

In memory of our colleague, Nina Sergeevna Probatova (August 2, 1939–March 3, 2023)

## CHROMOSOME NUMBERS OF SOME ASTERACEAE TAXA OF THE OLD AND NEW WORLD

© 2023 г. D. A. Krivenko<sup>1,\*</sup> and Yu. K. Vinogradova<sup>2,\*\*</sup>

<sup>1</sup>Siberian Institute of Plant Physiology and Biochemistry SB RAS  
Lermontov Str., 132, Irkutsk, 664033, Russia

<sup>2</sup>N.V. Tsytsin Main Botanical Garden RAS  
Botanicheskaya Str., 4, Moscow, 127276, Russia

\*e-mail: krivenko.irk@gmail.com

\*\*e-mail: gbsad@mail.ru

Received February 23, 2023; Revised February 27, 2023; Accepted February 28, 2023

The chromosome numbers ( $2n$ ) and ploidy level ( $nx$ ) according to the inferred basic chromosome number ( $x$ ) are presented for 35 species, subspecies, nothospecies as well as hybrids from 17 genera of the family Asteraceae (Compositae): *Aster* (1), *Amberboa* (1), *Carduus* (1), *Centaurea* (4), *Cirsium* (1), *Crepis* (1), *Erigeron* (5), *Hieracium* (1), *Hypochaeris* (1), *Leontopodium* (1), *Pilosella* (1), *Scorzoneroides* (1), *Solidago* (9), *Sonchus* (2), *Taraxacum* (2), *Tragopogon* (2), and *Tripleurospermum* (1). The studied specimens originated from Europe (European part of Russia, France and United Kingdom including the Crown Dependencies), Caucasus (Armenia and Russia), Central Asia (Tajikistan), Siberia (Irkutsk Region and Republic of Buryatia), Russian Far East (Primorye Territory), and North America (United States). The chromosome number was for the first time established in *Centaurea cheiranthifolia* subsp. *willdenowii* ( $2n = 18 + 0 - 2B$ ). A new chromosome number was found in *Solidago* × *snarskisii* ( $2n = 36$ ). For the other taxa, previously known chromosome numbers have been confirmed.

**Keywords:** diploid, triploid, polyploid, chromosomal races, vascular plants

**DOI:** 10.31857/S0006813623030067, **EDN:** VQKSZC

The results of studying the chromosome numbers of plants of the family Asteraceae from the Europe, Caucasus, Central Asia, Siberia, Russian Far East, and North America are presented. The meristem of germinal roots of seedlings was used to study chromosomes. Cypselas were germinated in Petri dishes on large filter paper. The method we followed was described by us previously (Efimov et al., 2016). Voucher specimens are preserved in the IRK Herbarium, with some duplicates in ALTB, LE, MW, NSK, and PVB. The Herbarium acronyms mentioned here follow B. Thiers (2023-onward). The chromosome numbers in literature were checked using “Chromosome Counts Database” – CCDB, version 1.66 (Rice et al., 2015) as well as a live search in “Google”. The taxonomy of plants is given according to the “Plants of the World Online” – POWO (Govaerts et al., 2021). The taxon for which the chromosome number was established for the first time is marked with \*, the taxon for which previously unknown cytotype was established is marked with \*\*.

