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Chromosome numbers in some vascular plant species from the Crimea

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ABSTRACT

Chromosome numbers (2n) for 42 species of vascular plants of 35 genera from 10 families: Apiaceae: *Myrrhoides*; Asteraceae: *Jurinea*, *Podospermum*, *Pterotheca*, *Steptorhamphus*, *Tragopogon*; Brassicaceae: *Alyssum*, *Camelina*, *Diplotaxis*, *Matthiola*; Caryophyllaceae: *Melandrium*, *Oberna*; Geraniaceae: *Geranium*; Lamiaceae: *Salvia*; Poaceae: *Aegilops*, *Anisantha*, *Arrhenatherum*, *Avena*, *Bromopsis*, *Bromus*, *Dactylis*, *Dasypyrum*, *Hordeum*, *Koeleria*, *Lolium*, *Poa*, *Rostraria*, *Sclerochloa*, *Stipa*, *Trachynia*, *Vulpia*; Rosaceae: *Potentilla*, *Poterium*; Rubiaceae: *Galium*; Violaceae: *Viola*, from Crimean Peninsula and Republic of Crimea are presented. For the Crimean endemic species *Jurinea sordida* Steven, *Salvia rhodantha* Zefir. and *Potentilla jailae* Juz. we studied the CNs for the first time. Most chromosome data are revealed first in Crimean plants.

Keywords: chromosome numbers, vascular plants, flora, Crimean Peninsula, Republic of Crimea, Russia

РЕЗЮМЕ

Пробатова Н.С., Казановский С.Г. Числа хромосом некоторых видов сосудистых растений из Крыма. Приводятся числа хромосом (2n) для 42 видов из 35 родов и 10 семейств: Apiaceae: *Myrrhoides*; Asteraceae: *Jurinea*, *Podospermum*, *Pterotheca*, *Steptorhamphus*, *Tragopogon*; Brassicaceae: *Alyssum*, *Camelina*, *Diplotaxis*, *Matthiola*; Caryophyllaceae: *Melandrium*, *Oberna*; Geraniaceae: *Geranium*; Lamiaceae: *Salvia*; Poaceae: *Aegilops*, *Anisantha*, *Arrhenatherum*, *Avena*, *Bromopsis*, *Bromus*, *Dactylis*, *Dasypyrum*, *Hordeum*, *Koeleria*, *Lolium*, *Poa*, *Rostraria*, *Sclerochloa*, *Stipa*, *Trachynia*, *Vulpia*; Rosaceae: *Potentilla*, *Poterium*; Rubiaceae: *Galium*; Violaceae: *Viola*. Впервые исследованы в кариологическом отношении эндемичные для Крыма виды *Jurinea sordida* Steven, *Salvia rhodantha* Zefir. и *Potentilla jailae* Juz. Большинство данных по числам хромосом приводятся для Крыма впервые.

Ключевые слова: числа хромосом, сосудистые растения, флора, полуостров Крым, Республика Крым, Россия

The original vascular flora of the Crimea, which includes 2536 spontaneous taxa of specific and sub-specific rank, belonging to 760 genera (Yena 2012) is poorly investigated as to chromosome numbers up-to-date, except the representatives of the Poaceae Family (see Prokudin et al. 1977). Besides there are several CN data from Crimea for some species in Tonyan (1968), Patudin et al. (1975), Sokolovskaya & Probatova (1976, 1978), Magulaev (1984, 1986), Glagoleva & Zemskova (1985), Alexeev et al. (1987, 1988), Probatova & Seledets (2008), Probatova et al. (2015, 2016).

We present results of chromosome number (CN) study in 42 species of vascular plants from the Crimean Peninsula (Fig. 1). Plants were collected by S.G. Kazanovsky in the field. As to Poaceae, our contribution continues the recent publications concerning the Poaceae of Russia (Probatova, Seledets & Barkalov 2015; Probatova, Barkalov & Chernyagina 2016; Probatova, Barkalov & Agafonov 2017), and these data will be added to the book "Poaceae of Russia" by Tzvelev & Probatova (in press), from where we took the information about species. Chromosome countings were made on squashed preparations of root tips taken and fixed with Carnoy's solution by N.S. Probatova from seedlings obtained through herbarium specimens. Preparations were stained with iron hematoxylin. Voucher specimens are preserved in the Herbarium VLA, Vladivostok, and in Herbarium IRK, Irkutsk. First CN data for the species are indicated by asterisk (*). The number of the dot on the map follows the number of voucher specimen. Brief information about species studied is given.

