lévl. et Vaniot, **2n = 16.**

REI, roadside near the settlement, 26 Aug 1999, Probatova & Seledets 7900. 2n = 2x. The species is poorly studied caryologically in the RFE.

(!) *Galeopsis bifida* Boenn., **2n = 32.**

REI, waste ground near the settlement, 26 Aug 1999, Probatova & Seledets 8068. 2n = 4x. Common weedy species on inhabited islands of PGB.

Mosla dianthera (Roxb.) Maxim., **2n = 18 (Sh.).**

RUS, 3 km SE of Glavnaya Mt., the edge of the valley *Fraxinus* forest, at the roadside, 17 Oct 1998, Probatova & Seledets 8022. The CN of this species was revealed from **POP** (2n = 18, Probatova, Seledets & Rudyka 2008). 2n = 2x. The species is registered on the inhabited islands of PGB only, perhaps it was neglected on the protected islands.

Scutellaria strigillosa Hemsl., **2n = 16.**

KLY, seacoast, 3 Jul 2007, Seledets 10621. The CN of this species was known from RUS (2n = 16 – Probatova, Rudyka, Sokolovskaya 1998, Shatalova 2000). 2n = 2x. This coastal species also has 2n = 32, in other parts of the PK, so, further studies on the PGB islands are needed. Very common coastal species on the PGB islands.

(!) *Stachys aspera* Michx., **2n = 64.**

REI, moist depression near the settlement, 26 Aug 1999, Probatova & Seledets 7912. 2n = 8x. This species is not common on the PGB islands.

LILIACEAE

Lilium cernuum Kom., **2n = 24.**

LIS, 11 Sep 2002, Nechaev 9330. The species was studied in **RUS** (2n = 24, Probatova, Seledets, Rudyka 2008). 2n = 2x. Very common on the PGB islands.

ONAGRACEAE

(!) *Epilobium maximowiczii* Hausskn., **2n = 36.**

LIS, coastal rocks, 11 Sep 2002, Nechaev 9322. 2n = 4x (?). Rather rare on the PGB islands, perhaps neglected.

(!)+ *Oenothera depressa* Greene, **2n = 14.**

REI, in the *Miscanthus* community, 15 Sep 1995, Kudryavtseva 7581. 2n = 2x. Expanding on the islands and other regions in the RFE.

POACEAE

Elymus woroschilowii Probat. (*E. dahuricus* subsp. *pacificus* Probat.), **2n = 42.**

REC, 9 Aug 2006, Nechaev 10358. The CN of this species was revealed also from **REI**, **RIK**, **MAT** (2n = 42, Probatova, Rudyka & Sokolovskaya 1998). 2n = 6x. Sea coastal species, common on the islands of PGB.

Setaria pachystachys (Franch. et Savat.) Matsum., **2n = 18.**

REI, S coast, supralittoral zone, on pebbles, 2 Oct 2001, Rudyka 8783. The CN of this species was revealed from **ELE** (2n = 18, Probatova, Seledets & Rudyka 2008). 2n = 2x. Sea coastal species.

(!)+ *Setaria pumila* (Poir.) Schult. (*S. glauca* auct.), **2n = 36.**

RUS, at the roadside, 17 Oct 1998, Nedoluzhko 8116. 2n = 4x. This weedy species is still rare on the PGB islands.

(!) *Setaria viridis* (L.) P. Beauv., **2n = 18.**

LIS, 11 Sep 2002, Nechaev 9329. 2n = 2x. Not common, perhaps confused with *S. pachystachys*.

POLYGONACEAE

(!) *Acetosa pratensis* Mill., **2n = 14 (2 sat.).**

RUS, Boyarin Bay, northern cape, marine terrace, meadow with shrubs, 24 Sep 1999, Probatova & Seledets 7995. 2n = 2x. Mostly known from inhabited islands.

(!) *Polygonum arenastrum* Boreau, **2n = 20.**

RUS, Novik Bay, 2 km E of Podnozhye wharf,

supralittoral zone, at the roadside, 17 Oct 1998, Probatova & Seledets 7747. 2n = 2x. Poorly studied species, perhaps polymorphic in CN, but not in the RFE.

Polygonum propinquum Ledeb., **2n = 20.**
RUS, Podnozhye wharf, at the roadside, 24 Sep 1999, Probatova & Seledets 8143. The species was already studied from **RUS** (2n = 20, Probatova, Seledets & Rudyka 2008). 2n = 2x. Poorly studied species, perhaps polymorphic as to CN.

