IAPT CHROMOSOME DATA

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Edited by Karol Marhold & Jaromír Kučera

DOI https://doi.org/10.12705/676.39

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This study was supported by Agencia Nacional de Promoción Científica y Técnica (ANPCyT) grant nos. PICT-2014-2218 and PICT-2016-1637, and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET).

All materials CHN; collectors: *D* = J.R. Daviña, *H* = A.I. Honfi, *L* = B. Leuenberger.

AMARYLLIDACEAE

Habranthus barrosianus Hunz. & Di Fulvio, $2n = 2x = 18$; Argentina, Buenos Aires, *L 3772* (B).

Habranthus brachyandrus (Baker) Sealy, $n = 12II$, $2n = 4x = 24$; Argentina, Corrientes, *D 416* (B, MNES).

Habranthus chacoensis Ravenna, $n = 6II$, $2n = 2x = 12$; Argentina, Chaco, *D 342* (B, CTES, MNES).

Habranthus coeruleus (Griseb.) Traub, $2n = 2x = 30$; Argentina, Misiones, *H 985* (MNES).

Habranthus gracilifolius Herb., $2n = 4x = 24$; Argentina, Buenos Aires, *L 3774* (B).

Habranthus pedunculosus Herb., $2n = 2x = 14$; Argentina, Chaco, *D 334* (B, MNES).

Habranthus tubisphathus (L'Hér.) Traub, $2n = 4x = 24$; Argentina, Corrientes, *D 329* (B, CTES, MNES). $2n = 6x = 36$; Argentina, Buenos Aires, *L 3771* (B).

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Chromosome numbers counted by L. Delgado and ploidy level estimated by B. Rojas-Andrés and N. López-González; collectors: *AA* = Antonio Abad, *AT* = Andreas Tribsch, *BR* = Blanca Rojas-Andrés, *DGL* = David Gutiérrez Larruscain, *DP* = Daniel Pinto, *JASA* = José Ángel Sánchez Agudo, *JPG* = Julio Peñas de Giles, *LMC* = Luz Mª Muñoz Centeno, *MO* = M. Montserrat Martínez-Ortega, *MS* = María Santos Vicente, *NLG* = Noemí López-González, *NPG* = Nélida Padilla-García, *SA* = Santiago Andrés, *SB* = Sara Barrios, *VL* = Víctor Lucía, *XG* = Ximena Giráldez.

This work has been supported by the Spanish Ministerio de Economía y Competitividad (projects CGL2009-07555, CGL2012-32574, *Flora iberica* VIII [CGL2008-02982-C03-02/CLI], *Flora iberica* IX [CGL2011-28613-C03-03], *Flora iberica* X [CGL2014-52787-C3-2-P]); the Spanish Ministerio de Ciencia e Innovación (Ph.D. grants to BR and NLG), and the University of Salamanca (Ph.D. grant to NPG financed jointly by Banco Santander). The authors are very grateful to all colleagues who helped with plant location and sampling.

PLANTAGINACEAE

Veronica angustifolia (Vahl) Bernh., $2n = 64$, CHN. Switzerland, *XG, MO 6038 & BR* (SALA 149416). $2n \sim 8x \sim 64$, FCM. France, *XG*, *MO & BR 167-1*, *XG*, *MO & BR 167-2*, *XG*, *MO & BR 167-3* (SALA 149398); Switzerland, *XG, MO 6038-1 & BR, XG, MO 6038-2 & BR, XG, MO 6038-3 & BR* (SALA 149416).

Veronica austriaca subsp. *jacquinii* (Baumg.) Watzl, $2n = 32$, CHN. Bosnia and Herzegovina, *MO 6122, XG, NPG & NLG* (SALA 157023); *MO 6123, XG, NPG & NLG* (SALA 157024). $2n = 48$, CHN. Bosnia and Herzegovina, *MO 6120, XG, NPG & NLG* (SALA 157021); Bulgaria, *XG, MO, BR 21 & MS* (SALA 149368), *XG, MO 4577, BR & MS* (SALA 149376). $2n \sim 6x \sim 48$, FCM. Croatia, *MO 1404-1 & AT*, *MO 1404-2 & AT* (SALA 124609), *MO 1391-1 & AT*, *MO 1391-2 & AT* (SALA 124604).

Veronica dalmatica N.Pad.Gar., Rojas-Andrés, López-González & M.M.Mart.Ort., $2n = 16$, CHN. Montenegro, *MO, XG, NPG & NLG 137* (SALA 157018), *MO, XG, NPG & NLG 139* (SALA 157030).

Veronica kindlii Adam., $2n = 16$, CHN. Macedonia (F.Y.R.O.M.), *XG, MO 6090, BR & NLG* (SALA 157011).

Veronica orsiniana Ten., $2n \sim 2x \sim 16$, FCM. France, *XG*, *MO & BR 203-1*, *XG*, *MO & BR 203-2*, *XG*, *MO & BR 203-3* (SALA 149303), *XG*, *MO & BR 207-1*, *XG*, *MO & BR 207-2*, *XG*, *MO & BR 207-3* (SALA 149305), *XG*, *MO & BR 210-1*, *XG*, *MO & BR 210-2*, *XG*, *MO & BR 210-3* (SALA 149308); Spain, *MO*, *BR 235-1*, *AA & NLG*, *MO*, *BR 235-2*, *AA & NLG*, *MO*, *BR 235-3*, *AA & NLG* (SALA 155093), *MO*,

All materials for the chromosome column should be submitted electronically to: Karol Marhold, 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.

*BR 235-22**, *AA & NLG* (SALA 155067), *MO 6064-1*, *BR*, *XG & NLG*, *MO 6064-2*, *BR*, *XG & NLG*, *MO 6064-3*, *BR*, *XG & NLG* (SALA 155119), *MO*, *BR*, *XG & NLG 8-1*, *MO*, *BR*, *XG & NLG 8-2*, *MO*, *BR*, *XG & NLG 8-3* (SALA 155097), *MO*, *BR 234-1*, *AA & NLG*, *MO*, *BR 234-2*, *AA & NLG*, *MO*, *BR 234-3*, *AA & NLG* (SALA 155094), *MO 6063-1*, *BR*, *AA*, *XG & NLG*, *MO 6063-2*, *BR*, *AA*, *XG & NLG*, *MO 6063-3*, *BR*, *AA*, *XG & NLG* (SALA 155123), *MO*, *BR 242-1*, *XG & NLG*, *MO*, *BR 242-2*, *XG & NLG*, *MO*, *BR 242-3*, *XG & NLG* (SALA 155109), *MO*, *BR 243-1*, *XG & NLG*, *MO*, *BR 243-2*, *XG & NLG*, *MO*, *BR 243-3*, *XG & NLG* (SALA 155110).

Veronica prostrata L., 2*n* ~ 2*x* ~ 16, FCM. Austria, *MO 1055-1*, *MO 1055-2*, *MO 1055-3* (SALA 124616), *MO 1337-1*, *MO 1337-2*, *MO 1337-3* (SALA 124615); Czech Republic, *XG*, *MO & BR 184-1*, *XG*, *MO & BR 184-2*, *XG*, *MO & BR 184-3* (SALA 149310), *MO 1445-1* (SALA 124617); France, *XG*, *MO & BR 219-1*, *XG*, *MO & BR 219-2*, *XG*, *MO & BR 219-3* (SALA 149313); Romania, *XG*, *MO 904-1 & JASA*, *XG*, *MO 904-2 & JASA* (SALA 124620); Serbia, *SA 428-1*, *XG*, *MO & BR*, *SA 428-2*, *XG*, *MO & BR*, *SA 428-3*, *XG*, *MO & BR*, *SA 428-4*, *XG*, *MO & BR* (SALA 149319).

Veronica rosea Desf., 2*n* ~ 2*x* ~ 16, FCM. Morocco, *DP*, *NLG 52-1 & VL*, *DP*, *NLG 52-2 & VL*, *DP*, *NLG 52-3 & VL* (SALA 155072), *JPG JP-1*, *JPG JP-2*, *JPG JP-3* (GDA 59936).

Veronica sennenii (Pau) M.M.Mart.Ort. & E.Rico, 2*n* ~ 8*x* ~ 64, FCM. Spain, *MO*, *BR 248-1 & NLG*, *MO*, *BR 248-2 & NLG*, *MO*, *BR 248-3 & NLG* (SALA 155081).

Veronica tenuifolia subsp. *javalambrensis* (Pau) Molero & J.Pujadas, 2*n* ~ 2*x* ~ 16, FCM. Spain, *MO*, *BR 250-1 & NLG*, *MO*, *BR 250-2 & NLG*, *MO*, *BR 250-3 & NLG* (SALA 155086), *DGL*, *NLG & DP 1278-1*, *DGL*, *NLG & DP 1278-2*, *DGL*, *NLG & DP 1278-3* (SALA 150521), *DGL*, *NLG & DP 1280-1*, *DGL*, *NLG & DP 1280-2*, *DGL*, *NLG & DP 1280-3* (SALA 150519), *MO 6074-1*, *BR & NLG*, *MO 6074-2*, *BR & NLG*, *MO 6074-3*, *BR & NLG* (SALA 155084), *MO & NLG 3-1*, *MO & NLG 3-2*, *MO & NLG 3-3* (SALA 155104), *DP 1315-1*, *DP 1315-2*, *DP 1315-3* (SALA 150484), *DP 1311-1*, *DP 1311-2*, *DP 1311-3* (SALA 150488), *DGL*, *NLG & DP 1287-1*, *DGL*, *NLG & DP 1287-2*, *DGL*, *NLG & DP 1287-3* (SALA 150512), *DP 1307-1*, *DP 1307-2*, *DP 1307-3* (SALA 150492), *DP 1322-1*, *DP 1322-2*, *DP 1322-3* (SALA 150477), *SB*, *NLG*, *MO & BR 221-1*, *SB*, *NLG*, *MO & BR 221-2*, *SB*, *NLG*, *MO & BR 221-3* (SALA 149327).

Veronica tenuifolia Asso subsp. *tenuifolia*, 2*n* ~ 2*x* ~ 16, FCM. Spain, *MO*, *BR 237-1*, *AA & NLG*, *MO*, *BR 237-2*, *AA & NLG*, *MO*, *BR 237-3*, *AA & NLG* (SALA 155065), *MO*, *BR*, *AA & NLG 16-1*, *MO*, *BR*, *AA & NLG 16-2, MO*, *BR*, *AA & NLG 16-3* (SALA 155125), *MO 6059-1*, *BR*, *XG & NLG*, *MO 6059-2*, *BR*, *XG & NLG*, *MO 6059-3*, *BR*, *XG & NLG* (SALA 155099).

Veronica teucrium L., 2*n* ~ 8*x* ~ 64, FCM. Slovakia, *MO 1551-1*, *XG & LMC*, *MO 1551-2*, *XG & LMC*, *MO 1551-3*, *XG & LMC* (SALA 124598).

Veronica thracica Velen., 2*n* ~ 2*x* ~ 16, FCM. Turkey, *XG*, *MO*, *BR 37-1 & MS*, *XG*, *MO*, *BR 37-2 & MS* (SALA 149289).

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The study was partially supported by the Russian Foundation for Basic Research (projects 16-34-60135-mol_a_dk, 16-05-00783-a, 18-04-01040, 17-00-00338) and done within the framework of the State Task 0126-2014-0028 "Karyological and molecular-phylogenetic investigation of the flowering plant taxa divergence". The chromosome counting for highland populations was proceeded under financial support of the Russian Science Foundation (project 17-74-10074).