### *Aster* L.

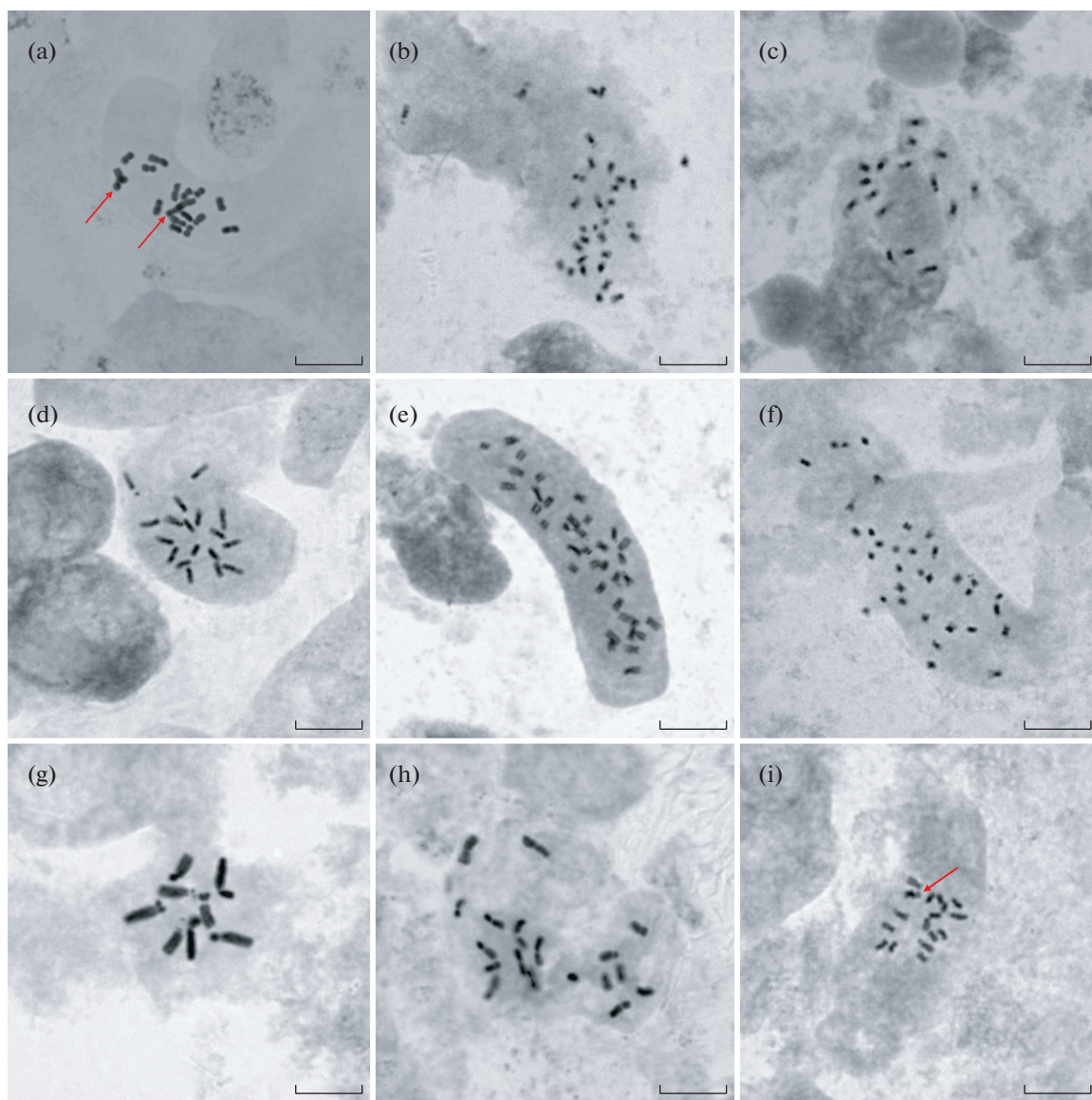
*A. incisus* Fisch.;  $2n = 2x = 18$ ,  $x = 9$ : Russia, Primorye Territory, Vladivostok city, Archipelago of Empress Eugenia, Russkiy island in the Ussuriiskiy Bay off the northern coast of Peter the Great Bay of the Sea of Japan, roadside, 50 m a.s.l., 43°00'33.59"N, 131°55'41.90"E, 10 X 2021, N.V. Filinova, 66060 IRK – Fig. 1a.

### *Amberboa* (Pers.) Less.

*A. glauca* (Puschk. ex Willd.) Grossh.;  $2n = 4x = 32$ ,  $x = 8$ : Russia, Republic of Dagestan, Magaramkentskiy district, Greater Caucasus, right bank of the Samur River, near Usukhchay village, sandy stony mountain slope, 900 m a.s.l., 41°25'19.00"N, 47°53'42.00"E, 9 VIII 2021, D.A. Krivenko, 66751 IRK – Fig. 1b.

### *Carduus* L.

*C. nutans* L.;  $2n = 2x = 16$ ,  $x = 8$ : Russia, Irkutsk Region, Irkutsk city, Akademgorodok, near I.I. Molchanov-Sibirskii Irkutsk Regional State Universal Scientific Library, forb plant groups, 450 m a.s.l., 52°15'04"N, 104°16'10"E, 4 VII 2018, D.A. Krivenko, 50708 IRK; Russia, Irkutsk Region, Irkutsk city,



**Fig. 1.** Mitotic metaphases: **a** – *Aster incisus* ( $2n = 18$ ); **b** – *Amberboa glauca* ( $2n = 32$ ); **c** – *Carduus nutans*, 66064 IRK ( $2n = 16$ ); **d** – *Centaurea cheiranthifolia* ( $2n = 18$ ); **e** – *C. virgata* subsp. *squarrosa* ( $2n = 36$ ); **f** – *Cirsium arvense*, 62974 IRK ( $2n = 34$ ); **g** – *Crepis tectorum*, 62693 IRK ( $2n = 8$ ); **h** – *Erigeron acris* ( $2n = 18$ ); **i** – *E. canadensis*, 68837 IRK ( $2n = 18$ ). – Scale bars = 10  $\mu\text{m}$ . Arrows indicate chromosome overlaps.

Akademgorodok, Melenteva Str., forb plant groups, 449 m a.s.l.,  $52^{\circ}14'59''\text{N}$ ,  $104^{\circ}16'25''\text{E}$ , 7 VII 2018, D.A. Krivenko, 50710 IRK, 50712 PVB; Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Alarskiy district, Aleksandrovsk village, at the forest edge,  $53^{\circ}20'49.07''\text{N}$ ,  $102^{\circ}39'54.81''\text{E}$ , 29 VIII 2021, O.Yu. Zavgorodnyaya, 66064 IRK – Fig. 1c.