APIACEAE

Myrrhoides nodosa (L.) Cannon, **2n = 22**

Republic of Crimea, surroundings of Yalta, Nikita settlement, near Massandra palace, Massandrovskie grottos, 358 m alt., big lumpy rocky outcrops, 5 Jun 2016, coll. S.G. Kazanovsky 13184: **1** (IRK, VLA). Species distribution: Euro-Mediterranean. In light forests, among shrubs, wet places at the rocks, sometimes on roadsides. Described from Italy (Sicily). Monotypic genus. In many cases the CN 2n = 22 is reported in the literature. No previous CN counts from Crimea. Diploid (2x), x = 11.

ASTERACEAE

****Jurinea sordida*** Steven, **2n = 34**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Zolotye Vorota, 226 m alt., dry rocky slope, 27 May 2016, coll. S.G. Kazanovsky 13190: **2** (IRK, VLA). Distribution: endemic of Crimea. On cretaceous limestone rock outcrops. Described from Crimea. In Yena (2012) it was included in *J. roegneri* K. Koch. The close relative *J. mollis* (L.) Rchb. has also 2n = 34 (Marhold et al. 2007), but sometimes 2n = 30, 36 (see Fedorov 1969, Májovský et al. 1987). In polybasic genus *Jurinea* Cass. x = 8, 9, 15, 17 (the basic CNs are given here and after according to Májovský et al. 1987). Diploid (2x), x = 17.

Podospermum laciniatum (L.) DC. (*Scorzonera laciniata* L.), **2n = 14**

Republic of Crimea, Feodossia city, near the Genujezskaya fort, 51 m alt., forb steppe, 26 May 2016, coll. S.G. Kazanovsky 13255: **4** (IRK, VLA). Distribution: Europe, SW Asia. Steppes, stony slopes. Described from W Europe. The CN is constant, there are many reports in the literature (as *Scorzonera* and *Podospermum*): 2n = 14 (IPCN Chromosome Reports: www.tropicos.org). Probably the first CN report from Crimea. Diploid (2x), x = 7.

Pterotheca sancta (L.) C. Koch (*Lagoseris sancta* (L.) K. Malý, *Crepis sancta* (L.) Babc.), **2n = 10**

Republic of Crimea, Sudak town, the Genujezskaya fort, near Konsul'skaya tower, 111 m alt., rocky slope, 29 May 2016, coll. S.G. Kazanovsky 13171: **3** (IRK, VLA); Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Zolotye Vorota, 226 m alt., dry rocky slope with steppe vegetation, 27 May 2016, coll. S.G. Kazanovsky 13200: **2** (IRK, VLA). Distribution: S Europe, Caucasus, SW Asia. Steppes, dry stony slopes and rocks; as alien – in waste places. Described from Middle East. Many CN reports (see Fedorov 1969): 2n = 10 (rarely 2n = 10 +1–2B), but none from Crimea. Diploid (2x), x = 5.

Steptorhamphus tuberosus (Jacq.) Grossh. (*Lactuca tuberosa* Jacq.), **2n = 16**

Republic of Crimea, surroundings of Yalta, near Foros settlement, 145 m alt., *Quercus*, *Pinus* and *Juniperus* forest on the S slope, at the forest road, 11 Jun 2016, coll. S.G. Kazanovsky 13256: **6** (IRK). Distribution: S Europe, SW Asia (mostly Mediterranean). On rocks and screes. Described from S Europe (Greece?). We found 6 reports of 2n = 16 (see Fedorov 1969; IPCN Chromosome Reports: www.tropicos.org). First CN report from Crimea. Diploid (2x), x = 8. In the related genus *Lactuca* the basic CN x = 9.

Tragopogon dubius Scop., **2n = 12**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Zolotye Vorota, 226 m alt., dry rocky slope, 27 May 2016, coll. S. G. Kazanovsky 13187: **2** (IRK, VLA). Distribution: Caucasian-Mediterranean; alien in N America. Stony (limestone) and melkozem slopes and rocks, glades and forest edges, steppes and along roadsides. Described from Italy. Many CN reports in the literature (2n = 12), but none from Crimea. Diploid (2x), x = 6.

