

## IAPT CHROMOSOME DATA

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All material CHN; collectors: AB = A.A. Bobrov, EA = E.A. Andriyanova, EC = E.V. Chemeris, EM = E.A. Movergoz, EN = E.G. Nikolin, LK = L.M. Kipriyanova, OM = O.A. Mochalova, VF = V.A. Filippova.

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## RANUNCULACEAE

*Caltha natans* Pall., 2n = 32; Russia, Magadanskaya Oblast', OM & EA A17009 (MAG).

*Caltha palustris* L., 2n = 64; Russia, Magadanskaya Oblast', EA A17003 (MAG).

*Ranunculus codyanus* B.Boivin, 2n = 48; Russia, Chukotskii Avtonomnyi Okrug, OM, AB & EC MI7102 (MAG).

*Ranunculus gmelinii* DC., 2n = 16; Russia, Magadanskaya Oblast', OM MI7010 (MAG); OM & EA A17010 (MAG); OM MI7016 (MAG); OM MI8009 (MAG); OM MI8010 (MAG). 2n = 24; Russia, Magadanskaya Oblast', OM MI8002 (MAG); OM MI8003 (MAG); OM MI8003a (MAG); OM MI8013 (MAG).

*Ranunculus kauffmannii* Clerc, 2n = 32; Russia, Yaroslavskaya Oblast', EM s.n. (IBIW).

*Ranunculus pallasii* Schleidl., 2n = 32; Russia, Magadanskaya Oblast', OM MI7016 (MAG).

*Ranunculus subrigidus* W.B.Drew, 2n = 16; Russia, Novosibirskaya Oblast', LK s.n. (IBIW); Russia, Republic of Sakha (Yakutia), EC & EN s.n. (IBIW).

*Ranunculus trichophyllus* Chaix, 2n = 32; Russia, Republic of Sakha (Yakutia), 18 Jul 2014, EC & EN s.n. (IBIW); 22 Jul 2014, EC & EN s.n. (IBIW); 15 Jul 2015, AB, EC, EN & VF s.n. (IBIW); 18 Jul 2015, AB, EC, EN & VF s.n. (IBIW); Russia, Chukotskii Avtonomnyi Okrug, 16 Jul 2017, AB, OM & EC s.n. (IBIW); 10 Aug 2017, AB, OM & EC s.n. (IBIW).

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## PAPAVERACEAE

*Papaver kuvajevii* Schaulo & Sonnikova, 2n = 14, CHN; Russia, Krasnojarskii krai, D.N. Shaulo ASHl (NS).

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## AMARANTHACEAE

*Atriplex sphaerocarpa* (L.) Bunge, 2n = 18; Russia, Altay Republic, EZ 4116/256. *Chenopodium polyspermum* L., 2n = 18; Russia, Altay Republic, EZ 3815/200, EZ 1716/241.

*Dysphania aristata* (L.) Mosyakin & Clemants, 2n = 18; Russia, Altay Republic, EZ 4316/271.

*Halogenon glomeratus* (M.Bieb.) Ledeb., 2n = 18; Russia, Altay Republic, EZ 4116/254.

## ASTERACEAE

*Sonchus arvensis* L., 2n = 18; Russia, Altay Republic, EZ 5215/280.

All materials for the chromosome column should be submitted electronically to: Karol Marhold, [karol.marhold@savba.sk](mailto:karol.marhold@savba.sk) (Institute of Botany, Slovak Academy of Sciences, SK-845 23 Bratislava, Slovakia, and Department of Botany, Charles University, CZ 128-01 Prague, Czech Republic). The full version of this contribution is available in the online edition of TAXON appended to this article. The following citation format is recommended: Baltisberger, M. & Voelger, M. 2006. *Sternbergia sicula*. In: Marhold, K. (ed.), IAPT/IOPB chromosome data 1. *Taxon* 55: 444, E2.

**BRASSICACEAE**

*Berteroia incana* (L.) DC.,  $2n = 16$ ; Russia, Altay Republic, EZ 3715/278.

**CAMPANULACEAE**

*Campanula patula* L.,  $2n = 20$ ; Russia, Altay Republic, EZ 4015/202.

**CAPRIFOLIACEAE**

*Valeriana officinalis* L.,  $2n = 28$ ; Russia, Novosibirsk city, EZ 0916/238.

**CARYOPHYLLACEAE**

*Spergula arvensis* L.,  $2n = 18$ ; Russia, Altay Republic, EZ 3315/290, EZ 3715/291.

**LEGUMINOSAE**

*Astragalus uliginosus* L.,  $2n = 16$ ; Russia, Altay Republic, EZ 4316/260, EZ 3515/273.

*Medicago platycarpa* (L.) Trautv.,  $2n = 16$ ; Russia, Altay Republic, EZ 4316/266.

*Vicia megalotropis* Ledeb.,  $2n = 12$ ; Russia, Altay Republic, EZ 4015/274.

**PLANTAGINACEAE**

*Veronica serpyllifolia* L.,  $2n = 14$ ; Russia, Altay Republic, EZ 0416/230.

**POLYGONACEAE**

*Fagopyrum tataricum* (L.) Gaertn.,  $2n = 16$ ; Russia, Altay Republic, EZ 2815/211.

**ROSACEAE**

*Chamaerhodos erecta* (L.) Bunge,  $2n = 14$ ; Russia, Altay Republic, EZ 4316/265.

**URTICACEAE**

*Urtica urens* L.,  $2n = 24$ ; Russia, Altay Republic, EZ 3716/231.

**VIOLACEAE**

*Viola arvensis* Murray,  $2n = 34$ ; Russia, Altay Republic, EZ 2816/178. *Viola tricolor* L.,  $2n = 26$ ; Russia, Barnaul city, EZ 234/194.

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**NITRARIACEAE**

*Nitraria komarovii* Iljin & Lava,  $2n = 48$ ; Republic of Kazakhstan, *EVB* & *MAT* 30009988.

*Nitraria schoberi* L.,  $2n = 48$ ; Republic of Kazakhstan, *EVB* & *MAT* 3000996.  $2n = 48, 56$ ; Republic of Kazakhstan, *EVB* & *MAT* 3000999.  $2n = 48, 60$ ; Republic of Tajikistan, *EVB* & *MAT* 3000993.

$2n = 48, 60, 72$ ; Republic of Kazakhstan, *EVB* & *MAT* 3001000.  $2n = 60$ ; Republic of Kazakhstan, *EVB* & *MAT* 3000997, *EVB* & *MAT* 3000995.  $2n = 72$ ; Republic of Kazakhstan, *EVB* & *MAT* 3000998.  $2n = 72, 76$ ; Republic of Tajikistan, *EVB* & *MAT* 3000994.

*Nitraria sibirica* Pall.,  $2n = 24$ ; Republic of Kazakhstan, *EVB* & *MAT* 3000990, *EVB* & *MAT* 3000989; Russia, Altai Krai, *EVB* & *MAT* 3000992; Russia, Republic of Tuva, *EVB* & *MAT* 3000991.

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**ASTERACEAE**

*Lactuca inermis* Forssk.,  $2n = 16$ ; Namibia, Hardap Region, *AS* s.n. (MW).

**CARYOPHYLLACEAE**

*Silene aprica* Turcz.,  $2n = 48$ ; China, Beijing, *AE*, *LL*, *LB* & *CS* 12 (NS).

*Spergularia rubra* (L.) J.Presl & C.Presl,  $2n = 36$ ; Russia, Khanty-Mansiysk Autonomous District, *IK* 37 (NS).

**KEWACEAE**

*Kewa salsoloides* (Burch.) Christenh.,  $2n = 16$ ; Namibia, Karas Region, *AS* 69 (MW).

**RANUNCULACEAE**

- Aquilegia hebeica* Erst., 2n = 14; China, Beijing, AE, LL, LB & CS 13 (NS).  
*Aquilegia sibirica* Lam., 2n = 14; Russia, Altay Republic, AE 427 (NS).  
*Aquilegia yabeana* Kitag., 2n = 14; China, Hebei Province, AE, LL & CS 14 (NS).  
*Delphinium elatum* L., 2n = 16; Russia, Tomsk Region, EM 18 (TK).  
*Pulsatilla patens* (L.) Mill., 2n = 16; Russia, Tomsk Region, EM 19 (TK).  
*Ranunculus acris* L., 2n = 14; Russia, Tomsk Region, EM 20 (TK).  
*Ranunculus propinquus* C.A.Mey., 2n = 14+0–1B; Russia, Khanty-Mansiysk Autonomous District, IK 38 (NS).

**ROSACEAE**

- Agrimonia pilosa* Ledeb., 2n = 16; China, Beijing, AE, LL, LB & CS 15 (NS).  
*Potentilla supina* L., 2n = 28; China, Beijing, AE, LL, LB & CS 16 (NS).

**VIOLACEAE**

- Viola tenuicornis* W.Becker, 2n = 24; China, Beijing, AE, LL, LB & CS 17 (NS).

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**POACEAE**

- Alopecurus aequalis* Sobol., 2n = 14; Russia, Altai Krai, EP, NN, AG & AR Alt14-231.  
*Alopecurus arundinaceus* Poir., 2n = 28; Russia, Altai Krai, EP, NN, AG & AR Alt14-374; EP, NN, AG & AR Alt14-379; EP, NN, AG & AR Alt14-416; EP, NN, AG & AR Alt14-670; EP, NN, AG & AR Alt14-539; EP, NN & AG Alt16-96; EP, AG & AR Alt15-421; EP, AG & AR Alt15-408; Russia, Republic of Altai, EP, AG & AR Alt15-86.  
*Alopecurus pratensis* L., 2n = 28; Russia, Republic of Altai, EP, AG & AR Alt10-583; EP, AG & AR Alt10-559; EP, AG & AR Alt15-43; Russia, Altai Krai, EP, NN, AG & AR Alt14-81; Russia, Volgogradskaya Oblast', EP & AR RI7.  
*Alopecurus vlassowii* Trin., 2n = ca. 120; Russia, Republic of Altai, EP, AG & AR Alt15-237.

*Beckmannia eruciformis* (L.) Host, 2n = 14; Russia, Volgogradskaya Oblast', EP & AR SA3; EP & AR RI; EP & AR R2.

*Beckmannia syzigachne* (Steud.) Fernald, 2n = 14; Russia, Altai Krai, EP, AG & NN Alt16-143; EP, AG & NN Alt16-376; Russia, Republic of Altai, EP, AG & AR Alt15-253.

*Phleum alpinum* L., 2n = 28; Russia, Republic of Altai, EP, AG & AR Alt10-580.

*Phleum phleoides* (L.) H.Karst., 2n = 14; Russia, Altai Krai, EP, NN, AG & AR Alt14-407; EP, NN, AG & AR Alt14-357; EP, NN, AG & AR Alt14-672; EP, NN, AG & AR Alt14-564.

*Phleum pratense* L., 2n = 42; Russia, Republic of Altai, EP, AG & AR Alt10-571; Russia, Altai Krai, EP, NN, AG & AR Alt14-676; EP, AG & NN Alt16-45.

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**MALVACEAE**

*Andeimalva mandonii* (Baker f.) J.A.Tate, 2n = 12; Bolivia, Cochabamba, SB 7438 (CTES).

*Anoda cristata* (L.) Schltdl., 2n = 30; México, Oaxaca, AK & CC 23595 (CTES). 2n = 60; Argentina, Salta, AK 30358 (BAA, C, CTES, LG, MBM, MO, SI); Argentina, Córdoba, AK 33755 (C, CTES). 2n = 90; México, Jalisco, PF 556 (CTES).

*Anoda hastata* Cav., 2n = 90, México; Yucatán, AK & CC 23552 (CTES).

*Herissantia crispa* (L.) Brizicky, 2n = 14; México, Hidalgo, AK & CC 23478 (CTES); México, Oaxaca, AK & CC 23599 (CTES, LP, MO).

*Herissantia intermedia* (Hassl.) Krapov., 2n = 14; Brasil, Mato Grosso, AK 40196 (BAB, CEN, CTES, ESA, HUEFS, MBM, SP, US).

*Malvastrum corchorifolium* (Desr.) Britton ex Small, 2n = 48; México, Hidalgo, AK & CC 23482 (CTES).

*Malvastrum fryxellii* (S.R.Hill) Krapov., 2n = 24; Brasil, Minas Gerais, AK & al. 10528 (CTES, LIL).

*Nototrichie obcuneata* (Baker. f.) A.W.Hill, 2n = 10; Bolivia, La Paz, CO 151 (CTES).

*Pavonia luetzelburgii* Ulbr., 2n = 56; Brasil, Bahia, AK 12850 (CTES).

*Pavonia sepium* A.St.-Hil., 2n = 56; Brasil, Santa Catarina, AK & CC 37736 (ASU, BAB, CTES, GH, MBM, MO, WIS).

*Sida leitaofiloi* Krapov., 2n = 14; Brasil, Minas Gerais, AK & CC 33449 (CTES).

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#### AMARANTHACEAE

*Amaranthus gracilis* Desf. ex Poir., 2n = 34; Israel, TA 588.

*Atriplex glauca* L., 2n = 18; Spain, NS 5.

*Atriplex rosea* L., 2n = 18; Israel, TA 593.

*Atriplex semibaccata* R.Br., 2n = 18; Israel, TA 769.

*Atriplex spongiosa* F.Muell., 2n = 18; Israel, TA 591.

*Caroxylon imbricatum* (Forssk.) Moq., 2n = 18; Jordan, EK 87.

*Chenopodiastrum hybridum* (L.) S.Fuentes, Uotila & Borsch, 2n = 18; Czech Republic, EK 180.

*Chenopodiastrum murale* (L.) S.Fuentes, Uotila & Borsch, 2n = 18; Austria, ML 1263b.

*Chenopodium acerifolium* Andrz., 2n = 36; Russia, Tomskaya Oblast', 28 Sep 1991, GT s.n.; Russia, Samarskaya Oblast', ML 1058; Russia, Krasnoyarskii Krai, ML 1141a, ML 1138a, ML 1134a.

*Chenopodium karoi* (Murr) Aellen, 2n = 36; Russia, Tuva Republic, ML 1019b, ML 1024a. Mongolia, 21 Jul 2017, AK & EK s.n.

*Chenopodium opulifolium* Schrad. ex W.D.J.Koch & Ziz, 2n = 54; Greece, ML 1151, EK & AK 110. Cyprus, EK 85a.

*Chenopodium probstii* Aellen, 2n = 54; Austria, ML 1263a. Russia, Primorskii Krai, ML & PG 1248a. Israel, EK 91. Cyprus, EK 85b. Greece, EK & AK 114.

*Dysphania ambrosioides* (L.) Mosyakin & Clemants, 2n = 32; Greece, EK & AK 112.

*Einadia nutans* (R.Br.) A.J.Scott, 2n = 36; Israel, TA 595.

*Sarcocornia fruticosa* (L.) A.J.Scott, 2n = 36; Spain, NS 4.

*Suaeda corniculata* (C.A.Mey.) Bunge, 2n = 54; Belarus, MD 1575.

*Suaeda fruticosa* Forssk. ex J.F.Gmel., 2n = 18; Israel, TA 583, NS 6.

*Suaeda pannonica* (Beck) Graebn., 2n = 72; Austria, ML 1258.

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#### APIACEAE

*Falcaria vulgaris* Bernh., 2n = 22; Slovakia, LM 34080.

#### ASTERACEAE

*Centaurea jacea* L., 2n = 44; Slovakia, PM 33535.

*Centaurea rhenana* Boreau s.l., 2n = 18; Slovakia, VM 33800.

*Senecio vulgaris* L., 2n = 40; Slovakia, VM 34083.

*Stenactis annua* (L.) Cass. ex Less s.l., 2n = 27; Slovakia, VM 33804.

*Tragopogon orientalis* L., 2n = 12; Slovakia, LM 33223.

#### BORAGINACEAE

*Myosotis sparsiflora* J.C.Mikan ex Pohl, 2n = 18; Slovakia, VM 33805.

#### BRASSICACEAE

*Erysimum odoratum* Ehrh., 2n = 14; Slovakia, PM 33217.

#### CAPRIFOLIACEAE

*Dipsacus fullonum* L., 2n = 18; Slovakia, LM 34081.

*Scabiosa ochroleuca* L., 2n = 16; Slovakia, LM 33222.

*Viburnum opulus* L., 2n = 18; Slovakia, PM 33221.

#### CARYOPHYLLACEAE

*Holosteum umbellatum* L., 2n = 20; Ukraine, VM 33803.

#### CHENOPodiACEAE

*Chenopodium album* L., 2n = 54; Slovakia, VM 33806.

*Chenopodium pedunculare* Bertol., 2n = 54; Slovakia, VM 34078.

#### FABACEAE

*Lotus zhugensis* Klokov, 2n = 24; Slovakia, VM 33802.

#### LAMIACEAE

*Prunella vulgaris* L., 2n = 28; Slovakia, LM 33278.

*Teucrium montanum* L., 2n = 26; Slovakia, PM 33220.

#### LINACEAE

*Linum tenuifolium* L., 2n = 18; Slovakia, PM 33772.

#### ONAGRACEAE

*Epilobium ciliatum* Raf., 2n = 36; Slovakia, VM 33799.

**PLANTAGINACEAE**

*Plantago major* L.,  $2n = 12$ ; Slovakia, PM 33219.

**RUBIACEAE**

*Galium verum* L.,  $2n = 44$ ; Slovakia, LM & PM 33807.

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**APOCYNACEAE**

*Leptadenia pyrotechnica* (Forssk.) Decne.,  $n = 11$ , RP 31133.

**ASTERACEAE**

*Blumea bovei* (DC.) Vatke,  $n = 10$ , RP 31115.

*Blumea obliqua* (L.) Druce,  $n = 9$ , RP 33630.

**BORAGINACEAE**

*Heliotropium europaeum* L.,  $n = 12$ , RP 31191.

*Heliotropium ovalifolium* Forssk.,  $n = 32$ , RP 31192.

*Heliotropium supinum* L.,  $n = 16$ , RP 33632.

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All materials CHN; vouchers in IRK and VLA.

The study was supported by Federal Agency for Scientific Organizations program for support the bioresource collections.

**AMARYLLIDACEAE**

*Allium spirale* Willd.,  $2n = 32$ ; Russia, Primorskii Krai, V.A. Nechaev 13133 (VLA).

**ASTERACEAE**

*Artemisia dracunculus* L.,  $2n = 18$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13248 (IRK, VLA).

*Artemisia saitoana* Kitam.,  $2n = 18$ ; Russia, Primorskii Krai, O.A. Chernyagina 13168 (VLA).

*Aster korshinskyi* Tamamsch.,  $2n = 18$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13164 (IRK, VLA).

*Conyza canadensis* (L.) Cronq.,  $2n = 18$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13253 (IRK, VLA).

*Tragopogon dubius* Scop.,  $2n = 12$ ; Russia, Astrakhanskaya Oblast', O.A. Chernyagina 13269 (VLA).

*Tragopogon marginifolius* Pavlov,  $2n = 12$ ; Russia, Astrakhanskaya Oblast', O.A. Chernyagina 13225 (VLA).

*Tragopogon soltisiorum* Mavrodiev,  $2n = 24$ ; Russia, Astrakhanskaya Oblast', O.A. Chernyagina 13224 (VLA).

*Tripleurospermum inodorum* (L.) Sch.Bip.,  $2n = 36$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13188 (IRK, VLA).

**BRASSICACEAE**

*Dontostemon pinnatifidus* (Willd.) Al-Shehbaz & H.Ohba,  $2n = 14$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13252 (IRK, VLA).

**CAPRIFOLIACEAE**

*Scabiosa lachnophylla* Kitag.,  $2n = 18$ ; Russia, Primorskii Krai, O.A. Chernyagina 13275 (VLA).

**COLCHICACEAE**

*Disporum viridescens* (Maxim.) Nakai,  $2n = 16$ ; Russia, Primorskii Krai, A.V. Gapeka 13130 (VLA).

**CUCURBITACEAE**

*Thladiantha dubia* Bunge,  $2n = 18$ ; Russia, Primorskii Krai, V.A. Nechaev 13159 (VLA).

**GENTIANACEAE**

*Comastoma malyschevii* (Zuev) Zuev,  $2n = 26$ ; Russia, Republic of Buryatia, S.G. Kazanovsky 13273 (IRK, VLA).

**IRIDACEAE**

*Iris biglumis* Vahl,  $2n = 40$ ; Russia, Republic of Khakassia, S.G. Kazanovsky 13210 (IRK, VLA).

**LAMIACEAE**

*Rabdosia excisa* (Maxim.) H.Hara,  $2n = 24$ ; Russia, Primorskii Krai, O.A. Chernyagina 13277 (VLA).

**LILIACEAE**

*Lilium pensylvanicum* Ker Gawl.,  $2n = 24$ ; Russia, Republic of Buryatia, S.G. Kazanovsky 13259 (IRK, VLA).

*Lloydia serotina* (L.) Rchb.,  $2n = 24$ ; Russia, Republic of Buryatia, S.G. Kazanovsky 13177 (IRK, VLA).

**MALVACEAE**

*Malva pusilla* Sm.,  $2n = 42$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13263 (IRK, VLA).

**PLANTAGINACEAE**

*Veronicastrum sibiricum* (L.) Pennell,  $2n = 34$ ; Russia, Primorskii Krai, O.A. Chernyagina 13278 (VLA).

**POACEAE**

*Achnatherum sibiricum* (L.) Keng ex Tzvelev,  $2n = 24$ ; Russia, Irkutskaya Oblast', A.V. Verkhozina & D.V. Tarassov 13155 (IRK, VLA).

*Anisantha tectorum* (L.) Nevski,  $2n = 14$ ; Russia, Astrakhanskaya Oblast', O.A. Chernyagina 13225 (VLA).

*Chloris virgata* Sw.,  $2n = 20$ ; Russia, Primorskii Krai, V.A. Nечаев 12788 (VLA).  
*Ochlopoa supina* (Schrad.) H.Scholz & Valdés,  $2n = 14$ ; Russia, Kamchatskii Krai, O.A. Chernyagina & E.A. Devyatova 13179 (VLA).  
*Panicum ruderale* (Kitag.) Chang,  $2n = 36$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13152 (IRK, VLA).

#### POLYGONACEAE

*Polygonum aviculare* agg.,  $2n = 28$ ; Russia, Republic of Buryatia, S.G. Kazanovsky 13266 (IRK, VLA).

#### PORTULACACEAE

*Portulaca oleracea* L.,  $2n = 36$ ; Russia, Primorskii Krai, V.A. Nечаев 13153 (VLA).

#### PRIMULACEAE

*Cortusa discolor* Vorosch. & Gorovoj,  $2n = 24$ ; Russia, Primorskii Krai, O.A. Chernyagina 13272 (VLA).

#### SOLANACEAE

*Solanum retroflexum* Dunal,  $2n = 48$ ; Russia, Primorskii Krai, V.T. Lapenko 12993 (VLA).

#### VACCINIACEAE

*Vaccinium vitis-idaea* L.,  $2n = 24$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13267 (IRK, VLA).

#### VIOLACEAE

*Viola dissecta* Ledeb.,  $2n = 24$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13160 (IRK, VLA).  
*Viola gmeliniana* Schult.,  $2n = 24$ ; Russia, Irkutskaya Oblast', S.G. Kazanovsky 13165 (IRK, VLA).