#### *Centaurea* L.

*C. cheiranthifolia* Willd.;  $2n = 2x = 18 + 0-2B$ ,  $x = 9$ : Russia, Kabardino-Balkarian Republic, Elbrusskiy district, Greater Caucasus, Bokovoy Ridge, foot of Elbrus Mountain, Polyana Azau settlement, sandy-pebbly deposits, 2380 m a.s.l.,  $43^{\circ}16'10''\text{N}$ ,

$42^{\circ}28'47''\text{E}$ , 7 VIII 2019, D.A. Krivenko, 63602 IRK – Fig. 1d.

\**C. cheiranthifolia* subsp. *willdenowii* (Czerep.) Mikheev;  $2n = 2x = 18 + 0-2B$ ,  $x = 9$ : Russia, Republic of Daghestan, Dokuzparinskiy district, Greater Caucasus, 4 km SSW of Kurush village, right bank of the Ragdanchay River – right tributary of the Mullaarchay River, slope of Nesindag Mountain, stony (porphyrite and shale) steppe slope, 2572 m a.s.l.,  $41^{\circ}15'10.9''\text{N}$ ,  $47^{\circ}47'57.5''\text{E}$ , 15 VIII 2019, D.A. Krivenko, 63623 IRK.

*C. cyanus* L.;  $2n = 2x = 24$ ,  $x = 12$ : Russia, Irkutsk Region, Cheremkhovskiy district, Golomet village,

field, 53°02'59.95"N, 102°20'49.52"E, 20 VIII 2016, I.O. Tymchenko, 49993 IRK.

*C. virgata* subsp. *squarrosa* (Boiss.) Gugler;  $2n = 4x = 36 + 0-1B$ ,  $x = 9$ : Armenia, Erevan city, Nor Nork city district, 8th residential area, roadside, 1350 m a.s.l., 40°10'32"N, 44°34'23"E, 31 VII 2019, D.A. Krivenko et al., 10253 IRK – Fig. 1e, 63598 LE, 63599 NSK.

#### *Cirsium* Mill.

*C. arvense* (L.) Scop.;  $2n = 2x = 34$ ,  $x = 17$ : Russia, Irkutsk Region, Tayshet town, Central Park of Culture and Leisure, 55°39'42.6"N, 98°27'20.4"E, 20 VII 2020, O.A. Chernysheva, 62974 IRK – Fig. 1f; Russia, Republic of Buryatia, Pribaykalskiy district, Goryachinsk village, Goryachinskiy thermal spring, along source of the spring, 488 m a.s.l., 52°59'14.6"N, 108°16'27.4"E, 28 VIII 2019, O.Yu. Zavgorodnyaya, 57702 IRK.

#### *Crepis* L.

*C. tectorum* L.;  $2n = 2x = 8$ ,  $x = 4$ : Russia, Irkutsk Region, Tayshet town, Central Park of Culture and Leisure, 55°39'42.6"N, 98°27'20.4"E, 20 VII 2020, O.A. Chernysheva, 62693 IRK – Fig. 1g; Russia, Republic of Buryatia, Ulan-Ude city, Yuzhnyy settlement, sparse steppified pine forest, 544 m a.s.l., 51°49'31.9"N, 107°44'41.7"E, 16 VII 2015, S.G. Kazanovsky, 42342 IRK; Russia, Republic of Buryatia, Ulan-Ude city, Yuzhnyy settlement, weedy, in the garden, 528 m a.s.l., 51°49'16.9"N, 107°44'19.9"E, 18 VII 2015, S.G. Kazanovsky, 42351 IRK.

#### *Erigeron* L.

*E. acris* L.;  $2n = 2x = 18$ ,  $x = 9$ : Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar State nature conservation area, near Guzhir ranger station, forb-wild rose mixed forest, 733 m a.s.l., 52°37'59.20"N, 105°18'25.02"E, 11 VIII 2018, O.Yu. Zavgorodnyaya, kr26 IRK – Fig. 1h.

*E. bonariensis* L.;  $2n = 6x = 54$ ,  $x = 9$ : Crown Dependencies of the United Kingdom, Channel Islands in the English Channel off the northern coast of France, Jersey Island, St. Helier town, weed on lawn, 49°10'59.99"N, 2°07'00.01"W, 13 VIII 2018, Yu.K. Vinogradova, 63575 IRK; Russia, Republic of Dagestan, Makhachkala city, Kirovskiy city district, Leninkent settlement, 2nd microraiion, the 8th line, weed-ruderal plant groups, 90 m a.s.l., 42°58'38"N, 47°21'51"E, 19 VIII 2021, D.A. Krivenko, 66767 IRK.