AMARYLLIDACEAE

Allium chamarense M.M.Ivanova, 2*n* = 16; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1664.*

APIACEAE

Pleurospermum uralense Hoffm., 2*n* = 18; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1642.*

ASPARAGACEAE

Maianthemum bifolium (L.) F.W.Schmidt, 2*n* = 36; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1641.*

ASTERACEAE

Antennaria dioica (L.) Gaertn., 2*n* = 28; Russia, Irkutskaya Oblast', *MP, VP & EZ C1663.*

Cirsium helenioides (L.) Hill, 2*n* = 34; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1635.*

Doronicum altaicum Pall., 2*n* = 60; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1647.*

Jacobaea nemorensis (L.) E.Wiebe, 2*n* = 40; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1673.*

Parasenecio hastatus (L.) H.Koyama, 2*n* = 60; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1672.*

Rhaponticum chamarense Peschkova (≡ *Rh. carthamoides* var. *chamarense* (Peschkova) O.S.Zhirova), 2*n* = 26; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1651.*

Saussurea latifolia Ledeb., 2*n* = 26; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1637.*

Solidago dahurica Kitag., 2*n* = 18; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1639*, *MP, VP & EZ C1667.*

BORAGINACEAE

Myosotis palustris (L.) L., 2*n* = 22; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK C1657.*

BRASSICACEAE

Cardamine macrophylla Willd., 2*n* = 64; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl656.*

CARYOPHYLLACEAE

Dianthus superbus L., 2*n* = 30; Russia, Irkutskaya Oblast', *MP, VP & EZ Cl665.*

CELASTRACEAE

Parnassia palustris L., 2*n* = 36; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl660.*

GERANIACEAE

Geranium krylovii Tzvelev, 2*n* = 28; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl655.*

LAMIACEAE

Prunella vulgaris L., 2*n* = 28; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl640.*

MELANTHIACEAE

Veratrum lobelianum Bernh., 2*n* = 32; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl653.*

ONAGRACEAE

Circaea alpina L., 2*n* = 22; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl670.*

OROBANCHACEAE

Pedicularis incarnata L., 2*n* = 16; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl658.*

POACEAE

Poa ×*intricata* Wein (*P. nemoralis* L. × *P. palustris* L.), 2*n* = 28; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl674.*

POLYGONACEAE

Rumex alpestris Jacq., 2*n* = 14; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl652.*

PRIMULACEAE

Primula pallasii Lehm., 2*n* = 22; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl644.*

RANUNCULACEAE

Aconitum baicalense Turcz. ex Rapaics, 2*n* = 32; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl636.*

Aconitum rubicundum Fisch. ex Steud., 2*n* = 16; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl638.*

Anemone baicalensis Turcz., 2*n* = 28; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl643*; *MP, VP, EZ & AK Cl645.*

Aquilegia glandulosa Fisch. ex Link, 2*n* = 14; Russia, Irkutskaya Oblast', *MP, VP & EZ Cl668.*

Caltha palustris L., 2*n* = 32; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl662.*

VIOLACEAE

Viola biflora L., 2*n* = 12; Russia, Irkutskaya Oblast', *MP, VP, EZ & AK Cl649.*

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Chromosomes counted by L. Mártonfiová. DNA ploidy levels estimated by P. Mereďa, Jr.; collectors: *IH* = I. Hodálová, *MZ* = M. Zaliberová, *PM* = P. Mereďa, Jr.; vouchers in SAV.

This study was supported by the Grant Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic and Slovak Academy of Sciences VEGA (grant no. 2/0131/16).

POACEAE

Sesleria heufleriana Schur

2n = 4*x* = 28, CHN. Romania, *IH*, *PM & MZ 137-1.*

2n ~ 4*x* ~ 28, FCM. Romania, *IH*, *PM & MZ 137-1*, *IH*, *PM & MZ 137-2*, *IH*, *PM & MZ 137-3*, *IH*, *PM & MZ 137-4*, *IH*, *PM & MZ 137-5*, *IH*, *PM & MZ 137-6*, *IH*, *PM & MZ 137-7*, *IH*, *PM & MZ 137-8*, *IH*, *PM & MZ 137-9*, *IH*, *PM & MZ 137-10*, *IH*, *PM & MZ 137-11*, *IH*, *PM & MZ 137-12*, *IH*, *PM & MZ 137-13*, *IH*, *PM & MZ 137-14*, *IH*, *PM & MZ 137-15*, *IH*, *PM & MZ 141-1*, *IH*, *PM & MZ 141-2*, *IH*, *PM & MZ 141-5*, *IH*, *PM & MZ 141-6*, *IH*, *PM & MZ 141-7*, *IH*, *PM & MZ 141-8*, *IH*, *PM & MZ 141-9*, *IH*, *PM & MZ 141-10*, *IH*, *PM & MZ 141-11*, *IH*, *PM & MZ 141-12*, *IH*, *PM & MZ 141-14*, *IH*, *PM & MZ 141-15*, *IH*, *PM & MZ 142-1*, *IH*, *PM & MZ 142-2*, *IH*, *PM & MZ 142-3*, *IH*, *PM & MZ 142-4*, *IH*, *PM & MZ 142-5*, *IH*, *PM & MZ 142-6*, *IH*, *PM & MZ 142-7*, *IH*, *PM & MZ 142-8*, *IH*, *PM & MZ 142-9*, *IH*, *PM & MZ 142-10*, *IH*, *PM & MZ 142-11*, *IH*, *PM & MZ 142-12*, *IH*, *PM & MZ 142-13*, *IH*, *PM & MZ 142-14*, *IH*, *PM & MZ 142-15.*

Sesleria rigida Rchb.

2n = 4*x* = 28, CHN. Romania, *IH*, *PM & MZ 139-1.*

2n ~ 4*x* ~ 28, FCM. Romania, *IH*, *PM & MZ 138-1*, *IH*, *PM & MZ 138-2*, *IH*, *PM & MZ 138-3*, *IH*, *PM & MZ 138-4*, *IH*, *PM & MZ 138-5*, *IH*, *PM & MZ 138-6*, *IH*, *PM & MZ 138-7*, *IH*, *PM & MZ 138-8*, *IH*, *PM & MZ 138-9*, *IH*, *PM & MZ 138-10*, *IH*, *PM & MZ 138-11*, *IH*, *PM & MZ 139-1*, *IH*, *PM & MZ 139-2*, *IH*, *PM & MZ 139-3*, *IH*, *PM & MZ 139-4*, *IH*, *PM & MZ 139-5*, *IH*, *PM & MZ 139-6*, *IH*, *PM & MZ 139-7*, *IH*, *PM & MZ 140-1*, *IH*, *PM & MZ 140-2*, *IH*, *PM & MZ 143-1*, *IH*, *PM & MZ 143-2*, *IH*, *PM & MZ 143-4*, *IH*, *PM & MZ 143-5*, *PM 144-1*, *PM 144-2*, *PM 144-3*, *PM 144-4*, *PM 144-5*, *PM 144-6*, *PM 144-7*, *PM 144-8*, *PM 144-9*, *PM 144-10*, *PM 144-11*, *PM 144-12*, *PM 144-13*, *PM 144-14.*

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The study is supported by financial grant under DRS SAP I, SAP II and SAP III of UGC; UGC-BSR Indira Gandhi Single Girl Child Fellowship (Award letter no. F7-152/2007 BSR, dated 16/12/2013) to Navjot Kaur and IPLS-DBT project (Project no. BT/PR-4548/INF/22/146/2012) sanctioned to Punjabi University, Patiala for using the facilities and financial support of this study.

All materials CHN. Collected in India, Rajasthan; collector: *NK* = Navjot Kaur; vouchers in PUN.

ASPARAGACEAE

Asparagus racemosus Willd., *n* = 30; *NK 60936.*

CANNACEAE

Canna indica L., *n* = 18; *NK 61126.*

COMMELINACEAE

Commelina attenuata Vahl, *n* = 12; *NK 60938.*
Commelina diffusa Burm.f., *n* = 60; *NK 60779.*
Commelina forskalaei Vahl, *n* = 45; *NK 60937.*
Commelina hasskarlii C.B.Clarke (= *C. caroliniana* Walter), *n* = 60; *NK 61120*, *NK 61121.*
Commelina paludosa Blume, *n* = 15; *NK 61116*, *NK 61117.*
Commelina suffruticosa Blume, *n* = 15; *NK 61122.*
Cyanotis cristata (L.) D.Don, *n* = 11; *NK 61115.*
Murdannia nudiflora (L.) Brenan, *n* = 40; *NK 61119.*

POACEAE

Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns, *n* = 18; *NK 60211*, *NK 60217.*
Chloris prieurii Kunth, *n* = 10; *NK 60164*, *NK 60186.*
Chloris quinquesetica Bhide, *n* = 10; *NK 60208.*
Eragrostis aspera (Jacq.) Nees, *n* = 10; *NK 60980.*
Leptothrium senegalense (Kunth) Clayton, *n* = 10; *NK 60149.*
Sporobolus coromandelianus (Retz.) Kunth, *n* = 24; *NK 60167.*

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Genome size data (C-values) were measured by E. Štubňová and J. Kučera. Chromosome numbers were counted by L. Mártonfiová. Collectors: *EŠ* = E. Štubňová, *FK* = Filip Kolář, *JK* = J. Kučera, *MS* = M. Slovák, *JS* = J. Smyčka, *MV* = M. Valachovič; vouchers in SAV.

This study was supported by the Grant Agency VEGA, Bratislava, Slovak Republic (grant no. VEGA 2/0088/15).

PRIMULACEAE

Soldanella alpina L. subsp. *alpina*
2n = 4*x* = 40, CHN. Austria, *JK & MS AT39/2*; Switzerland, *JK & MS SW5/5.*
2n ~ 4*x* ~ 40, 2C = 3.52–3.68 pg, FCM. Austria, *JK & MS AT37/1*, *JK & MS AT37/2*, *JK & MS AT37/5*, *JK & MS AT38/1*, *JK & MS AT38/2*, *JK & MS AT38/3*, *JK & MS AT39/1*, *JK & MS AT39/2*, *JK & MS AT39/3*, *FK AT41/1*, *FK AT41/2*, *FK AT41/3*; France, *JS FR2/1*, *JS FR2/2*, *JS FR2/3*, *JS FR3/1*, *JS FR3/2*, *JS FR3/3*; Italy, *JK & MS IT22/1*, *JK & MS IT22/2*, *JK & MS IT22/3*; Switzerland, *JK & MS SW2/1*, *JK & MS SW2/2*, *JK & MS SW2/4*, *JK & MS SW4/1*, *JK & MS SW4/2*, *JK & MS SW4/3*, *JK & MS SW5/2*, *JK & MS SW5/3*, *JK & MS SW5/5.*
Soldanella angusta L.B.Zhang
2n = 4*x* = 40, CHN. Ukraine, *MV UA8/13.*
2n ~ 4*x* ~ 40, 2C = 3.31–3.38 pg, FCM. Ukraine, *MV UA6/2*, *MV UA6/5*, *MV UA6/15*, *MV UA7/4*, *MV UA7/7*, *MV UA7/9*, *MV UA8/11*, *MV UA8/13*, *MV UA8/14.*
Soldanella ×hybrida A.Kern
2n = 4*x* = 40, CHN. Switzerland, *JK & MS SW4/4.*
2n ~ 4*x* ~ 40, 2C = 3.57–3.62 pg, FCM. Switzerland, *JK & MS SW4/4*, *JK & MS SW4/5*, *JK & MS SW4/6.*
Soldanella major (Nielr.) Vierh.
2n = 4*x* = 40, CHN. Romania, *EŠ RO23/3.*
2n ~ 4*x* ~ 40, 2C = 3.28–3.32 pg, FCM. Romania, *EŠ RO23/1*, *EŠ RO23/2*, *EŠ RO23/3.*
Soldanella minima Hoppe
2n ~ 4*x* ~ 40, 2C = 3.63–3.68 pg, FCM. Austria, *FK AT42/1*, *FK AT42/2*, *FK AT42/3.*
Soldanella pusilla subsp. *alpicola* (F.K.Mey.) Chrtek
2n = 4*x* = 40, CHN. Switzerland, *JK & MS SW3/2.*
2n ~ 4*x* ~ 40, 2C = 3.43–3.52 pg, FCM. Austria, *JK AT35/1*, *JK AT35/2*, *JK AT35/3*, *JK AT36/1*, *JK AT36/2*, *JK AT36/3*; Switzerland, *JK & MS SW1/1*, *JK & MS SW1/2*, *JK & MS SW1/3*, *JK & MS SW3/1*, *JK & MS SW3/2*, *JK & MS SW3/3*, *JK & MS SW4/7*, *JK & MS SW4/8*, *JK & MS SW4/9*, *JK & MS SW6/1*, *JK & MS SW6/2*, *JK & MS SW6/3*, *JK & MS SW7/1*, *JK & MS SW7/3*, *JK & MS SW7/5*, *JK & MS SW8/1*, *JK & MS SW8/2*, *JK & MS SW8/3.*
Soldanella ×wettsteinii Vierh.
2n ~ 4*x* ~ 40, 2C = 3.51–3.56 pg, FCM. Austria, *JK, MS & EŠ AT40/1*, *JK, MS & EŠ AT40/2*, *JK, MS & EŠ AT40/3*, *JK, MS & EŠ AT40/4.*

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The study was supported by financial grant under DRS SAP I, SAP II and SAP III of University Grant Commision (UGC), New Delhi, India; Women Scientist Fellowship Scheme (WOS-A) of Department

of Science and Technology, Government of India (GOI) to Vandna Kumari, Rajiv Gandhi National Fellowship Scheme of UGC to Rohit Kumar (award letter no. F1-17.1/2012-13 /RGNF-2012-13-SC HIM-18573) and IPLS project of Department of Biotechnology, GOI (BT/PR4548/INF/22/146/ 2012) sanctioned to Punjabi University Patiala, Punjab for using the facilities and financial support of this study.