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All materials CHN; collectors: *EK* = E.V. Kljuykov, *EZ* = E.A. Zakharova, *SP* = S.E. Petrova, *UU* = U.A. Ukrainskaja; vouchers in MW.

This study was supported by the grant No. 15-29-02748 from the Russian Foundation for Basic Research (RFBR).

#### UMBELLIFERAE/APIACEAE

*Chaerophyllum temulum* L.,  $2n = 14$ ; Italy, EZ, EK & UU 4; Greece, 03 Oct 2016, EK & UU s.n.  
*Conium divaricatum* Boiss. & Orph.,  $2n = 22$ ; Greece, EZ & SP 27.  
*Conium maculatum* L.,  $2n = 22$ ; Greece, 05 Oct 2016, EK & UU s.n.  
*Dichoropetalum oligophyllum* (Griseb.) Pimenov & Kljuykov,  $2n = 22$ ; Greece, EZ & SP 14.

*Dichoropetalum schottii* (Besser ex DC.) Pimenov & Kljuykov,  $n = 11$ ; Italy, EZ, EK & UU 7.

*Heracleum sibiricum* L.,  $2n = 22$ ; Greece, EK & UU 2.

*Heracleum sphondylium* L.,  $2n = 22, 22+1-2B$ ; Greece, EZ & SP 8.

*Heracleum ternatum* Velen.,  $2n = 22$ ; Italy, EZ, EK & UU 39.

*Katapsuxis silaifolia* (Jacq.) Reduron, Charpin & Pimenov,  $n = 11$ ; Greece, EZ & UU 5.

*Laserpitium pseudomeum* Orph., Heldr. & Sartori,  $n = 11$ ; Greece, EZ & UU 8.

*Opopanax hispidus* (Friv.) Griseb.,  $2n = 22$ ; Greece, EK & UU 3.

*Pastinaca sativa* L.,  $2n = 22$ ; Greece, EK & UU 10.

*Pimpinella major* (L.) Huds.,  $2n = 20$ ; Italy, EZ, EK & UU 59.

*Seseli montanum* L.,  $n = 11$ ; Greece, EZ & SP 20;  $2n = 22$ ; Greece, EZ & SP 25.

*Seseli varium* Trevir.,  $n = 11$ ; Italy, EZ, EK & UU 32.

*Smyrnium rotundifolium* Mill.,  $2n = 22$ ; Greece, 03 Oct 2016, EK & UU s.n.

*Tommasinia verticillaris* (L.) Bertol.,  $2n = 22$ ; Italy, EZ, EK & UU 2.

*Tordylium maximum* L.,  $2n = 20$ ; Greece, 08 Oct 2016, EK & UU s.n.

*Torilis arvensis* (Huds.) Link,  $2n = 12$ ; Greece, 02 Oct 2016, EK & UU s.n.

*Torilis arvensis* subsp. *purpurea* (Ten.) Hayek,  $2n = 12$ ; Greece, EK & UU 12.

*Trinia glauca* (L.) Dumort.,  $2n = 18$ ; Greece, EZ & SP 2.

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All materials CHN; collected in Morocco; collector: *MP* = M.G. Pimenov; vouchers in MW.

This study was supported by the grants 13-04-00648 and 16-04-00525 from the Russian Foundation for Basic Research (RFBR).

#### UMBELLIFERAE/APIACEAE

*Ammi majus* L.,  $n = 11, 2n = 22$ ; MP 66.

*Bupleurum atlanticum* Murb.,  $n = 16, 2n = 32$ ; MP 58.

*Bupleurum benoistii* Litard. & Maire,  $n = 16$ ; MP 23.

*Bupleurum spinosum* Gouan,  $n = 16$ ; MP 32.

*Daucus carota* L.,  $2n = 18$ ; MP 25.

*Daucus carota* subsp. *azoricus* Franco,  $2n = 18$ ; MP 70.

*Daucus crinitus* Desf.,  $2n = 22$ ; MP 82.

*Daucus muricatus* (L.) L.,  $2n = 22$ ; MP 73.

*Deverra scoparia* Coss. & Durieu,  $2n = 20$ ; MP 17.

*Dichoropetalum munbyi* (Boiss.) Pimenov & Kljuykov,  $2n = 44$ ; MP 60.

*Ferulago lutea* (Poir.) Grande,  $2n = 44$ ; 06 Sep 2013, MP s.n.

*Kundmannia sicula* (L.) DC.,  $2n = 22$ ; MP 69.

*Oenanthe pimpinelloides* L.,  $2n = 22$ ; MP 74.

*Seseli montanum* L.,  $n = 11$ ; MP 22, MP 55.

*Visnaga daucoides* Gaertn.,  $2n = 20$ ; MP 71.

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All materials CHN; chromosome numbers counted and ploidy level estimated by: DG = D. García, FM = F. Márquez, FMV = F.M. Vázquez, MJG = M.J. Guerra (posterior to HSS-AC number); collectors: AS = A. Sánchez, FC = F. Camello, FMV = F.M. Vázquez, RL = R. Lorenz; vouchers in HSS and the figures in the HSS-Anatomical collections (HSS-AC) sub numbers HSS-AC 254–HSS-AC 317.

## ORCHIDACEAE

*Serapias cordigera* L.,  $n = 18$ ; Spain, DG & FMV s.n. (HSS-AC 271; chromosomes counted by FM).  $2n = 36$ ; Spain, DG & FMV s.n. (HSS-AC 261; chromosomes counted by FMV), DG & FMV s.n. (HSS-AC 267; chromosomes counted by FMV).

*Serapias cordigera* subsp. *gentilii* C.Venhuis, P.Venhuis & Kreutz,  $n = 18$ ; Portugal, Algarve, DG, RL & FMV s.n. (HSS-AC 254; chromosomes counted by MJG).

*Serapias maria* F.M.Vázquez,  $2n = 60$ ; Spain, FMV s.n. (HSS-AC 293; chromosomes counted by FMV).

*Serapias occidentalis* C.Venhuis & P.Venhuis,  $2n = 36$ ; Spain, FMV s.n. (HSS-AC 302; chromosomes counted by DG).

*Serapias perez-chiscanoi* Acedo,  $n = 18$ ; Spain, FMV s.n. (HSS-AC 317; chromosomes counted by FM), FC, DG, AS & FMV (HSS-AC 308; chromosomes counted by DG).

*Serapias strictiflora* Welw. ex Veiga,  $n = 12$ ; Portugal, DG, RL & FMV s.n. (HSS-AC 286; chromosomes counted by FMV).  $n = 24$ ; Portugal, DG, RL & FMV s.n. (HSS-AC 280; chromosomes counted by FMV); Spain, DG & FMV s.n. (HSS-AC 279; chromosomes counted by DG).  $2n = 24$ ; Portugal, DG, RL & FMV s.n. (HSS-AC 282; chromosomes counted by FMV).  $2n = 48$ ; Spain, DG & FMV s.n. (HSS-AC 275; chromosomes counted by FMV).

## IAPT CHROMOSOME DATA

## IAPT chromosome data 27 [extended online version]

Edited by Karol Marhold &amp; Jaromír Kučera

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All cytological investigations have been carried out on root tips. The root tips were collected in natural habitats or obtained from seedlings, pretreated in 0.2% colchicine, fixed in methanol-acetic acid (3 : 1) and stained in 1% acetic hematoxylin (Smirnov, 1968). Identification of species of *Ranunculus* sect. *Batrachium* DC. was made by A.A. Bobrov.

This work was partially supported by the Russian Foundation for Basic Research (grants no. 15-29-02498-ofi\_m, 16-04-01308-a) and performed in the framework of the state assignment of IBIW RAS (theme no. AAAA-A18-118012690095-4).

\* First chromosome count for the species.

## RANUNCULACEAE

*Caltha natans* Pall.

$2n = 32$ , CHN. Russia, Magadanskaya Oblast', Olskii Raion, 6 km of Klyopka settlement, small pool near lake, 59°48'53"N, 151°29'07"E, 10 Jun 2017, O.A. Mochalova & E.A. Andriyanova A17009 (MAG).

*Caltha palustris* L.

$2n = 64$ , CHN. Russia, Magadanskaya Oblast', Khasynskii Raion, in vicinity of Talaya settlement, non-freezing sand spits near the road, 61°07'52"N, 152°23'12"E, 05 May 2017, E.A. Andriyanova A17003 (MAG).

The different chromosome races are known for *Caltha palustris* (Krogulevich & Rostovtseva, 1984; Agapova & al., 1993). The most common are  $2n = 32$ , the less common are 48, 56, 60. Only a few counts showed  $2n = 64$  and all that populations were from high latitude or permafrost area (Taimyr, east Yakutia and west Chukotka). Our record of  $2n = 64$  is in accordance with this tendency.

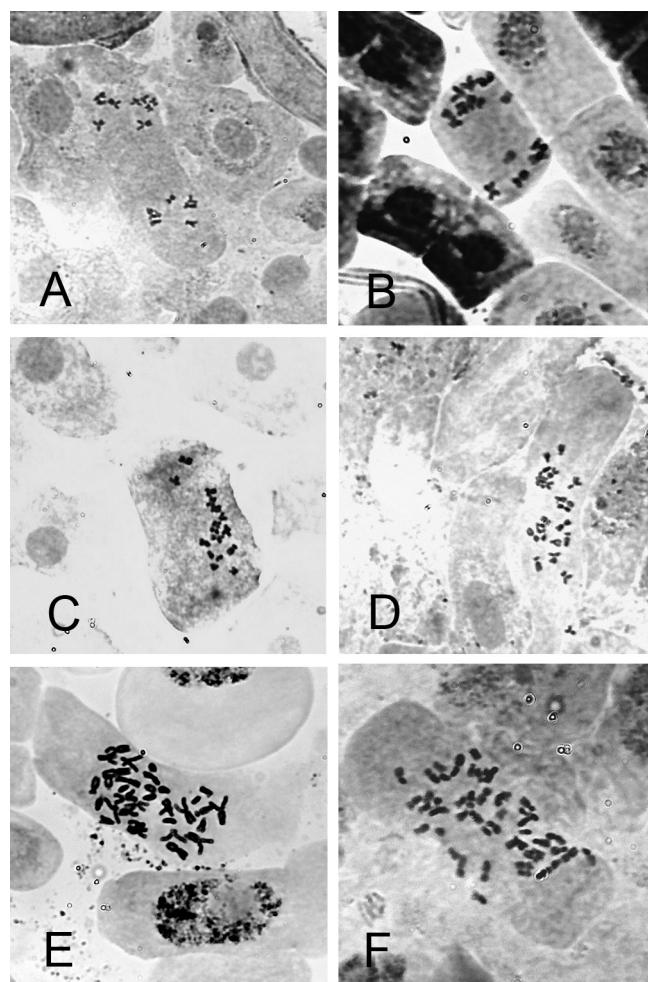
\* *Ranunculus codyanus* B.Boivin

$2n = 48$ , CHN. Russia, Chukotskii Avtonomnyi Okrug, Anadyr-skii Raion, Anadyr town, crossing of Polyarnaya and Kooperativnaya streets, lakelet in the lower reaches of Kazachka River, 64°43'31"N, 177°31'06"E, 24 Aug 2017, O.A. Mochalova, A.A. Bobrov & E.V. Chemeris M17102 (MAG) [Fig. 1F].

*Ranunculus gmelinii* DC.

$2n = 16$ , CHN. Russia, Magadanskaya Oblast', Severo-Evenskii Raion, in vicinity of Evensk settlement, near the mouth of Bolshaya

Garmanda River, seaside meadow, in pool, 61°54'59"N, 159°12'47"E, 04 Jun 2017, O.A. Mochalova M17010 (MAG); Russia, Magadanskaya Oblast', Olskii Raion, 6 km from Klyopka settlement, small pool near lake, 59°48'53"N, 151°29'07"E, 10 Jun 2017, O.A. Mochalova & E.A. Andriyanova A17010 (MAG) [Fig. 1C]; Russia, Magadanskaya Oblast', Khasynskii Raion, in vicinity of Palatka settlement, Palatkinskie Lakes, small pool near lake, 60°07'12"N, 150°59'41"E, 19 Jun 2017, O.A. Mochalova M17016 (MAG) [Fig. 1B]; Russia, Magadanskaya Oblast', Olskii Raion, Oira River, former riverbed with spring, on the bottom in pool behind sand spits, 59°44'37"N, 149°50'40"E, 16 Apr 2018, O.A. Mochalova M18009 (MAG) [Fig. 1A]; Russia, Magadanskaya Oblast',



**Fig. 1.** Mitotic metaphases. **A**, *Ranunculus gmelinii*, 16 Apr 2018,  $2n = 16$ ; **B**, *R. gmelinii*, 19 Jun 2017,  $2n = 16$ ; **C**, *R. gmelinii*, 10 Jun 2017,  $2n = 16$ ; **D**, *R. gmelinii*, 16 Mar 2018,  $2n = 24$ ; **E**, *R. pallasii*,  $2n = 32$ ; **F**, *R. codyanus*,  $2n = 48$ .

Olskii Raion, Oira River, former riverbed with spring, on bottom, at depth 0.5 m, 59°44'34"N, 149°51'10"E, 16 Apr 2018, O.A. Mochalova MI8010 (MAG).

$2n = 24$ , CHN. Russia, Magadanskaya Oblast', Olskii Raion, Tanon River, non-freezing section of river near spring, at the bottom near the bank, under a thin layer of ice, 59°42'21"N, 151°13'48"E, 16 Mar 2018, O.A. Mochalova MI8002 (MAG) [Fig. 1D]; Russia, Magadanskaya Oblast', Olskii Raion, near the mouth of Tanon River, near the mouth of non-freezing stream with spring, in water, 59°36'41"N, 151°15'48"E, 30 Mar 2018, O.A. Mochalova MI8003 (MAG); Russia, Magadanskaya Oblast', Olskii Raion, near the mouth of Tanon River, non-freezing moss bog under a thin layer of ice near non-freezing stream, 59°36'44"N, 151°16'08"E, 30 Mar 2018, O.A. Mochalova MI8003a (MAG); Russia, Magadanskaya Oblast', Olskii Raion, Oira River, former riverbed with spring, freshly thawed moss bog on the bank, 59°44'34"N, 149°51'10"E, 24 Apr 2018, O.A. Mochalova MI8013 (MAG).

*Ranunculus gmelinii* can grow throughout the winter as a wintergreen plant in non-freezing streams (Andriyanova & Mochalova, 2018). The chromosome counts of all samples collected earlier in non-freezing streams of Yama and Ola River Basins in cold season (March and April) were only  $2n = 24$  (Andriyanova & Mochalova, 2016, 2017, present study). The chromosome counts of samples collected in and around non-freezing streams near Oira River in April were  $2n = 16$  and  $2n = 24$ , but the chromosome counts of all samples collected there outside non-freezing habitats in the end of May and June were  $2n = 16$  only (Andriyanova & Mochalova, 2017, present study).

#### *Ranunculus kauffmannii* Clerc

$2n = 32$ , CHN. Russia, Yaroslavskaya Oblast', Myshkinskii Raion, Frolovskoe village, Sutka River, 57°53'35"N, 38°17'03"E, 05 Aug 2013, E.A. Movergoz s.n. (IBIW) [Fig. 2A].

#### *Ranunculus pallasii* Schleidl.

$2n = 32$ , CHN. Russia, Magadanskaya Oblast', Khasynskii Raion, in vicinity of Palatka settlement, Palatkinskiye Lakes, on

quagmire along the lake bank, 60°07'12"N, 150°59'41"E, 19 Jun 2017, O.A. Mochalova MI7016 (MAG) [Fig. 1E].

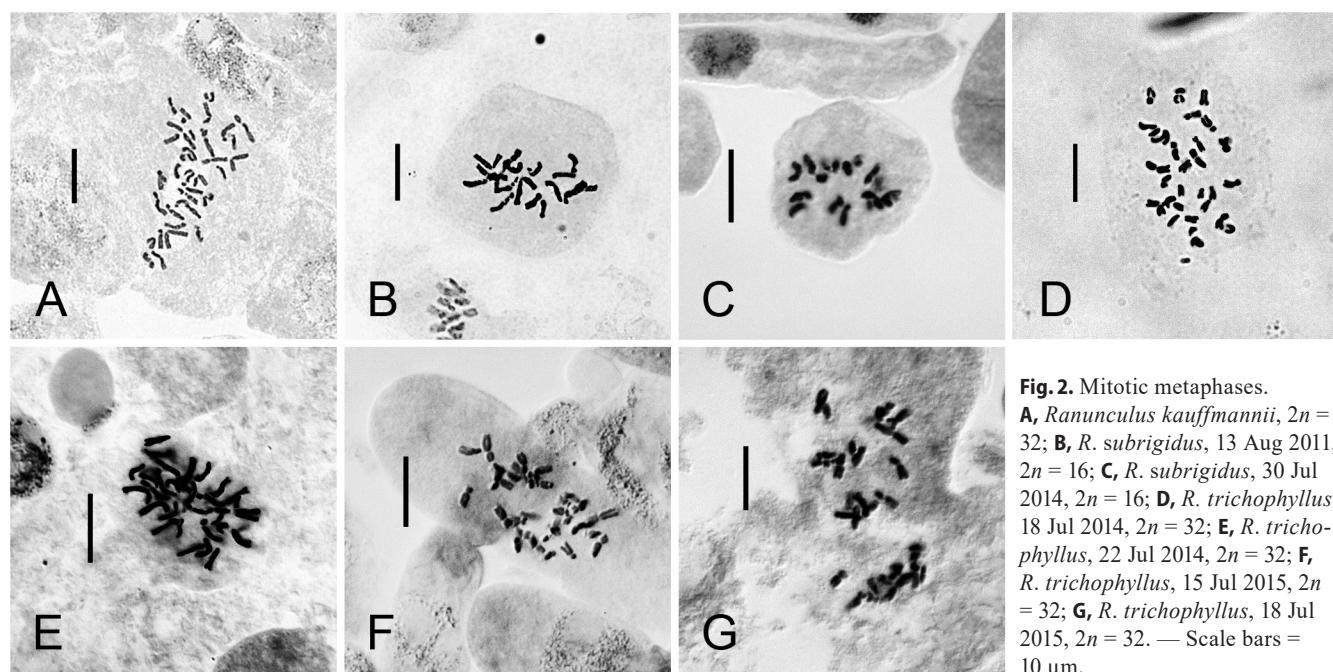
#### *Ranunculus subrigidus* W.B.Drew

$2n = 16$ , CHN. Russia, Novosibirskaya Oblast', Iskitimskii Raion, Berdsk Bay of Novosibirsk Reservoir, right bank, 54°43'53"N, 83°15'24"E, 13 Aug 2011, L.M. Kipriyanova s.n. (IBIW) [Fig. 2B]; Russia, Republic of Sakha (Yakutia), Amginskii Raion, 44 km NW of Amga village, valley of Biekene River, watered roadside ditch, 61°12'52"N, 131°25'52"E, 30 Jul 2014, E.V. Chemeris & E.G. Nikolin s.n. (IBIW) [Fig. 2C].

#### *Ranunculus trichophyllus* Chaix

$2n = 32$ , CHN. Russia, Republic of Sakha (Yakutia), Namskii Raion, 9 km WNW of Tumul village, near the cattle farmstead, watered roadside ditch, 62°55'46"N, 129°22'55"E, 18 Jul 2014, E.V. Chemeris & E.G. Nikolin s.n. (IBIW) [Fig. 2D]; Russia, Republic of Sakha (Yakutia), Khanganaskii Raion, W of Ulakhan-An village, floodplain bog near the mouth of Ulakhan-An-Yuryakh Stream, watered hollow, 61°17'39"N, 128°14'39"E, 22 Jul 2014, E.V. Chemeris & E.G. Nikolin s.n. (IBIW) [Fig. 2E]; Russia, Republic of Sakha (Yakutia), Verkhnevilyuskii Raion, 1.5 km SSE of Balagannakh village, watered roadside ditch, 63°31'03"N, 120°35'22"E, 15 Jul 2015, A.A. Bobrov, E.V. Chemeris, E.G. Nikolin & V.A. Filippova s.n. (IBIW) [Fig. 2F]; Russia, Republic of Sakha (Yakutia), Lenskii Raion, Nyuya Severnaya village, Nyuya River, 60°53'33"N, 114°49'25"E, 18 Jul 2015, A.A. Bobrov, E.V. Chemeris, E.G. Nikolin & V.A. Filippova s.n. (IBIW) [Fig. 2G]; Russia, Chukotskii Avtonomnyi Okrug, Chukotskii Raion, 1 km NNE of Lorino village, oxbow lake in tundra, 65°30'53"N, 171°41'36"W, 16 Jul 2017, A.A. Bobrov, O.A. Mochalova & E.V. Chemeris s.n. (IBIW); Russia, Chukotskii Avtonomnyi Okrug, Iultinskii Raion, 1 km SSE of Amguema village, near the bridge over Vyrvynaigypelgyn River, watered quarry, 67°02'03"N, 178°52'27"W, 10 Aug 2017, A.A. Bobrov, O.A. Mochalova & E.V. Chemeris s.n. (IBIW).

*Ranunculus* sect. *Batrachium* is a complicated group of aquatic plants. Chromosome numbers provide important information for



**Fig. 2.** Mitotic metaphases.

**A**, *Ranunculus kauffmannii*,  $2n = 32$ ; **B**, *R. subrigidus*, 13 Aug 2011,  $2n = 16$ ; **C**, *R. subrigidus*, 30 Jul 2014,  $2n = 16$ ; **D**, *R. trichophyllus*, 18 Jul 2014,  $2n = 32$ ; **E**, *R. trichophyllus*, 22 Jul 2014,  $2n = 32$ ; **F**, *R. trichophyllus*, 15 Jul 2015,  $2n = 32$ ; **G**, *R. trichophyllus*, 18 Jul 2015,  $2n = 32$ . — Scale bars = 10 µm.

delimitation of species and groups of species (Bobrov & al., 2015; Wiegleb & al., 2017). Here we gave the first chromosome count for the poorly known Arctic Beringian species *R. codyanus*,  $2n = 48$ . This species turned out to be hexaploid ( $x = 8$ ) despite the morphological affinity with the ridig-leaved species lineage which all have  $2n = 16$  (Wiegleb & al., 2017). We evidenced  $2n = 16$  for *R. subrigidus* from West Siberia and Yakutia, before there were only two counts from Baikal Siberia (Bobrov & al., 2015). We also provided chromosome numbers for ecologically different populations of the very complex species *R. trichophyllum* from Yakutia and Chukotka, and all of them have  $2n = 32$ , which is characteristic for the species (Wiegleb & al., 2017), while recently we have found some variation (Bobrov & al., 2015). The same is true for *R. kauffmannii* which is closely related to the latter.