*E. canadensis* L.;  $2n = 2x = 18$ ,  $x = 9$ : Crown Dependencies of the United Kingdom, Channel Islands in the English Channel off the northern coast of France, Jersey Island, St. Helier town, weed on lawn, 49°10'59.99"N, 2°07'00.01"W, 13 VIII 2018, Yu.K. Vinogradova, 63572 IRK; Russia, Kaliningrad Region, Kaliningrad city, right bank of the Pergolya River, Borodinskaya Str. 22, house territory, 54°43'01.37"N, 20°28'03.17"E, 4 X 2022, O.Yu. Zavgorodnyaya,

68837 IRK – Fig. 1i; Russia, Primorye Territory, Vladivostok city, Archipelago of Empress Eugenia, Russkiy Island in Ussuriyskiy Bay off the northern coast of Peter the Great Bay of the Sea of Japan, roadside, 50 m a.s.l., 43°00'33.59"N, 131°55'41.90"E, 10 X 2021, N.V. Filinova, 66032 IRK.

*E. sumatrensis* Retz.;  $2n = 6x = 54$ ,  $x = 9$ : United Kingdom, London city, West Brompton, front garden of the Lily hotel, weedy, 51°29'11.01"N, 0°11'52.15"W, 3 VIII 2018, Yu.K. Vinogradova, 63574 IRK.

*E. canadensis* × *E. sumatrensis* (= *Conyza* × *rouyana* Sennen);  $2n = 6x = 54$ ,  $x = 9$ : Crown Dependencies of the United Kingdom, Channel Islands in the English Channel off the northern coast of France, Jersey Island, St. Helier town, weed on lawn, 49°10'59.99"N, 2°07'00.00"W, 13 VIII 2018, Yu.K. Vinogradova, 63578 IRK; United Kingdom, London city, Regent's Park, weed on lawn, 51°31'55.99"N, 0°09'24.01"W, 13 VIII 2018, Yu.K. Vinogradova, 63568 IRK; ib., 63573 IRK – Fig. 2a.

#### *Hieracium* L.

*H. ganeschinii* Zahn;  $2n = 3x = 27$ ,  $x = 9$ : Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Guzhir ranger station, forb pine-birch forest, 52°37'07.75"N, 105°14'57.36"E, 8 VII 2019, O.Yu. Zavgorodnyaya, kr11 IRK – Fig. 2b.

#### *Hypochaeris* L.

*H. maculata* L.;  $2n = 2x = 10$ ,  $x = 5$ : Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Krasnyy Yar ranger station, grass-forb meadow, 645 m a.s.l., 52°32'43.08"N, 105°02'57.84"E, 24 VII 2019, O.Yu. Zavgorodnyaya, kr5 IRK – Fig. 2c.

#### *Leontopodium* R. Br. ex Cass.

*L. leontopodioides* (Willd.) Beauverd;  $2n = 2x = 24$ ,  $x = 12$ : Russia, Irkutsk Region, Olkhonskiy district, Pribaykalskiy National Park, west coast of Lake Baikal, between Khuzhir and Oto-Khushun capes, steppified meadow, 478 m a.s.l., 53°20'51.82"N, 107°17'34.36"E, 27 VII 2020, O.Yu. Zavgorodnyaya, kr18 IRK.