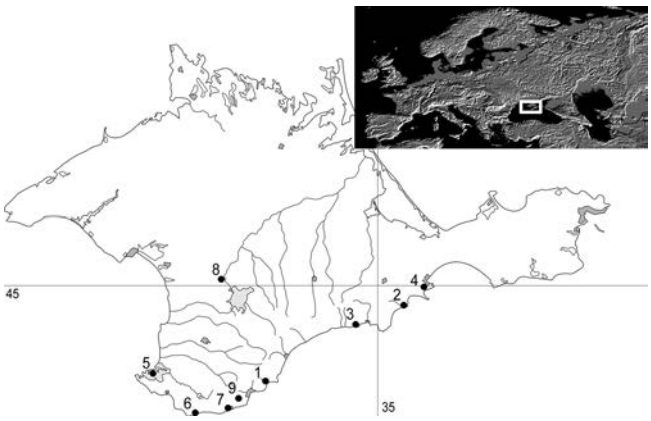

Figure 1 Study area. Dots with numbers from 1 to 9 are the sampling plot locations (according to numbering in the text)

BRASSICACEAE

Alyssum trichostachyum Rupr., **2n = 48**

Republic of Crimea, Sudak town, the Genujezskaya fort, on the slope at the fort wall, 89 m alt., rocky slope, 26 May 2016, coll. S.G. Kazanovsky 13185: **3** (IRK, VLA). Distribution: Crimean–Caucasian. On dry slopes. Described from N Caucasus. For *A. trichostachyum* 2n = 16, 24, 32 were known (see Fedorov 1969), and 2n = 48 was reported from Bulgaria (Anchev 1991 – cit. by Index …, 1994). Perhaps this hexaploid cytotype (2n = 48) is distributed around the Black Sea. The diploid cytotype (2n = 16) was revealed from Krasnodarskii Krai (Magulaev 1984). No previous CN data from Crimea. Hexaploid cytotype (6x), x = 8 (in general – the variable ploidy).

Camelina rumelica Velen., **2n = 12**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Chertov Palets, 374 m alt., grass-forb steppe, 27 May 2016, coll. S.G. Kazanovsky 13203: **2** (IRK). Distribution: S Europe, SW Asia; alien in NW Russia. Steppes, rarely on railroads. Described from Bulgaria. We found only one CN report of 2n = 12 for *C. rumelica*, but also 2n =26 and 40 reported by Májovský et al. (1987). Diploid (2x), x = 6. Polybasic genus (and species ?): x = 6, 10, 13. No CN data reported previously from Crimea.

Diplotaxis tenuifolia (L.) DC., **2n = 22**

Republic of Crimea, Feodossia city, near the Genujezskaya fort, 51 m alt., ruderal vegetation among the ruins of the fort, 26 May 2016, coll. S.G. Kazanovsky 13205: **4** (IRK, VLA). Distribution: Europe, SW Asia; alien elsewhere. On roadsides, in settlements. Described from W Europe. The CN 2n = 22 is the most common for *D. tenuifolia* (see Májovský et al. 1987), and it was revealed also from Krasnodarskii Krai (Magulaev 1984). Diploid (2x), x = 11. No previous CN data from Crimea. Polybasic genus (x = 7, 9, 10, 11).

Matthiola odoratissima (M. Bieb.) W.T. Aiton, **2n = 12**

Republic of Crimea, surroundings of Yalta, Nikita settlement, near Massandra palace, Massandrovskie grottos, 358 m alt., *Pinus* and *Quercus* forest on big lumpy rocky outcrops, 5 Jun 2016, coll. S.G. Kazanovsky 13163: **1** (IRK, VLA). Distribution: S Europe – SW Asia. On clay and

limestone slopes. Described from "Caucasus" and Crimea. *M. odoratissima* was studied from Krasnodarskii Krai and from Republic of Daghestan (2n = 12 – Magulaev 1984). The genus *Mattiola* R. Br. is characterized by x = 6 and 7. Diploid (2x), x = 6.

CARYOPHYLLACEAE

Melandrium latifolium (Poir.) Maire, **2n = 24**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the Biological station, 219 m alt., dry broadleaved (*Pistacia* and *Quercus*) forest, 27 May 2016, coll. S. G.Kazanovsky 13195: **2** (IRK, VLA). Distribution: E European–Caucasian–Mediterranean. In steppes, forest edges and clearings with steppe vegetation, on cretaceous and limestone outcrops, rarely at roadsides. Described from N Africa. There are several CN reports: 2n = 24 (see Marhold et al. 2007 – as *Silene*). No previous CN counts from Crimea. Diploid (2x), x = 12.

Oberna commutata (Guss.) Ikonn., **2n = 24**

Republic of Crimea, surroundings of Yalta, Nikita settlement, near Massandra palace, Massandrovskie grottos, 358 m alt., *Quercus* forest with shrubs on big lumpy placer, 5 Jun 2016, coll. S.G. Kazanovsky 13191: **1** (IRK, VLA). Distribution: Caucasian–Mediterranean. Rocky and loamy slopes, forest edges and clearings. Described from Italy (Sicily). This species is often considered in the genus *Silene*, where 2n = 24 is known in most cases. For *O. commutata* 2n = 24 is known from Armenia (Nazarova & Gukassian 2004 – as Silene). No previous CN counts from Crimea. Diploid (2x), x = 12.