#### Literature cited

- Agapova, N.D., Arkharova, K.B., Vakhtina, L.I., Zemskova, E.A. & Tarvis, L.V.** 1993. *Chisla khromosom tsvetkovykh rastenii flory SSSR. Moraceae–Zygophyllaceae* [Chromosome numbers of flowering plants in the flora of USSR. Moraceae–Zygophyllaceae]. St. Petersburg: Nauka. [in Russian]
- Andriyanova, E.A. & Mochalova, O.A.** 2016. [Report] In: Marhold, K. (ed.), IAPT/IOPB chromosome data 21. *Taxon* 65: 673, E1–E2. <https://doi.org/10.12705/653.44>
- Andriyanova, E.A. & Mochalova, O.A.** 2017. [Report] In: Marhold, K. (ed.), IAPT/IOPB chromosome data 26. *Taxon* 66: 1487, E1–E2. <https://doi.org/10.12705/666.30>
- Andriyanova, E.A. & Mochalova, O.A.** 2018. Lyutiki, tsvetuschie v morozy [The frost flowering buttercups]. *Priroda* 4: 24–33. [in Russian]
- Bobrov, A.A., Erst, A.S., An'kova, T.V. & Movergoz, E.A.** 2015. Chisla khromosom vodyanykh lyutikov (*Ranunculus* sektsiya *Batrachium*, Ranunculaceae) flory Rossii [Chromosome numbers of water crowfoots (*Ranunculus* section *Batrachium*, Ranunculaceae) of the flora of Russia]. *Bot. Zhurn.* 100(6): 595–601. [in Russian]
- Krogulevich, R.E. & Rostovtseva, T.S.** 1984. *Khromosomnye chisla tsvetkovykh rastenii Sibiri i Dal'nego Vostoka* [Chromosome numbers of flowering plants of Siberia and Far East]. Novosibirsk: Nauka. [in Russian]
- Smirnov, Yu.A.** 1968. Uskorennyyi metod issledovaniya somaticheskikh khromosom plodovykh [Accelerated method for studying somatic chromosomes in fruit trees]. *Tsitologia* 10: 1132–1134. [in Russian]
- Wiegleb, G., Bobrov, A.A. & Zalewska-Galosz, J.** 2017. A taxonomic account of *Ranunculus* section *Batrachium* (Ranunculaceae). *Phytotaxa* 319(1): 1–55. <https://doi.org/10.11646/phytotaxa.319.1.1>

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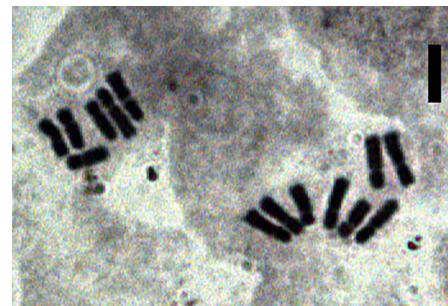
\* First chromosome count for species.

#### PAPAVERACEAE

##### *Papaver kuvajevii* Schaulo & Sonnikova

\*  $2n = 2x = 14$ , CHN. Russia, Krasnojarskii krai, Ermakovskii raion, Western Sayan, Khemchinskii Ridge, the bank of Sayano-Shushenskoe Reservoir, mouth of a small stream Kolbak-Mys, 51°50'33.8"N, 92°06'57.9"E, 17 Jul 2016, D.N. Shaulo ASH1 (NS) [Figs. 3, 4].

Endemic species for the Western Sayan (South Siberia) *Papaver kuvajevii* was described in 2003 (Shaulo & Sonnikova, 2003), it is related to *P. stubendorfii* Tolm. from Yakutia,  $2n = 42$  (6x) (Zhukova & al., 2003).



**Fig. 3.** Chromosomes at mitotic metaphase of *Papaver kuvajevii*,  $2n = 14$ . Scale bar, 5  $\mu\text{m}$ .



**Fig. 4.** Monoploid ideogram of *Papaver kuvajevii*,  $2n = 7$ .

#### Methods

The native seeds of *Papaver kuvajevii* were germinated at 25°C (day) and 10°C (night) on moist filter paper in Petri dishes on several days. Roots with a 0.5–1 cm length were used to obtain mitotic metaphases and determine karyotype characteristics. Root tips were pretreated with 0.1 % colchicine for 2 hours, at room temperature, then fixed in Carnoy (3:1, ethyl alcohol : acetic acid) for 24 hours. Finally, aceto iron-hematoxylin was used for the staining stage at 100°C. The squashed preparations of root tips were made with chloral hydrate (1:1). The chromosome preparations were made by using a standard root-tip squash technique. Then, to study the karyotype, ten best metaphases under 100× magnification were photographed by an Axioscope 40 (Karl Zeiss, Axio Lab) using an AxioCam MRc 5 digital camera. Chromosome and chromosome arm lengths were measured by MicroMeasure v.3.3 software environment (Aaron Reeves and Jim Tear, Colorado State University, Fort Collins, U.S.A.).

All chromosomes were identified as submetacentric according to Levan method (Levan & al., 1964). Karyotype formula of the species was  $2n = 7$  (submetacentric). Chromosome sizes ranged from 5.29 to 4.72  $\mu\text{m}$ , the longest arm was 3.35  $\mu\text{m}$ , the shortest arm was 1.32  $\mu\text{m}$  [Table 1]. To estimate the karyotype asymmetry were used TF = 35.87% (Huziwara, 1962) and A1 = 0.44 (Romero-Zarco, 1986).

**Table 1.** Parameters of mitotic metaphase chromosomes of *Papaver kuvajevii*.

Chromosome no.	Total chromosome length (C) [μm]	Long arm length (L) [μm]	Short arm length (S) [μm]	Arm ratio R = L / S	Centromeric index I = S / C × 100 [%]	Relative length [%]*
1	5.29	3.35	1.94	1.73	36.67	16.65
2	5.07	3.28	1.79	1.83	35.31	15.95
3	4.83	3.12	1.70	1.84	35.20	15.20
4	4.69	2.98	1.71	1.74	36.46	14.76
5	4.25	2.79	1.46	1.91	34.35	13.37
6	3.93	2.45	1.48	1.66	37.66	12.37
7	3.72	2.40	1.32	1.82	35.48	11.71

\* Relative length = C / (C<sub>1</sub> + C<sub>2</sub> ... + C<sub>n</sub>) × 100

#### LITERATURE CITED

- Huziwara, Y. 1962. Karyotype analysis in some genera of Compositae. VIII. Further studies on the chromosome of *Aster*. *Amer. J. Bot.* 49: 116–119. <https://doi.org/10.1002/j.1537-2197.1962.tb14916.x>
- Levan, A., Fredga, K. & Sanberg, A.A. 1964. Nomenclature for centromeric position on chromosomes. *Hereditas* 52: 201–220. <https://doi.org/10.1111/j.1601-5223.1964.tb01953.x>
- Shaulo, D. & Sonnikova, A. 2003. A new species of the genus *Papaver* L. (Papaveraceae) from the Western Sayan. *Turczaninowia* 6(4): 5–6. <http://old.ssgb.asu.ru/turcz/p5-6.pdf>
- Romero-Zarco, C. 1986. A new method for estimating karyotype asymmetry. *Taxon* 35: 526–530. <https://www.jstor.org/stable/1221906>
- Zhukova, P.G., Kotseruba, V.V. & Petrovsky, V.V. 2003. Caryological and taxonomical studies of the genus *Papaver* (Papaveraceae) in the Northern Yakutia. *Bot. Zhurn.* 88(11): 113–117.

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\* First chromosome count from the given regions.

#### AMARANTHACEAE

*Atriplex fera* (L.) Bunge

2n = 18, CHN. Russia, Altay Republic, Kosh-Agachskii Raion, vicinity of Chegan-Uzun village, wasteland, 50°07'N, 88°20'E, 19 Aug 2016, E.Yu. Zykova 4116/256.

*Chenopodium polyspermum* L.

\*2n = 18, CHN. Russia, Altay Republic, Turochakskii Raion, vicinity of Turochak village, wasteland, 52°15'N, 87°07'E, 7 Aug 2015, E.Yu. Zykova 3815/200; Russia, Altay Republic, Maiminskii Raion,

Manzherok village, roadside, 51°50'N, 85°45'E, 30 Jun 2016, E.Yu. Zykova 1716/241.

*Dysphania aristata* (L.) Mosyakin & Clements

\*2n = 18, CHN. Russia, Altay Republic, Shebalinskii Raion, vicinity of Cherga village, 51°34'N, 85°34'E, in a wasteland near the river, 20 Aug 2016, E.Yu. Zykova 4316/271.

*Halogenon glomeratus* (M.Bieb.) Ledeb.

\*2n = 18, CHN. Russia, Altay Republic, Kosh-Agachskii Raion, vicinity of Chegan-Uzun village, wasteland, 50°07'N, 88°20'E, 19 Aug 2016, E.Yu. Zykova 4116/254.

#### ASTERACEAE

*Sonchus arvensis* L.

\*2n = 18, CHN. Russia, Altay Republic, Maiminskii Raion, Rybalka village, wasteland at a construction site, 51°55'N, 85°51'E, 18 Aug 2015, E.Yu. Zykova 5215/280.

#### BRASSICACEAE

*Berteroia incana* (L.) DC.

\*2n = 16, CHN. Russia, Altay Republic, Choiskii Raion, vicinity of Choya village, wasteland, 52°02'N, 86°33'E, 7 Aug 2015, E.Yu. Zykova 3715/278 [Fig. 5A].

#### CAMPANULACEAE

*Campanula patula* L.

\*2n = 20, CHN. Russia, Altay Republic, Turochakskii Raion, vicinity of Ust'-Lebed' village, roadside, 52°17'N, 87°20'E, 8 Aug 2015, E.Yu. Zykova 4015/202.

#### CAPRIFOLIACEAE

*Valeriana officinalis* L.

\*2n = 28, CHN. Russia, Novosibirskaya Oblast, Novosibirsk, Akademgorodok, the University campus territory, 54°59'N, 83°00'E, 18 Sep 2016, E.Yu. Zykova 0916/238.

#### CARYOPHYLLACEAE

*Spergula arvensis* L.

\*2n = 18, CHN. Russia, Altay Republic, Maiminskii Raion, Rybalka village, wasteland at a construction site, 51°55'N, 85°51'E, 02 Aug 2015, E.Yu. Zykova 3315/290; Russia, Altay Republic, Choiskii

Raion, vicinity Choya village, wasteland, 52°02'N, 86°33'E, 7 Aug 2015, E.Yu. Zykova 3715/291.

#### LEGUMINOSAE

*Astragalus uliginosus* L.

\* $2n = 16$ , CHN. Russia, Altay Republic, Shebalinskii Raion, vicinity of Cherga village, 51°34'N, 85°34'E, in a wasteland near the river, 20 Aug 2016, E.Yu. Zykova 4316/260; Russia, Altay Republic, Maiminskii Raion, Kyzyl-Ozek village, in a wasteland near the bridge of the Maima river, 51°53' N, 86°00'E, 7 Aug 2015 E.Yu. Zykova 3515/273.

*Medicago platycarpa* (L.) Trautv.

$2n = 16$ , CHN. Russia, Altay Republic, Shebalinskii Raion, vicinity of Cherga village, 51°34'N, 85°34'E, in a wasteland near the river, 20 Aug 2016, E.Yu. Zykova 4316/266 [Fig. 5B].

*Vicia megalotropis* Ledeb.

$2n = 12$ , CHN. Russia, Altay Republic, Turochakskii Raion, vicinity of Ust'-Lebed' village, roadside, 52°17'N, 87°20'E, 08 Aug 2015, E.Yu. Zykova 4015/274 [Fig. 5C].

#### PLANTAGINACEAE

*Veronica serpyllifolia* L.

\* $2n = 14$ , CHN. Russia, Altay Republic, Turochakskii Raion, vicinity of Artybash, on the shores of Lake Teletskoe, 51°47'N, 87°15'E, 26 Jun 2016, E.Yu. Zykova 0416/230.

#### POLYGONACEAE

*Fagopyrum tataricum* (L.) Gaertn.

\* $2n = 16$ , CHN. Russia, Altay Republic, Shebalinskii Raion, Kamlak village, the dried river bed, 51°37'N, 85°40'E, 26 Jul 2015, E.Yu. Zykova 2815/211.

#### ROSACEAE

*Chamaerhodos erecta* (L.) Bunge

$2n = 14$ , CHN. Russia, Altay Republic, Shebalinskii Raion, vicinity of Cherga village, 51°34'N, 85°34'E, in a wasteland near the river, 20 Aug 2016, E.Yu. Zykova 4316/265.

#### URTICACEAE

*Urtica urens* L.

\* $2n = 24$ , CHN. Russia, Altay Republic, Shebalinskii Raion, vicinity of Shebalino village, wasteland, 50°18'N, 85°40'E, 18 Aug 2016, E.Yu. Zykova 3716/231.

#### VIOLACEAE

*Viola arvensis* Murray

\* $2n = 34$ , CHN. Russia, Altay Republic, Turochakskii Raion, Turochak village, roadside, 52°15'N, 87°07'E, 5 Aug 2016, E.Yu. Zykova 2816/178 [Fig. 5D].

*Viola tricolor* L.

\* $2n = 26$ , CHN. Russia, Altaiiskii Krai, Barnaul city, Nauchnyi gorodok, at the edge of the fields, 53°22'N, 83°50'E, 12 Jun 2011, E.Yu. Zykova 234/194.

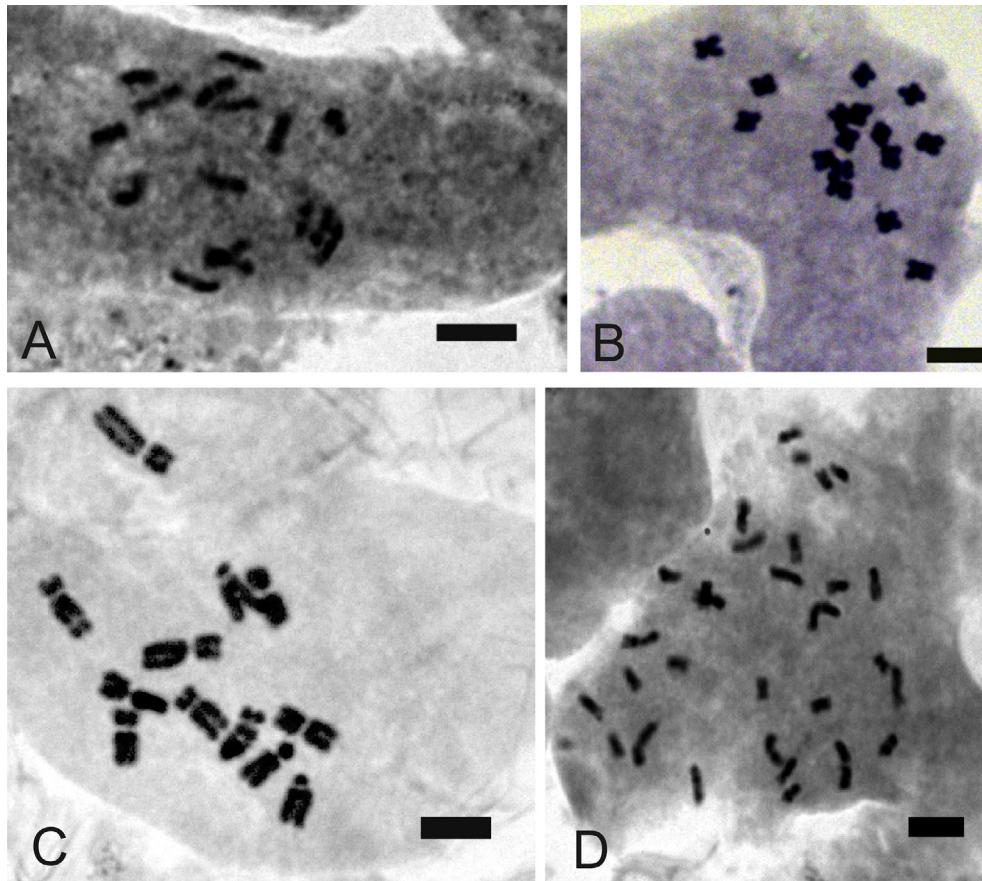


Fig. 5. Mitotic metaphase.

**A**, *Berteroia incana*,  $2n = 16$ ;  
**B**, *Medicago platycarpa*,  $2n = 16$ ;  
**C**, *Vicia megalotropis*,  $2n = 12$ ;  
**D**, *Viola arvensis*,  $2n = 34$ . —  
 Scale bars = 5  $\mu$ m

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\* First chromosome count from the given region.

#### NITRARIACEAE

*Nitraria komarovii* Iljin & Lava.

\*  $2n = 48$ , CHN. Republic of Kazakhstan, Almaty region, on the shore of Lake Balkhash, sandy desert,  $46^{\circ}37'55.80''N$ ,  $79^{\circ}16'13.26''E$ , 25 Jul 2013, E.V. Banaev & M.A. Tomoshevich 30009988 (NSK).

*Nitraria schoberi* L.

\*  $2n = 48$ , CHN. Republic of Kazakhstan, Almaty region, vicinity of Lepsi village,  $46^{\circ}14'04.26''N$ ,  $78^{\circ}55'31.86''E$ , 11 Aug 2015, E.V. Banaev & M.A. Tomoshevich 3000996 (NSK).

\*  $2n = 48, 56$ , CHN. Republic of Kazakhstan, Almaty region, vicinity of Koktal village,  $44^{\circ}07'58.74''N$ ,  $79^{\circ}43'47.94''E$ , 30 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3000999 (NSK).

\*  $2n = 48, 60$ , CHN. Republic of Tajikistan, Gorno-Badakhshan Autonomous Region, 10 km north of Ishkashim village, on the bank of the Pyanj River,  $36^{\circ}48'27.96''N$ ,  $71^{\circ}33'32.16''E$ , 08 Aug 2014, E.V. Banaev & M.A. Tomoshevich 3000993 (NSK).

\*  $2n = 48, 60, 72$ , CHN. Republic of Kazakhstan, Almaty region, on the shore of Lake Balkhash, sandy desert,  $46^{\circ}37'55.80''N$ ,  $79^{\circ}16'13.26''E$ , 25 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3001000 (NSK).

\*  $2n = 60$ , CHN. Republic of Kazakhstan, Almaty region, on the bank of the Lepsy River in outskirts of Lepsy village,  $46^{\circ}13'41.22''N$ ,  $78^{\circ}57'43.23''E$ , 28 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3000997 (NSK); Republic of Kazakhstan, Almaty region, 30 km north of Saryozek village,  $44^{\circ}34'54.54''N$ ,  $77^{\circ}56'32.10''E$ , 29 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3000995 (NSK).

\*  $2n = 72$ , CHN. Republic of Kazakhstan, Almaty region, vicinity of Bashshi village,  $44^{\circ}07'58.74''N$ ,  $79^{\circ}43'47.94''E$ , 30 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3000998 (NSK).

\*  $2n = 72, 76$ , CHN. Republic of Tajikistan, Gorno-Badakhshan Autonomous Region, on the sandy bank of the Pyanj River,  $36^{\circ}56'53.34''N$ ,  $71^{\circ}28'37.32''E$ , 08 Aug 2014, E.V. Banaev & M.A. Tomoshevich 3000994 (NSK).

*Nitraria sibirica* Pall.

\*  $2n = 24$ , CHN. Republic of Kazakhstan, Almaty region, on the bank of Kurty river,  $43^{\circ}55'41.82''N$ ,  $76^{\circ}19'28.20''E$ , 02 Aug 2013, E.V. Banaev & M.A. Tomoshevich 3000990 (NSK); Republic of Kazakhstan, Almaty region, vicinity of Koktal village,  $44^{\circ}07'58.74''N$ ,  $79^{\circ}43'47.94''E$ , 30 Jul 2013, E.V. Banaev & M.A. Tomoshevich 3000989 (NSK).

$2n = 24$ , CHN. Russia, Altai Krai, vicinity of Rubtsovsk city,  $51^{\circ}31'58.44''N$ ,  $81^{\circ}09'34.56''E$ , 06 Aug 2011, E.V. Banaev & M.A. Tomoshevich 3000992 (NSK); Russia, Republic of Tuva, on the shore of lake Shara-Nur,  $50^{\circ}13'58.32''N$ ,  $94^{\circ}33'25.32''E$ , 28 Jul 2011, E.V. Banaev & M.A. Tomoshevich 3000991 (NSK).

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Mitotic metaphase chromosomes were examined in root tips of seedlings. Method is described in Smirnov (1968). Chromosome numbers in literature were checked using CCDB, version 1.45 (Rice & al., 2015).

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\* First chromosome count for the species.

\*\* New cytotype for the species.

#### ASTERACEAE

*Lactuca inermis* Forssk.

$2n = 16$ , CHN. Namibia, Hardap Region, 20 km of Windhoek, grassland, 28 Feb 2017, A. Sukhorukov s.n. (MW) [Fig. 6A].

#### CARYOPHYLLACEAE

*Silene aprica* Turcz.

$2n = 48$ , CHN. China, Beijing, Yun Xiu Gu Forest park, rocky ledges,  $40^{\circ}36'16.6''N$ ,  $117^{\circ}24'28.0''E$ , 22 Jul 2016, A. Erst, L. Lian, L. Bing & C. Shi 12 (NS).

*Spergularia rubra* (L.) J.Presl & C.Presl

$2n = 36$ , CHN. Russia, Khanty-Mansiysk Autonomous District, Seul' River, near bridge, 25 Jul 2016, I. Kuzmin 37 (NS).

**KEWACEAE**

\* *Kewa salsolooides* (Burch.) Christenh.  
 $2n = 16$ , CHN. Namibia, Karas Region, Aus, dried up river bed, 04 Mar 2017, A. Sukhorukov 69 (MW) [Fig. 6B].

**RANUNCULACEAE**

\* *Aquilegia hebeica* Erst  
 $2n = 14$ , CHN. China, Beijing, Yun Xiu Gu Forest park, rocky ledges,  $40^{\circ}36'16.6''N$ ,  $117^{\circ}24'28.0''E$ , 22 Jul 2016, A. Erst, L. Lian, L. Bing & C. Shi 13 (NS).

*Aquilegia sibirica* Lam.

$2n = 14$ , CHN. Russia, Altay Republic, Ulaganskii Raion, near Aktash village,  $50^{\circ}18'N$ ,  $87^{\circ}36'E$ , 07 May 2015, A. Erst 427 (NS).

\* *Aquilegia yabeana* Kitag.

$2n = 14$ , CHN. China, Hebei Province, Xiaolongmen forest park, shrubs near the road,  $39^{\circ}57'58.6''N$ ,  $115^{\circ}26'30.8''E$ , 24 Jul 2016, A. Erst, L. Lian & C. Shi 14 (NS) [Fig. 6C].

*Delphinium elatum* L.

$2n = 16$ , CHN. Russia, Tomsk Region, Tomsk City, near Siberian Botanical Garden of National Research Tomsk State University,  $56^{\circ}28'N$ ,  $84^{\circ}56'E$ , 24 Aug 2017, E. Mitrenina 18 (TK).

*Pulsatilla patens* (L.) Mill.

$2n = 16$ , CHN. Russia, Tomsk Region, near Kislovka Village, Pine Forest,  $56^{\circ}23'N$ ,  $84^{\circ}50'E$ , 01 Jul 2017, E. Mitrenina 19 (TK) [Fig. 6D].

*Ranunculus acris* L.

$2n = 14$ , CHN. Russia, Tomsk Region, Tomsk City, near Siberian Botanical Garden of National Research Tomsk State University,  $56^{\circ}27'N$ ,  $84^{\circ}59'E$ , 13 Jul 2017, E. Mitrenina 20 (TK).

*Ranunculus propinquus* C.A.Mey.

$2n = 14+0-1B$ , CHN. Russia, Khanty-Mansiysk Autonomous District, Seul' River, near bridge, 25 Jul 2016, I. Kuzmin 38 (NS) [Fig. 6E].