(!)+ *Rumex patientia* L., **2n = 40.**
LIS, 11 Sep 2002, Dolgalyova 9503; **KLY**, sandy-pebble supralittoral zone, 3 Jul 2007, Seledets 10651 (Gn.); **REI**, near the settlement, 26 Aug 1999, Probatova & Seledets 8117; **RUS**, Shiguino, depression on the slope, 22 Aug 2011, Rudyka 11914. 2n = 4x. This weedy species expands quickly on the PGB islands and other regions of the RFE.

Truellum thunbergii (Siebold et Zucc.) Soják, **2n = 40.**
RUS, Shiguino, 22 Aug 2011, Rudyka 11881. The same CN was known from **POP** (Probatova & Sokolovskaya 1981). 2n = 4x. Common on the PGB islands.

RANUNCULACEAE

Ranunculus grandis Honda, **2n = 28.**
POP, near Stark settlement, wet forest, 4 Jun 1978, Probatova & Seledets 4990 (Sokolovskaya et al. 1989 as "*R. stevenii*"). *R. grandis* was also studied from **RUS** (2n = 28, Probatova, Seledets & Rudyka 2008). 2n = 4x. Forest species, often misidentified. It is obviously present on the protected islands, too.

ROSACEAE

Potentilla centigrana Maxim., **2n = 14.**
RUS, near Podnozhye wharf, 500 m to Shiguino, the forest glade, along the rivulet, 28 May 2007, Rudyka 10575. The same CN was revealed from **POP** (Probatova & Sokolovskaya 1981, Shatalova 2000). 2n = 2x. Forest species, perhaps more widely distributed on the PGB islands.

Potentilla cryptotaeniae Maxim., **2n = 14.**
RUS, the watershed of the Voyevoda and Boyarin Bays, forest edge, 24 Sep 1999, Probatova & Seledets 7959; **RUS**, Shiguino, forest on the slope of a hill, 22 Aug 2011, Rudyka 11903; **REI**, central part, 15 Sep 1995, Kudryavtseva 7597 (Sh). This species was also studied on **POP** (2n = 14, Probatova & Sokolovskaya 1983). 2n = 2x. Common species on the PGB islands. Forest edges.

Potentilla fragarioides L., **2n = 14.**
LIS, in the forest, on rocks, 10 Jun 2006, Nechaev 10235; **KLY**, 30 Jun 2000, Prosorova 8174. Earlier this species was studied on **POP** and **NAU** (2n = 14, Probatova & Sokolovskaya 1981). 2n = 2x. Very common species on the PGB islands. Forest edges.

(!)+ *Potentilla supina* L., **2n = 28.**
REI, near the berth, footworn place, 2 Oct 2001, Probatova & Seledets 8647. 2n = 4x. The species is still rare on PGB islands, and it is reported from **REI** for the first time. Disturbed habitats.

(!) *Sanguisorba tenuifolia* Fisch. ex Link, **2n = 28.**
REI, plateau in the central part of the island, 26 Aug 1999, Probatova & Seledets 7906; RUS, 2 km NW of Vyatlina Cape, marine terrace, meadow with shrubs, 24 Sep 1999, Probatova & Seledets 7947. 2n = 4x (?).

(!) *Waldsteinia maximowiczii* (Teppner) Probat., **2n = 28.**
RUS, Shiguino, forest on the slope, 13 Sep 2012, Rudyka 12242. Rare species on the islands: it is hitherto known only from RUS. Forest species. 2n = 4x. Diploid cytotype (2n = 14) also might be found, as in many localities in the PK.

RUBIACEAE

(!)+ *Galium mollugo* L., **2n = 44.**
RIK, 15 Aug 2009, Burundukova 11511. First report of the species in the PGB islands. First CN count for this alien species from the Russian Far East. 2n = 4x.

Galium ruthenicum Willd., **2n = 22.**
MAL, coastal rocks, 3 Jul 2007, Seledets 10626; **KLY**, seacoast, 3 Jul 2007, Seledets 10622. 2n = 2x. However, we obtained 2n = 44 from **NAU** (Probatova & Sokolovskaya 1989).

VALERIANACEAE

(!) *Patrinia rupestris* (Pall.) Dufr., **2n = 22.**
LIS, 11 Sep 2002, Nechaev 8904. 2n = 2x. The species is not common on the PGB islands.