All materials CHN; collectors: *RK* = Rohit Kumar; *VK* = Vandna Kumari; vouchers in PUN.

BRASSICACEAE

Turritis glabra L., *n* = 7; India, Uttarakhand, *RK 34335.*

CARYOPHYLLACEAE

Arenaria festucoides Benth., *n* = 11; India, Uttarakhand, *RK 34336.*

FABACEAE

Astragalus uttaranchalensis L.B.Chowdhary & Z.H.Khan, *n* = 8; India, Uttarakhand, *RK 34862.*

Medicago edgeworthii Širj., *n* = 8; India, Uttarakhand, *RK 34903.*

Thermopsis barbata Benth., *n* = 9; India, Uttarakhand, *RK 34916.*

HYPERICACEAE

Hypericum elodeoides Choisy, *n* = 10; India, Uttarakhand, *RK 34358.*

PAPAVERACEAE

Corydalis stracheyi Duthie ex Prain, *n* = 8; India, Uttarakhand, *RK 34310.*

POACEAE

Digitaria abludens (Roem. & Schult.) Veldkamp, *n* = 36; India, Himachal Pradesh, *VK 32435.*

Festuca sibirica Hack. ex Boiss., *n* = 21; India, Himachal Pradesh, *VK 34676.*

Hordeum murinum L., *n* = 7; India, Himachal Pradesh, *VK 34704.*

Leptochloa chinensis (L.) Nees, *n* = 9; India, Himachal Pradesh, *VK 34712.*

Microstegium vimineum (Trin.) A.Camus, *n* = 10; India, Tosh, *VK 34711.*

Poa setulosa Bor, *n* = 14; India, Himachal Pradesh, *VK 34740.*

Puccinellia himalaica Tzvelev, *n* = 14; India, Himachal Pradesh, *VK 34689.*

Stipa jacquemontii Jaub. & Spach, *n* = 10; India, Himachal Pradesh, *VK 34694.*

SAXIFRAGACEAE

Saxifraga pedemontana subsp. *cymosa* Engl., *n* = 8; India, Uttarakhand, *RK 34981.*

TAMARICACEAE

Myricaria elegans Royle, *n* = 8; India, Uttarakhand, *RK 34988.*

Myricaria rosea W.W.Sm., *n* = 8; India, Uttarakhand, *RK 34990.*

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All materials CHN; collectors: *DU* = Diego Uñates; *FC* = Franco Chiarini, *JU* = Juan Urdampilleta, *MLLP* = M. Laura Las Peñas; vouchers in CORD.

Funding was provided by CONICET, FONCyT, and SECyT-UNC (FCEFyN) from Argentina.

CACTACEAE

Arrojadoa rhodantha (Gürke) Britton & Rose, 2*n* = 22; Brasil, Rio de Contas, *JU & al. 379.*

Cereus aethiops Haw., 2*n* = 22; Argentina, Mendoza, *FC 614.*

Cleistocactus smaragdiflorus (F.A.C.Weber) Britton & Rose, 2*n* = 22; Argentina, Salta, *MLLP & DU 279.*

Denmoza rhodacantha (Salm-Dyck) Britton & Rose, 2*n* = 22; Argentina, La Rioja, *MLLP & FC 212.*

Echinopsis aurea var. *dobeana* (Dölz) J.Ullmann, 2*n* = 22; Argentina, Catamarca, *MLLP 125.*

Echinopsis aurea var. *falax* (Oehme) J.Ullmann, 2*n* = 22; Argentina, La Rioja, *MLLP & FC 203.*

Echinopsis leucantha (Gillies ex Salm-Dyck) Walp., 2*n* = 22; Argentina, San Juan, *MLLP & DU 87.*

Gymnocalycium andreae (Boed.) Backeb. & F.M.Knuth, 2*n* = 44; Argentina, Córdoba, *MLLP & DU 231.*

Gymnocalycium monvillei subsp. *achirasense* (H.Till & Schatzl) H.Till, 2*n* = 22; Argentina, Cordoba, *MLLP & al. 363.*

Gymnocalycium monvillei (Lem.) Britton & Rose subsp. *monvillei*, 2*n* = 44; Argentina, Córdoba, *MLLP & DU 232.*

Harrisia hahniana (Backeb.) Kimnach & Hutchison ex Kimnach, 2*n* = 22; Paraguay, Presidente Hayes, *MLLP 588.*

Harrisia pomanensis (F.A.C.Weber ex K.Schum.) Britton & Rose, 2*n* = 44; Argentina, San Luis, *MLLP & DU 100.*

Lobivia saltensis (Speg.) Britton & Rose, 2*n* = 22; Argentina, Salta, *MLLP 138.*

Maihueniopsis darwinii (Hensl.) F.Ritter, 2*n* = 55; Argentina, Chubut, *MLLP & DU 349.*

Maihueniopsis glomerata (Haw.) R.Kiesling, 2*n* = 44; Argentina, San Juan, *MLLP & DU 178.*

Maihueniopsis ovata (Pfeiff.) F.Ritter, 2*n* = 44; Argentina, San Juan, *MLLP & DU 181.*

Melocactus bahiensis (Britton & Rose) Luetzelb, 2*n* = 44; Brasil, Rio de Contas, *JU & al. 387.*

Opuntia quimilo K.Schum., 2*n* = 22; Argentina, La Rioja, *MLLP & al. 539.*

Oreocereus celsianus (Lem. ex Salm-Dyck) Riccob., 2*n* = 44; Argentina, Jujuy, *MLLP & DU 274.*

Oreocereus trollii (Kupper) Backeb., 2*n* = 22; Argentina, Jujuy, *MLLP & DU 339.*

Pachycereus pringlei (S.Watson) Britton & Rose, 2*n* = 22; México, Dpt. La Paz, *MLLP 714.*

Quiabentia verticillata (Vaupel) Vaupel ex A.Berger, 2*n* = ca. 187; Bolivia, Dpt. Mizque, *JU & al. 542.*

Rhipsalis lumbricoides (Lem.) Lem. ex Salm-Dyck, 2*n* = 22; Argentina, Misiones, *MLLP & DU 56.*

Tacinga inamoena (K.Schum.) Taylor & Stuppy, 2*n* = 44; Brasil, Rio de Contas, *JU & al. 385.*
Trichocereus arboricola Kimnach, 2*n* = 22; Argentina, Salta, *MLLP & FC 715.*
Trichocereus atacamensis (Phil.) W.T.Marshall & T.M.Bock, 2*n* = 22; Argentina, Salta, *MLLP & al. 319.*
Trichocereus macrogonus Britton & Rose, 2*n* = 22; Perú, *MLLP 122.*
Trichocereus thelegonus (F.A.C.Weber ex K.Schum.) Britton & Rose, 2*n* = 22; Argentina, Salta, *MLLP & al. 283.*

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All materials CHN; vouchers in SUK.

Authors express thanks to Head, Department of Botany, Shivaji University, Kolhapur for providing laboratory facilities, SERB (File No.: SB/FT/LS-130/2012).

ACANTHACEAE

Barleria gibsonii Dalzell, 2*n* = 44; India, Maharashtra, *K.V.C. Gosavi 126.*
Barleria prattensis Santapau, 2*n* = 44; India, Maharashtra, *K.V.C. Gosavi 125*
Pleocaulus sessilis (Nees) Bremek., 2*n* = 30; India, Maharashtra, *R.N. Mane 56.*
Ruellia urens Roth, 2*n* = 30; India, Maharashtra, *R.N. Mane 54.*
Strobilanthes callosa Nees, 2*n* = 30; India, Maharashtra, *K.V.C. Gosavi 452.*

ARECACEAE

Trachycarpus takil Becc., 2*n* = 36; India, Uttarakhand, *S.R. Yadav 226.*

DIPTEROCARPACEAE

Vatica chinensis L., 2*n* = 22; India, Karnataka, *R.N. Mane 67.*

FABACEAE

Clitoria biflora Dalzell, 2*n* = 14; India, Maharashtra, *K.V.C. Gosavi 186.*

POACEAE

Hemarthria protensa Nees ex Steud., *n* = 9; India, Assam, *K.V.C. Gosavi 171.*
Lasiurus scindicus Henrard, *n* = 18; India, Rajasthan, *K.N. Koli 167.*
Manisuris myurus L., *n* = 8; India, Tamil Nadu, *K.V.C. Gosavi 196.*
Mnesithea striata (Nees ex Steud.) de Koning & Sosef, *n* = 18; India, Meghalaya, *K.V.C. Gosavi 235.*

SAPOTACEAE

Chrysophyllum roxburghii G.Don, 2*n* = 26; India, Karnataka, *R.N. Mane 61.*

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# The two first authors have equally contributed to this article
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All material CHN.

CYPERACEAE
SUBFAMILY CYPEROIDEAE
TRIBE ABILDGAARDIEAE

Fimbristylis spadicea (L.) Vahl, 2*n* = 20; Brazil, Pernambuco, 15 Aug 1996, *Luceño & al. s.n.* (UFP).

TRIBE BISBOECKELEREAE

Calyptrocarya glomerulata (Brongn.) Urb., 2*n* = 20; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP).

TRIBE CARICEAE

Carex acidicola Naczi, 2*n* = 50; U.S.A., Georgia, *Naczi 1783* (MICH, NY).
Carex aethiopica Schkuhr, 2*n* = 74, 76; South Africa, Cape Town, 12 Sep 2009, *Luceño & al. s.n.* (BOL).
Carex amphibola Steud., 2*n* = 56; U.S.A., Arkansas, *Naczi 2829* (MICH, NY).
Carex asynchrona Naczi, 2*n* = 52; Mexico, Tamaulipas, *Naczi 2949* (MICH).
Carex bolanderi Olney, 2*n* = 50; U.S.A., Oregon, *Zika 24689* (MOR). 2*n* = 58; U.S.A., New Mexico, *Norris, Kleinman & Walkup 2008-7-23-43* (SNM).
Carex borbonica Lam., 2*n* = 68; France, La Réunion, *Luceño & Guzmán 1ML09* (UPOS-3635).
Carex borbonica Lam. × *C. boryana* Schkuhr, 2*n* = 68; France, La Réunion, *Luceño & Guzmán 20ML09* (UPOS-3724).
Carex boryana Schkuhr, 2*n* = 68; France, La Réunion, *Luceño & Guzmán 14ML09* (UPOS-3641).
Carex brevior (Dewey) Mack. ex Lunell, 2*n* = 60; U.S.A., Iowa, *Norris & Thompson s.n.* (MOR).