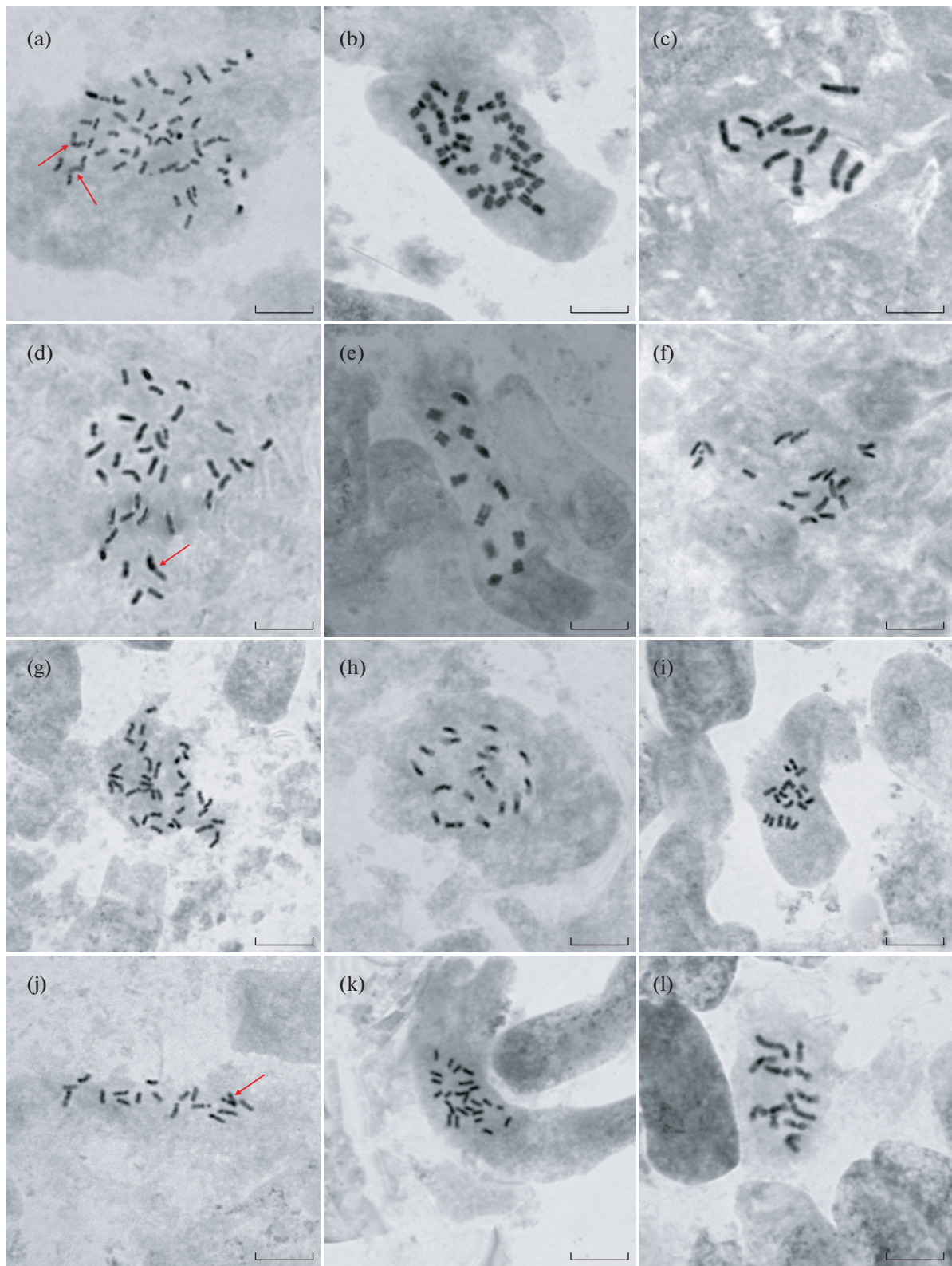
#### *Pilosella* Hill

*P. floribunda* (Wimm. & Grab.) Fr.;  $2n = 4x = 36$ ,  $x = 9$ : Russia, Republic of Buryatia, Kabanskiy district, southern cost of Lake Baikal, 4 km SW of Rechka Vydrino settlement, gravel side of the road, 471 m a.s.l., 51°27'36"N, 104°48'02"E, 28 VI 2022, D.A. Krivenko, 70228 ALTB, 70225 IRK – Fig. 2d, 70227 LE, 70229 MW.

#### *Scorzoneroideis* Moench

*S. autumnalis* (L.) Moench;  $2n = 2x = 12$ ,  $x = 6$ : Russia, Republic of Tatarstan, Kazan city, Sovetskiy city district, Azino-1 urban area, on Jaudat Faizi Str., at the sidewalk, 100 m a.s.l., 55°47'21"N, 49°13'46"E, 21 VII 2021, M.A. Markaryan, 65845 IRK – Fig. 2e.





**Fig. 2.** Mitotic metaphases: **a** – *Erigeron canadensis* × *E. sumatrensis*, 63573 IRK ( $2n = 54$ ); **b** – *Hieracium ganeschinii* ( $2n = 27$ ); **c** – *Hypochaeris maculata* ( $2n = 10$ ); **d** – *Pilosella floribunda* ( $2n = 36$ ); **e** – *Scorzoneroides autumnalis* ( $2n = 12$ ); **f** – *Solidago canadensis*, 64228 IRK ( $2n = 18$ ); **g** – *S. canadensis*, 64220 IRK ( $2n = 36$ ); **h** – *S.* × *niederederi*, 49815 IRK ( $2n = 18$ ); **i** – *S. virgaurea* ( $2n = 18$ ); **j** – *S. gigantea* × *S. speciosa* ( $2n = 18$ ); **k** – *Taraxacum longicorne* ( $2n = 24$ ); **l** – *Tragopogon sibiricus*, kr53 IRK ( $2n = 12$ ). – Scale bars = 10  $\mu\text{m}$ . Arrows indicate chromosome overlaps.



*Solidago* L.

*S. canadensis* L.;  $2n = 2x = 18, x = 9$ : Russia, Yaroslavl Region, outskirts of Uglich town, left bank of the Volga River, on the slope towards the river, 57°31'16.34"N, 38°17'38.36"E, 28 IX 2017, Yu.K. Vinogradova, 64228 IRK – Fig. 2f; United States, State of Montana, Flathead County, vicinity of Hungry Horse unincorporated community, pine forest, 48°22'12"N, 114°03'36"W, 2017, Yu.K. Vinogradova [Cultivated from a fragment of a rhizome in the vicinity of Zvenigorod city, Moscow Region], 64221 IRK; United States, State of Minnesota, Olmsted County, vicinity of Rochester city, Quarry Hill Park, along the footpath, 44°01'48"N, 92°25'48"W, 17 X 2018, Yu.K. Vinogradova, 64226 IRK.  $2n = 4x = 36, x = 9$ : United States, State of Minnesota, Olmsted County, vicinity of Rochester city, Quarry Hill Park, along the footpath, 44°01'48"N, 92°25'48"W, 17 X 2018, Yu.K. Vinogradova, 64220 IRK – Fig. 2g.  $2n = 6x = 54, x = 9$ : United States, State of Minnesota, Olmsted County, vicinity of Rochester city, Quarry Hill Park, along the footpath, 44°01'48"N, 92°25'48"W, 17 X 2018, Yu.K. Vinogradova, 64219 IRK.