VIOLACEAE

Viola acuminata Ledeb., **2n = 20.**
RUS, the watershed of the Voyevoda and Boyarin Bays, forest edge, 24 Sep 1999, Probatova & Seledets 7970. This species was studied from **REI** and **NAU** (2n = 20), but in **RUS** we revealed once 2n = 40 (Probatova & Sokolovskaya 1983; Probatova et al. 2001, Probatova, Seledets, Gnutikov et al. 2008). 2n = 2x, 4x. Very common on the PGB islands. Forest species. Very polymorphic.

The chromosome numbers of the majority of species in the PGB islands are constant, only few species are characterized by the intraspecific polymorphism (as expected in some cases), which testify about the speciation processes. Alien species are not agressive on the islands, despite of expectation. The specificity of the flora in the PGB islands consists in prevailing of diploid species in comparison with polyploids of higher levels. The East Asian forest species make the main body of the insular flora, and among them many diploid (2x) species are found. The second largest group consists of sea coastal (mostly W Pacific) species, among which the 2x and 4x species prevail. That might testify these 2 groups of species are relatively ancient.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. Vitaly P. Nechaev (Vladivostok) for providing plant material from Lissii and Rechnoi Isls., and to colleagues S. A. Shatalova (Ussuriysk) and A. A. Gnutikov (Saint Petersburg) for some chromosome counts. The study was financially supported by the Russian Foundation for Basic Research (04-04-49750, 07-04-00610 and 11-04-00240, to N.S. Probatova).

LITERATURE CITED

Agapova, N. D., K. B. Arkharova, L. I. Vakhtina, E. A. Zemskova & L.V. Tarvis 1990. *Chromosome numbers in flowering plants of the flora of the USSR: Aceraceae – Menyanthaceae.* Nauka, Leningrad, 509 pp. (in Russian). [Агапова Н.Д., Архарова К.Б., Вахтина Л.И., Земскова Е.А., Тарвис Л.В. 1990. Числа хромосом цветковых растений флоры СССР: семейства Aceraceae – Menyanthaceae. Л.: Наука. 509 с.].

Agapova, N. D., K. B. Arkharova, L. I. Vakhtina, E. A. Zemskova & L.V. Tarvis 1993. Chromosome numbers in flowering plants of the flora of the USSR: Moraceae – Zygophyllaceae. Nauka, St.-Petersburg, 430 pp. (in Russian). [Агапова Н.Д., Архарова К.Б., Вахтина Л.И., Земскова Е.А., Тарвис Л.В. 1993. Числа хромосом цветковых растений флоры СССР: семейства Moraceae – Zygophyllaceae. СПб: Наука. 430 с.].

Alexeev, E. B., A. P. Sokolovskaya & N. S. Probatova 1990. Taxonomy, distribution and chromosome numbers of fescues (*Festuca* L., Poaceae) in the USSR flora, 4. Section *Festuca*: *F. ovina* – *F. filiformis*. *Byulleten Moskovskogo Obshchestva Ispytatelei Prirody, Otdel biologicheskii* 95(4):71–78 (in Russian). [Алексеев Е.Б., Соколовская А.П., Пробатова Н.С. 1990. Таксономия, распространение и числа хромосом овсяниц (*Festuca* L., Poaceae) флоры СССР. 4. Секция *Festuca*: *F. ovina* – *F. filiformis* // Бюл. Моск. общ. испыт. прир. Отд. биол. Т. 95, вып. 4. С. 71–78.].

Chubar', E. A., N. S. Probatova & V. P. Seledets. 2004. Vascular Plants. In: Far East Marine Biosphere Reserve, Vol. 2: Biota (Tyurin A. N., ed.). Vladivostok: Dal'nauka. P. 373-420 (In Russian). [Чубарь Е.А., Пробатова Н.С., Селедец В.П. 2004. Сосудистые растения // Дальневосточный морской биосферный заповедник. Т. II. Биота. Под ред. А.Н. Тюрина. Владивосток: Дальнаука. С. 373-420.

Korobkov, A. A., V. V. Kotseruba, N. S. Probatova & A. A. Gnutikov. 2012. IAPT/IOPB chromosome data 13 (K. Marhold, ed.). Taxon 61 (4): 895-896, E 21–27.