Carex brysonii Naczi, 2*n* = 50; U.S.A., Alabama, *Naczi 2950* (MICH, NY).
Carex bulbostylis Mack., 2*n* = 54; U.S.A., Texas, *Naczi 2328* (MICH, NY).
Carex calcifugens Naczi, 2*n* = 52; U.S.A., South Carolina, *Naczi 2059* (MICH, NY, PH).
Carex cespitosa L., 2*n* = 78; Spain, *Jiménez-Mejías & al. 99PJM06* (UPOS-1930).
Carex conoidea Schkuhr ex Willd., 2*n* = 68; Canada, New Brunswick, *Naczi 2347* (MICH, NY).
Carex corrugata Fernald, 2*n* = 58; U.S.A., Virginia, *Naczi 2238* (MICH, NY).
Carex cusickii Mack. ex Piper & Beattie, 2*n* = 63; U.S.A., California, *Janeway & Gog 3197C* (MOR).
Carex demissa Hornem., 2*n* = 70; Portugal, *Jiménez-Mejías & al. 06PJM05* (UPOS), *Jiménez-Mejías & al. 185PJM05* (UPOS-2866); Spain, *Jiménez-Mejías & al. 201PJM04* (UPOS-3518), *Jiménez-Mejías & al. 28PJM03* (UPOS).
Carex demissa Hornem. × *C. lepidocarpa* Tausch, 2*n* = 68; Spain, *Marín 15504JMM* (UPOS-3577), *Jiménez-Mejías & al. 451PJM05* (UPOS-2615). 2*n* = 70; Spain, *Luceño & al. 9205MLbis* (UPOS-1405).
Carex densa (L.H.Bailey) L.H.Bailey, 2*n* = 54; U.S.A., California, *Janeway & Gog 3183A* (MOR).
Carex distans L., 2*n* = 70; Turkey, *Martín-Bravo & al. 112SMB10* (UPOS-7401).
Carex ecklonii Nees, 2*n* = 64; South Africa, 12 Sep 2009, *Luceño & al. s.n.* (UPOS-6503).
Carex edwardsiana E.L.Bridges & Orzell, 2*n* = 52; U.S.A., Texas, *Naczi 2321* (MICH, NY).
Carex flaccosperma Dewey, 2*n* = 46; U.S.A., Arkansas, *Naczi 2733* (MICH, NY).
Carex fracta Mack., 2*n* = 70; U.S.A., Oregon, *Wilson & Otting 15143* (MOR).
Carex glaucodea Tuck. ex Olney, 2*n* = 44; Canada, Ontario, *Naczi 2954* (MICH, NY).
Carex glomerabilis V.I.Krecz., 2*n* = 60; South Africa, *Márquez-Corro & al. 196JMC17* (UPOS-9968).
Carex godfreyi Naczi, 2*n* = 50; U.S.A., Florida, *Naczi 2740* (MICH, NY).
Carex grisea Wahlenb., 2*n* = 56; Canada, Québec, *Naczi 1768* (MICH, NY).
Carex hitchcockiana Dewey, 2*n* = 54; Canada, Ontario, *Naczi 1786* (MICH, NY).
Carex impressinervia Bryson, Kral & Manhart, 2*n* = 46; U.S.A., Mississippi, *Naczi 2956* (MICH, NY).
Carex leporinella Mack., 2*n* = 82; U.S.A., Idaho, *Wilson & al. 15858* (MOR).
Carex mariposana L.H.Bailey ex Mack., 2*n* = 81; U.S.A., California, *Taylor & al. 20752* (MOR).
Carex mesochorea Mack., 2*n* = 48; U.S.A., Michigan, 14 Jul 2011, *Reznicek s.n.* (MOR).
Carex molesta Mack. ex Bright, 2*n* = 72; U.S.A., Wisconsin, *Hipp & Gog 3137* (MOR).
Carex nervina L.H.Bailey, 2*n* = 52; U.S.A., California, *Janeway & Gog 3195C* (MOR).
Carex nigra (L.) Reichard, 2*n* = 83; Portugal, *Martín-Bravo 216SMB06* (UPOS); Spain, *Marín & Luceño 40JMM04* (UPOS), *Jiménez-Mejías & al. 31PJM06* (UPOS-2253), *Jiménez-Mejías & Escudero 160PJM06* (UPOS), *Martín-Bravo & al. 153SMB07* (UPOS). 2*n* = 84; France, Corse, *Escudero & Luceño 89ME07* (UPOS); Greece, *Vargas & Luceño 284PV04* (UPOS-831); Portugal, *Martín-Bravo 216SMB06* (UPOS); Spain, *Jiménez-Mejías & García 153PJM06* (UPOS), *Jiménez-Mejías 36PJM06* (UPOS), *Jiménez-Mejías & al. 136PJM06* (UPOS-2220), *Jiménez-Mejías & Escudero 157PJM06* (UPOS), *Jiménez-Mejías & al. 137PJM06* (UPOS-2221). 2*n* = 85; Morocco, *Chaparro & al. 07AJC05* (UPOS-1632), *Jiménez-Mejías & al. 88PJM07* (UPOS-4750); Spain, *Jiménez-Mejías & García 153PJM06* (UPOS), *Jiménez-Mejías & al. 135PJM06* (UPOS-2218). 2*n* = 86; Morocco, *Jiménez-Mejías & al. 88PJM07* (UPOS-4750).
Carex oedipostyla Duval-Jouve, 2*n* = 68; Spain, *Luceño & al. 1ML11* (UPOS-6228), *Maguilla & al. 1EMS13* (UPOS-5127).
Carex oligocarpa Schkuhr ex Willd., 2*n* = 54; U.S.A., Illinois, *Naczi 2902* (MICH, NY).
Carex oronensis Fernald, 2*n* = 68, 71, 74; U.S.A., Maine, *Reznicek 11968* (MOR).
Carex ouachitana Kral, Manhart & Bryson, 2*n* = 52; U.S.A., Arkansas, *Naczi 1774* (MICH, NY).
Carex pachycarpa Mack., 2*n* = 70; U.S.A., Oregon, *Otting & Wilson 1945B* (MOR), *Wilson & Otting 14947* (MOR), *Wilson & Otting 14948* (MOR), *Wilson & N. Otting 14949* (MOR), *Wilson & Otting 15017* (MOR). 2*n* = 74; U.S.A., Oregon, *Wilson 15018* (MOR).
Carex pachystachya Cham. ex Steud., 2*n* = 82; U.S.A., Oregon, *Wilson 15052* (MOR).
Carex paeninsulae Naczi, E.L.Bridges & Orzell, 2*n* = 48; U.S.A., Florida, *Naczi 2958* (MICH, NY).
Carex petasata Dewey, 2*n* = 74; U.S.A., Oregon, *Wilson 15019* (MOR).
Carex pigra Naczi, 2*n* = 56; U.S.A., Alabama, *Naczi 2735* (MICH, NY).
Carex planispicata Naczi, 2*n* = 50; U.S.A., Alabama, *Naczi 2060* (MICH, NY).
Carex projecta Mack., 2*n* = 62; U.S.A., Michigan, *Rothrock 4070* (MOR). 2*n* = 64; U.S.A., Ontario, *Rothrock 3971* (MOR). 2*n* = 66; U.S.A., Maine, *Rothrock 3970* (MOR). U.S.A., Wisconsin, *Rothrock 4289* (MOR).
Carex radiata (Wahlenb.) Small, 2*n* = 58; U.S.A., Wisconsin, *Hipp & Gog 3133* (MOR).
Carex rainbowii Luceño, Jim.Mejías, M.Escudero & Martín-Bravo, 2*n* = 58; South Africa, KwaZulu-Natal, *Martín-Bravo & Luceño 120SMB11* (UPOS-5030).
Carex retroflexa Muhl. ex Willd., 2*n* = 42; U.S.A. Michigan, 14 Jun 2009, *Reznicek & Walters s.n.* (MOR).
Carex reuteriana subsp. *mauritanica* (Boiss. & Reut.) Jim.Mejías & Luceño, 2*n* = 74; Spain, *Jiménez-Mejías & al. 22PJM05* (UPOS), *Escudero & al. 4ME05* (UPOS).
Carex simulata Mack., 2*n* = 64; U.S.A., Colorado, *Chung & Lederer 1039* (MOR).
Carex subbracteata Mack., 2*n* = 80; U.S.A., Washington, *Zika 24641* (MOR).
Carex subfusca W.Boott, 2*n* = 82; U.S.A., Oregon, *Wilson & al. 15068* (MOR). 2*n* = 86; U.S.A., Nevada, *Zika 24619* (MOR).
Carex thornei Naczi, 2*n* = 50; U.S.A., Georgia, *Naczi 1779* (MICH, NY).
Carex tincta (Fernald) Fernald, 2*n* = 72; U.S.A., Maine, *Reznicek 10919A* (MOR).
Carex tribuloides Wahlenb., 2*n* = 70; U.S.A., Indiana, *Rothrock 4243* (MOR), *Rothrock 3839C* (MOR). 2*n* = 72; U.S.A., Indiana, *Rothrock 3839A* (MOR).
Carex trinervis Degl., 2*n* = 82, 84; Portugal, Coimbra, *Jiménez-Mejías & al. 10PJM05* (UPOS).

Carex vernacula L.H.Bailey, 2*n* = 52; U.S.A., Colorado, *Chung 1063* (MOR).
Carex viridula Michx., 2*n* = 70; Greece, *Luceño 1404ML* (UPOS-691).
Carex vixdentata (Kük.) G.A.Wheeler, 2*n* = 62; Argentina, Buenos Aires, *Marín 2102JMM* (UPOS-849).

TRIBE CARPHEAE

Trianoptiles capensis (Steud.) Harv., 2*n* = 52; South Africa, Cape Town, *Muasya & al. 4549* (BOL).

TRIBE CRYPTANGIEAE

Lagenocarpus guianensis Nees, 2*n* = 34; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP).

TRIBE CYPEREAE

Afroscirpoides dioeca (Kunth) García-Madr. & Muasya (≡ *Scirpoides dioeca* (Kunth) J.Browning), 2*n* = 35; South Africa, *Muasya & al. 4557* (BOL).
Cyperus fuscus L., 2*n* = 36; Spain, *M. Luceño s.n.* (UPOS).
Cyperus salzmannianus (Steud.) Bauters (= *Lipocarpha salzmanniana* Steud.), 2*n* = 38; Brazil, Rio Grande do Norte, *M. Luceño & al. s.n.* (UFP). 2*n* = 36, 38, 40; Brazil, Pernambuco, *Luceño & Guerra s.n.* (UFP).
Cyperus sesquiflorus (Torr.) Mattf. & Kük. (= *Kyllinga odorata* Vahl), 2*n* = 108; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP).
Cyperus subsquarrosus (Muhl.) Bauters (= *Hemicarpha micrantha* (Vahl) Britton), 2*n* = 52; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP). 2*n* = 54; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP).
Dracoscirpoides ficinioides (Kunth) Muasya, 2*n* = 104; South Africa, *Maguilla & al. 79EMS12* (UPOS).
Isolepis marginata (Thunb.) A.Dietr., 2*n* = 8; South Africa, *Muasya & al. 4516* (BOL).

TRIBE ELEOCHARIDEAE

Eleocharis confervoides (Poir.) Steud. (= *Websteria submersa* (C.Wright) Britton), 2*n* = 38, 40, 41; Brazil, Pernambuco, *Luceño & al. s.n.* (UFP).

TRIBE RHYNCHOSPOREAE

Rhynchospora brownii Roem. & Schult., 2*n* = 36; South Africa, *Luceño & al. 125ML08* (UPOS-3707).
Rhynchospora modesti-lucennoi Castrov., 2*n* = 84; Portugal, *Jiménez-Mejías & al. 113PJM05* (UPOS-1394).

TRIBE SCHOENEAE

Schoenus nigricans L., 2*n* = 76; Spain, *Jiménez-Mejías & al. 3PJM07* (UPOS-2857).

SUBFAMILY MAPANIOIDEAE
TRIBE CHRYSITRICHEAE

Chrysitrix capensis L., 2*n* = 46; South Africa, *Muasya & al. 4540* (BOL).

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The research was supported by the state project LIN SB RAS #AAAA-A16-116122110060-9.

HYDROCHARITACEAE

Elodea canadensis Michx., 2*n* = 48; Russia, Irkutskaya Oblast', *AVN & YuSB 50785*, *AVN 50789*, *AVN 50786*, *Yu.R. Zakharova & M.V. Bashenkhaeva 50791*, *AVN 50787*, *EVM 50788*, *M.P. Tskhovrebova 50795*, *AVN 50796*, *D.A. Krivenko & AVN 50771*; Russia, Republic of Buryatiya, *AVN 50790*, *AVN 50792*, *L.S. Kravtsova 50793*; Russia, Zabaikal'skii Krai, *EVM 50794*; Russia, Moskovskaya Oblast', *YuSB 51398*.
Egeria densa Planch., 2*n* = 48; Russia, Moskovskaya Oblast', *AVN 51053*.

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All materials CHN; collected in India; collector: *SKP = Saroj Kumar Pradhan*; vouchers in PUN.

The study is supported by financial grant under DBT-IPLS Project (Reference number: BT/PR 4548/INF/22/146/2012).

ASTERACEAE

Arctium lappa L., *n* = 17; *SKP 32112*.
Carduus edelbergii Rech.f., *n* = 16; *SKP 32149*.
Cremanthodium arnicoides (DC. ex Royle) R.D.Good, *n* = 9; *SKP 32150*.
Saussurea auriculata (DC.) Sch.Bip., *n* = 16*; SKP 32121*.
Saussurea costus (Falc.) Lipsch., *n* = 17; *SKP 32104*.

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All materials CHN; vouchers in EAN (Herbarium Prof. Jayme Coelho de Moraes).

Financial support from CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), and INSA (Instituto Nacional do Semiárido).