*S. flexicaulis* L.;  $2n = 4x = 36, x = 9$ : United States, State of Minnesota, Hennepin County, Bloomington city, Minnesota Valley National Wildlife Refuge, in the shrub thickets, 44°51'36"N, 93°12'36"W, 18 X 2018, Yu.K. Vinogradova, 64227 IRK.

*S. gigantea* Aiton;  $2n = 4x = 36, x = 9$ : United States, State of Minnesota, Hennepin County, Bloomington city, Minnesota Valley National Wildlife Refuge, 44°51'36"N, 93°12'36"W, 18 X 2018, Yu.K. Vinogradova, 64224 IRK.

*S. × niedereideri* Khek (= *S. canadensis* × *S. virgaurea*);  $2n = 2x = 18, x = 9$ : Russia, Yaroslavl Region, Uglich town, bank of the Volga River, meadow on the slope, 57°31'38.11"N, 38°18'44.70"E, 25 IX 2017, Yu.K. Vinogradova, 49815 IRK – Fig. 2h; Russia, Kaluga Region, outskirts of the city of Kaluga, fallow, 54°31'59.99"N, 36°16'00.01"E, 4 X 2017, Yu.K. Vinogradova, 64064 IRK; ib., 64065 IRK; ib., 64066 IRK.

*S. rigida* L.;  $2n = 4x = 36, x = 9$ : United States, State of Minnesota, Carver County, Chaska city, Minnesota Landscape Arboretum, on the site of the restored steppe, 44°51'42"N, 93°36'54"W, 18 X 2018, Yu.K. Vinogradova, 64218 IRK.

\*\**S. × snarskisi* Gudž. & Žaln. (= *S. gigantea* × *S. virgaurea*);  $2n = 4x = 36, x = 9$ : Russia, Moscow Region, Losinyy Ostrov National Park, 55°51'29.88"N, 37°48'51.84"E, 1 X 2017, Yu.K. Vinogradova, 63579 IRK.

*S. ulmifolia* Muhl. ex Willd.;  $2n = 2x = 18, x = 9$ : United States, State of Minnesota, Carver County, Chaska city, Minnesota Landscape Arboretum, wild, 44°51'42"N, 93°36'54"W, 18 X 2018, Yu.K. Vinogradova, 64223 IRK.

*S. virgaurea* L.;  $2n = 2x = 18, x = 9$ : United States, State of Minnesota, Lake County, Castle Danger un-

incorporated community of Silver Creek township, Gooseberry Falls State Park, waterfalls at the confluence of the Gooseberry River into Lake Superior of the Great Lakes, in the glade, 47°08'34"N, 91°27'25.00"W, 20 X 2018, Yu.K. Vinogradova, 64225 IRK – Fig. 2i.

*S. gigantea* × *S. speciosa* Nutt.;  $2n = 2x = 18, x = 9$ : United States, State of Minnesota, Lake County, coast of the Lake Superior is the largest of the Great Lakes, Two Harbors city, along the fence, 47°01'12"N, 91°41'24"W, 20 X 2018, Yu.K. Vinogradova, 64222 IRK – Fig. 2j.

*Sonchus* L.

*S. arvensis* subsp. *uliginosus* (M. Bieb.) Nyman;  $2n = 4x = 36, x = 9$ : Russia, Republic of Buryatia, Barguzinskiy district, Zabaykalskiy National Park, middle part of Lake Baikal, Bolshoy Ushkaniy Island, 466 m a.s.l., 53°51'15"N, 108°39'25"E, 3 IX 2019, O.Yu. Zavgorodnyaya, 57838 IRK.

*S. oleraceus* L.;  $2n = 4x = 32, x = 8$ : Russia, Krasnodar Territory, Black Sea coast, Anapa city, stony slope, 44°51'14.48"N, 37°20'14.42"E, 8 VII 2021, O.A. Chernysheva, 66086 IRK; Tajikistan, Sughd Region, Ghafurov district, left bank of the Kayrakkum Reservoir (Syr Darya River), near Guliston city, shrub thickets on the river bank, 40°15'22.33"N, 69°48'12.54"E, 26 VI 2021, O.T. Rusinek, 66244 IRK.

*Taraxacum* F.H. Wigg.

*T. longicorne* Dahlst.;  $2n = 3x = 24, x = 8$ : Russia, Irkutsk Region, Olkhonskiy district, Pribaykalskiy National Park, west coast of Lake Baikal, Aya Bay, 52°47'12.57"N, 106°36'06.89"E, 6 VI 2019, O.Yu. Zavgorodnyaya, kr27 IRK – Fig. 2k.

*T. officinale* F.H. Wigg. aggr.;  $2n = 3x = 24, x = 8$ : Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Guzhir ranger station, forb pine-birch forest, 52°37'07.75"N, 105°14'57.36"E, 8 VII 2019, O.Yu. Zavgorodnyaya, kr24 IRK; Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Guzhir ranger station, legume-grass-forb meadow, 52°37'06.72"N, 105°17'40.82"E, 8 VII 2019, O.Yu. Zavgorodnyaya, kr25 IRK.