**ROSACEAE**

\*\* *Agrimonia pilosa* Ledeb.

$2n = 16$ , CHN. China, Beijing, Yun Xiu Gu Forest park, rocky ledges,  $40^{\circ}36'16.6''N$ ,  $117^{\circ}24'28.0''E$ , 22 Jul 2016, A. Erst, L. Lian, L. Bing & C. Shi 15 (NS) [Fig. 6F].

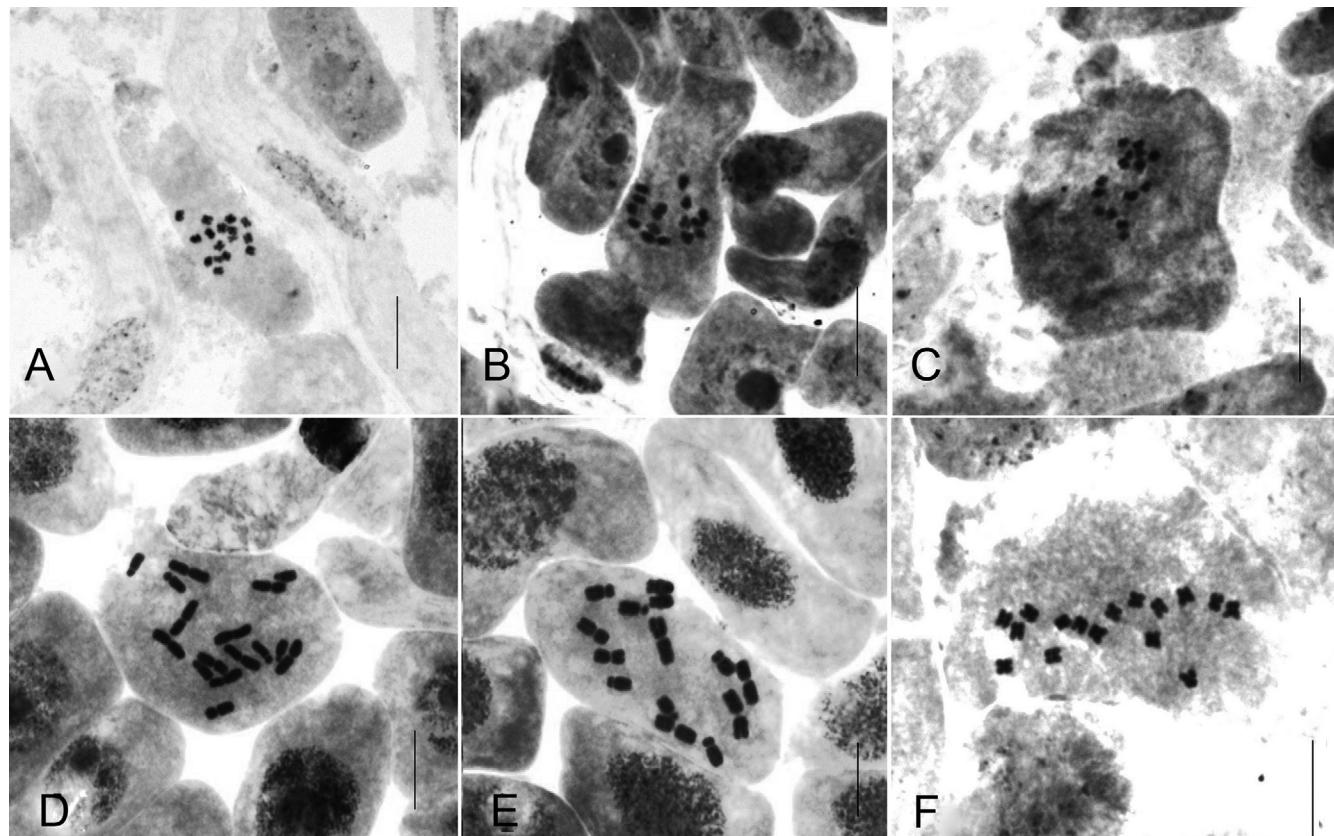
*Potentilla supina* L.

$2n = 28$ , CHN. China, Beijing, Yun Xiu Gu Forest park, rocky ledges,  $40^{\circ}36'16.6''N$ ,  $117^{\circ}24'28.0''E$ , 22 Jul 2016, A. Erst, L. Lian, L. Bing & C. Shi 16 (NS).

**VIOLACEAE**

*Viola tenuicornis* W.Becker

$2n = 24$ , CHN. China, Beijing, Yun Xiu Gu Forest park, rocky ledges,  $40^{\circ}36'16.6''N$ ,  $117^{\circ}24'28.0''E$ , 22 Jul 2016, A. Erst, L. Lian, L. Bing & C. Shi 17 (NS).



**Fig. 6.** Mitotic metaphase chromosomes. **A**, *Lactuca inermis*,  $2n = 16$ ; **B**, *Kewa salsolooides*,  $2n = 16$ ; **C**, *Aquilegia yabeana*,  $2n = 14$ ; **D**, *Pulsatilla patens*,  $2n = 16$ ; **E**, *Ranunculus propinquus*,  $2n = 14+0-1B$ ; **F**, *Agrimonia striata*,  $2n = 16$ . — Scale bars = 10  $\mu$ m.

**Literature cited**

- 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: 19–26. <https://doi.org/10.1111/nph.13191>
- Smirnov, J.A.** 1968. Uskorennyyi metod issledovaniya somaticheskikh khromosom plodovykh [Accelerated method for studying somatic chromosomes in fruit trees, in Russian]. *Tsitologiya* 10: 1132–1134.

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**POACEAE**

*Alopecurus aequalis* Sobol.

$2n = 14$ , CHN. Russia, West Siberia, Altaiskii Krai, Krutikhinskii Raion, the surroundings of Malovolchanka settlement, the coast of lake, 54.0661°N, 80.89191°E, 20 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-231* (LE).

*Alopecurus arundinaceus* Poir.

$2n = 28$ , CHN. Russia, West Siberia, Altaiskii Krai, Krutikhinskii Raion, the road to Malovolchanka settlement, birch forest, 54.05205°N, 80.96471°E, 20 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-374* (LE); Russia, West Siberia, Altaiskii Krai, Burlinskii Raion, the surroundings of Burla settlement, solonchak, 53.30068°N, 78.29396°E, 22 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-379* (LE); Russia, West Siberia, Altaiskii Krai, Suetskii Raion, near the Nizhnaya Suetka settlement, along the country road, 53.20076°N, 79.70986°E, 23 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-416* (LE); Russia, West Siberia, Altaiskii Krai, Zmeinogorskii Raion, surroundings of the Kolyvanskoe Lake, 342 m, 51.37586°N, 82.20733°E, 01 Jul 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-670* (LE); Russia, West Siberia, Altaiskii Krai, Blagoveschenskii Raion, near the dam on the Kulunda River, 99 m, 52.9998°N, 79.87635°E, 25 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-539* (LE); Russia, West Siberia, Altaiskii Krai, Topchikhinskii Raion, near the Chistjun'ka settlement, along roadside, 52.682372°N, 83.208221°E, 16 Jul 2016, E. Punina, N. Nosov & A. Gnutikov *Alt16-96* (LE); Russia, West Siberia, Altaiskii Krai, Aleiskii Raion, surroundings of Aleisk town, 160 m, 52.46666°N, 82.8011°E, 19 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-421* (LE); Russia, West Siberia, Altaiskii Krai, Shipunovskii Raion, coast of Zerkal'noe Lake,

220 m, 52.48333°N, 81.68333°E, 19 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-408* (LE); Russia, West Siberia, Republic of Altai, Ulaganskii Raion, riverside of the Chuya River, 808 km of the Chuysky Trakt (route M52), 1470 m, 50.23361°N, 87.70972°E, 07 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-86* (LE).

*Alopecurus pratensis* L.

$2n = 28$ , CHN. Russia, West Siberia, Republic of Altai, Shebalinskii Raion, the Sarlyk mountain, subalpine meadow, 2330 m, 51.07108°N, 85.72793°E, 02 Sep 2010, E. Punina, A. Gnutikov & A. Rodionov *Alt10-583* (LE); Russia, West Siberia, Republic of Altai, Shebalinskii Raion, the Sarlyk mountain, cedar forest, 1675 m, 51.074°N, 85.68833°E, 02 Sep 2010, E. Punina, A. Gnutikov & A. Rodionov *Alt10-559* (LE); Russia, West Siberia, Republic of Altai, Shebalinskii Raion, the riverside of the Sarlyk River, near the Topuchaya settlement, 1200 m, 51.11468°N, 85.59778°E, 11 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-43* (LE); Russia, West Siberia, Altaiskii Krai, Baevkii Raion, near the Baevo settlement, 53.26048°N, 80.79601°E, 18 Jun 2014, E. Punina, N. Nosov, A. Gnutikov & A. Rodionov *Alt14-81* (LE); Russia, Volgogradskaya Oblast', Sredneakhtubinskii Raion, near the Rakhinka settlement, riverside of the Volga River, 49.01194°N, 44.99222°E, 21 Jun 2016, E. Punina & A. Rodionov *R17* (LE).

*Alopecurus vlassowii* Trin.

$2n = \text{ca. } 120$ , CHN. Russia, West Siberia, Republic of Altai, Kosh-Agachskii Raion, the road to the Kokkol' Lake, subalpine meadow, 2200 m, 50.1133°N, 88.1195°E, 11 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-237* (LE).

*Beckmannia eruciformis* (L.) Host

$2n = 14$ , CHN. Russia, Volgogradskaya Oblast', Sredneakhtubinskii Raion, near the Srednyaya Akhtuba settlement, riverside of the Volga River, 48.72194°N, 44.88333°E, 21 Jun 2016, E. Punina & A. Rodionov *SA3* (LE); Russia, Volgogradskaya Oblast', Sredneakhtubinskii Raion, near the Rakhinka settlement, riverside of the Volga River, 49.01194°N, 44.99222°E, 21 Jun 2016, E. Punina & A. Rodionov *R1* (LE); Russia, Volgogradskaya Oblast', Sredneakhtubinskii Raion, near the Rakhinka settlement, riverside of the Volga River, 49.00972°N, 44.91166°E, 21 Jun 2016, E. Punina & A. Rodionov *R2* (LE).

*Beckmannia syzigachne* (Steud.) Fernald

$2n = 14$ , CHN. Russia, West Siberia, Altaiskii Krai, Krasnoshchekovskii Raion, the road between Chineta settlement and Tulata village, oxbow lake, near the water, 51.55305°N, 83.46388°E, 21 Jul 2016, E. Punina, A. Gnutikov & N. Nosov *Alt16-143* (LE); Russia, West Siberia, Altaiskii Krai, Soloneshenskii Raion, riverside of the Anui River, on pebbles, 51.56833°N, 84.56583°E, 22 Jul 2016, E. Punina, A. Gnutikov & N. Nosov *Alt16-376* (LE); Russia, West Siberia, Republic of Altai, Kosh-Agachskii Raion, the left riverside of the Justyt River, wet meadow, 1830 m, 49.91666°N, 88.91666°E, 08 Jul 2015, E. Punina, A. Gnutikov & A. Rodionov *Alt15-253* (LE).

*Phleum alpinum* L.

$2n = 28$ , CHN. Russia, West Siberia, Republic of Altai, Shebalinskii Raion, the Sarlyk mountain, subalpine meadow, 2200 m, 51.06733°N, 85.71283°E, 02 Sep 2010, E. Punina, A. Gnutikov & A. Rodionov *Alt10-580* (LE).

*Phleum phleoides* (L.) H.Karst.  
 $2n = 14$ , CHN. Russia, West Siberia, Altaiskii Krai, Slavgorodskii Raion, near of the Kulundinskoe Lake, 53.10003°N, 79.43166°E, 23 Jun 2014, *E. Punina, A. Gnutikov, N. Nosov & A. Rodionov* Alt14-407 (LE); Russia, West Siberia, Altaiskii Krai, Khabarskii Raion, southern surroundings of Pleso-Kur'ya village, 53.66458°N, 79.96653°E, 20 Jun 2014, *E. Punina, A. Gnutikov, N. Nosov & A. Rodionov* Alt14-357 (LE); Russia, West Siberia, Altaiskii Krai, Zmeinogorskii Raion, surroundings of the Kolyvanskoe Lake, 342 m, 51.37586°N, 82.20733°E, 01 Jul 2014, *E. Punina, N. Nosov, A. Gnutikov & A. Rodionov* Alt14-672 (LE); Russia, West Siberia, Altaiskii Krai, Mikhailovskii Raion, coast of the Malinovoe Lake, solonchak, 51.72113°N, 79.7747°E, 27 Jun 2014, *E. Punina, N. Nosov, A. Gnutikov & A. Rodionov* Alt14-564 (LE).

*Phleum pratense* L.  
 $2n = 42$ , CHN. Russia, West Siberia, Republic of Altai, Shebalinskii Raion, the Sarlyk mountain, cedar forest, 1675 m, 51.074°N, 85.68833°E, 02 Sep 2010, *E. Punina, A. Gnutikov & A. Rodionov* Alt10-571 (LE); Russia, West Siberia, Altaiskii Krai, Zmeinogorskii Raion, surroundings of the Kolyvanskoe Lake, 342 m, 51.37586°N, 82.20733°E, 01 Jul 2014, *E. Punina, N. Nosov, A. Gnutikov & A. Rodionov* Alt14-676 (LE); Russia, West Siberia, Altaiskii Krai, Soloneshenskii Raion, surroundings of Topol'noe settlement, riverside of the Anui River, 51.472767°N, 84.55095°E, 22 Jul 2016, *E. Punina, N. Nosov & A. Gnutikov* Alt16-45 (LE).

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\* First chromosome count for the species.

## MALVACEAE

\* *Andeimalva mandonii* (Baker f.) J.A.Tate

$2n = 12$ , CHN. Bolivia, Cochabamba, Ayopaya, 29 Nov 1981, *S. Beck* 7438 (CTES) [Fig. 7A].

*Anoda cristata* (L.) Schltldl.

$2n = 30$ , CHN. México. Oaxaca, Oaxaca, Monte Albán, 19 Dec 1972, *A. Krapovickas & C. Cristóbal* 23595 (CTES).

$2n = 60$ , CHN. Argentina, Salta, Caldera, Quebrada del Gallinato, 20 Mar 1977, *A. Krapovickas* 30358 (BAA, C, CTES, LG, MBM, MO, SI); Argentina, Córdoba, Manfredi, Estación Experimental Agropecuaria INTA, 22 Mar 1978, *A. Krapovickas* 33755 (C, CTES).

\*  $2n = 90$ , CHN. México, Jalisco, 3.2 km of San Luis, Soyatlán, 15 Oct 1966, *P. Fryxell* 556 (CTES) [Fig. 7B].

\* *Anoda hastata* Cav.

$2n = 90$ , CHN. México, Yucatán, Ruinas de Chichén Itzá, 15 Dec 1972, *A. Krapovickas & C. Cristóbal* 23552 (CTES).

\* *Herissantia crispa* (L.) Brizicky

$2n = 14$ , CHN. México, Hidalgo, Cañada del Salitre, 02 Dec 1972, *A. Krapovickas & C. Cristóbal* 23478 (CTES); México, Oaxaca, Monte Albán, 19 Dec 1972, *A. Krapovickas & C. Cristóbal* 23599 (CTES, LP, MO).

\* *Herissantia intermedia* (Hassl.) Krapov.

$2n = 14$ , CHN. Brasil, Mato Grosso, Cáceres, 29 May 1985, *A. Krapovickas* 40196 (BAB, CEN, CTES, ESA, HUEFS, MBM, SP, US).

*Malvastrum corchorifolium* (Desr.) Britton ex Small

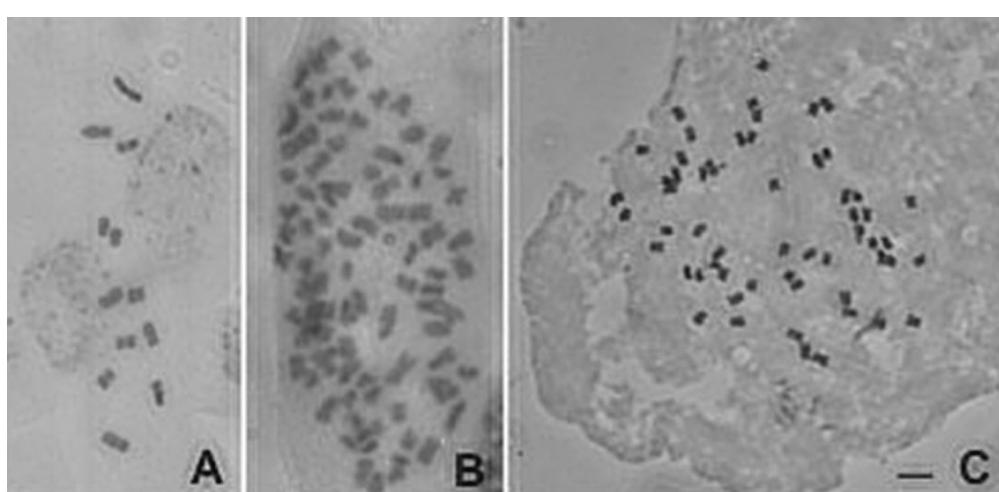
$2n = 48$ , CHN. México, Hidalgo, Cañada del Salitre, 02 Dec 1972, *A. Krapovickas & C. Cristóbal* 23482 (CTES).

\* *Malvastrum fryxellii* (S.R.Hill) Krapov.

$2n = 24$ , CHN. Brasil, Minas Gerais, 30 km W of Gouveia, 01 May 1961, *A. Krapovickas, J.F.M. Valls, C.E. Simpson & G. Silva* 10528 (CTES, LIL).

\* *Nototrichie obcuneata* (Baker f.) A.W.Hill

$2n = 10$ , CHN. Bolivia, La Paz, Los Andes, valle de Hichu Kkota, 21 Nov 1984, *C. Ostria* 151 (CTES).



**Fig. 7.** Mitotic metaphases. **A**, *Andeimalva mandonii*,  $2n = 12$  (*S. Beck* 7438); **B**, *Anoda cristata*,  $2n = 90$  (*P. Fryxell* 556); **C**, *Pavonia sepium*,  $2n = 56$ , (*A. Krapovickas & C. Cristóbal* 37736). — Scale bar = 5  $\mu\text{m}$ .

\**Pavonia luetzelburgii* Ulbr.  
 $2n = 56$ , CHN. Brasil, Bahia, 20 km W of Jacobina, 04 Apr 1967,  
*A. Krapovickas* 12850 (CTES).

\**Pavonia sepium* A.St.-Hil.  
 $2n = 56$ , CHN. Brasil, Santa Catarina, Laguna, 25 Jan 1982,  
*A. Krapovickas & C. Cristóbal* 37736 (ASU, BAB, CTES, GH, MBM,  
 MO, WIS) [Fig. 7C].

\**Sida leitaofilhoi* Krapov.  
 $2n = 14$ , CHN. Brasil, Minas Gerais, Ouro Preto, Morro do  
 Cachorro, Serra Itacolomí, 4 Feb 1978, *A. Krapovickas & C. Cris-*  
*tóbal* 33449 (CTES).

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The cytological studies have been carried out in metaphase cells in root tips of seedlings. Chromosome numbers in literature were checked using IPCN (Goldblatt & Johnson, 1979–) and CCDB (Rice & al., 2015).

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\* First chromosome number for the species.

## AMARANTHACEAE

*Amaranthus gracilis* Desf. ex Poir.

$2n = 34$ , CNH. Israel, Southern District, Gulf of Aqaba, Eilat city,  $29^{\circ}32'59.35''N$ ,  $34^{\circ}57'18.4''E$ , on the beach, 28 Nov 2016, *T.V. An'kova* 588 (NS).

*Atriplex glauca* L.

$2n = 18$ , CNH. Spain, Murcia Province, Cartagena, Cabo de Palos municipality,  $37^{\circ}37'57.20''N$ ,  $0^{\circ}43'38.80''W$ , 13 Mar 2016, *N.V. Sinel'nikova* 5 (NS).

*Atriplex rosea* L.

$2n = 18$ , CNH. Israel, Southern District, Be'er-Sheva city, Schuna Dalet East neighborhood,  $31^{\circ}16'11.77''N$ ,  $34^{\circ}47'55.31''E$ , 20 Nov 2016, *T.V. An'kova* 593 (NS).

\**Atriplex semibaccata* R. Br.

$2n = 18$ , CNH. Israel, Southern District, Be'er-Sheva city, Schuna Dalet East neighborhood,  $31^{\circ}16'11.77''N$ ,  $34^{\circ}47'55.31''E$ , 22 Nov 2016, *T.V. An'kova* 769 (NS).

*Atriplex spongiosa* F. Muell.

$2n = 18$ , CNH. Israel, Southern District, Be'er-Sheva city, Schuna Dalet East neighborhood,  $31^{\circ}16'11.77''N$ ,  $34^{\circ}47'55.31''E$ , 20 Nov 2016, *T.V. An'kova* 591 (NS).

*Caroxylon imbricatum* (Forssk.) Moq.  
 $2n = 18$ , CNH. Jordan, vicinity of Ma'an village,  $30^{\circ}15'N$ ,  $35^{\circ}28'E$ , 10 Nov 2015, *E.A. Korolyuk* 87 (NS).

*Chenopodiastrum hybridum* (L.) S. Fuentes, Uotila & Borsch  
 $2n = 18$ , CHN. Czech Republic, Brno,  $49^{\circ}12'N$ ,  $16^{\circ}36'E$ , 3 Nov 2017, *E.A. Korolyuk* 180 (NS).

*Chenopodiastrum murale* (L.) S. Fuentes, Uotila & Borsch  
 $2n = 18$ , CHN. Austria, Burgenland, Neusiedl am See District, NW of Illmitz, Alber See, fire-site,  $47^{\circ}46'N$ ,  $16^{\circ}46'E$ , 31 Oct 2015, *M.N. Lomonosova* 1263b (NS).

*Chenopodium acerifolium* Andrž.  
 $2n = 36$ , CHN. Russia, Tomskaya Oblast', Aleksandrovskii Raion, Strizhevoi town, riverside of the Ob' river,  $60^{\circ}44'N$ ,  $77^{\circ}35'E$ , 28 Sep 1991, *G. Taran* s.n. (NS); Russia, Samarskaya Oblast', Zhigulevsk city, the bank of the Volga river,  $53^{\circ}25'N$ ,  $49^{\circ}32'E$ , 21 Sep 2013, *M.N. Lomonosova* 1058 (NS); Russia, Krasnoyarskii Krai, Turukhansk town, the bank of the Yenisei river,  $65^{\circ}47'N$ ,  $87^{\circ}58'E$ , 7 Aug 2014, *M.N. Lomonosova* 1141a (NS); Russia, Krasnoyarskii Krai, Turukhanskii Raion, Bor village, the bank of the Yenisei river,  $61^{\circ}36'N$ ,  $90^{\circ}00'E$ , 6 Aug 2014, *M.N. Lomonosova* 1138a (NS); Russia, Krasnoyarskii Krai, Yeniseiskii Raion, Yartsevo village,  $60^{\circ}15'N$ ,  $90^{\circ}12'E$ , 6 Aug 2014, *M.N. Lomonosova* 1134a (NS).