Nedoluzhko, V. A. & N. I. Denisov. 2001. Vascular flora of the Russian Island (Peter the Great Bay, Sea of Japan). Vladivostok: Dal'nauka. 98 pp. (In Russian). [Недолужко В.А., Денисов Н.И. 2001. Флора сосудистых растений острова Русский (залив Петра Великого в Японском море). Владивосток: Дальнаука. 98 с.].

Nishikawa, T. (ed.) 2008 Chromosome atlas of flowering plants in Japan. National Museum of Nature & Science Monographs, 37. Tokyo. 706 pp.

Probatova, N. S., T. A. Bezdeleva, & E. G. Rudyka 2001. Chromosome numbers, taxonomy and geographical distribution of the Far Eastern Viola (Violaceae). Komarov Memorial Lectures (Vladivostok) 48: 85-124 (In Russian). [Пробатова Н.С., Безделева Т.А., Рудыка Э.Г. 2001. Числа хромосом, таксономия и распространение дальневосточных фиалок (Viola, Violaceae) // Комаровские чтения. Владивосток: Дальнаука, Вып. 48. С. 85-124.].

Probatova, N. S., S. G. Kazanovsky, V. Yu. Barkalov, E. G. Rudyka & V. P. Seledets 2013. Chromosome numbers in vascular plants from diverse regions of Russia. Botanicheskii Zhurnal 98 (2): 135-148 (In Russian). [Пробатова Н. С., Казановский С. Г., Баркалов В. Ю., Рудыка Э. Г., Селедец В. П. 2013. Числа хромосом сосудистых растений из разных регионов России // Бот. журн. Т. 98, № 2. С. 135-148.]

Probatova, N. S., E. G. Rudyka, V. P. Seledets, A. E. Kozhevnikov & Z. V. Kozhevnikova 2009. Karyological studies on vascular flora in the basin of Peter the Great Bay, Sea of Japan (the Primorskii Krai). Ecology of Biosystems: problems of study, indication and forecasting. Proceedings of II International scientific practical conference (Astrakhan', 25-30 Aug 2009). Astrakhan': the Astrakhanskii University Publishing House. P. 266-270 (In Russian). [Пробатова Н. С., Рудыка Э. Г., Селедец В. П., Кожевников А. Е., Кожевникова З. В. 2009. Кариологическое изучение сосудистой флоры в бассейне залива Петра Великого, Японское море (Приморский край) // Экология биосистем: проблемы изучения, индикации и прогнозирования. Матер. II Международной научно-практической конференции (г. Астрахань, 25-30 августа 2009 г.). Астрахань: Изд-во АГУ. С. 266-270.]

Probatova, N. S., E. G. Rudyka, V. P. Seledets & V. A. Nechaev 2008. IAPT / IOPB chromosome data 6 (K. Marhold, ed.). Taxon 57 (4): 1268-1271, E4-12.

Probatova, N. S., E. G. Rudyka, & A. P. Sokolovskaya 1998. Chromosome numbers in vascular plants from the islands of Peter the Great Bay and Muravyev-Amursky Peninsula (the Primorsky Territory). *Botanicheskii Zhurnal* 83(5):125–130 (in Russian). [Пробатова Н.С., Рудыка Э.Г., Соколовская А.П. 1998. Числа хромосом сосудистых растений с островов залива Петра Великого и полуострова Муравьева-Амурского (Приморский край) // Бот. журн. 1998. Т. 83, № 5. С. 125–130.].

Probatova, N. S., V. P. Seledets, A. A. Gnutikov & A.V. Shatokhina. 2008. IAPT / IOPB chromosome data 6 (K. Marhold, ed.). Taxon 57 (4): 1272-1273, E12-16.

Probatova, N. S., V. P. Seledets, V. A. Nedoluzhko & N. S. Pavlova 1998. *Vascular plants in the islands of Peter the Great Bay, Sea of Japan (the Primorsky Territory)*. Dalnauka, Vladivostok, 116 pp. (in Russian). [Пробатова Н.С., Селедец В.П., Недолужко В.А., Павлова Н.С. 1998. Сосудистые растения островов залива Петра Великого в Японском море (Приморский край). Владивосток: Дальнаука. 116 с.].

Probatova, N. S., V. P. Seledets, & E. G. Rudyka 2008. IAPT / IOPB chromosome data 5 (K. Marhold, ed.). Taxon 57 (2): 558-562, E16-24.