*Tragopogon* L.

*T. sibiricus* Ganesh.;  $2n = 2x = 12, x = 6$ : Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Guzhir ranger station, legume-grass-forb meadow, 52°37'06.72"N, 105°17'40.82"E, 8 VII 2019, O.Yu. Zavgorodnyaya, kr29 IRK; ib., kr53 IRK – Fig. 2l; Russia, Irkutsk Region, Ust-Orda Buryat Okrug, Ekhirit-Bulagatskiy district, Krasnyy Yar nature conservation area, near Guzhir ranger station, forb meadow, 52°38'33.65"N, 105°20'42.51"E, 15 VII 2019, O.Yu. Zavgorodnyaya, kr30 IRK.

*T. trachycarpus* S.A. Nikitin;  $2n = 2x = 12$ ,  $x = 6$ : Russia, Republic of Buryatia, Kabanskiy district, left bank of the Selenga River, near Treskovo village, step-pified meadow, 52°03'14"N, 106°55'01"E, 5 VII 2019, D.A. Krivenko, 66519 IRK.

*Tripleurospermum* Sch. Bip.

*T. inodorum* (L.) Sch. Bip.;  $2n = 4x = 36$ ,  $x = 8$ : France, Nord-Pas-de-Calais and Picardy region, department Somme, commune Assevillers, near highway E19, weed-ruderal plant groups, 49°53'16.17"N, 2°50'13.27"E, 30 XII 2019, D.A. Krivenko et al., 58711 IRK.

Most of the karyologically studied taxa (including interspecific hybrid *Solidago gigantea* × *S. speciosa*), namely 18 out of 35, are diploids ( $2x$ ), with basic numbers ( $x$ ) 4, 5, 6, 8, 9, 12, and 17. Three species are triploids ( $3x$ ): *Hieracium ganeschii* ( $2n = 27$ ,  $x = 9$ ), *Taraxacum longicorne*, and *T. officinale* aggr. (both  $2n = 24$ ,  $x = 8$ ). Among the 35 taxa, 13 are polyploids ( $4x$  and  $6x$ ), with  $x = 8$  and 9.

Variable ploidy levels ( $2x$ ,  $4x$ , and  $6x$ ) are observed in *Solidago canadensis* from native localities in North America (United States), while a diploid ( $2x$ ) was found in a secondary locality in the European part of Russia (Yaroslavl Region). Our data also confirm that *Leontopodium leontopodioides* has three chromosomal races:  $2n = 22$  from Qinghai Province of China (Stille et al., 2014),  $2n = 24$  from two localities in South Korea (Lee et al., 2010), and our data from the Baikal region (Chepinoga et al., 2012), in the Russian Far East (Primorye Territory) repeatedly showed  $2n = 26$  (Probatova et al., 2006, 2008, 2011), with  $x = 11$ , 12, and 13, respectively. A special karyosystematic research is necessary. It is probable that the chromosomal races can represent independent species.

For the most of the taxa, previously known chromosome numbers were confirmed. The chromosome number for *Erigeron canadensis* × *E. sumatrensis*  $2n = 54$  was confirmed. The same chromosome number was obtained by us from two localities of this hybrid in Italy as for "*Conyza* × *rouyana* Sennen" (Krivenko et al., 2017).

New chromosome number ( $2n = 36$ ) and ploidy level ( $4x$ ) were established for *Solidago* × *snarskii* in the European part of Russia (Moscow Region). The only other chromosome number count for this nothospecies from Eastern Europe (Lithuania) gave another result,  $2n = 3x = 27$  (Musiał et al., 2020).

#### ACKNOWLEDGEMENTS

This study was funded by Institutional research projects no. 122041100047-6 (to D.A. Krivenko) and no. 122042600141-3 (to Yu.K. Vinogradova).