GERANIACEAE

Geranium lucidum L., **2n = 40**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near Biological station, 219 m alt., broadleaved (*Pistacia* and *Quercus*) forest, moist plot, 27 May 2016, coll. S.G. Kazanovsky 13186: **2** (IRK, VLA). Distribution: Europe, Caucasus, SW and Central Asia. In forests, usually on shaded stony slopes, on rocks and screes. Described from Europe. The CN 2n = 40 is the most common for *G. lucidum*, but 2n = 20 also occurs. No previous CN data from Crimea. Tetraploid (4x), x = 10. The genus *Geranium* L. is polybasic (x = 7, 10, 13).

Geranium molle L., **2n = 26**

Republic of Crimea, Sudak town, the Genujezskaya fort, at the wall of the fort, 89 m alt., rocky slope, 26 May 2016, coll. S.G. Kazanovsky 13197: **3** (IRK, VLA). Distribution: Europe, Caucasus, SW Asia; sometimes as alien. Forest glades, steppe stony slopes, on rocks and screes. as a weed in loaded meadows and fields, in settlements, along the roads. Described from Europe. Multiple CN counts give 2n = 26 (see Fedorov 1969, Májovský et al. 1987). No previous CN counts from Crimea. Diploid (2x), x = 13.

Geranium pusillum L., **2n = 26**

Republic of Crimea, Sudak town, the Genujezskaya fort, the rocks near the Konsul'skaya tower, 111 m alt., rocky slope, 29 May 2016, coll. S.G. Kazanovsky 13198: **3** (IRK, VLA). Distribution: E Europe, Caucasus, SW Asia; alien in Arctic Russia and in Urals. Meadow-steppe stony slopes, forest glades, as a weed in disturbed meadows and fields, in settlements and roadsides. Described from Europe. Multiple CN counts: 2n = 26 (see Fedorov 1969, Májovský et al. 1987). No previous CN counts from Crimea. Diploid (2x), x = 13.

LAMIACEAE

****Salvia rhodantha*** Zefir., **2n = 36**

Republic of Crimea, surroundings of Yalta, near Nikita settlement, the coast of the Black Sea, 72 m alt., the *Pinus* and *Juniperus* forest, 3 Jun 2016, coll. S.G. Kazanovsky 13193: **1** (IRK, VLA). Distribution: endemic of Crimea. Described from Crimea (Zefirov 1960). Dry stony slopes, along roads, in coastal zone. In Yena (2012) this species was included in *S. verbenaca* L. However, in *S. verbenaca* 2n = 14 is known (Patudin et al. 1975), and as *S. verbenacea* (?) L. – 2n = 42, 54, 64, also some aneuploids (see Fedorov 1969; IPCN Chromosome Reports: www.tropicos.org.). The CN for *S. rhodantha* is revealed first, on the specimen collected near its "*locus classicus*". Hexaploid (6x), x = 6. Further studies are needed. The genus *Salvia* L. is polybasic (x = 6, 7, 8, 9, 11, 15, 17, 19).

POACEAE

Aegilops ovata L., **2n = 28**

Russia, Crimea Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, near the beach "Solnechnyi", 58 m alt., the grass-forb stony steppe on the slope, 7 Jun 2016, coll. S.G. Kazanovsky 13215: **5** (IRK, VLA); Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near Biological station, 219 m alt., broadleaved (*Pistacia* and *Quercus*) forest, moist plot, 27 May 2016, coll. S.G. Kazanovsky 13234: **2** (IRK, VLA). Distribution: S Europe – SW Asia. On stony and loamy slopes, along roadsides. Described from S Europe. Several CN counts from Crimea: 2n = 28 (see Prokudin et al. 1977). Tetraploid (4x), x = 7.

Anisantha rubens (L.) Nevski, **2n = 28**

Russia, the Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., in the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13240: **5** (IRK, VLA). Distribution: S Europe, SW Asia, N Africa; alien in many other countries. Stony and loamy slopes, sands, screes, along roadsides. Described from Spain. No previous CN counts from Crimea. Tetraploid (4x), x = 7.

Anisantha sterilis (L.) Nevski, **2n = 14**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the Biological station, 219 m alt., dry broadleaved (*Pistacia* and *Quercus*) forest, 27 May 2016, coll. S.G. Kazanovsky 13150: **2** (IRK, VLA).