APOCYNACEAE

Allamanda doniana Müll.Arg., 2*n* = 27; Brazil, Ceará, *E.M. Almeida 1137.*
Aspidosperma pyrifolium Mart., 2*n* = 34; Brazil, Paraíba, *A.M.S. Santos 24.*
Mandevilla bahiensis (Woodson) M.F.Sales & Kin.-Gouv., 2*n* = 20; Brazil, Bahia, *L.P. Felix 15520.*
Mandevilla catimbauensis Souza-Silva, Rapini & J.F.Morales, 2*n* = 26; Brazil, Pernambuco, *J.M.P. Cordeiro 379.*
Mandevilla dardanoi M.F.Sales, Kin.-Gouv. & A.O.Simões, 2*n* = 20; Brazil, Alagoas, *J.M.P. Cordeiro 481.*
Mandevilla leptophylla (A.DC.) K.Schum., 2*n* = 18; Brazil, Ceará, *L.P. Felix 15060.*
Mandevilla tenuifolia (J.C.Mikan) Woodson, 2*n* = 20; Brazil, Ceará, *E.M. Almeida 1165.*
Marsdenia caatingae Morillo, 2*n* = 22; Brazil, Paraíba, *A.S. Santos 26.*
Marsdenia hilariana E.Fourn., 2*n* = 22; Brazil, Ceará, *L.P. Felix 15063.*
Marsdenia megalantha Goyder & Morillo, 2*n* = 22; Brazil, Ceará, *E.M. Almeida 1169.*
Peltastes peltatus (Vell.) Woodson, 2*n* = 18; Brazil, Pernambuco, *L.P. Felix 13771.*
Petalostelma dardanoi Fontella, 2*n* = 20; Brazil, Paraíba, *J.M.P. Cordeiro 258.*
Tabernaemontana catharinensis A.DC., 2*n* = 22; Brazil, Ceará, *L.P. Felix 14943.*
Tabernaemontana solanifolia A.DC., 2*n* = 22; Brazil, Bahia, *J.M.P. Cordeiro 654.*
Temnadenia stellaris (Lindl.) Miers, 2*n* = 18; Brazil, Paraíba, *J.M.P. Cordeiro 591.*

ARACEAE

Anthurium affine Schott, 2*n* = 30; Brazil, Paraíba, *E.M. Almeida 1069.*

COMMELINACEAE

Aneilema brasiliense C.B.Clarke, 2*n* = 24; Brazil, Paraíba, *L.P. Felix 15908.*
Commelina diffusa Burm.f., 2*n* = 30; Brazil, Paraíba, *A.S. Santos 32.*
Commelina diffusa Burm.f., 2*n* = 60; Brazil, Paraiba, *E.M. Almeida 1067.*
Commelina obliqua Vahl, 2*n* = 60; Brazil, Pernambuco, *L.P. Felix 15665.*
Dichorisandra hexandra (Aubl.) Standl., 2*n* = 76; Brazil, Pernambuco, *L.P. Felix 15736.*
Tradescantia ambigua Mart., 2*n* = 24; Brazil, Paraíba, *A.S. Santos 18.*

COSTACEAE

Chamaecostus subsessilis (Nees & Mart.) C.D.Specht & D.W.Stev., 2*n* = 18; Brazil, Paraíba, *E.M. Almeida 1074.*

EUPHORBIACEAE

Cnidoscolus urens (L.) Arthur, 2*n* = 72; Brazil, Paraíba, *E.M. Almeida 1076.*

MELASTOMATACEAE

Tibouchina heteromalla (D.Don) Cogn., 2*n* = 36; Brazil, Paraiba, *E.M. Almeida 1077.*

SOLANACEAE

Solanum polytrichum Moric., 2*n* = 24; Brazil, Bahia, *E.M. Almeida 1409.*

VELLOZIACEAE

Vellozia plicata Mart., 2*n* = 18; Brazil, Paraíba, *L.P. Felix 14525.*

VITACEAE

Cissus decidua Lombardi, 2*n* = 34; Brazil, Paraíba, *J.M.P. Cordeiro 260.*

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

UMBELLIFERAE/APIACEAE

Athamanta sicula L., 2*n* = 22; Italy, Sicily, *MP 12-4*, 22 Jul 2012, *MP s.n.*, 13 Jul 2012, *MP s.n.*
Berula erecta (Huds.) Coville, *n* = 9; Greece, *MP 15-30.*
Bupleurum glumaceum Sm., *n* = 8; Greece, *MP 15-7.*
Chaerophyllum temulum L., *n* = 7; Greece, *MP 15-39.*
Conium divaricatum Boiss. & Orph., 2*n* = 22; Greece, *MP 15-4.*
Daucus carota subsp. *gummifer* (Syme) Hook.f. = *D. carota* subsp. *hispanicus* (Gouan) Thell.), *n* = 9; France, 03 Jun 2017, *MP s.n.*
Daucus involucratus Sm., 2*n* = 22; Greece, *MP 15-17.*

Daucus maximus Desf. (≡ *D.carota* subsp. *maximus* (Desf.) Ball), 2*n* = 18; Turkey, 7 Aug 2014, *MP s.n.*
Eryngium campestre var. *virens* (Link) Weins, *n* = 14; Greece, *MP 15-9.*
Eryngium creticum Lam., *n* = 7; Greece, *MP 15-29.*
Ferula tingitana L., 2*n* = 22; Turkey, *MP 14-4.*
Ferulago humilis Boiss., 2*n* = 22; Turkey, *MP 14-8.*
Ferulago mughlae Peşmen, 2*n* = 66; Turkey, *MP 14-9.*
Ferulago trojana Akalın & Pimenov, 2*n* = 22; Turkey, 6 Aug 2014, *MP & E. Akalın s.n.*
Helosciadium nodiflorum (L.) W.D.J.Koch, 2*n* = 22; Italy, Sicily, *MP 12-13.*
Orlaya grandiflora (L.) Hoffm., 2*n* = 20; Greece, *MP 15-25.*
Pastinaca yildizii Dirmenci, *n* = 11; Turkey, *MP & T. Dirmenci 14-10.*
Pimpinella cretica Poir., *n* = 9; Greece, *MP 15-3*; 2*n* = 18; Greece, 25 Jun 2015, *MP s.n.*
Ridolfia segetum (Guss.) Moris, 2*n* = 22; Italy, Sicily, *MP 12-8.*
Scaligeria moreana Engstrand, 2*n* = 22; Greece, *E.A. Zakharova & U.A. Ukrainskaya 48.*
Scaligeria napiformis (Willd. ex Spreng.) Grande, 2*n* = 20; Greece, *MP 15-20*, *MP 15-32*, *E.A. Zakharova & U.A. Ukrainskaya 47.*
Seseli varium Trevir. (= *S. pallasii* Besser), *n* = 9; Greece, *MP 15-23.*
Smyrnium olusatrum L., 2*n* = 22; Greece, 25 Jun 2015, *MP s.n.*; Italy, Sicily, 13 Jul 2012, *MP s.n.*; Turkey, 27 Jul 2014, *MP s.n.*
Smyrnium rotundifolium Mill., 2*n* = 22; Greece, 23 Jun 2015, *MP s.n.*; Italy, Sicily, *MP 12-15.*
Thapsia garganica L., 2*n* = 22; Italy, Sicily, *MP 12-1.*
Tordylium apulum L., 2*n* = 20; Greece, *MP 15-2.*
Torilis triradiata Boiss. & Heldr., 2*n* = 12; Turkey, *MP 14-3.*

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All materials CHN.

Financial support from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior/CAPES, Conselho Nacional de Desenvolvimento Científico e Tecnológico/ CNPq (Proc. 312215/2013-4, 562340/2010-6 and 561768/2010-2), and Fundação de Amparo à Pesquisa do Distrito Federal/FAP-DF (Proc. 0193.000.979/2015). Brasília, Brazil.

POACEAE

Paspalum centrale Chase, 2*n* = 20; Brazil, Acre, *R.C. Oliveira 3405* (UB).
Paspalum convexum Humb. & Bonpl. ex Flüggé, 2*n* = 32; Brazil, Distrito Federal, *J.F.M. Valls & M.W.S. Sousa 16788* (CEN, UB), *J.F.M. Valls & M.W.S. Sousa 16789* (CEN, UB); Brazil, Goiás, *J.F.M. Valls & al. 16187* (CEN, UB), *R.C. Oliveira & M.W.S. Sousa 3005* (UB).
Paspalum cordaense Swallen, 2*n* = 40; Brazil, Bahia, *J.F.M. Valls & al. 16694* (CEN, UB); Brazil, Goiás, *J.F.M. Valls & al. 16611* (CEN, UB).
Paspalum macranthecium Parodi, 2*n* = 20; Brazil, Bahia, *J.F.M. Valls & al. 16693* (CEN, UB).
Paspalum marmoratum Kuhlm., 2*n* = 18; Brazil, Mato Grosso, *C.O. Moura & Y.F.F. Soares 98* (UB).
Paspalum melanospermum Desv. ex Poir., 2*n* = 20; Brazil, Amazonas, *R.C. Oliveira & J.M. Mendoza 3025* (UB); Brazil, Bahia, *R.C. Oliveira 3362* (UB); Brazil, Goiás, *Valls & al. 16671* (CEN, UB); 2*n* = 40, Brazil, Amazonas, *R.C. Oliveira & J.M. Mendoza 3010* (UB); Brazil, Distrito Federal, *R.C. Oliveira & al. 3443* (UB); Brazil, Goiás, *J.F.M. Valls. & al. 16188* (CEN, UB), *J.F.M. Valls. & al. 16195* (CEN, UB), *J.F.M. Valls. & al. 16622* (CEN, UB); *R.C. Oliveira & M.W.S. Sousa 3003* (UB); Brazil, Mato Grosso, *C.O. Moura & Y.F.F. Soares 90* (UB); Brazil, Tocantins, *M.W.S. Sousa 87* (UB).
Paspalum plicatulum Michx., 2*n* = 40; Brazil, Distrito Federal, *A.P.M.L. Gouveia 232* (UB), *R.C. Oliveira & M.W.S. Sousa 3423* (UB).
Paspalum riparium Nees, 2*n* = 40; Brazil, Amazonas, *R.C. Oliveira & J.M. Mendoza 3008* (UB), *R.C. Oliveira & J.M. Mendoza 3016* (UB).
Paspalum rojasii Hack., 2*n* = 40; Brazil, Distrito Federal, *J.F.M. Valls & M.W.S. Sousa 16777* (CEN, UB).

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The study was financially supported by Research Institute Forests and Rangeland of Iran (grant no. 12-09-09-7701-89001). The authors are grateful to several collectors for material donation.

All materials CHN; collectors: *A.A.* = Ardeshir Ashrafi, *J.M.* = Javad Mohebi, *S.M.* = Saeedeh Mirzadeh; vouchers in PUN.

APIACEAE

Ferulago angulata (Schltdl.) Boiss., 2*n* = 22; Iran, *A.A. 106062.*

ASTERACEAE

Achillea talagonica Boiss., 2*n* = 18; Iran, *J.M. 106054.*
Anthemis tinctoria L., 2*n* = 18; Iran, *A.A. 106056.*
Tanacetum abrotanifolium (L.) Druce, 2*n* = 36; Iran, *J.M. 106059.*
Tanacetum pinnatum Boiss., 2*n* = 18; Iran, *J.M.* 106057.
Varthemia persica DC., 2*n* = 16; Iran, *J.M. 106058.*

CAPRIFOLIACEAE

Centranthus longiflorus Steven, 2*n* = 32; Iran, *J.M. 106047.*

CARYOPHYLLACEAE

Gypsophila bicolor Grossh., 2n = 34; Iran, *A.A. 106063.*

ELAEAGNACEAE

Hippophae rhamnoides L., 2*n* = 24; Iran, *S.M. 105207.*

LAMIACEAE

Lallemantia canescens Fisch. & C.A.Mey., 2*n* = 14; Iran, *A.A. 106048.*
Phlomis olivieri Benth., 2*n* = 20; Iran, *J.M. 106050.*

Salvia hypoleuca Benth., 2*n* = 22; Iran, *S.M. 106052.*
Teucrium hircanicum L., 2*n* = 32; Iran, *J.M. 106051.*
Thymus persicus (Ronniger ex Rech.f.) Jalas, 2*n* = 30; Iran, *J.M. 106049.*

MALVACEAE

Sida rhombifolia L., 2*n* = 14; Iran, *J.M. 106061.*

PAPAVERACEAE

Papaver bracteatum Lindl., 2*n* = 14; Iran, *J.M. 106060.*

PAPILIONACEAE/FABACEAE

Astragalus mesoleios Boiss. & Hohen., 2*n* = 16; Iran, *A.A. 106053.*
Oreophysa triphylla (Bunge ex Boiss.) Bornm., 2*n* = 16; Iran, *S.M. 106055.*

IAPT CHROMOSOME DATA

IAPT chromosome data 28 [extended online version]

Edited by Karol Marhold & Jaromír Kučera

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Methods are described in Daviña & Fernández (1989) and Daviña (2001).

- ⁎ First chromosome count for the species.
- ● First gametic chromosome count for the species.
- ▼ New cytotype for the species.
- ■ First meiotic behaviour report for the species.

This study was supported by Agencia Nacional de Promoción Científica y Técnica (ANPCyT) grant nos. PICT-2014-2218 and PICT-2016-1637, and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET).