#### REFERENCES

- Chepinoga V.V., Gnutikov A.A., Lubogoschinsky P.I., Isaikina M.M., Kononov A.S. 2012. IAPT/IOPB chromosome data 13 (K. Marhold, ed.). – *Taxon*. 61 (4): 891–892.  
<https://doi.org/10.1002/tax.614023>
- Efimov P.G., Philippov E.G., Krivenko D.A. 2016. Allopolyploid speciation in Siberian *Dactylorhiza* (Orchidaceae, *Orchidoideae*). – *Phytotaxa*. 258 (2): 101–120.  
<https://doi.org/10.11646/phytotaxa.258.2.1>
- Govaerts R., Nic Lughadha E., Black N., Turner R., Paton A. 2021. The World Checklist of Vascular Plants, a continuously updated resource for exploring global plant diversity. – *Sci. Data*. 8: 215.  
<https://doi.org/10.1038/s41597-021-00997-6>
- Krivenko D.A., Kazanovsky S.G., Knayzev M.S., Vinogradova Yu.K., Verkhozina A.V., Murtazaliev R.A. 2017. IAPT/IOPB chromosome data 26 (K. Marhold, ed.). – *Taxon*. 66 (6): 1491–1492.  
<https://doi.org/10.12705/666.30>
- Lee D.H., Chung G.Y., Choi B.H. 2010. Chromosome number of four Korean species of *Leontopodium* (Asteraceae). – *Korean J. Pl. Taxon*. 40 (3): 153–156 (In Korean).  
<https://doi.org/10.11110/kjpt.2010.40.3.153>
- Musiał K., Pagitz K., Gudžinskas Z., Łazarski G., Pliszko A. 2020. Chromosome numbers in hybrids between invasive and native *Solidago* (Asteraceae) species in Europe. – *Phytotaxa*. 471 (3): 267–275.  
<https://doi.org/10.11646/phytotaxa.471.3.8>
- Probatova N.S., Kazanovsky S.G., Rudyka E.G., Barkalov V.Yu., Seledets V.P., Nechaev V.A. 2011. IAPT/IOPB chromosome data 12 (K. Marhold, ed.). – *Taxon*. 60 (6): 1790–1794.  
<https://doi.org/10.1002/tax.606033>
- Probatova N.S., Rudyka E.G., Pavlova N.S., Verkholat V.P., Nechaev V.A. 2006. Chromosome numbers of plants of the Primorsky Territory, the Amur River basin and Magadan Region. – *Bot. Zhurn.* 91 (3): 491–509 (In Russ.).
- Probatova N.S., Rudyka E.G., Seledets V.P., Nechaev V.A. 2008. IAPT/IOPB chromosome data 6 (K. Marhold, ed.). – *Taxon*. 57 (4): 1268–1271.  
<https://doi.org/10.1002/tax.574017>
- Rice A., Glick L., Abadi S., Einhorn M., Kopelman N.M., Salman-Minkov A., Mayzel J., Chay O., Mayrose I. 2015. The Chromosome Counts Database (CCDB) – A community resource of plant chromosome numbers. – *New Phytol.* 206 (1): 19–26.  
<https://doi.org/10.1111/nph.13191>
- Stille J.S., Jaeger M., Dickoré W.B., Ehlers K., Holzhauser S.I.J., Mayland-Quellhorst E., Safer S., Schwaiger S., Stuessy T.F., Stuppner H., Wissemann V. 2014. Chromosome numbers of the edelweiss, *Leontopodium* (Asteraceae, Compositae – *Gnaphalieae*). – *Edinburgh J. Bot.* 71 (1): 23–33.  
<https://doi.org/10.1017/S0960428613000243>
- Thiers B. 2023. [continuously updated] Index Herbariorum. A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/science/ih> (Accessed 24.01.2023).



## ЧИСЛА ХРОМОСОМ НЕКОТОРЫХ ТАКСОНОВ ASTERACEAE СТАРОГО И НОВОГО СВЕТА

Д. А. Кривенко<sup>a, #</sup>, Ю. К. Виноградова<sup>b, ##</sup>

<sup>a</sup>Сибирский институт физиологии и биохимии растений СО РАН  
ул. Лермонтова, 132, Иркутск, 664033, Россия

<sup>b</sup>Главный ботанический сад им. Н.В. Цицина РАН  
ул. Ботаническая, 4, Москва, 127276, Россия

<sup>#</sup>e-mail: krivenko.irk@gmail.com

<sup>##</sup>e-mail: gbsad@mail.ru

Представлены числа хромосом ( $2n$ ) и уровень пloidности ( $nx$ ), в соответствии с предполагаемым основным числом хромосом ( $x$ ), для 35 видов, подвидов, нотовидов, а также гибридов из 17 родов семейства Asteraceae (Compositae): *Aster* (1), *Amberboa* (1), *Carduus* (1), *Centaurea* (4), *Cirsium* (1), *Crepis* (1), *Erigeron* (5), *Hieracium* (1), *Hypochaeris* (1), *Leontopodium* (1), *Pilosella* (1), *Scorzonoides* (1), *Solidago* (9), *Sonchus* (2), *Taraxacum* (2), *Tragopogon* (2), и *Tripleurospermum* (1). Изучаемые экземпляры – происхождением из Европы (европейская часть России, Франция и Великобритания, включая ее коронные земли), Кавказа (Армения и Россия), Центральной Азии (Таджикистан), Сибири (Иркутская область и Республика Бурятия), Дальнего Востока России (Приморский край) и Северной Америки (США). Впервые число хромосом определено у *Centaurea cheiranthifolia* subsp. *willdenowii* ( $2n = 18 + 0-2B$ ). Неизвестное ранее число хромосом (цитотип) установлено у *Solidago* × *snariskisii* ( $2n = 36$ ). Для других таксонов были подтверждены ранее известные числа хромосом.

*Ключевые слова:* диплоид, триплоид, полиплоид, хромосомные расы, сосудистые растения

### БЛАГОДАРНОСТИ

Исследование финансировалось Базовыми исследовательскими проектами № гос. рег. 122041100047-6

(для Д.А. Кривенко) и № гос. рег. 122042600141-3 (для Ю.К. Виноградовой).