Anisantha sterilis* var. *velutina (Volkart ex Hegi) Tzvelev, **2n = 14**

Republic of Crimea, Sudak town, the Genujezskaya fort, near Konsul'skaya tower, 111 m alt., at the bottom

of the rock, 29 May 2016, coll. S.G. Kazanovsky 13241: **3** (IRK, VLA). Distribution of the species: Euro-Mediterranean. On the slopes, waste places, along roadsides. Described from Europe. Several CN counts from Crimea: 2n = 14 (see Prokudin et al. 1977). Diploid (2x), x = 7.

Anisantha tectorum (L.) Nevski **var. *hirsuta*** (Regel) Tzvelev, **2n = 14**

Republic of Crimea, Feodossia city, Mitridat Mt., 71 m alt., sight place, the ruderal vegetation, 26 May 2016, coll. S.G. Kazanovsky 13151: **4** (IRK, VLA); Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, near the beach "Solnechnyi", 58 m alt., the grass-forb stony steppe on the slope, 7 Jun 2016, coll. S.G. Kazanovsky 13189: **5** (IRK, VLA); Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., in the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13196: **5** (IRK, VLA). Distribution: Euro-Mediterranean, as alien in many countries and regions throughout the world. On stony and loamy slopes, fixed sands, pebbles, waste places, in steppes, along roadsides. Described from Europe. Several CN counts from Crimea: 2n = 14 (see Prokudin et al. 1977). Diploid (2x), x = 7. Var. *hirsuta* has shortly pubescent lemmas.

Arrhenatherum elatius (L.) P. Beauv. ex J. Presl et C. Presl, **2n = 28**

Republic of Crimea, surroundings of Yalta, near Foros settlement, 102 m alt., *Quercus* forest on the S slope, along the stream, 11 Jun 2016, coll. S.G. Kazanovsky 13156: **6** (IRK, VLA). Distribution: Euro-Mediterranean; cultivated or as alien in many countries. Forest edges and clearings. Described from Europe. Second CN count from Crimea (the first CN on Crimean plants was published in Probatova et al. 2016: 2n = 28). Tetraploid (4x), x = 7.

Avena trichophylla K. Koch, **2n = 42**

Republic of Crimea, surroundings of Yalta, near Foros settlement, 145 m alt., coniferous-broadleaved (*Juniperus*, *Pinus* and *Quercus*) forest on the S slope, forest edge, 11 Jun 2016, coll. S.G. Kazanovsky 13213: **6** (IRK, VLA). Distribution: S Europe – SW Asia. On stony and loamy slopes, in the fields and plantations, waste places, at the roadsides, in settlements. Described from Azerbaidzhan. Second CN count from Crimea (see Prokudin et al. 1977: 2n = 42). Hexaploid (6x), x = 7.

Bromopsis riparia (Rehmann) Holub, **2n = 56** (counted by A.P. Sokolovskaya)

Republic of Crimea, the Ay-Petri yaila, on the slope, 13 Aug 1974, coll. V.V. Fedyajeva 3958 (a): **9** (VLA). Distribution: E Europe – Caucasus – W Siberia – Middle Asia; alien elsewhere. Dry meadows, steppes, forest clearings, among shrubs. Described from S Ukraine. Octoploid cytotype (8x), x = 7; on the whole – variable ploidy (2n = 56, 70, 84 – Roos 1975; Prokudin et al. 1977; Probatova, Seledets, Rudyka et al. 2012). First CN count from Crimea.

Bromus squarrosus L., **2n = 14**

Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., in the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13199: **5** (IRK, VLA). Distribution: Euro-Mediterranean; as alien in many countries and temperate regions. In steppes and semi-deserts, on stony and loamy slopes, sands and gravels, as a weed in plantations, waste places, roadsides, in settlements. Described from Europe. Several CN counts from Crimea (see Prokudin et al. 1977: 2n = 14). Diploid (2x), x = 7.

Dactylis hispanica Roth, **2n = 28**

Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., among the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13237: **5** (IRK, VLA). Distribution: S Europe, SW Asia, N Africa. Stony and loamy slopes, gravels, forest edges, light forests. Described from Spain. The 2n = 28 was already known (see Fedorov 1969). First CN count from Crimea. Tetraploid (4x), x = 7.

Dasypyrum villosum (L.) P. Candargy, **2n =14**

Republic of Crimea, Sudak town, the Genujezskaya fort, on the slope of the fort wall, 89 m alt., grass-forb meadow, 26 May 2016, coll. S.G. Kazanovsky 13230: **3** (IRK, VLA). Distribution: Europe, SW Asia. Stony and loamy slopes, sands, among shrubs, on plantations, in roadsides. Described from Greece. Several CN counts from Crimea (see Prokudin et al. 1977: 2n = 14). Diploid (2x), x = 7.