*Chenopodium karoi* (Murr) Aellen  
 $2n = 36$ , CNH. Russia, Tyva Republic, Ovyurskii Raion, vicinity of Ak-Chyraa village, semi-desert,  $50^{\circ}42'N$ ,  $93^{\circ}26'E$ , *M.N. Lomonosova* 1019b (NS); Russia, Tyva Republic, Ovyurskii Raion, West Tannu-Ola Range,  $50^{\circ}55'N$ ,  $92^{\circ}32'E$ , 2293 m, 5 Sep 2013, *M.N. Lomonosova* 1024a (NS); Mongolia, Bayan-Ulgii somon, 20–25 km NW Tolbo village, 2500 m,  $48^{\circ}54'N$ ,  $90^{\circ}54'E$ , 21 Jul 2017, *A.Yu. Korolyuk & E.A. Korolyuk* s.n. (NS).

*Chenopodium opulifolium* Schrad. ex W.D.J. Koch & Ziz  
 $2n = 54$ , CNH. Greece, Rhodes Island, Afantou city,  $36^{\circ}17'16.02''N$ ,  $28^{\circ}09'47.09''E$ , 9 Sep 2014, *M.N. Lomonosova* 1151 (NS); Greece, Central Greece Region, Delfi,  $38^{\circ}28'N$ ,  $22^{\circ}29'E$ , 601 m, 25 Oct 2016, *E.A. Korolyuk & A.Yu. Korolyuk* 110 (NS); Cyprus, Paphos District, New Paphos,  $34^{\circ}55'N$ ,  $33^{\circ}09'E$ , 1000 m, 28 Oct 2015, *E.A. Korolyuk* 85a (NS).

*Chenopodium probstii* Aellen  
 $2n = 54$ , CNH. Austria, Burgenland, Neusiedl am See District, NW of Illmitz, Alber See, fire-site,  $47^{\circ}46'49.95''N$ ,  $16^{\circ}46'10.69''E$ , 31 Oct 2015, *M.N. Lomonosova* 1263a (NS); Russia, Primorskii Krai, Shkotovskii Raion, vicinity of Rechishche village, the mouth of the Sukhodol river, saltwort annuals on a sandy seashore,  $43^{\circ}12'N$ ,  $132^{\circ}23'E$ , 22 Sep 2015, *M.N. Lomonosova & P.G. Gorovoy* 1248a (NS); Israel, Jerusalem,  $31^{\circ}44'N$ ,  $35^{\circ}13'E$ , 13 Nov 2015, *E.A. Korolyuk* 91 (NS); Cyprus, Paphos District, New Paphos,  $34^{\circ}55'N$ ,  $33^{\circ}09'E$ , 1000 m, 28 Oct 2015, *E.A. Korolyuk* 85b (NS); Greece, Thessaly Region, Kalabaka,  $39^{\circ}42'N$ ,  $21^{\circ}37'E$ , 261 m, 5 Nov 2016, *E.A. Korolyuk & A.Yu. Korolyuk* 114 (NS).

*Dysphania ambrosioides* (L.) Mosyakin & Clemants  
 $2n = 32$ , CNH. Greece, Attica Region, Poros Island, Kyani-Akti village,  $37^{\circ}30'N$ ,  $23^{\circ}28'E$ , 30 Oct 2016, *E.A. Korolyuk & A.Yu. Korolyuk* 112 (NS).

*Einadia nutans* (R.Br.) A.J.Scott  
 $2n = 36$ , CNH. Israel, Southern District, Be'er-Sheva city, Schuna Dalet East neighborhood,  $31^{\circ}16'11.77''N$ ,  $34^{\circ}47'55.31''E$ , 15 Nov 2016, T.V. An'kova 595 (NS).

*Sarcocornia fruticosa* (L.) A.J.Scott  
 $2n = 36$ , CNH. Spain, Murcia Province, Salinas de San Pedro del Pinatar municipality,  $37^{\circ}50'00.68''N$ ,  $0^{\circ}45'59.85''W$ , 11 Mar 2016, N.V. Sinel'nikova 4 (NS).

*Suaeda corniculata* (C.A.Mey.) Bunge  
 $2n = 54$ , Belarus, Minsk Province, Soligorsk District, 2 km SE of Bryantchytzy village,  $52^{\circ}07''N$ ,  $27^{\circ}33'49''E$ , slags near salt mine called Kaliy-3, Sep 2009, M. Dzhus 1575 (NS).

*Suaeda fruticosa* Forssk. ex J.F.Gmel.  
 $2n = 18$ , CNH. Israel, Southern District, Be'er-Sheva city, Schuna Dalet East neighborhood,  $31^{\circ}16'11.77''N$ ,  $34^{\circ}47'55.31''E$ , 20 Nov 2016, T.V. An'kova 583 (NS); Israel, Southern District, Eilat outskirts, the neighborhood of a salt factory,  $29^{\circ}35''N$ ,  $34^{\circ}57''E$ , 29 Jan 2018, N.V. Sinel'nikova 6 (NS).

*Suaeda pannonica* (Beck) Graebn.  
 $2n = 72$ , CNH. Austria, Burgenland, Neusiedl am See District, vicinity of Hölle village, salted meadow,  $47^{\circ}49'02.76''N$ ,  $16^{\circ}47'28.17''E$ , 31 Oct 2015, M.N. Lomonosova 1258 (NS).

**Literature cited**  
**Goldblatt, P. & Johnson, D.E. (eds.)** 1979–. Index to plant chromosome numbers. <http://www.tropicos.org/Project/IPCN> (accessed 15 Apr 2018).  
**Rice, A., Glick, L., Abadi, S., Einhorn, M., Kopelman, N., 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: 19–25. <https://doi.org/10.1111/nph.13191>

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Chromosome numbers counted by L. Mártonfiová.

## Methods

For karyological analyses, root tip meristems from seedlings were employed. The root tips were pre-treated in a 0.002 M water solution of 8-hydroxyquinoline at  $4^{\circ}C$  for about 16 h (overnight), fixed in a 1 : 3 mixture of 98% acetic acid and 96% ethanol for 1–24 h, washed in distilled water, macerated in 1N HCl at the temperature of  $60^{\circ}C$  for 3–6 min (dependent on the species concerned) and washed in distilled water. Squashes were made using the cellophane square technique (Murín, 1960). The slides were stained by a 7% solution

of Giemsa Stain, Modified Solution, Fluka Analytical, in Sörensen phosphate buffer, dried and observed in a drop of immersion oil using a Leica DM 2500 microscope equipped with camera DFC 290 HD and software Leica application suite v.3.5.0, Switzerland.

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## APIACEAE

*Falcaria vulgaris* Bernh.

$2n = 22$ , CHN. Slovakia, town of Košice, Pri Prachární Str., ruderализed lawn between Möbelix store and former Blšák, 237 m, N  $48^{\circ}41'52.83''N$ ,  $20^{\circ}14'54.49''E$ , 7 Sep 2017, L. Mártonfiová 34080 (KO) [Fig. 8A].

## ASTERACEAE

*Centaurea jacea* L.

$2n = 44$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa, near the quarry,  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, P. Mártonfi 33535 (KO) [Fig. 8B].

*Centaurea rhenana* Boreau s.l.

$2n = 18$ , CHN. Slovakia, Slovenské Rudohorie Mts., the town of Košice, Žlaby Str., in the middle part of the street,  $48^{\circ}44'32''N$ ,  $21^{\circ}13'56''E$ , 3 Nov 2007, V. Mikoláš 33800 (KO) [Fig. 8C].

*Senecio vulgaris* L.

$2n = 40$ , CHN. Slovakia, the town of Košice, Staničné námestie, in front of the Bus Station,  $48^{\circ}43'18.63''N$ ,  $21^{\circ}16'03.69''E$ , 29 Nov 2009, V. Mikoláš 34083 (KO) [Fig. 8D].

*Stenactis annua* (L.) Cass. ex Less s.l.

$2n = 27$ , CHN. Slovakia, the town of Košice, Kukučínova Str. no. 38,  $48^{\circ}42'47.84''N$ ,  $21^{\circ}14'59.11''E$ , 15 Jun 2009, V. Mikoláš 33804 (KO) [Fig. 8E].

*Tragopogon orientalis* L.

$2n = 12$ , CHN. Slovakia, Slovenský kras Karst, meadow near the road from Drienovec village to Drienovecké kúpele Spa,  $48^{\circ}37'03''N$ ,  $20^{\circ}56'07''E$ , 13 Sep 2016, L. Mártonfiová 33223 (KO) [Fig. 8F].

## BORAGINACEAE

*Myosotis sparsiflora* J.C.Mikan ex Pohl

$2n = 18$ , CHN. Slovakia, Slovenské Rudohorie Mts., Botanical Garden of P.J. Šafárik University, genefund area,  $48^{\circ}43'59.49''N$ ,  $21^{\circ}14'08.29''E$ , spontaneous occurrence, 16 Jun 2009, V. Mikoláš 33805 (KO) [Fig. 8G].

## BRASSICACEAE

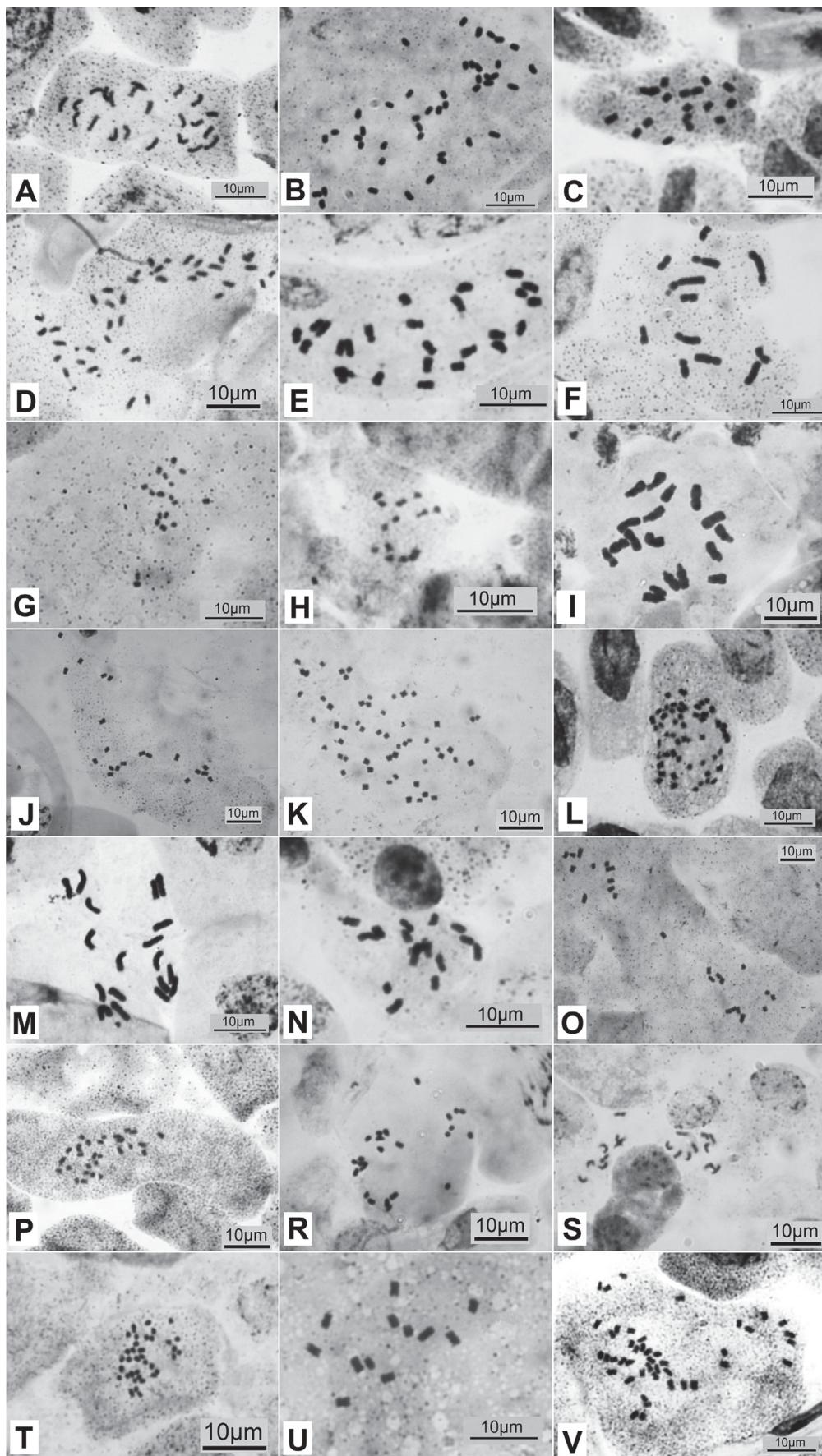
*Erysimum odoratum* Ehrh.

$2n = 14$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa near the quarry,  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, P. Mártonfi 33217 (KO) [Fig. 8H].

## CAPRIFOLIACEAE

*Dipsacus fullonum* L.

$2n = 18$ , CHN. Slovakia, town of Košice, Topoľčianska Str., building site, 255 m a.s.l.,  $48^{\circ}42'11.92''N$ ,  $21^{\circ}13'24.24''E$ , 11 Sep 2017, L. Mártonfiová 34081 (KO) [Fig. 8M].



**Fig. 8.** C-metaphases:  
**A**, *Falcaria vulgaris*, 2n = 22;  
**B**, *Centaurea jacea*, 2n = 44;  
**C**, *Centaurea rhenana*, 2n = 18;  
**D**, *Senecio vulgaris*, 2n = 40;  
**E**, *Stenactis annua*, 2n = 27; **F**,  
*Tragopogon orientalis*, 2n = 12;  
**G**, *Myosotis sparsiflora* 2n = 18;  
**H**, *Erysimum odoratum* 2n = 14;  
**I**, *Viburnum opulus* 2n = 18; **J**,  
*Holosteum umbellatum* 2n = 20;  
**K**, *Chenopodium album* 2n = 54;  
**L**, *Chenopodium pedunculare*  
2n = 54; **M**, *Dipsacus fullonum*  
2n = 18; **N**, *Scabiosa ochroleuca*  
2n = 16; **O**, *Lotus zhugulensis* 2n  
= 24; **P**, *Prunella vulgaris* 2n =  
28; **R**, *Teucrium montanum* 2n  
= 26; **S**, *Linum tenuifolium* 2n =  
18; **T**, *Epilobium ciliatum* 2n =  
36; **U**, *Plantago major* 2n = 12;  
**V**, *Galium verum* 2n = 44.

*Scabiosa ochroleuca* L.  
 $2n = 16$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa near the quarry,  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, L. Mártonfiová 33222 (KO) [Fig. 8N].

*Viburnum opulus* L.  
 $2n = 18$ , CHN. Slovakia, Slovenský kras Karst, near the road from Drienovec village to Drienovecké kúpele Spa,  $48^{\circ}37'03''N$ ,  $20^{\circ}56'07''E$ , 13 Sep 2016, P. Mártonfi 33221 (KO) [Fig. 8I].

#### CARYOPHYLLACEAE

*Holosteum umbellatum* L.  
 $2n = 20$ , CHN. Ukraine, 0.5–0.8 km SE from the village of Lesičniki, right from the river Seret, 17 Apr 2009, V. Mikoláš 33803 (KO) [Fig. 8J].

#### CHENOPodiACEAE

*Chenopodium album* L.  
 $2n = 54$ , CHN. Slovakia, the town of Košice, in front of the railway station,  $48^{\circ}43'23.15''N$ ,  $21^{\circ}16'01.90''E$ , 13 Sep 2009, V. Mikoláš 33806 (KO) [Fig. 8K].

*Chenopodium pedunculare* Bertol.  
 $2n = 54$ , CHN. Slovakia, town of Košice, crossroads of Boženy Němcovej and Letná Streets,  $48^{\circ}43'47.33''N$ ,  $21^{\circ}14'42.67''E$ , 2 Oct 2009, V. Mikoláš 34078 (KO) [Fig. 8L].

#### FABACEAE

*Lotus zhugulensis* Klokov  
 $2n = 24$ , CHN. Slovakia, the town of Košice, Palackého Str., near Námestie osloboditeľov Square,  $48^{\circ}42'59.72''N$ ,  $21^{\circ}15'40.34''E$ , 24 Jun 2007, V. Mikoláš 33802 (KO) [Fig. 8O]

#### LAMIACEAE

*Prunella vulgaris* L.  
 $2n = 28$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa pathway to the quarry  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, L. Mártonfiová 33278 (KO) [Fig. 8P].

*Teucrium montanum* L.  
 $2n = 26$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa near the quarry  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, P. Mártonfi 33220 (KO) [Fig. 8R].

#### LINACEAE

*Linum tenuifolium* L.  
 $2n = 18$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa near the quarry,  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, P. Mártonfi 33772 (KO) [Fig. 8S].

#### ONAGRACEAE

*Epilobium ciliatum* Raf.  
 $2n = 36$ , CHN. Slovakia, 0.7 km SE from Javorinka (Ždiar), valley of Tokarenský brook,  $49^{\circ}15'34.05''N$ ,  $20^{\circ}12'27.16''E$ , 28 Jul 2007, V. Mikoláš 33799 (KO) [Fig. 8T].

#### PLANTAGINACEAE

*Plantago major* L.  
 $2n = 12$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa,  $48^{\circ}37'12''N$ ,  $20^{\circ}56'36''E$ , 13 Sep 2016, P. Mártonfi 33219 (KO) [Fig. 8U].

#### RUBIACEAE

*Galium verum* L.  
 $2n = 44$ , CHN. Slovakia, Slovenský kras Karst, Drienovecké kúpele Spa near the quarry,  $48^{\circ}37'19''N$ ,  $20^{\circ}56'02''E$ , 13 Sep 2016, L. Mártonfiová & P. Mártonfi 33807 (KO) [Fig. 8V].

#### Literature cited

Murín, A. 1960. Substitution of cellophane for glass covers to facilitate preparation of permanent squashes and smears. *Stain Technol.* 35: 351–353.

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\* New chromosome number (cytotype) for the species.

▼ First chromosome count from an Indian accession.

The study was supported by financial grant under IPLS project of DBT (BT/PR/4548/INF/22/146/2012).

#### ASTERACEAE

▼ *Blumea bovei* (DC.) Vatke

$n = 10$ , CHN. India, Rajasthan, Hemawas Dam, Pali,  $25^{\circ}46'15.18''N$ ,  $73^{\circ}19'24.34''E$ , 237 m, on dry waste lands, 26 Sep 2014, Raman Preet RP 31115 (PUN 59904) [Fig. 9A].

This count agrees with  $n = 10$  by Razaq & al. (1994) from Pakistan.

\* *Blumea obliqua* (L.) Druce

$n = 9$ , CHN. India, Rajasthan, Umaid Bhawan Palace, Jodhpur,  $26^{\circ}16'51.33''N$ ,  $73^{\circ}02'51.57''E$ , 480 m, 15 Sep 2014, Raman Preet RP 33630 (PUN 60859) [Fig. 9B].

The present count differs from the earlier report of  $2n = 20$  by Daruwalla (1995).

#### APOCYNACEAE

▼ *Leptadenia pyrotechnica* (Forssk.) Decne.

$n = 11$ , CHN. India, Rajasthan, Tal Chapper, Churu,  $28^{\circ}18'57.65''N$ ,  $74^{\circ}59'06.60''E$ , 290 m, 29 Nov 2012, Raman Preet RP 31133 (PUN 60576) [Fig. 9C].

This count agrees with  $n = 11$  by Al-Turki & al. (2000) from Saudi Arabia.

#### BORAGINACEAE

\* *Heliotropium europaeum* L.

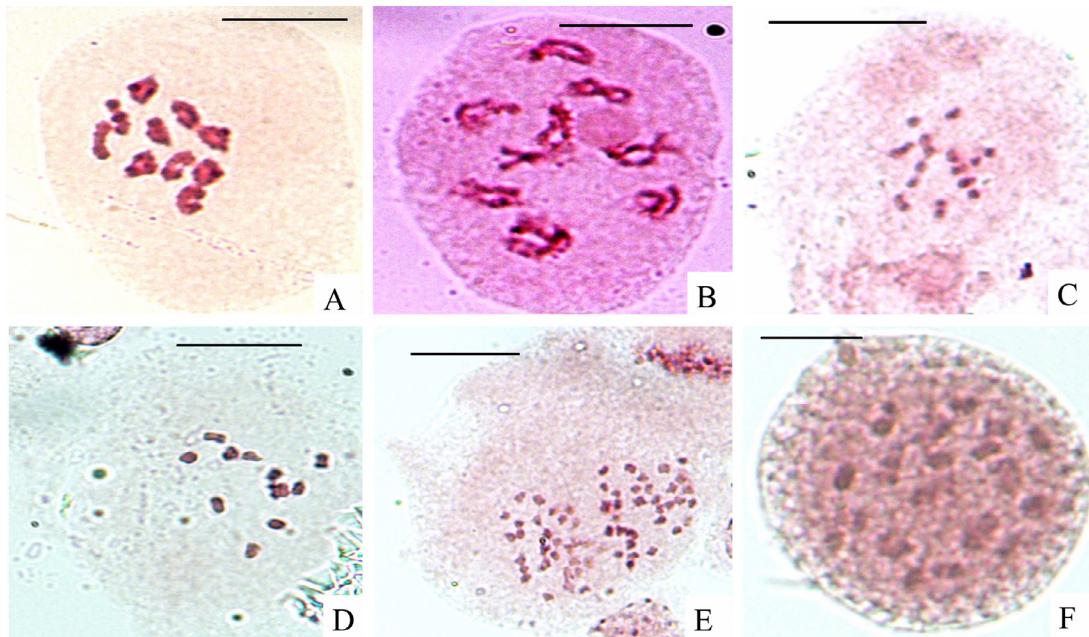
$n = 12$ , CHN. India, Rajasthan, near Bheemsagar Dam, Jhalawar,  $24^{\circ}33'45.88''N$ ,  $76^{\circ}20'04.42''E$ , 322 m, 03 Feb 2013, Raman Preet RP 31191 (PUN 59882) [Fig. 9D].

The present count differs from earlier report of  $2n = 48$  by Vasudevan (1975).

\* *Heliotropium ovalifolium* Forssk.

$n = 32$ , CHN. India, Rajasthan, Luni, Pali,  $25^{\circ}59'50.88''N$ ,  $73^{\circ}00'03.49''E$ , 210 m, on dry sandy area, 23 Mar 2016, Raman Preet RP 31192 (PUN 59919) [Fig. 9E].

The present count differs from earlier report of  $2n = 22$  by Munian (1982) and  $2n = 32$  by Pal (1963, 1957).



**Fig. 9.** **A**, *Blumea bovei*, meiotic metaphase I,  $n = 10$  (PUN 59904); **B**, *Blumea obliqua*, meiotic diakinesis,  $n = 9$  (PUN 60859); **C**, *Leptadenia pyrotechnica*, meiotic metaphase I,  $n = 11$  (PUN 60576); **D**, *Heliotropium europaeum*, meiotic metaphase I,  $n = 12$  (PUN 59882); **E**, *Heliotropium ovalifolium*, meiotic anaphase I,  $n = 32$  (PUN 59919); **F**, *Heliotropium supinum*, meiotic metaphase I,  $n = 16$  (PUN 59485).

\**Heliotropium supinum* L.