Probatova, N. S. & A. P. Sokolovskaya 1981. Caryological study on vascular plants from the islands of the Far East state marine reserve. In: *Flowering plants of the islands of the Far East marine reserve* (Y. D. Chugunov, ed.), pp. 92–114, Far East Scientific Center of the USSR Academy of Sciences, Vladivostok (in Russian). [Пробатова Н.С., Соколовская А.П. 1981. Кариологическое исследование сосудистых растений островов Дальневосточного государственного морского заповедника // Цветковые растения островов Дальневосточного морского заповедника. Владивосток: ДВНЦ АН СССР. С. 92–114].

Probatova, N. S. & A. P. Sokolovskaya 1983. New chromosome numbers for vascular plants from the islands of Peter the Great Bay (the Primorsky Territory). *Botanicheskii Zhurnal* 68(12):1655–1662 (in Russian). [Пробатова Н.С., Соколовская А.П. 1983. Новые числа хромосом сосудистых растений с островов залива Петра Великого (Приморский край) // Бот. журн. 1983. Т. 68, № 12. С. 1655–1662.].

Probatova, N. S. & A. P. Sokolovskaya 1989. Chromosome numbers in vascular plants from Primorye, the Amur region, Sakhalin, Kamchatka and the Kuril Islands. *Botanicheskii Zhurnal* 74(1):120–123 (in Russian). [Пробатова Н. С., Соколовская А. П. 1989. Числа хромосом сосудистых растений из Приморья, Приамурья, Сахалина, Камчатки и Курильских островов // Бот. журн. Т. 74, № 1. С. 120–123.].

Probatova, N. S. & A. P. Sokolovskaya 1990. Chromosome numbers in some representatives of the families Asclepiadaceae, Asteraceae, Boraginaceae, Chenopodiaceae, Lamiaceae, Oleaceae, Onagraceae, Scrophulariaceae, Solanaceae, Urticaceae from the Far East of the USSR. Botanicheskii Zhurnal 75 (11): 1619-1623 (In Russian). [Пробатова Н.С., Соколовская А.П. 1990. Числа хромосом некоторых представителей семейств Asclepiadaceae, Asteraceae, Boraginaceae, Chenopodiaceae, Lamiaceae, Oleaceae, Onagraceae, Scrophulariaceae, Solanaceae, Urticaceae с Дальнего Востока СССР // Бот. журн. Т. 75, № 11. С.1619 - 1623.]

Probatova, N. S. & A. P. Sokolovskaya 1995. Chromosome numbers in some vascular plant species of the Russian Far East. *Botanicheskii Zhurnal* 80(3):85–88 (in Russian). [Пробатова Н.С., Соколовская А.П. 1995. Числа хромосом некоторых видов сосудистых растений Российского Дальнего Востока // Бот. журн. Т. 80, № 3. С. 85-88.].

Rudyka, E. G. 1988. Chromosome numbers in some vascular plant species of the Far East of the USSR. Botanicheskii Zhurnal 73, 2, 294-295 (In Russian). [Рудыка Э.Г. 1988. Числа хромосом некоторых видов сосудистых растений Дальнего Востока СССР // Бот. журн. Т. 73, № 2. С. 294-295.]

Rudyka, E. G. 1995. Chromosome numbers in some vascular plant species from the south of the Russian Far East. Botanicheskii Zhurnal 80, 2, 87-90 (In Russian). [Рудыка Э.Г. 1995. Числа хромосом некоторых видов сосудистых растений юга Российского Дальнего Востока // Бот. журн. Т. 80, № 2. С. 87-90.]

Shatalova, S. A. 2000. Chromosome numbers in vascular plants of the Primorsky territory. Botanicheskii Zhurnal 85 (1): 152-156 (In Russian). [Числа хромосом сосудистых растений из Приморского края // Бот. журн. Т. 85, № 1. С. 152-156.].

Sokolovskaya, A. P., N. S. Probatova & E. G. Rudyka 1989. Chromosome numbers in some plant species of the flora of the soviet Far East, from the families Actinidiaceae, Aristolochiaceae, Fabaceae, Ranunculaceae, Saxifragaceae. *Botanicheskii Zhurnal* 74(2):268–271 (in Russian). [Соколовская А.П., Пробатова Н.С., Рудыка Э.Г. Числа хромосом некоторых видов флоры советского Дальнего Востока из семейств Actinidiaceae, Aristolochiaceae, Fabaceae, Ranunculaceae, Saxifragaceae // Бот. журн. 1989. Т. 74, № 2. С. 268–271].