Hordeum bulbosum L., **2n = 28**

Republic of Crimea, surroundings of Yalta, near Foros settlement, 145 m alt., coniferous-broadleaved (*Juniperus*, *Pinus* and *Quercus*) forest on S slope, 11 Jun 2016, coll. S.G. Kazanovsky 13212: **6** (IRK, VLA). Distribution: S Europe, SW Asia. Open stony and loamy slopes, screes, among shrubs, at roadsides and in plantations. Described from Italy. Two CN counts from Crimea (see Prokudin et al. 1977: 2n = 28). Tetraploid (4x), x = 7.

Hordeum murinum L., **2n = 28**

Republic of Crimea, Feodossia city, Mitridat Mt., 71 m alt., sight place, the ruderal vegetation, 26 May 2016, coll. S.G. Kazanovsky 13214 (13246): **4** (IRK, VLA); Republic of Crimea, surroundings of Yalta, outskirts of Alupka town, the Alupkinskii Palace-Park Museum-Reserve, Vorontsovskii Palace, 15 m alt., the coast of the Black Sea, Aivazovsky rock, among stones, 4 Jun 2016, coll. S.G. Kazanovsky 13243: **7** (IRK, VLA); Republic of Crimea, Simferopol' city, near the airport, as a weed on the lawn, 25 May 2016, coll. S.G. Kazanovsky 13244: **8** (IRK, VLA); Republic of Crimea, Sudak town, the Genujezskaya fort, on the rocks near Konsul'skaya tower, 111 m alt., at the bottom of the rock, 29 May 2016, coll. S.G. Kazanovsky 13245: **3** (IRK, VLA). Distribution: Europe – SW Asia, alien in Caucasus, Altai, in N America and elsewhere in temperate regions. On sands and gravels, at roadsides, in plantations and settlements. Described from Europe. There were no CN data for *H. murinum* from Crimea. The same CN 2n = 28 was revealed from Crimea in closely related *H. leporinum* Link (see Prokudin et al. 1977). The aggregate *H.* aggr. *murinum*, very complicated, needs further studies. Tetraploid (4x), x = 7.

Koeleria brevis Steven (*K. lobata* (M. Bieb.) Roem. et Schult.), **2n = 14** (counted by A. P. Sokolovskaya)

Republic of Crimea, the Ay-Petri yaila, on stony outcrops, 10 Aug 1974, coll. V.V. Fedyajeva 3964: **9** (VLA). Distribution: E Europe (S part). On limestone outcrops, slopes with steppe vegetation, up to the middle mountain belt. Described from Crimea. Diploid (2x), x = 7. However, for *K. lobata* the CN 2n = 70 was reported from Crimea (see Prokudin et al. 1977). The variable ploidy is possible. Further studies of this species are needed.

Lolium loliaceum (Bory et Chaub.) Hand.-Mazz., **2n = 14**

Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, near the beach "Solnechnyi", 58 m alt., the grass-forb stony steppe on the slope, 7 Jun 2016, coll. S.G. Kazanovsky 13232: **5** (IRK, VLA). Distribution: S Europe, SW Asia. In steppes and semi-deserts, on stony and loamy slopes, sands and gravels, in coastal zone. Described from Greece. Multiple authors give 2n = 14 (see Fedorov 1969). There was CN count from Crimea (see Prokudin et al. 1977: 2n = 14). Diploid (2x), x = 7.

Poa angustifolia L., **2n = 56**

Republic of Crimea, Feodossia city, near the Genujezskaya fort, 51 m alt., forb steppe, 26 May 2016, coll. S.G. Kazanovsky 13216: **4** (IRK, VLA). Distribution: Eurasia; alien or introduced in N America and other regions. Dry meadows, steppes, forest clearings, on the slopes, stony outcrops, coastal and streamside sands and pebbles, along roadsides, in settlements. Described from Europe. Many CNs in the abundant literature, in Russia – 2n = 56, 63–64, c. 70, 70, 70–72. The voucher specimen No 13216 has very narrow contracted panicles with almost smooth panicle branches, and filiform leaf blades; perhaps it represents a still unknown Crimean race. Octoploid (8x), x = 7. This CN 2n = 56 is common for *P. angustifolia*, but on the whole this species has variable ploidy. First CN count from Crimea.