AMARYLLIDACEAE

Amaryllidaceae family comprises 860 species and 59 genera with mainly tropical distribution (Meerow & Snijman, 1998). The Hippeastreae Herb. ex Sweet tribe has a major center of diversification in central Chile and western Andean Argentina and a second center in eastern Brazil and northeastern Argentina (Meerow & Snijman, 1998; Arroyo-Leuenberger & Dutilh, 2008). In this opportunity, species belonging to *Habranthus* Herb. from Argentina were cytogenetically studied.

Habranthus barrosianus Hunz. & Di Fulvio

$2n = 2x = 18$, CHN. Argentina, Buenos Aires Province, Tandil Department, South City Park, 37°20′S, 59°08′W, 27 Jan 1987, *Leuenberger & Arroyo 3772* (B) [Fig. 1A].

The somatic chromosome number of this accession agrees and confirms the findings made by Naranjo (1969, 1974).

Habranthus brachyandrus (Baker) Sealy

●■ $n = 12$, $2n = 4x = 24$, CHN. Argentina, Corrientes Province, General Paz Department, National Route nº 12, Km 1099, 27°28′S, 58°47′W, 17 Dec 1997, *Daviña 416* (B, MNES) [Fig. 1E].

This chromosome number is in agreement with a previous report (Flory & Flagg, 1958). Chromosomes behave regularly at meiosis, with 12 II at metaphase I (Fig. 2A). Sometimes, in pollen mother cells (PMCs) at anaphase I and telophase I, chromosomes bridges and few laggards were observed (Fig. 2B, C). The chromosome pairing suggest allotetraploidy for the taxon.

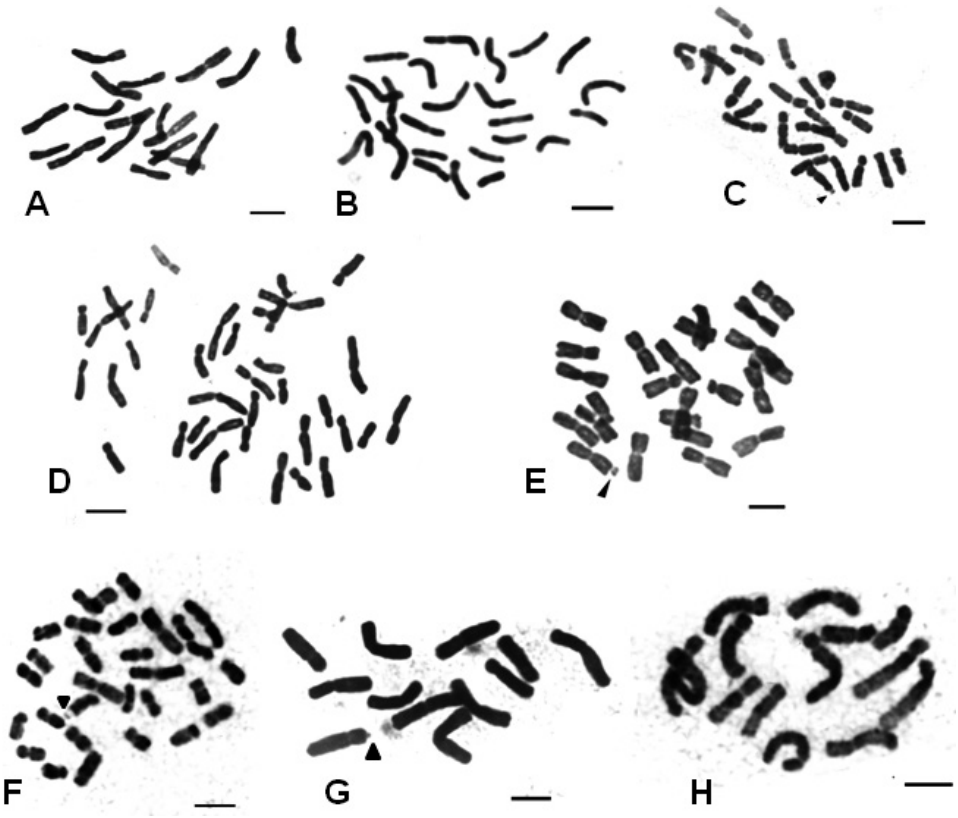

Fig. 1. *M*itotic metaphase.
A, *Habranthus barrosianus*, $2n = 18$;
B, *H. gracilifolius*, $2n = 24$;
C, *H. tubispathus*, $2n = 24$;
D, *H. tubispathus*, $2n = 36$;
E, *H. brachyandrus*, $2n = 24$, arrowhead points out to chromosome carrying satellite at the short arm;
F, *H. coeruleus*, $2n = 30$, arrowhead points out to chromosome carrying satellite at the long arm;
G, *H. chacoensis*, $2n = 12$, arrowhead points out to chromosome carrying satellite at the short arm;
H, *H. pedunculosus*, $2n = 14$. — Scale bars = 5 µm.

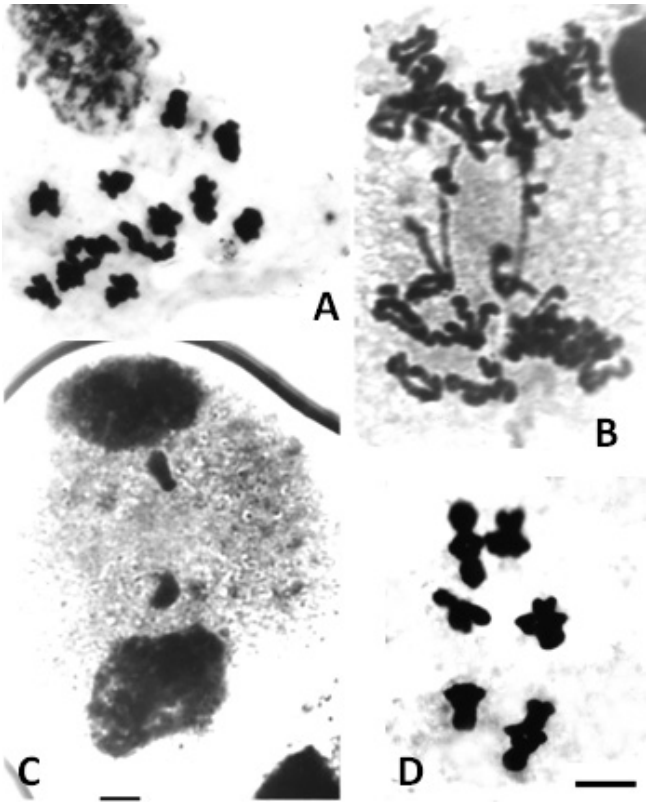

Fig. 2. Meiotic behaviour: **A,** *Habranthus brachyandrus*, PMC at metaphase I with 12 bivalents; **B,** *H. brachyandrus*, anaphase I with chromosome bridges without fragments suggesting translocation rearrangements; **C,** *H. brachyandrus*, PMC at telophase I with laggard chromosomes; **D,** *H. chacoensis,* PMC at metaphase I with 6 bivalents. — Scale bars = 5 µm.

Habranthus chacoensis Ravenna

∗●■ n = 6, $2n$ = $2x$ = 12, CHN. Argentina, Chaco Province, 1ro. de Mayo Department, Paraje tres Horquetas, 27°27′S, 59°00′W, 4 Mar 1996, *Daviña & Lavia 342* (B, CTES, MNES) [Fig. 1G].

Regularly, chromosomes associate in 6 II at diakinesis and metaphase I (Fig. 2D) in all analyzed PMCs of this diploid species.

Habranthus coeruleus (Griseb.) Traub

* $2n$ = $2x$ = 30, CHN. Argentina, Misiones Province, Capital Department, Parada Leis, 27°36′S, 55°52′W, 16 Feb 1999, *Honfi & Daviña 985* (MNES) [Fig. 1F].

Habranthus gracilifolius Herb.

$2n$ = $4x$ = 24, CHN. Argentina, Buenos Aires Province, Tandil Department, South City Park, 37°20′S, 59°08′W, 27 Jan 1987, *Leuenberger & Arroyo 3774* (B) [Fig. 1B].

This is a species with two ploidy levels, diploids ($2n$ = 12; Naranjo, 1974) and tetraploids as found here, in agreement with a previous report of Flory & Flagg (1958).

Habranthus pedunculosus Herb.

$2n$ = $2x$ = 14, CHN. Argentina, Chaco Province, 1º de Mayo Department, Colonia Benítez, 27°27′S, 59°00′W, 21 Feb 1996, *Daviña, Dematteis, Lavia & López 334* (B, MNES) [Fig. 1H].

We confirm the chromosome number and ploidy level of the species, previously reported by Naranjo (1974) and Flory & Flagg (1958).

Habranthus tubispathus (L'Hér.) Traub

$2n$ = $4x$ = 24, CHN. Argentina, Corrientes Province, Capital Department, Molina Punta, 27°27′S, 58°47′W, 22 Feb 1996, *Daviña, Dematteis & Schinini 329* (B, CTES, MNES) [Fig. 1C].

Our count confirms the tetraploid level for the species in agreement with Flory (1948) and Flory & Flagg (1958).

▼ $2n$ = $6x$ = 36, CHN. Argentina, Buenos Aires Province, Tandil Department, South City Park, 37°20′S, 59°08′W, 27 Jan 1987, *Leuenberger & Arroyo 3771* (B) [Fig. 1D].

For the first time, we report a new hexaploid cytotype for *H. tubisphathus* from Argentina.

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▲ First chromosome count for the species.

This work has been supported by the Spanish Ministerio de Economía y Competitividad (projects CGL2009-07555, CGL2012-32574, *Flora iberica* VIII [CGL2008-02982-C03-02/CLI], *Flora iberica* IX [CGL2011-28613-C03-03], *Flora iberica* X [CGL2014-52787-C3-2-P]); the Spanish Ministerio de Ciencia e Innovación (Ph.D. grants to BR and NLG), and the University of Salamanca (Ph.D. grant to NPG financed jointly by Banco Santander). The authors are very grateful to all colleagues who helped with plant location and sampling.

CHN

Material CHN, collected in Bosnia and Herzegovina, Bulgaria, Montenegro, Macedonia (F.Y.R.O.M.) and Switzerland. All cytological investigations have been carried out on anthers and gynoecia. Material was fixed in 3 : 1 absolute ethanol-glacial acetic acid and stained in 2% acetic orcein (Cour, 1945).

FCM

Material FCM, collected in Austria, Czech Republic, Croatia, France, Morocco, Romania, Serbia, Slovakia, Spain, Switzerland and Turkey. DNA ploidy levels were estimated from silica-gel-dried leaves. Samples were prepared according to the procedure described in Rojas-Andrés & al. (2015). Leaf samples of *Pisum sativum* L. 'Ctirad' (2C DNA = 9.09 pg; Dolezel & al., 1998), *Solanum pseudocapsicum* L. (2C DNA = 2.589 pg; Temsch & al., 2010) and *Zea mays* L. 'CE-777' (2C DNA = 5.43 pg; Lysak & Dolezel, 1998) were used as internal reference standards according to sample C-value and standard availability. Results on DNA ploidy level were acquired using a CyFlow SL system (Partec, Münster, Germany) equipped with a blue 488 nm solid state laser. For each individual, the ratio of the G_0/G_1 peak positions of samples and internal standards were recorded. DNA ploidy level was estimated based on the genome size value found and the available chromosome number for each particular taxon. In many cases FCM measurements were directly compared with CHN corresponding to the same samples. The coefficient of variation (CV) was calculated for each sample and the standard used. All data were suitable for DNA ploidy level estimation because CV values did not exceed the 10% threshold.

TAXONOMIC TREATMENT

Material determination and nomenclatural treatment follow Rojas-Andrés & Martínez-Ortega (2016) and Rojas-Andrés & al. (2016), respectively, with the modifications proposed by Padilla-García & al. (2018).

PLANTAGINACEAE

Veronica angustifolia (Vahl) Bernh.

$2n = 64$, CHN. Switzerland, Valais, on the ascent to Tanay lake, 46°20′36.0″N, 06°50′33.4″E, 1418 m, 11 Jul 2011, *X. Giráldez, M.M. Martínez-Ortega 6038 & B. Rojas-Andrés* (SALA 149416) [Fig. 3I].