$n = 16$ , CHN. India Rajasthan, Hemawas, Pali,  $25^{\circ}41'02.72''N$   $73^{\circ}20'26.57''E$ , 207 m, on dry sandy area, 26 Sep 2014, Raman Preet RP 33632 (PUN 59485) [Fig. 9F].

The present count differ from earlier report of  $2n = 16$  by Malik & al. (1959) from India.

#### Literature cited

- Al-Turki, T.A., Fililan, S.A. & Mehmood, S.F. 2000. A cytological study of flowering plants from Saudi Arabia. *Willdenowia* 30: 339–358. <https://doi.org/10.3372/wi.30.30211>
- Daruwalla, A.R. 1995. Cytological investigations on the Asteraceae—genus *Blumea* and related genera *Laggera* and *Nanothamnus*. *J. Bombay Nat. Hist. Soc.* 92: 314–321.
- Malik, C.P., Sehgal, S.M. & Tandon, S.L. 1959. Chromosome number in some species of *Heliotropium*. *Curr. Sci.* 28: 500.
- Munian, M. 1982. Cytomorphological studies in *Heliotropium*. *Proc. Indian Sci. Congr. Assoc.* 69: 231.
- Pal, P.K. 1963. Comparative studies in four species of *Heliotropium* L. *Proc. Natl. Inst. Sci. India, B* 29: 1–40.
- Pal, P.K. 1957. Chromosome numbers in the genus *Heliotropium* Linn. *Curr. Sci.* 26: 218.
- Razaq, Z.A., Vahidy, A.A. & Ali, S.I. 1994. Chromosome numbers in Compositae from Pakistan. *Ann. Missouri Bot. Gard.* 81: 800–808. <https://doi.org/10.2307/2399925>
- Vasudevan, K.N. 1975. Contribution of the cytotaxonomy and cytogeography of the flora of the western Himalayas (with an attempt to compare it with the flora of Alpes) part II. *Ber. Schweiz. Bot. Ges.* 85: 210–252.

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\* First chromosome count for the species marked.

#### AMARYLLIDACEAE

*Allium spirale* Willd.

$2n = 32$ , CHN. Russia, Far East, Primorskii Krai, Nadezhdininskii Raion, near Tavrichanka settlement, the coast of Amurskii Bay (Sea of Japan), sandy spit, 2 Sep 2017, V.A. Nечаев 13133 (VLA).

#### ASTERACEAE

*Artemisia dracunculus* L.

$2n = 18$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, in vicinity of Listvennichnoe (Listvyanka) settlement, the shore of Baikal Lake, 525 m, abrupt rocky slope with steppe vegetation, 29 Aug 2015, S.G. Kazanovsky 13248 (IRK, VLA).

- Artemisia saitoana** Kitam.  
 $2n = 18$ , CHN. Russia, Far East, Primorskii Krai, Dal'negorskii Raion, in the vicinity of Dal'negorsk town, the Rudnaya River basin, locality Barachnaya Pad', *Quercus mongolica* forest, on dry rocks, 28 Sep 2017, O.A. Chernyagina 13168 (VLA).
- Aster korshinskyi** Tamamsch.  
 $2n = 18$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Kachugskii Raion, near Kachug settlement, 560 m, the edge of *Larix* and *Betula* forest, 13 Aug 2014, S.G. Kazanovsky 13164 (IRK, VLA).
- Conyza canadensis** (L.) Cronq.  
 $2n = 18$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Kazachinsko-Lenskii Raion, near Ul'kan settlement, at routing indicator BAM, 395 m, meadow at the road, 6 Aug 2014, S.G. Kazanovsky 13253 (IRK, VLA).
- Tragopogon dubius** Scop.  
 $2n = 12$ , CHN. Russia, Volga Region, Astrakhanskaya Oblast', Astrakhan' city, near Babaevskii Raion, on the edge of the floodplain, 20 May 2017, O.A. Chernyagina 13269 (VLA).
- Tragopogon marginifolius** Pavlov  
 $2n = 12$ , CHN. Russia, Volga Region, Astrakhanskaya Oblast', Akhtubinskii Raion, Bogdinsko-Baskunchakskii nature reserve, the slope of Bol'shoe Bogdo Mt., 17 May 2017, O.A. Chernyagina 13225 (VLA).
- Tragopogon soltisiorum** Mavrodiev  
 $2n = 24$ , CHN. Russia, Volga Region, Astrakhanskaya Oblast', Astrakhan' city, in abandoned lawn, 22 May 2017, O.A. Chernyagina 13224 (VLA).
- Tripleurospermum inodorum** (L.) Sch.Bip.  
 $2n = 36$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Zalairinskii Raion, Bazhir settlement, biological station of the Siberian Institute of Plant Physiology and Biochemistry, 507 m, the first year fallow, 19 Aug 2016, S.G. Kazanovsky 13188 (IRK, VLA).
- BRASSICACEAE**  
*Dontostemon pinnatifidus* (Willd.) Al-Shehbaz & H.Ohba  
 $2n = 14$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, near Bol'shoe Goloustnoe village, 489 m, the bottom of a slope, meadow with steppe species, 28 Aug 2015, S.G. Kazanovsky 13252 (IRK, VLA).
- CAPRIFOLIACEAE**  
*Scabiosa lachnophylla* Kitag.  
 $2n = 18$ , CHN. Russia, Far East, Primorskii Krai, Dal'negorskii Raion, in the vicinity of Dal'negorsk town, the Rudnaya River basin, locality Barachnaya Pad', 561 m, *Quercus mongolica* forest, on the rock, 28 Sep 2017, O.A. Chernyagina 13275 (VLA).
- COLCHICACEAE**  
*Disporum viridescens* (Maxim.) Nakai  
 $2n = 16$ , CHN. Russia, Far East, Primorskii Krai, Nadezhinskii Raion, 15 km of Nezhino settlement, near the hunting area "Nezhinskoe", the 25-years' fallow land, 7 Jul 2017, A.V. Gapeka 13130 (VLA).
- CUCURBITACEAE**  
*Thladiantha dubia* Bunge  
 $2n = 18$ , CHN. Russia, Far East, Primorskii Krai, Nadezhinskii Raion, in vicinity of the railway station Nadezhinskaya, the valley of Schmidtovka River, floodplain forest (*Fraxinus*, *Padus*, *Salix*, etc.), 9 Sep 2017, V.A. Nechaev 13159 (VLA).
- GENTIANACEAE**  
*\*Comastoma malyschevii* (Zuev) Zuev  
 $2n = 26$ , CHN. Russia, East Siberia, Republic of Buryatia, Tunkinskii Raion, Mondy settlement, 1318 m, the edge of the light *Larix* forest, 14 Sep 2017, S.G. Kazanovsky 13273 (IRK, VLA).
- IRIDACEAE**  
*Iris biglumis* Vahl  
 $2n = 40$ , CHN. Russia, East Siberia, Republic of Khakassia, Askizskii Raion, left riverside of the Kamyshta River, 317 m, saline steppe (*Achnatherum splendens* and forbs), 25 May 2014, S.G. Kazanovsky 13210 (IRK, VLA).
- LAMIACEAE**  
*Rabdosia excisa* (Maxim.) H.Hara  
 $2n = 24$ , CHN. Russia, Far East, Primorskii Krai, Dal'negorskii Raion, in the vicinity of Dal'negorsk town, the Rudnaya River basin, locality Barachnaya Pad', 266 m, *Quercus mongolica* forest in the valley, 28 Sep 2017, O.A. Chernyagina 13277 (VLA).
- LILIACEAE**  
*Lilium pensylvanicum* Ker Gawl.  
 $2n = 24$ , CHN. Russia, East Siberia, Republic of Buryatia, Kabanskii Raion, Mishikha village, left riverside of the Mishikha River near the mouth, 453 m, the meadow of *Deschampsia cespitosa* and forbs, 18 Aug 2015, S.G. Kazanovsky 13259 (IRK, VLA).
- Lloydia serotina* (L.) Rehb.  
 $2n = 24$ , CHN. Russia, East Siberia, Republic of Buryatia, Tunkinskii Raion, near the mouth of Belyi Irkut River, right riverside (at the bridge), 1584 m, on the rocks covered by mosses, 24 Aug 2015, S.G. Kazanovsky 13177 (IRK, VLA).
- MALVACEAE**  
*Malva pusilla* Sm.  
 $2n = 42$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Zalairinskii Raion, Bazhir settlement, biological station of the Siberian Institute of Plant Physiology & Biochemistry, 507 m, the first year fallow, 19 Aug 2016, S.G. Kazanovsky 13263 (IRK, VLA).
- PLANTAGINACEAE**  
*Veronicastrum sibiricum* (L.) Pennell  
 $2n = 34$ , CHN. Russia, Far East, Primorskii Krai, Dal'negorskii Raion, in vicinity of Dal'negorsk town, the Rudnaya River basin, locality Barachnaya Pad', 266 m, *Quercus mongolica* forest, 28 Sep 2017, O.A. Chernyagina 13278 (VLA).
- POACEAE**  
*Achnatherum sibiricum* (L.) Keng ex Tzvelev  
 $2n = 24$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, Primorskii Range, 4 km E of Bol'shie Koty settlement, the rock "Skriper", 500 m, 7 Aug 2015, A.V. Verkhozina & D.V. Tarassov 13155 (IRK, VLA).

*Anisantha tectorum* (L.) Nevski

$2n = 14$ , CHN. Russia, Volga Region, Astrakhanskaya Oblast', Astrakhan' city, as a weed on the lawn, frequent, abundant, 23 May 2017, O.A. Chernyagina 13226 (VLA).

*Chloris virgata* Sw.

$2n = 20$ ; CHN. Russia, Far East, Primorskii Krai, the railway station Ugol'naya, 30 Aug 2015, V.A. Nechaev 12788 (VLA).

*Ochlopoa supina* (Schrad.) H.Scholz & Valdés

$2n = 14$ , CHN. Russia, Far East, Kamchatskii Krai, Kamchatka Peninsula, Bystrinskii Raion, near Esso settlement, high floodplain of the Bystraya River, the meadow on fresh soil of lower part of the mountain ski-track, 13 Jul 2017, O.A. Chernyagina & E.A. Devyatova 13179 (VLA).

*Panicum ruderale* (Kitag.) Chang

$2n = 36$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Zalairinskii Raion, Bazhir settlement, biological station of the Siberian Institute of Plant Physiology & Biochemistry, 507 m, the first year fallow, 19 Aug 2016, S.G. Kazanovsky 13152 (IRK, VLA).

**POLYGONACEAE***Polygonum aviculare* agg.

$2n = 28$ , CHN. Russia, East Siberia, Republic of Buryatia, Selenginskii Raion, in vicinity of Gussinozersk town, 639 m, roadside, 28 Jul 2014, S.G. Kazanovsky 13266 (IRK, VLA).

**PORTULACACEAE***Portulaca oleracea* L.

$2n = 36$ , CHN. Russia, Far East, Primorskii Krai, near the railway station Amurskii Zaliv (in vicinity of Ugol'naya), on the railway embankment, 9 Sep 2017, V.A. Nechaev 13153 (VLA).

**PRIMULACEAE***Cortusa discolor* Vorosch. & Gorovoj

$2n = 24$ , CHN. Russia, Far East, Primorskii Krai, Dal'negorskii Raion, in vicinity of Dal'negorsk town, the Rudnaya River basin, locality Barachnaya Pad', 450 m, *Quercus mongolica* forest, on the slope, at moist rock, 28 Sep 2017, O.A. Chernyagina 13272 (VLA).

**SOLANACEAE***Solanum retroflexum* Dunal

$2n = 48$ , CHN. Russia, Primorskii Krai, Mikhailovskii Raion, Novoshakhtinsk settlement, in vegetable garden, 01 Sep 2015 V.T. Lapenko 12993 (VLA).

**VACCINIACEAE***Vaccinium vitis-idaea* L.

$2n = 24$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, in vicinity of Listvennichnoe (Listvyanka) settlement, the locality Krestovaya, 590 m alt., mixed forest (*Pinus*, *Picea*, *Betula*, *Populus tremula*), with grasses, forbs and green mosses, 29 Aug 2015, S.G. Kazanovsky 13267 (IRK, VLA).

**VIOLACEAE***Viola dissecta* Ledeb.

$2n = 24$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, in vicinity of Bol'shoe Goloustnoe village, the delta of

Goloustnaya River, 454 m, on pebbles, 28 Aug 2017, S.G. Kazanovsky 13160 (IRK, VLA).

*Viola gmeliniana* Schult.

$2n = 24$ , CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutskii Raion, in vicinity of Bol'shoe Goloustnoe settlement, the delta of Goloustnaya River, 454 m alt., on pebbles, 28 Aug 2017, S.G. Kazanovsky 13165 (IRK, VLA).

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\* First chromosome count for the species.

**UMBELLIFERAE/APIACEAE***Chaerophyllum temulum* L.

$2n = 14$ , CHN. Italy, Emilia-Romagna/Tuscany, The Tuscan-Emilian Apennines, between Romanoro and Madonna di Petrvolta, near the road, 44°20'N, 10°35'E, 735 m, 16 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 4 (MW); Greece, northern Greece, Pieria, E slope of Mt. Olympus, above the town of Litochoro, the road to Pronia, near the road, 40°06'N, 22°30'E, 03 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja s.n. (MW) [Fig. 10A].

More than 20 reports of chromosome numbers for this species have been published, based on materials collected in Europe and western Asia, *Ch. temulum* has two cytotypes –  $2n = 14$  and  $2n = 22$  without any geographic pattern (Pimenov & al., 2002). Our samples, both from Italy and from Greece belong to the  $2n = 14$  cytotype.

*Conium divaricatum* Boiss. & Orph.

$2n = 22$ , CHN. Greece, Nomos Ioanninon, Timfi Mountains, viewing point at the road near Kalivia, 39°58'N, 20°38'E, 695 m, 03 Sep 2015, E.A. Zakharova & S.E. Petrova 27 (MW) [Fig. 10C].

This is the second chromosome number report for the species, it is in agreement with the previous one of  $2n = 22+0-1B$  made from Greece too (Constantinidis & al., 1997).

*Conium maculatum* L.

$2n = 22$ , CHN. Greece, northern Greece, Pieria, E slope of Mt. Olympus, above the town of Platamon, near the village of Kalipephki, near the road, soft red soil, 39°57'N, 22°27'E, 1163 m, 05 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja s.n. (MW) [Fig. 10D].

*Dichoropetalum oligophyllum* (Griseb.) Pimenov & Kljuykov

$2n = 22$ , CHN. Greece, northern Greece, Nomos Pellis, Mt. Tzena, E-facing slope, grassy slope, 41°08'N, 22°12'E, 1609 m, 01 Sep 2015, E.A. Zakharova & S.E. Petrova 14 (MW) [Fig. 12A].

*Dichoropetalum schottii* (Besser ex DC.) Pimenov & Kljuykov

$n = 11$ , CHN. Italy, Province Lucca, Garfagnana, near Bagni di Lucca, village of Scesta, right bank of river Lima, above the road, calcareous rock, in the grass, rarely on rock, 44°02'N, 10°39'E, 250 m,

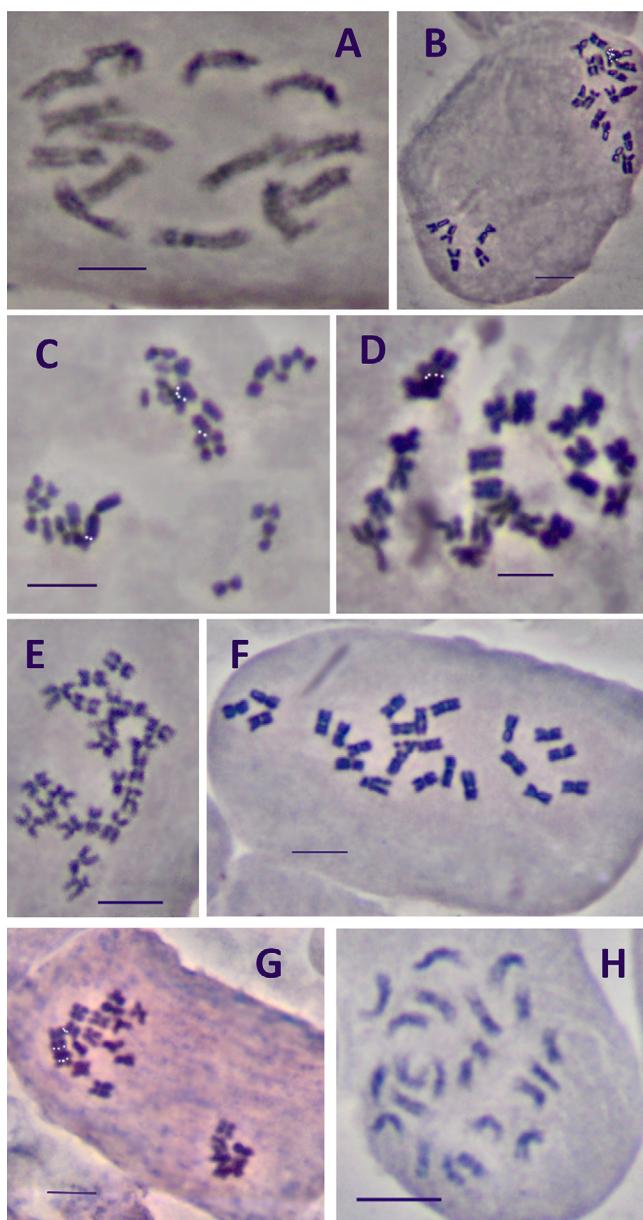
17 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 7 (MW) [Fig. 11A].

*Heracleum sibiricum* L.

$2n = 22$ , CHN. Greece, northern Greece, Pieria, E slope of Mt. Olympus, above the town of Platamon, near the village of Kalipephki, near the road, soft red soil,  $39^{\circ}57'N$ ,  $22^{\circ}27'E$ , 1163 m, 05 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja 2 (MW) [Fig. 10B].

*Heracleum sphondylium* L.

$2n = 22, 22+1-2B$ , CHN. Greece, northern Greece, Nomos Kavala, Mt. Pangeo, near 20.65 km to W-NW of the village of Akrovuni,



**Fig. 10.** Mitotic chromosomes. **A**, *Chaerophyllum temulum*,  $2n = 14$ ; **B**, *Heracleum sibiricum*,  $2n = 22$ ; **C**, *Conium divaricatum*,  $2n = 22$ ; **D**, *Conium maculatum*,  $2n = 22$ ; **E**, *Pastinaca sativa*,  $2n = 22$ ; **F**, *Heracleum sphondylium*,  $2n = 22+1B$ ; **G**, *Heracleum ternatum*,  $2n = 22$ ; **H**, *Opopanax hispidus*,  $2n = 22$ . — Scale bars = 5  $\mu$ m.

near the road, bushes, in the grass,  $40^{\circ}54'N$ ,  $24^{\circ}07'E$ , 1368 m, 30 Aug 2015, E.A. Zakharova & S.E. Petrova s.n. (MW) [Fig. 10F].

There are more than 50 reports of chromosome number  $2n = 22$  for *Heracleum sphondylium* from Europe and North Africa (Morocco) (Pimenov & al., 2002; Siljak-Yakovlev & al., 2010; Shner & Pimenov, 2013). B chromosomes were reported from different parts of its distribution area, including Greece (Weimarck, 1978).

*Heracleum ternatum* Velen.

$2n = 22$ , CHN. Italy, Abruzzo, the Grand Sasso and Monti della Laga National Park, Grand Sasso, descent from the pass Vado di Corno to St. Stefano, near the road,  $42^{\circ}20'N$ ,  $13^{\circ}39'E$ , 1498 m, 23 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 39 (MW) [Fig. 10G].

*Katapsuxis silaifolia* (Jacq.) Reduron, Charpin & Pimenov

$n = 11$ , CHN. Greece, central Greece, Nomos Viotias, Mt. Parnassos; N of Arachova, near Ski-Center, NE-facing slope, under rocks,  $38^{\circ}33'N$ ,  $22^{\circ}35'E$ , 1850 m, 28 Jun 2012, E.A. Zakharova & U.A. Ukrainskaja 5 (MW) [Fig. 11D].

\**Laserpitium pseudomeum* Orph., Heldr. & Sartori

$n = 11$ , CHN. Greece, Central Greece, Nomos Viotias, Mt. Parnassos; N of Arachova, near Ski-Center, NW-facing slope, among rocks,  $38^{\circ}32'N$ ,  $22^{\circ}35'E$ , 1985 m, 28 Jun 2012, E.A. Zakharova & U.A. Ukrainskaja 8 (MW) [Fig. 11E].

This is the first chromosome number report for this species, the report of  $2n = 12$  by Franzén & Gustavsson (1983) was an error (Hartvig, 1986).

*Opopanax hispidus* (Friv.) Griseb.

$2n = 22$ , CHN. Greece, northern Greece, Trikala, N part of Meteora, the village of Gavros, 6 km of the road Kalabaka–Grevena, in the grass near the road,  $39^{\circ}48'N$ ,  $21^{\circ}35'E$ , 463 m, 08 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja 3 (MW) [Fig. 10H].

Material from Greece is investigated here for the first time.

*Pastinaca sativa* L.

$2n = 22$ , CHN. Greece, northern Greece, Larissa, Ossa Mountain, above the village of Stomio, the road to Karitsa, near the road on the soft soil,  $39^{\circ}51'N$ ,  $22^{\circ}45'E$ , 187 m, 10 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja 10 (MW) [Fig. 10E].

Material from Greece is investigated here for the first time.

*Pimpinella major* (L.) Huds.

$2n = 20$ , CHN. Italy, Abruzzo, Majella National Park, Morrone Mts., E-facing slope, near pass St. Leonardo, below the beech forest, on the meadows among *Juniperus* sp.,  $42^{\circ}07'N$ ,  $14^{\circ}00'E$ , 25 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 59 (MW) [Fig. 12B].

Numerous chromosome numbers reports from the Central and South Europe demonstrate aneuploid variability  $2n = 18, 20$  (Pimenov & al., 2002), tetraploid  $2n = 36$  was found in Slovenia (Druskovic, 1995). Material from Italy is investigated here for the first time.

*Seseli montanum* L.

$n = 11$ , CHN. Greece, northern Greece, Nomos Kastorias, near 8 km S of Eptakhorri, above the village of Zouzouli, N-facing stony slope, in the grass and lichen,  $40^{\circ}10'N$ ,  $21^{\circ}01'E$ , 1099 m, 03 Sep 2015, E.A. Zakharova & S.E. Petrova 20 (MW) [Fig. 11B].

$2n = 22$ , CHN. Greece, northern Greece, Nomos Kastorias, near 8 km S of Eptakhori, above the village of Zouzouli, in woodland of *Pinus nigra*, litter, moss and grass,  $40^{\circ}10'N$ ,  $21^{\circ}01'E$ , 1200 m, 03 Sep 2015, E.A. Zakharova & S.E. Petrova 25 (MW).

Material from Balkan Peninsula is investigated here for the first time.

*Seseli varium* Trevir.

$n = 11$ , CHN. Italy, Lazio/Abruzzo, the road Antrodoco–L'Aquila, near the road, meadow slopes, in the grass,  $42^{\circ}23'N$ ,  $13^{\circ}08'E$ , 873 m, 22 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 32 (MW) [Fig. 11C].