Poa crispa Thuill. (*P. bulbosa* var. *vivipara* Koeler), **2n = 28**

Republic of Crimea, Simferopol' city, in vicinity of the airport, as a weed on the lawn, 25 May 2016, coll. S.G. Kazanovsky 13202: **8** (IRK, VLA); Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Zolotye Vorota, 226 m alt., broadleaved forest, 27 May 2016, coll. S.G. Kazanovsky 13242: **2** (IRK, VLA); Republic of Crimea, Sudak town, the Genujezskaya fort, on the rocks near Konsul'skaya tower, 111 m alt., at the bottom of a rock, 29 May 2016, coll. S.G. Kazanovsky 13236: **3** (IRK, VLA). Distribution: predominately Euro-Mediterranean. In steppes and semi-deserts, on stony and loamy slopes, sands and gravels, as alien – at roadsides, in settlements. Described from France. From Crimea 2n = 28 and 42 were reported (see Prokudin et al. 1977). This taxon is usually recognized as a variety of *P. bulbosa* L., though its area of distribution is larger than in *P. bulbosa* s. str.; we agree that it is acceptable to take it as a separate species. Tetraploid (4x), x = 7. On the whole – the variable ploidy (we revealed 2n = 28 and 42 in Russia and adjacent countries).

Rostraria cristata (L.) Tzvelev, **2n = 26**

Republic of Crimea, surroundings of Yalta, outskirts of Alupka town, the Alupkinskii Palace-Park Museum-Reserve, Vorontsovskii Palace, 15 m alt., the coast of the Black Sea, Aivazovsky rock, among stones, 4 Jun 2016, , coll. S.G. Kazanovsky 13235: **7** (IRK, VLA). Distribution: Euro-Mediterranean; alien in other non-tropical countries. Open stony and loamy slopes, sands and gravels, at roadsides. Described from Portugal. First CN count from Crimea. Diploid (2x), x = 13.

Sclerochloa dura (L.) P. Beauv., **2n = 14**

Republic of Crimea, surroundings of Yalta, near Nikita settlement, the Nikitskii Botanical Garden, 19 m alt., on the stony wall, in fissure, 3 Jun 2016, coll. S.G. Kazanovsky 13204: **1** (IRK, VLA); Republic of Crimea, surroundings of Yalta, outskirts of Alupka town, the Alupkinskii Palace-Park Museum-Reserve, Vorontsovskii Palace, 15 m alt., the coast of the Black Sea, Aivazovsky rock, among stones, 4 Jun 2016, coll. S.G. Kazanovsky 13231: **7** (IRK, VLA). Distribution: Euro-Mediterranean; alien in other non-tropical countries. Weedy meadows, pastures, steppe slopes, on plantations, at roadsides and in settlements. Described from S Europe. The species was studied from Turkmenistan and Armenia: 2n = 14 (Sokolovskaya & Probatova 1978; Nazarova & Gukassian 2004). Before there were no CN counts from Crimea. Diploid (2x), x = 7.

Stipa tirsa Steven (*S. longifolia* Borbás), **2n = 44**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Chertov Palets, 374 m alt., grass-forb steppe, 27 May 2016, coll. S.G. Kazanovsky 13220: **2** (IRK, VLA). Distribution: Europe,W Siberia. Steppes, forest edges and clearings with steppe vegetation, stony slopes. Described from Ukraine. In Crimea – 2n = 44 (see Prokudin et al. 1977). Tetraploid (4 x), x = 11.

Trachynia distachya (L.) Link, **2n = 10**

Russia, Crimea Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., in the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13149: **5** (IRK, VLA). Distribution: Europe, SW and S Asia, N and S Africa. On stony and loamy slopes, rocks, screes and pebbles. Described from SW Asia. The same CN (2n = 10) we revealed in Daghestan, Azerbaidzhan and Turkmenistan; however in Turkmenistan the species also showed 2n = 28, 30 (Sokolovskaya & Probatova 1978; Probatova & Seledets 2008). Two CN counts from Crimea (2n = 10 – see Prokudin et al. 1977). Variable ploidy, with different basic numbers (x = 5, 7). Perhaps these cytotypes have their own areas of distribution. Diploid (2x), x = 5.

Vulpia ciliata Dumort., **2n = 28**

Russia, Crimean Peninsula, Sevastopol' city, the historical-archaeological state museum-reserve Khersones Tavricheskii, 55 m alt., in the ruins of the ancient settlement, 7 Jun 2016, coll. S.G. Kazanovsky 13211: **5** (IRK, VLA). Distribution: Euro-Mediterranean. On stony and loamy slopes, on sands and pebbles, in plantations, at roadsides, in

settlements. Described from Balkan Peninsula. Several CN counts from Crimea (2n = 28 – see Prokudin et al. 1977). Tetraploid (4x), x = 7.