$2n \sim 8x \sim 64$, FCM. France, Departement of Hautes-Alpes, Gap. Chorges, near Gap. On the ascent to Monte Chabrières from Les Andrieux, at the margins of the road, 44°34′35.3″N, 06°16′35.3″E,

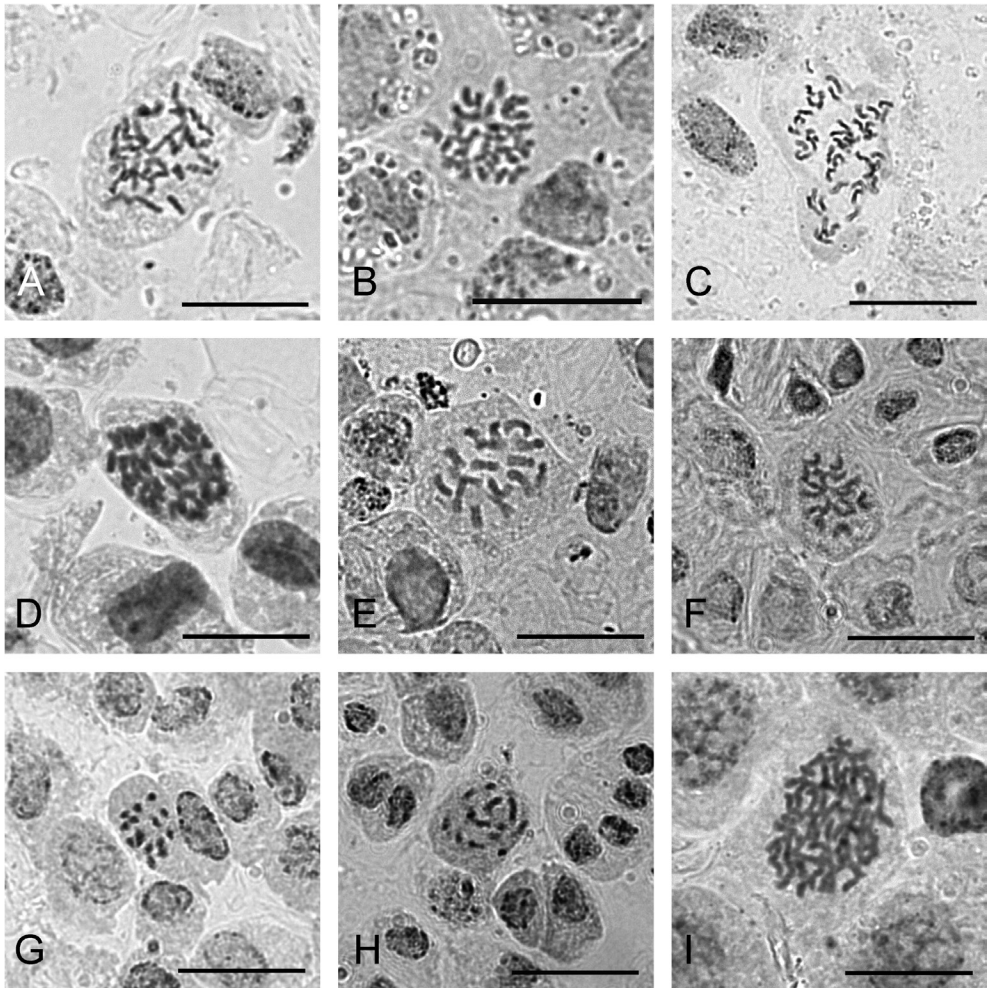

Fig. 3. Mitotic metaphases: **A–D,** *Veronica austriaca* subsp. *jacquinii*: **A,** $2n = 32$ (SALA 157023); **B,** $2n = 32$ (SALA 157024); **C,** $2n = 48$ (SALA 157021); **D,** $2n = 48$ (SALA 149376); **E & F,** *V. dalmatica*: **E,** $2n = 16$ (SALA 157018); **F,** $2n = 16$ (SALA 157030); **G & H,** *V. kindlii*, $2n = 16$ (SALA 157011); **I,** *V. angustifolia*, $2n = 64$ (SALA 149416). — Scale bars, 10 µm.

1393 m, 10 Jul 2011, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 167-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 167-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 167-3* (SALA 149398); Switzerland, Valais, on the ascent to Tanay lake, 46°20′36.0″N, 06°50′33.4″E, 1418 m, 11 Jul 2011, *X. Giráldez, M.M. Martínez-Ortega 6038-1 & B. Rojas-Andrés*, *X. Giráldez, M.M. Martínez-Ortega 6038-2 & B. Rojas-Andrés*, *X. Giráldez*, *M.M. Martínez-Ortega 6038-3 & B. Rojas-Andrés* (SALA 149416).

Based on AFLP data, this species name has been recently resurrected to name plants that were previously included under the variation of *V. teucrium* L. (Padilla-García & al., 2018). Simonet (1934) and Brandt (1952) counted the chromosomes of plants from this group from France and Switzerland, but we have not been able to revise the corresponding herbarium vouchers and do therefore not know for sure whether they correspond to *V. angustifolia* or *V. teucrium*.

Veronica austriaca subsp. *jacquinii* (Baumg.) Watzl

2*n* = 32, CHN. Bosnia and Herzegovina, Trebinje, between Gacko and Tjentiste, subalpine meadows on limestone soils, 43°11′04.92″N, 18°33′56.808″E, 1076 m, 10 Jun 2015, *M.M. Martínez-Ortega 6122, X. Giráldez, N. Padilla-García & N. López-González* (SALA 157023) [Fig. 3A], *M.M. Martínez-Ortega 6123, X. Giráldez, N. Padilla-García & N. López-González* (SALA 157024) [Fig. 3B].

2*n* = 48, CHN. Bosnia and Herzegovina, Trebinje, between Gacko and Tjentiste, subalpine meadows on limestone soils, 43°11′04.92″N, 18°33′56.808″E, 1076 m, 10 Jun 2015, *M.M. Martínez-Ortega 6120, X. Giráldez, N. Padilla-García & N. López-González* (SALA 157021) [Fig. 3C]; Bulgaria, Pazardzhik, between Batak and Beglika, perennial grassland, 41°50′27″N, 24°08′48″E, 1522 m, 17 Jun 2009, *X. Giráldez, M.M. Martínez-Ortega, B. Rojas-Andrés 21 & M. Santos Vicente* (SALA 149368); Bulgaria, Pernik, between Staychovtsi and Dolna Melna, 42°41′04″N, 22°31′57″E, 950 m, 14 Jun 2009, *X. Giráldez, M.M. Martínez-Ortega 4577, B. Rojas-Andrés & M. Santos Vicente* (SALA 149376) [Fig. 3D].

2*n* ~ 6*x* ~ 48, FCM. Croatia, Licausko Polje, meadows on limestone soils, 704 m, 17 Jun 2001, *M.M. Martínez-Ortega 1404-1 & A. Tribsch*, *M.M. Martínez-Ortega 1404-2 & A. Tribsch* (SALA 124609); Croatia, Primorje-Gorski Kotar, Velika Kapela, Gornje Jelenje pass, at the crossroad towards Crikvanica, meadows on limestone soils, 45°21′58″N, 14°37′09″E, 880 m, 16 Jun 2001, *M.M. Martínez-Ortega 1391-1 & A. Tribsch*, *M.M. Martínez-Ortega 1391-2 & A. Tribsch* (SALA 124604).

Numerous chromosome counts are known for this taxon, 2*n* = 32, 48, 64 (cf. Scheerer, 1937; Moore, 1973, 1977; Peev, 1978; Goldblatt & Johnson, 1979+; Goldblatt, 1981, 1988; Májovský & Murín, 1987), but 2*n* = 48 is the most frequent one. The tetraploid cytotype 2*n* = 32 is rare and has been reported only once from Bulgaria (Peev, 1972). The population studied here from Bosnia and Hercegovina contains tetraploid (2*n* = 32; SALA 157023 and SALA 157024) and hexaploid individuals (2*n* = 48; SALA 157021). The morphology of the tetraploid individuals is also close to that of *Veronica orbiculata* A.Kern.

▲ *Veronica dalmatica* N.Pad.Gar., Rojas-Andrés, López-González & M.M.Mart.Ort.

2*n* = 16, CHN. Montenegro, Kotor, Lovcen, shrub clearings on limestones, 42°25′04.9″N, 18°47′39″E, 904 m, 9 Jun 2015, *M.M. Martínez-Ortega, X. Giráldez, N. Padilla-García & N. López-González 137* (SALA 157018) [Fig. 3E]; Montenegro, Žabljak, Meždo, dry meadows on limestone soils with *Juniperus*, 43°09′49.824″N, 19°08′56.688″E, 1390 m, 12 Jun 2015, *M.M. Martínez-Ortega, X. Giráldez, N. Padilla-García & N. López-González 139* (SALA 157030) [Fig. 3F].

It has not been possible to revise herbarium material corresponding to a previous chromosome count (2*n* = 16) from an Albanian population (Baltisberger, 1988) identified as *V. jacquinii*. Padilla-García & al. (2018) have recently shown that the diploid representatives traditionally assigned to *V. austriaca* subsp. *jacquinii* represent a distinct species named *V. dalmatica*. Here, material clearly assigned to this species collected in Montenegro is investigated for the first time.

▲ *Veronica kindlii* Adam.

2*n* = 16, CHN. Macedonia (F.Y.R.O.M.), Bitola, on the ascent to Pelister summit, subalpine meadows on granite soils, 40°59′40.416″N, 21°10′42.492″E, 2355 m, 8 Jul 2014, *X. Giráldez, M.M. Martínez-Ortega 6090, B. Rojas-Andrés & N. López-González* (SALA 157011) [Fig. 3G, H].

The name *V. kindlii* has been recently resurrected to designate those populations from the Balkan Peninsula previously identified as *V. orsiniana* (Rojas-Andrés & al., 2015). A previous chromosome count for *V. kindlii* was carried out on material collected in the Macedonian locality of Barbaros (Makedonski Brod) (Sopova & al., 1983 in Goldblatt, 1988). However, AFLP data showed that the latter population corresponds to the closely related species *V. linearis* (Padilla-García & al., 2018). Thus, the chromosome count published here would represent the first one for *V. kindlii*.

Veronica orsiniana Ten.

2*n* ~ 2*x* ~ 16, FCM. France, Department of Lozère, Cévennes, 5 kilometers from Aven Armand cave, at the crossroad towards Mas-de-la-Font, montane meadows with *Buxus* on acid soil, 44°12′22″N, 03°23′31″E, 945 m, 8 Jun 2012, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 203-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 203-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 203-3* (SALA 149303); France, Department of Lozère, Cévennes, Aven Armand cave, meadows on limestone soils, 44°13′29″N, 03°21′34″E, 1006 m, 8 Jun 2012, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 207-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 207-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 207-3* (SALA 149305); France, Department of Var, on the ascent to Sainte Baume massif, Braque pathway, meadows on limestone soils, 43°19′21″N, 05°42′09″E, 693 m, 9 Jun 2012, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 210-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 210-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 210-3* (SALA 149308); Spain, Barcelona, Collsuspina, between Tona and Moyá, grazed pastures near the road, grassy slopes, 41°49′39″N, 02°10′45″E, 916 m, 14 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 235-1, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 235-2, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 235-3, A. Abad & N. López-González* (SALA 155093), *M.M. Martínez-Ortega, B. Rojas-Andrés 235-22*, A. Abad & N. López-González* (SALA 155067); Spain, Barcelona, Espunyola, towards Montclar village, clearings in *Quercus ilex* and *Q. faginea* forest on limestone soils, 42°01′15″N, 01°46′11″E, 757 m, 16 Jun 2013, *M.M. Martínez-Ortega 6064-1, B. Rojas-Andrés, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega 6064-2, B. Rojas-Andrés, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega 6064-3, B. Rojas-Andrés, X. Giráldez & N. López-González* (SALA 155119); Spain, Barcelona, Montserrat, on the road to the monastery El Bruc, to Manresa, Can Maçana, meadows on limestone soils behind the farmhouse,

41°36′36″N, 01°46′01″E, 724 m, 13 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 8-1*, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 8-2*, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 8-3* (SALA 155097); Spain, Barcelona, Tona, on the road to Castell and the Lourdes chapel, dry grassy meadows at the side of the pathway, marly limestones, 41°51′16″N, 02°13′18″E, 661 m, 14 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 234-1, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 234-2, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 234-3, A. Abad & N. López-González* (SALA 155094); Spain, Gerona, from Viladray to Sta. Fe del Montseny, at the crossroad to Mas el Martí, meadows near the road, 41°50′24″N, 02°24′52″E, 966 m, 16 Jun 2013, *M.M. Martínez-Ortega 6063-1, B. Rojas-Andrés, A. Abad & N. López-González*, *M.M. Martínez-Ortega 6063-2, B. Rojas-Andrés, A. Abad & N. López-González*, *M.M. Martínez-Ortega 6063-3, B. Rojas-Andrés, A. Abad & N. López-González* (SALA 155123); Spain, Huesca, Sta. Cruz de la Serós, San Juan de la Peña, meadows at the picnic area, near the interpretation center and the new Monastery, 42°30′26″N, 00°39′55″W, 1214 m, 20 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 242-1, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 242-2, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 242-3, X. Giráldez & N. López-González* (SALA 155109); Spain, Huesca, pathway between Binacua and the crossroad to the road N-240, meadows on limestone soils and slopes with *Buxus*, 42°33′09″N, 00°41′47″W, 718 m, 20 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 243-1, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 243-2, X. Giráldez & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 243-3, X. Giráldez & N. López-González* (SALA 155110).