*Seseli varium* has two cytotypes –  $2n = 20$  (from Czechia, Slovakia and Italy) and  $2n = 22$  (from the Crimea) (Pimenov & al., 2002). Our report does not correspond to the previous one from Italy (Damboldt, 1968).

*Smyrnium rotundifolium* Mill.

$2n = 22$ , CHN. Greece, northern Greece, Pieria, E slope of Mt. Olympus, above the town of Litochoro, the road to Prionia, near the road,  $40^{\circ}06'N$ ,  $22^{\circ}30'E$ , 03 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja s.n. (MW) [Fig. 12C].

*Tommasinia verticillaris* (L.) Bertol.

$2n = 22$ , CHN. Italy, Modena, Regio Emilia, S.-Pellegrino,  $44^{\circ}21'N$ ,  $10^{\circ}35'E$ , 360 m, 16 Aug 2014, E.A. Zakharova, E.V. Kljuykov & U.A. Ukrainskaja 2 (MW) [Fig. 12D].

Material from Italy is investigated here for the first time.

*Tordylium maximum* L.

$2n = 20$ , CHN. Greece, northern Greece, Trikala, N part of Meteora, the village of Gavros, 6 km of the road Kalabaka–Grevena, in the grass near the road,  $39^{\circ}48'N$ ,  $21^{\circ}35'E$ , 463 m, 08 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja s.n. (MW) [Fig. 12G].

Our report of  $2n = 20$  corresponds to numerous previous ones from Central and South Europe and Turkmenistan (Pimenov & al., 2002). We have also reported  $2n = 18$  from Turkey (Shner & al., 2010),  $2n = 22$  was reported for cultivated plants and the plants from Spain (Tamamschjan, 1933; Silvestre, 1978).

*Torilis arvensis* (Huds.) Link

$2n = 12$ , CHN. Greece, northern Greece, Platomonas, 02 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja s.n. (MW) [Fig. 12E].

*Torilis arvensis* subsp. *purpurea* (Ten.) Hayek

$2n = 12$ , CHN. Greece, northern Greece, Ossa Mountain, above the village Stomio, the road to Spilia, near the road in the forest of *Fagus sylvatica*,  $39^{\circ}51'N$ ,  $22^{\circ}45'E$ , 10 Oct 2016, E.V. Kljuykov & U.A. Ukrainskaja 12 (MW) [Fig. 12F].

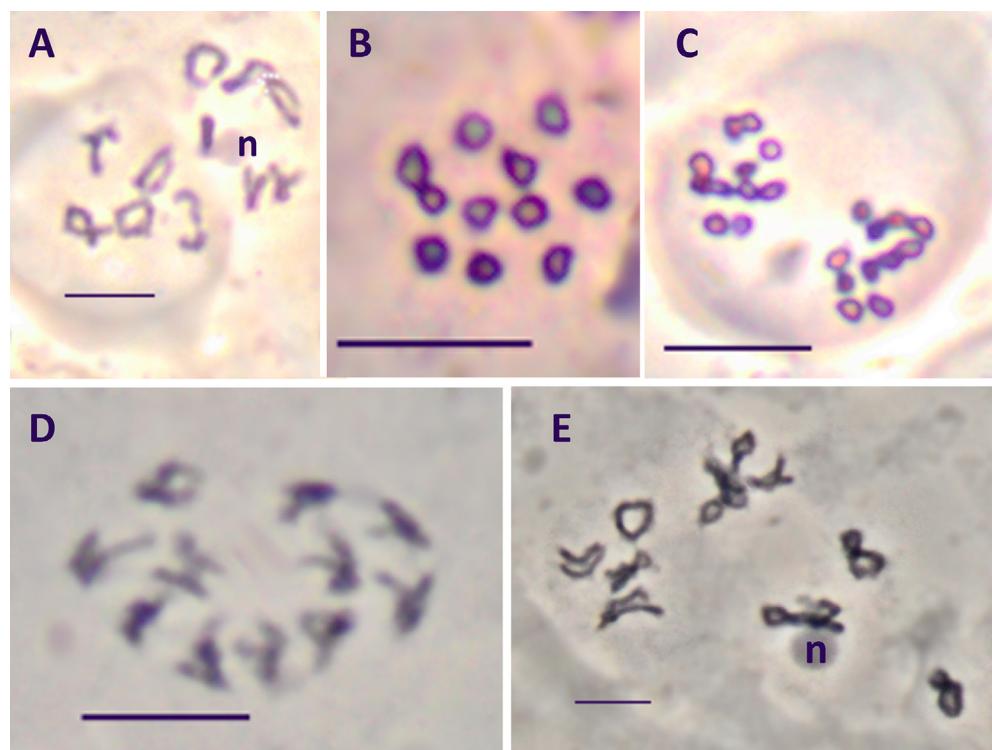
*Trinia glauca* (L.) Dumort.

$2n = 18$ , CHN. Greece, northern Greece, Nomos Serron, Mt. Menikion, SW-part, ca. 5.5 km NE of the village of Inoussa (above the hamlet of Chionochorion), W-facing slope, near the road, rock and crushed stone,  $41^{\circ}09'N$ ,  $23^{\circ}39'E$ , 1306 m, 28 Aug 2015, E.A. Zakharova & S.E. Petrova, 2 (MW) [Fig. 12H].

Our report of  $2n = 18$  corresponds to numerous previous ones from Central and South Europe (Pimenov & al., 2002). Material from Greece is investigated here for the first time.

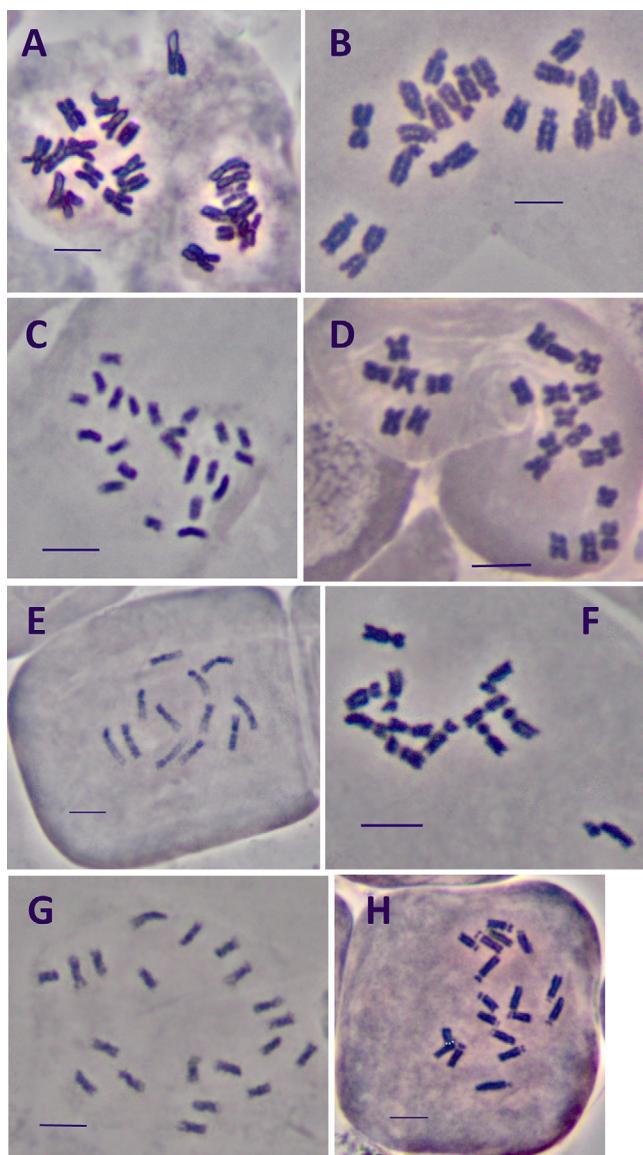
**Literature cited**

- Constantinidis, T., Kamari, G. & Phitos, D. 1997. A cytological study of 28 phanerogams from the mountains of SE Sterea Ellas, Greece. *Willdenowia* 27: 121–142. <https://doi.org/10.3372/wi.27.2711>  
**Damboldt, J.** 1968. [Reports] In: Löve, Á. (ed.), IOPB Chromosome Number Reports XV. *Taxon* 17: 91–104.  
**Druskovic, B.** 1995. [Reports] In: Stace, C.A. (ed.), IOPB Chromosome Data 9. *Int. Organ. Pl. Biosyst. Newslett.* 24: 11–14.



**Fig. 11.** Meiotic chromosomes.

- A, *Dichoropetalum schottii*,  $n = 11$ ;  
 B, *Seseli montanum*,  $n = 11$ ;  
 C, *Seseli varium*,  $n = 11$ ;  
 D, *Katapsxis silaifolia*,  $n = 11$ ;  
 E, *Laserpitium pseudomeum*,  $n = 11$ . — Scale bars = 10  $\mu$ m; n, nucleolus.



**Fig. 12.** Mitotic chromosomes. **A**, *Dichoropetalum oligophyllum*,  $2n = 22$ ; **B**, *Pimpinella major*,  $2n = 20$ ; **C**, *Smyrnium rotundifolium*,  $2n = 22$ ; **D**, *Tommasinia verticillaris*,  $2n = 22$ ; **E**, *Torilis arvensis*,  $2n = 12$ ; **F**, *Torilis arvensis* subsp. *purpurea*,  $2n = 12$ ; **G**, *Tordylium maximum*,  $2n = 20$ ; **H**, *Trinia glauca*,  $2n = 18$ . — Scale bars = 5  $\mu\text{m}$ .

Franzen, R. & Gustavsson, L.-A. 1983. Chromosome numbers in flowering plants from the high mountains of Sterea Ellas, Greece. *Willdenowia* 13: 101–106.

Hartwig, P. 1986. *Laserpitium pseudomeum*. P. 733 in: Strid, A. (ed.), *Mountain flora of Greece*, vol. 1. Cambridge: University Press.

Pimenov, M.G., Vasil'eva, M.G., Leonov, M.V. & Daushkevich, J.V. 2002. *Karyotaxonomical analysis in Umbelliferae*. Enfield, Plymouth: Science Publishers.

Shner, J. & Pimenov, M.G. 2013. Reports 1784–1798. In: Kamari, G., Blanché, C. & Siljak-Yakovlev, S. (eds.), Mediterranean chromosome number reports – 23. *Fl. Medit.* 23: 263–273.

Shner, J.V., Pimenov, M.G., Kljuykov, E.V. & Alexeeva, T.V. 2010. Umbelliferae/Apiaceae. In: Marhold, K. (ed.), IAPT/IOPB Chromosome Data 10. *Taxon* 59: 1937, E10–E12.

Siljak-Yakovlev, S., Pustahija, F., Šolić, E.M., Bogunić, F., Muratović, E., Bašić, N., Catrice, O. & Brown, S.C. 2010. Towards a genome size and chromosome number database of Balkan flora: C-values in 343 taxa with novel values for 242. *Advanced Sci. Lett.* 3: 190–213. <https://doi.org/10.1166/asl.2010.1115>

Silvestre, S. 1978. Contribución al estudio cariológico de la familia Umbelliferae en la Península Ibérica. II. *Lagascalia* 7: 163–172.

Tamamschjan, S. 1933. Materials for the karyosystematics of the cultivated and wild growing species of the family Umbelliferae. *Trudy Prikl. Bot., Ser. 2, Genet. Rast.* 2: 137–164.

Weimareck, G. 1978. B chromosomes in *Heracleum sphondylium* s. lat. in Europe. Pp. 293–303 in: Cauwet-Marc, A.M. & Carbonnier, J. (eds.), *Les Ombellifères: Contributions pluridisciplinaires à la systématique; Actes du 2e Symposium International sur les Ombellifères, Centre Universitaire de Perpignan, 18–21 mai 1977*. Perpignan.

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We used the administrative regionalization of Morocco as of 2015.

\* First chromosome count for the species.

#### UMBELLIFERAE/APIACEAE

*Ammi majus* L.

$n = 11$ ,  $2n = 22$ , CHN. Morocco, Région Fès-Meknès, between Emouzzer-Kandar and Fès,  $33^{\circ}50'57''\text{N}$ ,  $04^{\circ}58'57''\text{W}$ , 764 m, 06 Sep 2013, M.G. Pimenov 66 (MW) [Fig. 13A].

Chromosome number of *A. majus* was determined at least 25 times from Portugal, Spain, Greece, Iraq, Jordan, Turkey, and India (cult.) with constant results –  $n = 11$  or  $2n = 22$ ; for the material from Morocco there are two previous reports (Humphries & al., 1978; El Alaoui-Faris & al., 2009).

*Bupleurum atlanticum* Murb.

$n = 16$ ,  $2n = 32$ , CHN. Morocco, Région Fès-Meknès, Middle Atlas Mts., between Timahdite and Foum Khenag,  $33^{\circ}08.88'\text{N}$ ,  $05^{\circ}03.34'\text{W}$ , 1860 m, 05 Sep 2013, M.G. Pimenov 58 (MW) [Fig. 13B].

The species was an object of A.-M. Cauwet & J. Carbonier's detailed investigations (see Pimenov & al., 2002). Four subspecies were studied – besides the type one – *B. atlanticum* subsp. *aiouense* Cauwet & Carb. and *B. atlanticum* subsp. *airei* (Panellatti & Vindt) Cauwet & Carb. from Morocco, as well as *B. atlanticum* subsp. *algeriense* Cauwet & Carb. from Algeria, showing infraspecific variability in chromosome numbers. Two main cytotypes were found – with  $x = 8$  ( $n = 16$ ;  $2n = 32$ ) and with  $x = 7$  ( $n = 7$ , 14;  $2n = 14$ , 28). The cytotypes are only partly correlated with the subspecies, and in *B. atlanticum* subsp. *mairei* dysploidy and odd numbers were found (Cauwet, 1975; Cauwet & Carbonnier, 1976, 1977). Our results correspond with the known chromosome counts for *B. atlanticum* subsp. *aiouense*; the same number was reported also for the type subspecies (Cauwet, 1975; Cauwet & Carbonnier, 1976, 1977; Cauwet-Marc, 1979).

*\*Bupleurum benoistii* Litard. & Maire

$n = 16$ , CHN. Morocco, Région Béni Mellal-Khénifra, High Atlas Mts., near Tizi-n Tirlist, 31°06.58'N, 06°41.20'W, 2300 m, high mountain pasture, 28 Aug 2013, M.G. Pimenov 23 (MW) [Fig. 13C].

The chromosome number has been determined for this species for the first time.

*Bupleurum spinosum* Gouan

$n = 16$ , CHN. Morocco, Région Drâa-Tafilalet, High Atlas Mts., road Marrakech–Ouarzazate, near Tizi-n'Tichka Pass, 31°17.24'N, 07°23.03'W, 2200 m, 30 Aug 2013, M.G. Pimenov 32 (MW) [Fig. 13D].

Our result corresponds with 12 previous reports of chromosome numbers of *B. spinosum* from Spain, Algeria and Morocco (Cauwet-Marc, 1978, 1979), the Moroccan material, separated as *B. spinosum* var. *mauritanicus* Cauwet does not differ from the type variety in the number of chromosomes ( $n = 16$ ;  $2n = 32$ ).

*Daucus carota* L.

$2n = 18$ , CHN. Morocco, Région Béni Mellal-Khénifra, High Atlas Mts., near Demnote, 31°43'52"N, 07°02'10"W, 968 m, along road, 28 Aug 2013, M.G. Pimenov 25 (MW) [Fig. 14B].

The overwhelming majority of more than 60 reports for cultivated and wild carrot (see Pimenov & al., 2002 and subsequent information in TROPICOS on-line database of the Missouri botanical garden, <http://www.tropicos.org/Project/IPCN>) show the same numbers –  $n = 9$  or  $2n = 18$  in spite of considerable and up to now incompletely investigated infraspecific morphological variability. Chromosome morphology was investigated in at least 8 publications of karyotype analyses, including one using Giemsa C-banding and FISH of 5S and 18S/25S RNA (Schradler & al., 2003). Morocco belongs to the area of Western Mediterranean, which is regarded as a center of the diversity and most probable origin of the genus.

*Daucus carota* subsp. *azoricus* Franco

$2n = 18$ , CHN. Morocco, Région Rabat-Salé-Kénitra, between Sidi-Kacem and Souk-el-Arba du Rhart, 34°25.38'N, 06°01.79'W, 07 Sep 2013, M.G. Pimenov 70 (MW) [Fig. 14A].

This subspecies is known also under the name of *D. carota* subsp. *maximus* (Desf.) P.W.Ball, but the authors of the *Flore pratique du Maroc* (El Alaoui Faris, 2007) considered that *D. carota* subsp. *maximus* (Desf.) was erroneously recorded for Morocco.

*Daucus crinitus* Desf.

$2n = 22$ , CHN. Morocco, Région Tanger-Tétouan-Al Hoceïma, near Asilah, 35°25.38'N, 06°01.79'W, 08 Sep 2013, M.G. Pimenov 82 (MW) [Fig. 14J].

Two different chromosome numbers were reported for the species –  $2n = 18$  and 22. The number of  $2n = 18$  was found by Queiros (1972) for plants from Portugal. Three remaining reports for plants from Portugal and Spain (Garde & Malheiros-Garde, 1949; Queiros, 1979; Aparicio & Silvestre, 1985) correspond to our new report. Plants from Morocco have been investigated for the first time.

*Daucus muricatus* (L.) L.

$2n = 22$ , CHN. Morocco, Région Tanger-Tétouan-Al Hoceïma, 3 km S of Asilah, 35°25.38'N, 06°01.71'W, 08 Sep 2013, M.G. Pimenov 73 (MW) [Fig. 14D].

All previous reports (see Pimenov & al., 2002), including one for plants from Morocco (Vogt & Oberprieler, 1994) show invariable chromosome number ( $n = 11$ ,  $2n = 22$ ) in the species. The early report of  $2n = 16$  for the material of unknown origin under the name of *Orlaya muricata* L. (Wanscher, 1933) is an obvious misidentification.

Our specimen M.G. Pimenov 73, collected near Asilah in NW Morocco, demonstrates an interesting example of heterocarpy. Heterocarpy is known in *Daucus* (Drude, 1897–98; Kord'um, 1967; Cohen & Plitmann, 1997), for example, it was described in *D. muricatus* (Moris, 1842).

*Deverra scoparia* Coss. & Durieu

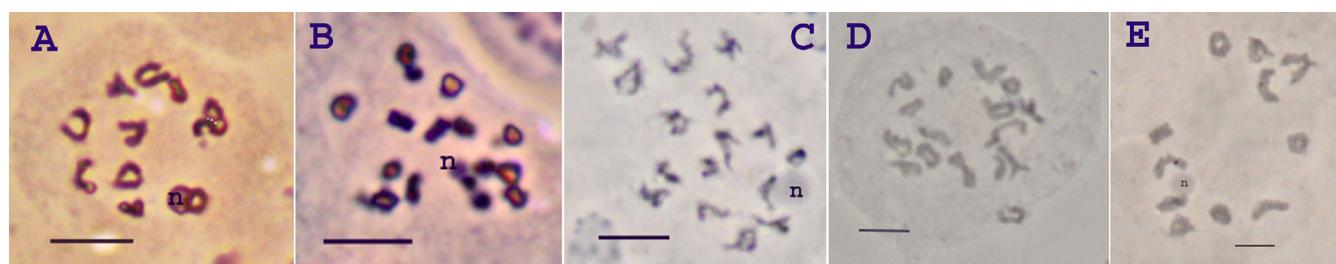
$2n = 20$ , CHN. Morocco, Région Béni Mellal-Khénifra, High Atlas Mts., Ait Al Bouli, 31°41.53'N, 06°43.05'W, 1350 m, 28 Aug 2013, M.G. Pimenov 17 (MW) [Fig. 14E].

There are two reports of chromosome number for the species –  $n = 10$  from Algeria (Reese, 1957) and  $2n = 20+2B$  (origin not indicated) (El Alaoui Faris, 1989). Our report agrees with these data.

*\*Dichoropetalum munbyi* (Boiss.) Pimenov & Kljuykov

$2n = 44$ , CHN. Morocco, Région Fès-Meknès, Middle Atlas Mts., between Timahdite and Azrou, 33°25.49'N, 05°10.73'W, 1620 m, cedar forest, 06 Sep 2013, M.G. Pimenov 60 (MW) [Fig. 14H].

This is a first report of the chromosome number for this species, and the first finding of polyploidy for the genus *Dichoropetalum* Fenzl. All previously studied species of *Dichoropetalum* (partly published as belonging to the genera *Peucedanum* L., *Johreniopsis* Pimenov, or *Holandrea* Reduron & al.) namely *D. anatomicum* Pimenov & Kljuykov, *D. carvifolia* (Vill.) Pimenov & Kljuykov (≡ *Peucedanum carvifolia* Vill.), *D. chrysanthemum* (Boiss. & Heldr.) Pimenov & Kljuykov, *D. longibracteolatum* (Parolly & Nordt) Pimenov & Kljuykov (≡ *Peucedanum longibracteolatum* Parolly & Nordt), *D. palimboides* (Boiss.) Pimenov & Kljuykov, *D. pschawicum* (Boiss.) Pimenov & Kljuykov (≡ *Peucedanum pschawicum* Boiss.), *D. schottii* (Besser ex DC.) Pimenov & Kljuykov (≡



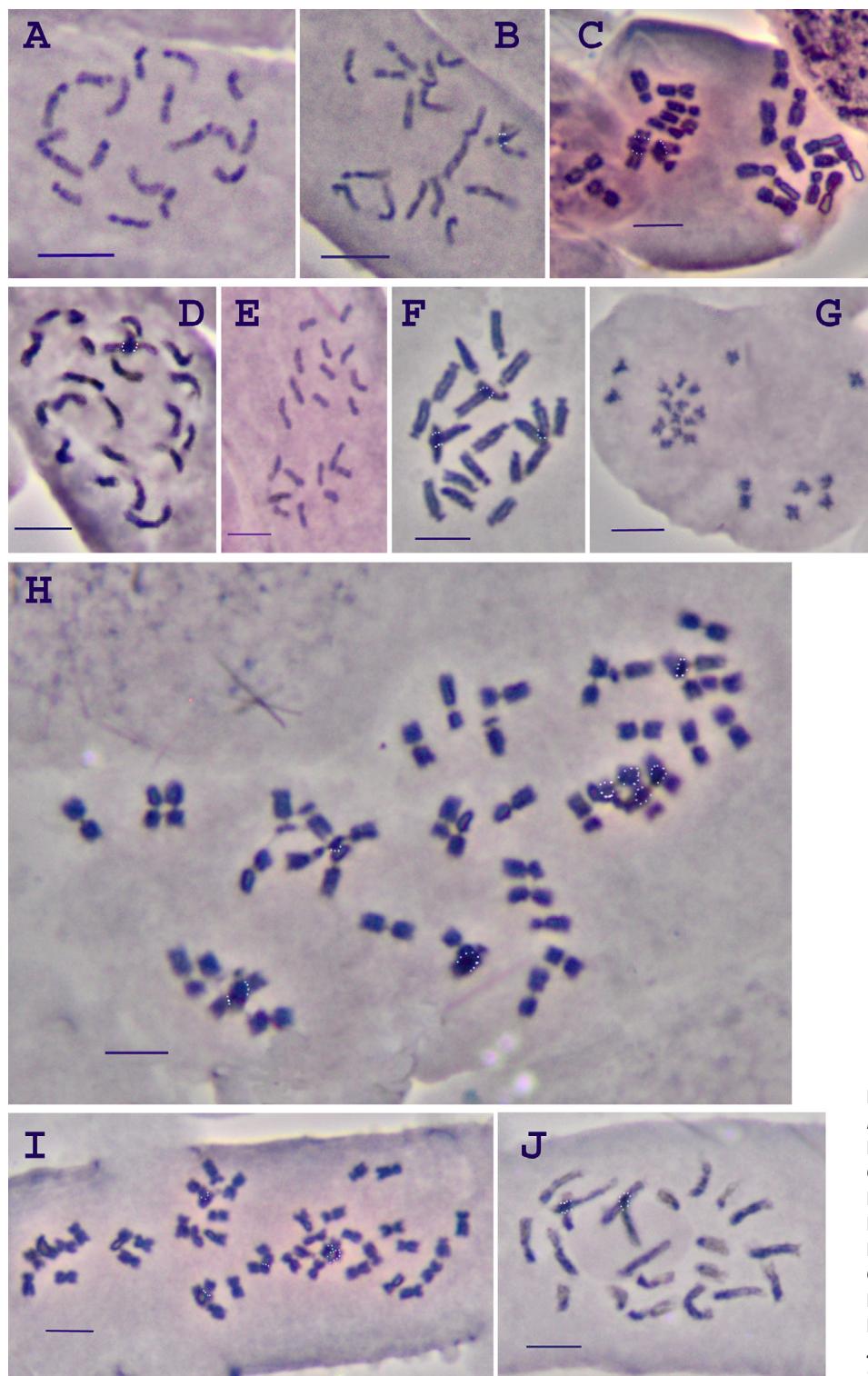
**Fig. 13.** Meiotic chromosomes. **A**, *Ammi majus*,  $n = 11$ ; **B**, *Bupleurum atlanticum*,  $n = 16$ ; **C**, *Bupleurum benoistii*,  $n = 16$ ; **D**, *Bupleurum spinosum*,  $n = 16$ ; **E**, *Seseli montanum*,  $n = 11$ . — Scale bars = 10  $\mu\text{m}$ ; n, nucleolus.