ROSACEAE

Potentilla jailae Juz. (*P. rupestris* subsp. *jailae* (Juz.) Soják), **2n = 14**

Republic of Crimea, Sudak town, the Genujezskaya fort, on the rocky slope near Konsul'skaya tower, 111 m alt., 29 May 2016, coll. S.G. Kazanovsky 13207: **3** (IRK, VLA); Republic of Crimea, surroundings of Yalta, Nikita settlement, near Massandra palace, Massandrovskie grottos, 358 m alt., *Pinus* and *Quercus* forest, 5 Jun 2016, coll. S.G. Kazanovsky 13206: **1** (IRK, VLA). Distribution: Crimean endemic. Pine forests on the slopes, mountain pastures (in Crimea). Diploid (2x), x = 7. Its closely relative species – *P. rupestris* L., also with 2n = 14 (see Májovský et al. 1987). First CN count for the species.

Poterium polygamum Waldst. et Kit., **2n = 28**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the rock Zolotye Vorota, 226 m alt., dry rocky slope, 27 May 2016, coll. S.G. Kazanovsky 13180: **2** (IRK); Republic of Crimea, surroundings of Yalta, near Foros settlement, 145 m alt., coniferous-broadleaved (*Quercus* and *Juniperus*) forest on the S slope, 11 Jun 2016, coll. S.G. Kazanovsky 13233: **6** (IRK, VLA). Distribution: E Mediterranean. On the slopes of hills, on the rocks, the edges of pine forests, among shrubs, in sibljak, and in disturbed habitats. Described from Hungary and Romania. 2n = 16 (?), 28 (Stavropol'skii Krai, Daghestan – see Agapova et al. 1993). First CN count from Crimea. Tetraploid (4x), x = 7.

RUBIACEAE

Galium aparine L., **2n = 44**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the Biological station, 219 m alt., broadleaved (*Pistacia* and *Quercus*) forest, moist plot, 27 May 2016, coll. S.G. Kazanovsky 13182: **2** (IRK, VLA). Distribution: Euro-Mediterranean; alien in NW Russia, Central Asia, Siberia and N America. As a weed in crops, vegetable gardens, railway embankments, waste places. Described from Europe. Several cytotypes (variable ploidy): 2x, 4x, 6x, 8x and aneuploids (see Fedorov 1969; Májovský et al. 1987). From Crimea this species was studied first. We revealed tetraploid cytotype – 4x (x = 11).

Galium verticillatum Danthoine ex Lam., **2n = 22**

Republic of Crimea, surroundings of Yalta, Nikita settlement, near Massandra palace, Massandrovskie grottos, 358 m alt., *Quercus* forest with shrubs on big lumpy placer, 5 Jun 2016, coll. S.G. Kazanovsky 13194: **1** (IRK, VLA). Distribution: E Mediterranean, Caucasus, Asia Minor. Stony steppes, mountain slopes, foothills. Described from Italy (Sicily). We found the only one CN report (see Fedorov 1969) for this species (2n = 22). In Crimea the species was studied first. Diploid (2x), x = 11.

VIOLACEAE

Viola arvensis Murray, **2n = 34**

Republic of Crimea, surroundings of Feodossia, Kurortnoe settlement, the Karadagskii nature reserve RAS, near the Biological station, 219 m alt., broadleaved (*Pistacia* and *Quercus*) forest, moist plot, 27 May 2016, coll. S.G. Kazanovsky 13208: **2** (IRK, VLA). Distribution: Europe, alien in Asia (Asia Minor, Central Asia, Siberia, Russian Far East) and N America. Meadows, forest clearings; as a weed in plantations and roadsides. Described from Europe. Multiple CN counts give 2n = 34. In Crimea the species was studied first time. Diploid (2x), x = 17. The genus *Viola* L. is polybasic (x = 5, 6, 8, 11, 13, 17, 29).

CONCLUSION

Many species were poorly studied as to their CNs, and nearly 66 % of them were not investigated earlier from Crimea. From 42 species most part (22) are diploids or presented by diploid cytotypes, 14 species are tetraploids. The prevalence of diploids indicates the relatively ancient flora. The variable ploidy is obvious in *Alyssum trichostachyum*, *Camelina rumelica*, *Geranium lucidum*, *Poa crispa*, *P. angustifolia*, *Galium aparine* and, without doubt, it might be observed in some more species. In many genera the polybasic situation is known. Most of the species need further karyological studies in the Crimean Peninsula.

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