*Peucedanum schottii* Besser ex DC.), *D. seseloides* (C.A.Mey.) Pimenov & Kljuykov (= *Peucedanum paucifolium* Ledeb.), *D. vittijugum* (Boiss.) Pimenov & Kljuykov (= *Peucedanum vittijugum* Boiss.), and *D. minutifolium* (Janka) Pimenov & Kljuykov (= *Peucedanum vittijugum* Boiss. subsp. *minutifolium* (Janka) Kuzmanov & Andreev) are diploids with  $x = 11$  (see Pimenov & al., 2002; Parolly & Nordt, 2005; Shner & al., 2010, 2013).

\**Ferulago lutea* (Poir.) Grande

$2n = 44$ , CHN. Morocco, Région Fès-Meknès, near Moulay-Idriss, Roman ruins of Volubilis,  $34^{\circ}05'38''\text{N}$ ,  $05^{\circ}34'05''\text{W}$ , 330 m, 06 Sep 2013, M.G. Pimenov s.n. (MW) [Fig. 14I].

This is the first report for this species and the second report on polyploidy for the genus. Sixteen species of *Ferulago* W.D.J.Koch were previously studied, all of them are diploids with  $x = 11$  ( $n = 11$ ,



**Fig. 14.** Mitotic chromosomes.  
**A**, *Daucus carota* subsp. *azoricus*,  $2n = 18$ ;  
**B**, *Daucus carota*,  $2n = 18$ ;  
**C**, *Kundmannia sicula*,  $2n = 22$ ;  
**D**, *Daucus muricatus*,  $2n = 22$ ;  
**E**, *Deverra scoparia*,  $2n = 20$ ;  
**F**, *Visnaga daucoides*,  $2n = 20$ ;  
**G**, *Oenanthe pimpinelloides*,  $2n = 22$ ;  
**H**, *Dichoropetalum munbyi*,  $2n = 44$ ;  
**I**, *Ferulago lutea*,  $2n = 44$ ;  
**J**, *Daucus crinitus*,  $2n = 22$ . —  
Scale bars = 5  $\mu\text{m}$ .

$2n = 22$ ) with one exception of report for *Ferulago galbanifera* (Mill.) W.D.J.Koch from Italy, Sicily (Colombo & al., 1983).

*Kundmannia sicula* (L.) DC.

$2n = 22$ , CHN. Morocco, Région Fès-Meknès, near Moulay-Idriss, Roman ruins of Volubilis,  $34^{\circ}05'38''\text{N}$ ,  $05^{\circ}34'05''\text{W}$ , 330 m, 06 Sep 2013, M.G. Pimenov 69 (MW) [Fig. 14C].

Four reports of chromosome numbers were published for this species, all being  $2n = 22$  (see Pimenov & al., 2002), however, material from Morocco has never been studied. Our report agrees with chromosome data from Spain, Italy, and France (Corsica).

*Oenanthe pimpinelloides* L.

$2n = 22$ , CHN. Morocco, Région Tanger-Tétouan-Al Hoceïma, 3 km S of Asilah,  $35^{\circ}25.38''\text{N}$ ,  $06^{\circ}01.71''\text{W}$ , 08 Sep 2013, M.G. Pimenov 74 (MW) [Fig. 14G].

Our report (the first one from Morocco) corresponds to numerous previous reports ( $n = 11$  or  $2n = 22$ ) made for the plants from Portugal, Spain, Greece, Italy, Bulgaria, and the Crimea (Pimenov & al., 2002).

*Seseli montanum* L.

$n = 11$ , CHN. Morocco, Région Béni Mellal-Khénifra, High Atlas Mts., Tizi-n'Tirlist,  $31^{\circ}06.58''\text{N}$ ,  $06^{\circ}41.20''\text{W}$ , 2300 m, high mountain pasture, 28 Aug 2013, M.G. Pimenov 22 (MW); Morocco, Région Béni Mellal-Khénifra, Middle Atlas Mts., between Aït-Oufella and Col-du-Zad,  $32^{\circ}59.97''\text{N}$ ,  $05^{\circ}04.46''\text{W}$ , 2000 m, 05 Sep 2013, M.G. Pimenov 55 (MW) [Fig. 13E].

These are the first reports of numbers from Morocco for the species with mainly European area. Previous reports from France, Spain and from the botanical gardens reported the same chromosome number (see Pimenov & al., 2002). In one of the publications B-chromosomes and dysploid variability were reported (Gardé & Malheiros-Gardé, 1954).

*Visnaga daucoides* Gaertn.

$2n = 20$ , CHN. Morocco, Région Tanger-Tétouan-Al Hoceïma, 3 km S of Asilah,  $35^{\circ}25.38''\text{N}$ ,  $06^{\circ}01.71''\text{W}$ , 07 Sep 2013, M.G. Pimenov 71 (MW) [Fig. 14F].

Our report, the first for Morocco plants, corresponds with the majority of previous reports, both from nature and culture of this medicinal plant ( $n = 10$  or  $2n = 20$ ). There are, however, some rare reports of  $n = 11$  and  $2n = 22$  (see Pimenov & al., 2002). For both cytotypes, morphology of karyotypes was described (Sharma, 1970; Hore, 1980; Hamal & al., 1986).

#### Literature cited

- Aparicio, A. & Silvestre S. 1985. Números cromosómicos para la flora española 363–434. *Lagascalia* 13: 318–323.
- Cauwet, A.-M. 1975. Contribution à l'étude caryosystématique du genre *Bupleurum* L. IV. Espèces marocaines. *Bull. Soc. Bot. France* 122: 371–384. <https://doi.org/10.1080/00378941.1975.10839337>
- Cauwet-Marc, A.-M. 1978. [Reports]. In: Löve, Á. (ed.), IOPB Chromosome Number Reports LXI. *Taxon* 27: 385–386. <https://www.jstor.org/stable/1220381>
- Cauwet-Marc, A.-M. 1979. Connaissances caryologiques actuelles sur le genre *Bupleurum* L. (Umbelliferae): Nombres cromosómicos et nombres de base. *Bull. Mus. Natl. Hist. Nat.*, B 1: 191–211.
- Cauwet, A.-M. & Carbonnier, J. 1976. Recherches sur l'origine du *Bupleurum atlanticum* subsp. *mairei*, endémique du Haut-Atlas marocain. *Candollea* 31: 17–35.
- Cauwet, A.-M. & Carbonnier, J. 1977. Revision du complexe *Bupleurum atlanticum* Murb. *Bull. Soc. Bot. France* 124: 167–176. <https://doi.org/10.1080/00378941.1977.10835740>
- Cohen, O. & Plitmann, U. 1997. Dispersal strategies in the Apiaceae: The temporal factor and its role in dissemination. *Lagascalia* 19: 423–438.
- Colombo, P., Marceno, C. & Princiotta, R. 1983. Números cromosómicos de plantas occidentales. 239–250. *Anales Jard. Bot. Madrid* 40: 263–270.
- Drude, O. 1897–98 (“1898”) Umbelliferae. Pp. 49–192 in: Engler, A. & Prantl, K. (eds.), *Die natürlichen Pflanzenfamilien* III(8). Leipzig: Engelmann.
- El Alaoui Faris, F.E. 1989. Caryologie d'espèces de la famille des Umbelliferae. *Ann. Sci. Nat., Bot. Biol. Vég.*, sér. 13, 10: 157–169.
- El Alaoui Faris, F.E. 2007. Umbelliferae. Pp. 281–336 in: Fennane, M., Ibn Tattou, M., Ouyahya, A. & Oualidi, J. (eds.), *Flore pratique du Maroc*, vol. 2. Rabat: Inst. Scientifique, Univ. Mohammed V.
- El Alaoui-Faris, F.E., Tahiri, H., Cubas, P. & Pardo, C. 2009. Reports 1688–1696. In: Kamari, G., Blanché, C. & Garbari, F. (eds.), Mediterranean chromosome number reports – 19. *Fl. Medit.* 19: 314–321.
- Gardé, A. & Malheiros-Gardé, N. 1949. Contribuição para o estudo cariologico da familia Umbelliferae. I. *Agron. Lusit.* 11: 91–140.
- Gardé, A. & Malheiros-Gardé, N. 1954. Contribuição para o estudo cariologico da familia Umbelliferae. III. *Broteria* 23: 5–35.
- Hamal, I.A., Langer, A. & Koul A.K. 1986. Nucleolar organizing Région in the Apiaceae (Umbelliferae). *Pl. Syst. Evol.* 154: 11–30. <https://doi.org/10.1007/BF00984865>
- Hore, A. 1980. Structure and behavior of chromosomes as an aid to the study of phylogeny of Umbelliferae with special reference to the tribe Apieae (Ammineae) and Saniculeae. *Cytologia* 45: 389–402. <https://doi.org/10.1508/cytologia.45.389>
- Humphries, C.J., Murray, B.G., Bocquet, G. & Vasudevan, K. 1978. Chromosome numbers of phanerogams from Morocco and Algeria. *Bot. Not.* 131: 391–406.
- Kord'um, E.L. 1967. *Tzitoembriologia semeistva Zontichnykh*. Kiev: Naukova Dumka.
- Moris, G.G. 1842 (“1840–1843”). *Flora sardoa seu historia plantarum in Sardinia et adjacentibus insulis vel sponte nascentium vel ad utilitatem latius excultarum* 2. Taurini [Turin]: Ex regio typographo. <https://doi.org/10.5962/bhl.title.6355>
- Parolly, G. & Nordt, B. 2005. A further new *Peucedanum* species (Apiaceae) from the Taurus Mts, Turkey. *Willdenowia* 35: 97–105. <https://doi.org/10.3372/wi.35.35107>
- Pimenov, M.G., Vasil'eva, M.G., Leonov, M.V. & Daushkevich, J.V. 2002. *Karyotaxonomical analysis in the Umbelliferae*. Enfield, Plymouth: Science Publishers.
- Queirós, M. 1972. Contribuição para o conhecimento citotaxonomico das Spermatophyta de Portugal. VII. Umbelliferae. *Anuario Soc. Brot.* 38: 293–314.
- Queirós, M. 1979. Numeros cromosómicos para a flora Portuguesa. 16–37. *Bol. Soc. Brot.*, ser. 2, 53: 15–28.
- Reese, G. 1957 Über die Polyploidiespectren in der nordsaharischen Wüstenflora. *Flora* 144: 598–634.
- Schrader, O., Ahne, R. & Fuchs, J. 2003. Karyotype analysis of *Daucus carota* L. using Giemsa C-Banding and FISH of 5S and 18S/25S rRNA specific genes. *Caryologia* 56: 149–154. <https://doi.org/10.1080/00087114.2003.10589318>
- Sharma, A.K. 1970. Annual report, 1967–1968. *Res. Bull. Cytogen. Lab. Dept. Bot. Univ. Calcutta* 2: 1–50.

- Shner, J.V., Pimenov, M.G., Kljuykov, E.V. & Alexeeva, T.V.** 2010. Umbelliferae/Apiales. In: Marhold, K. (ed.), IAPT/IOPB chromosome data 10. *Taxon* 59: 1937, E10–E12.
- Shner, J.V., Alexeeva, T.V., Pimenov, M.G. & Kljuykov, E.V.** 2013. Reports 1768–1783. In: Kamari, G., Blanché, C. & Siljak-Yakovlev, S. (eds.), Mediterranean chromosome number reports – 23. *Fl. Medit.* 23: 256–263.
- Vogt, R. & Oberprieler, C.** 1994. Chromosome numbers of North African phanerogams. IV. *Candollea* 49: 549–570.
- Wanscher, J.H.** 1933. Studies on the chromosome numbers of the Umbelliferae. III. *Bot. Tidsskr.* 42: 384–399.

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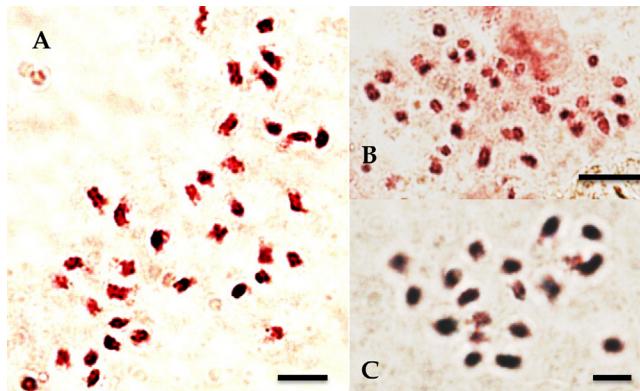
\* First chromosome count for the species.

#### ORCHIDACEAE

##### *Serapias cordigera* L.

\* $n = 18$ , CHN. Spain, Huelva, Galaroza, Navahermosa, El Talenque, between Fuenteheridos and Valdelarco, 655 m, 37.925592°N, 06.676072°W, 26 Apr 2016, D. García & F.M. Vázquez s.n. (HSS-AC 271; chromosomes counted by F. Márquez) [Fig. 15C].

$2n = 36$ , CHN. Spain, Badajoz, Badajoz, Cañada Real Sancha Brava, 38.796908°N, 06.946527°W, 07 Apr 2017, D. García



**Fig. 15.** *Serapias cordigera*. **A**, PMC at mitotic metaphase,  $2n = 36$  (HSS-AC 267); **B**, PMC at mitotic metaphase,  $2n = 36$  (HSS-AC 261); **C**, PMC at meiotic metaphase I,  $n = 18$  (HSS-AC 271). — Scale bars = 0.5 μm.

& F.M. Vázquez s.n. (HSS-AC 261; chromosomes counted by F.M. Vázquez) [Fig. 15B]; Spain, Huelva, Galaroza, Navahermosa, El Talenque, between Fuenteheridos and Valdelarco, 655 m, 37.925592°N, 06.676072°W, 26 Apr 2016, D. García & F.M. Vázquez s.n. (HSS-AC 267; chromosomes counted by F.M. Vázquez) [Fig. 15A].

\* *Serapias cordigera* subsp. *gentilii* C.Venhuis, P.Venhuis & Kreutz

$n = 18$ , CHN. Portugal, Algarve, Aljezur, road Marmeleta to Aljezur (N267) past crossing to Mº Novo, 84 m, 37.314181°N, 08.763072°W, 18 Apr 2016, D. García, R. Lorenz & F.M. Vázquez s.n. (HSS-AC 254; chromosomes counted by M.J. Guerra) [Fig. 16A].

\* *Serapias maria* F.M.Vázquez

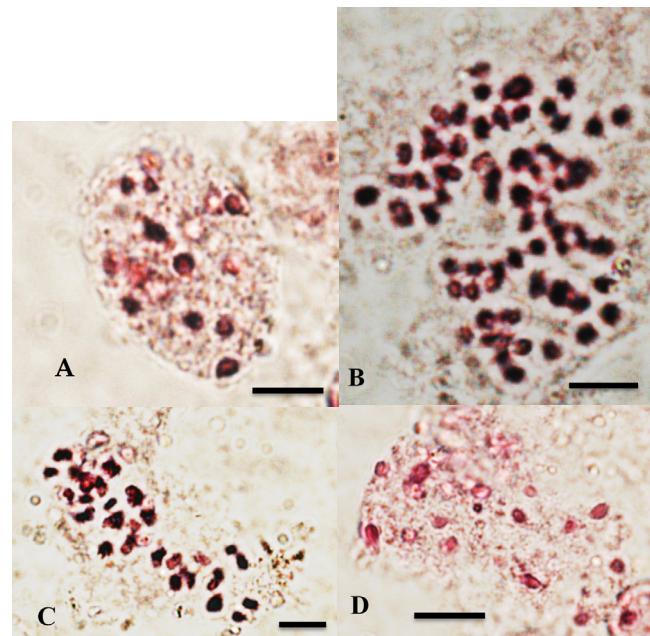
$2n = 60$ , CHN. Spain, Badajoz, Arroyo de San Serván, Sierra de Arroyo de San Serván, 260 m, 38.873813°N, 06.420867°W, 17 Apr 2016, F.M. Vázquez s.n. (HSS-AC 293; chromosomes counted by F.M. Vázquez) [Fig. 16B].

\* *Serapias occidentalis* C.Venhuis & P.Venhuis

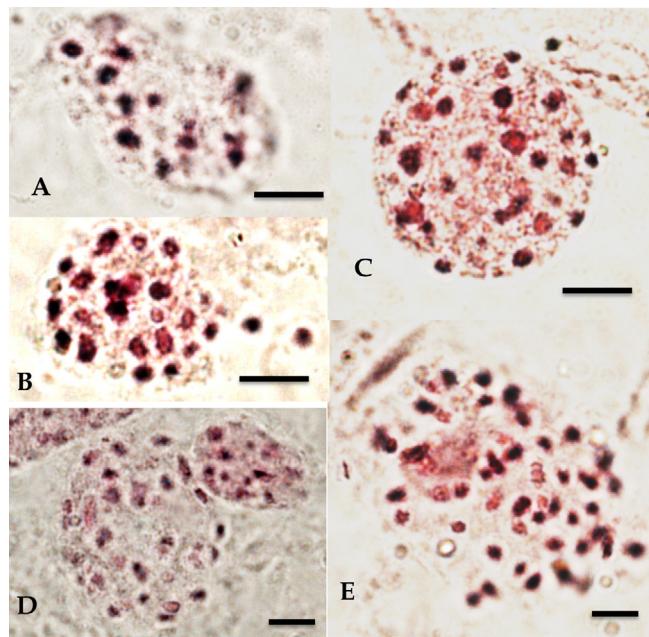
$2n = 36$ , CHN. Spain, Badajoz, Arroyo de San Serván, Sierra de Arroyo de San Serván, 260 m, 38.873813°N, 06.420867°W, 17 Apr 2016, F.M. Vázquez s.n. (HSS-AC 302; chromosomes counted by D. García) [Fig. 16C].

*Serapias perez-chiscanoi* Acedo

\* $n = 18$ , CHN. Spain, Badajoz, Arroyo de San Serván, Arroyo de San Serván, Sierra de Arroyo de San Serván, 260 m, 38.873813°N, 06.420867°W, 17 Apr 2016, F.M. Vázquez s.n. (HSS-AC 317; chromosomes counted by F. Márquez); Spain, Badajoz, San Vicente



**Fig. 16.** **A**, *Serapias cordigera* subsp. *gentilii*, PMC at meiotic diakinesis,  $n = 18$  (HSS-AC 254); **B**, *Serapias maria*, PMC at mitotic metaphase,  $2n = 60$  (HSS-AC 293); **C**, *Serapias occidentalis*, PMC at mitotic metaphase,  $2n = 36$  (HSS-AC 302); **D**, *Serapias perez-chiscanoi*, PMC at meiotic diakinesis,  $n = 18$  (HSS-AC 308). — Scale bars = 0.5 μm.



**Fig. 17.** *Serapias strictiflora*. **A**, PMC at meiotic diakinesis,  $n = 12$  (HSS-AC 286); **B**, PMC at mitotic metaphase,  $2n = 24$  (HSS-AC 282); **C**, PMC at meiotic diakinesis,  $n = 24$  (HSS-AC 280); **D**, PMC at meiotic metaphase I,  $n = 24$  (HSS-AC 279); **E**, PMC at mitotic metaphase,  $2n = 48$  (HSS-AC 275). — Scale bars = 0.5  $\mu\text{m}$ .

de Alcántara, Sierra del Naranjal, Dehesa de Mayorga, 368 m, 39.253514°N, 07.132783°W, 04 May 2016, *F. Camello, D. García, A. Sánchez & F.M. Vázquez s.n.* (HSS-AC 308; chromosomes counted by D. García) [Fig. 16D].

\* *Serapias strictiflora* Welw. ex Veiga

$n = 12$ , CHN. Portugal, Algarve, Aljezur, road Marmelete to Aljezur (N267) past crossing to Mº Novo, 84 m, 37.314181°N, 08.763072°W, 18 Apr 2016, *D. García, R. Lorenz & F.M. Vázquez s.n.* (HSS-AC 286; chromosomes counted by F.M. Vázquez) [Fig. 17A].

$n = 24$ , CHN. Portugal, Algarve, Aljezur, road Marmelete to Aljezur (N267) past crossing to Mº Novo, 84 m, 37.314181°N, 08.763072°W, 18 Apr 2016, *D. García, R. Lorenz & F.M. Vázquez s.n.* (HSS-AC 280; chromosomes counted by F.M. Vázquez) [Fig. 17C]; Spain, Badajoz, Valdebotoa, Arroyo Vallehondo, 38.981658°N, 06.938803°W, 07 Apr 2017, *D. García & F.M. Vázquez s.n.* (HSS-AC 279; chromosomes counted by D. García) [Fig. 17D]; Portugal, Algarve, Aljezur, road Marmelete to Aljezur (N267) past crossing to Mº Novo, 84 m, 37.314181°N, 08.763072°W, 18 Apr 2016, *D. García, R. Lorenz & F.M. Vázquez s.n.* (HSS-AC 282; chromosomes counted by F.M. Vázquez) [Fig. 17B].

$2n = 48$ , CHN. Spain, Badajoz, Badajoz, Arroyo Herrerín, 176 m, 38.918919°N, 06.977554°W, 07 Apr 2017, *D. García & F.M. Vázquez s.n.* (HSS-AC 275; chromosomes counted by F.M. Vázquez) [Fig. 17E].