Veronica prostrata L.

$2n \sim 2x \sim 16$, FCM. Austria, Burgenland, Leithagebirge, between Donnerskirchen and Franz Josef-Warte, dry grasslands, Pannonian vegetation, 47°55′59″N, 16°40′03″E, 250 m, 28 May 2001, *M.M. Martínez-Ortega 1055-1*, *M.M. Martínez-Ortega 1055-2*, *M.M. Martínez-Ortega 1055-3* (SALA 124616); Austria, Niederösterreich, Falkenstein, near the castle ruins, 48°43′28″N, 16°34′45″E, 390 m, 11 Jun 2001, *M.M. Martínez-Ortega 1337-1*, *M.M. Martínez-Ortega 1337-2*, *M.M. Martínez-Ortega 1337-3* (SALA 124615); Czech Republic, South Moravia, Břeclav District, Mikulov, near the Austrian border, Šibeničník Nature reserve, dry meadows, Pannonian vegetation, 48°47′25″N, 16°37′56″E, 236 m, 23 Jul 2011, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 184-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 184-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 184-3* (SALA 149310); Czech Republic, South Moravia, Břeclav District, between Mikulov and Klentnice, dry meadows on limestone soils, in an environment of Pannonian vegetation, 48°49′33″N, 16°38′26″E, 345 m, 24 Jul 2001, *M.M. Martínez-Ortega 1445-1* (SALA 124617); France, Departement of Hautes-Alpes, Gap, Col du Noyer, between Le Noyer and L'Enclus, subalpine meadows on limestone soils, 44°41′35″N, 05°59′13″E, 1671 m, 14 Jun 2012, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 219-1*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 219-2*, *X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés 219-3* (SALA 149313); Romania, Cluj, Fanatele Clujului, 8 km from Cluj-Napoca, meadows on limestone soils, 46°51′08″N, 23°37′01″E, 550 m, 30 Jun 2000, *X. Giráldez, M.M. Martínez-Ortega 904-1 & J.A. Sánchez Agudo*, *X. Giráldez, M.M. Martínez-Ortega 904-2 & J.A. Sánchez Agudo* (SALA 124620); Serbia, Južnobanatski okrug (South Banat), Devojački Bunar, Vladimirovac, dry sandy meadows, 45°00′58″N, 20°57′17″E, 163 m, 27 Jul 2010, *S. Andrés 428-1, X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés*, *S. Andrés 428-2, X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés*, *S. Andrés 428-3, X. Giráldez, M.M. Martínez-Ortega & B. Rojas-Andrés* (SALA 149319).

Ploidy level estimations for the species in Romania are here given for the first time. No previous chromosome count or ploidy level estimation was available for *V. prostata* in this country (cf. Bolkhovskikh & al., 1969; Goldblatt & Johnson, 1979+; Albach & al., 2008).

Veronica rosea Desf.

$2n \sim 2x \sim 16$, FCM. Morocco, Ifrane, Meknès-Tafilalet, Jebel Hebri, grazed pastures with *Thymelaea*, 33°21′13″N, 05°08′43″W, 1931 m, 18 Jul 2013, *D. Pinto, N. López-González 52-1 & V. Lucía García*, *D. Pinto, N. López-González 52-2 & V. Lucía García*, *D. Pinto, N. López-González 52-3 & V. Lucía García* (SALA 155072); Morocco, Ifrane, in front of Aquelmame de Si-Ali, road between Azrou and Midelt (between Timahdite and Ait-Oufella), scrubland in clearings of *Juniperus thurifera* subsp. *africana*, on limestone soils, 33°04′50.988″N, 05°01′13.094″W, 2168 m, 1 May 2013, *J. Peñas de Giles 1*, *J. Peñas de Giles 2*, *J. Peñas de Giles 3* (GDA 59936).

Veronica sennenii (Pau) M.M.Mart.Ort. & E.Rico

$2n \sim 8x \sim 64$, FCM. Spain, León, Lois, near the road towards Liegos/Anciles, meadows on limestone soils, 42°59′04″N, 05°07′05″W, 1278 m, 2 Jul 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 248-1 & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 248-2 & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 248-3 & N. López-González* (SALA 155081).

Veronica tenuifolia subsp. *javalambrensis* (Pau) Molero & J.Pujadas

$2n \sim 2x \sim 16$, FCM. Spain, Burgos, Amaya, on the ascent to Peña Amaya, meadows on limestone soils, 42°39′02″N, 04°10′41″W, 1167 m, 5 Jul 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 250-1 & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 250-2 & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 250-3 & N. López-González* (SALA 155086); Spain, Burgos, Ciruelos de Cervera, Briongos de Cervera, Raposa pathway, near the road BU-914, clearings of *Juniperus sabina*, limestone soil, 41°54′50″N, 03°29′48″W, 1085 m, 2 Jun 2013, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1278-1*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1278-2*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1278-3* (SALA 150521); Spain, Burgos, Espinosa de Cervera, near the old football ground, short pastures in clearings of *Juniperus sabina* close to the pathway, 41°54′01.3″N, 03°27′53.9″W, 1074 m, 2 Jun 2013, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1280-1*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1280-2*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1280-3* (SALA 150519); Spain, Santander, road between Espinama and the Áliva refuge, subalpine meadows on limestone soils, 43°09′55.86″N, 04°46′25.92″W, 1565 m, 3 Jul 2013, *M.M. Martínez-Ortega 6074-1, B. Rojas-Andrés & N. López-González*, *M.M. Martínez-Ortega 6074-2, B. Rojas-Andrés & N. López-González*, *M.M. Martínez-Ortega 6074-3, B. Rojas-Andrés & N. López-González* (SALA 155084); Spain, Segovia, Moral de Hornuez, Sabinar de Hornuez (picnic area near the chapel), dry and short meadows on limestone soils, 41°29′00″N, 03°37′32.8″W, 25 May 2013, *M.M. Martínez-Ortega & N. López-González 3-1*, *M.M. Martínez-Ortega & N. López-González 3-2*, *M.M. Martínez-Ortega*

& N. López-González 3-3 (SALA 155104); Spain, Soria, El Burgo de Osma, Torralba del Burgo, Arroyo de los Barranquillos, in environments of *Juniperus thurifera*, on clay and gravel soils, 41°37′44.1″N, 02°55′00.2″W, 974 m, 8 Jun 2013, *D. Pinto 1315-1*, *D. Pinto 1315-2*, *D. Pinto 1315-3* (SALA 150484); Spain, Soria, Herrera de Soria, Camino del Oropar, Barranco de la Covatilla, streambed in *Juniperus thurifera* forest, 41°46′16.8″N, 03°02′05.0″W, 1093 m, 8 Jun 2013, *D. Pinto 1311-1*, *D. Pinto1311-2*, *D. Pinto 1311-3* (SALA 150488); Spain, Soria, Langa de Duero, Alcozar, near Cerro Hestilla, short meadows and scrublands of *Thymus* sp. on limestone soils, 41°37′29.9″N, 03°19′28.1″W, 904 m, 2 Jun 2013, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1287-1*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1287-2*, *D. Gutiérrez-Larruscain, N. López-González & D. Pinto 1287-3* (SALA 150512); Spain, Soria, Recuerda, on the ascent to La Muela from the water source el Cepo, *Juniperus thurifera* forest on limestones, 41°28′01.0″N, 02°58′54.1″W, 950 m, 8 Jun 2013, *D. Pinto 1307-1*, *D. Pinto 1307-2*, *D. Pinto 1307-3* (SALA 150492); Spain, Soria, Villaciervos, El Santo, streambed on *Genista scorpius* scrublands in environment of *Juniperus sabina*, 41°46′08.1″N, 02°38′54.6″W, 1228 m, 8 Jun 2013, *D. Pinto 1322-1*, *D. Pinto 1322-2*, *D. Pinto 1322-3* (SALA 150477); Spain, Zamora, Vezdemarbán, hills near the village on limestone soils, table hills, 41°39′03.8″N, 05°21′50.0″W, 793 m, 19 Jun 2012, *S. Barrios, N. López-González, M.M. Martínez-Ortega & B. Rojas-Andrés 221-1*, *S. Barrios, N. López-González, M.M. Martínez-Ortega & B. Rojas-Andrés 221-2*, *S. Barrios, N. López-González, M.M. Martínez-Ortega & B. Rojas-Andrés 221-3* (SALA 149327).

Veronica tenuifolia Asso subsp. *tenuifolia*

$2n \sim 2x \sim 16$, FCM. Spain, Barcelona, Collsuspina, meadows on limestones near the village, on the left side along the pathway to Sta. Coloma de Castellterçol (GR177), 41°49′24″N, 02°10′36.24″E, 905 m, 14 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés 237-1, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 237-2, A. Abad & N. López-González*, *M.M. Martínez-Ortega, B. Rojas-Andrés 237-3, A. Abad & N. López-González* (SALA 155065); Spain, Barcelona, on the ascent to Sta. Perpetua chapel, near the road, 41°59′54.9″N, 02°12′09.9″E, 663 m, 15 Jun 2013, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 16-1*, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 16-2*, *M.M. Martínez-Ortega, B. Rojas-Andrés, A. Abad & N. López-González 16-3* (SALA 155125); Spain, Teruel, Bordón, on the road to Calanda, before the crossroad to Luco de Bordón and Bordón river, marly slopes, 40°41′36.6″N, 00°19′09.5″W, 769 m, 10 Jun 2013, *M.M. Martínez-Ortega 6059-1, B. Rojas-Andrés, X. Giraldez & N. López-González*, *M.M. Martínez-Ortega 6059-2, B. Rojas-Andrés, X. Giraldez & N. López-González*, *M.M. Martínez-Ortega 6059-3, B. Rojas-Andrés, X. Giraldez & N. López-González* (SALA 155099).

Veronica teucrium L.

$2n \sim 8x \sim 64$, FCM. Slovakia, Košice, distr. Košice-okolie, Dvorníky-Včeláre, Zádiel, dry meadows on limestones, 48°36′46″N, 20°50′32″E, 300 m, 3 Jul 2002, *M.M. Martínez-Ortega 1551-1, X. Giráldez & Muñoz Centeno*, *M.M. Martínez-Ortega 1551-2, X. Giráldez & Muñoz Centeno*, *M.M. Martínez-Ortega 1551-3, X. Giráldez & Muñoz Centeno* (SALA 124598).

Veronica thracica Velen.

$2n \sim 2x \sim 16$, FCM. Turkey, Kirklareli, Dereköy, road towards Geçitagzi, mixed forest and meadows on limestone soils, 41°56′15″N, 27°21′11″E, 462 m, 23 Jun 2009, *X. Giráldez, M.M. Martínez-Ortega, B. Rojas-Andrés 37-1 & M. Santos Vicente*, *X. Giráldez, M.M. Martínez-Ortega, B. Rojas-Andrés 37-2 & M. Santos Vicente* (SALA 149289).

Veronica thracica was previously included within the variation of *V. crinita* Velen. (Peev, 1972; Rojas-Andrés & al., 2015) but has been recently combined at the specific rank based on AFLP data (Padilla-García & al., 2018). Previous chromosome counts (Peev, 1975, 1976) and ploidy level estimations (Padilla-García & al., 2018) concern plants distributed in Bulgaria. Consequently, these are the first ploidy level estimations for this species from Turkey.

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The study was partially supported by the Russian Foundation for Basic Research (projects 16-34-60135-mol_a_dk, 16-05-00783-a, 18-04-01040, 17-00-00338) and done within the framework of the State Task 0126-2014-0028 "Karyological and molecular-phylogenetic investigation of the flowering plant taxa divergence". The chromosome counting for highland populations was proceeded under financial support of the Russian Science Foundation (project 17-74-10074).

* First chromosome count for the species.

AMARYLLIDACEAE

Allium chamarense M.M.Ivanova

2*n* = 16, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), SE of Mt. Osinovskii Golets, alpine meadow, 1677 m, 51.41106°N, 104.16936°E, 31 Jul 2017, *M. Protopopova, V. Pavlichenko & E. Zolotovskaya Cl664* (IRKU).

APIACEAE

Pleurospermum uralense Hoffm.

2*n* = 18, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl642* (IRKU).

ASPARAGACEAE

Maianthemum bifolium (L.) F.W.Schmidt

2*n* = 36, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl641* (IRKU).

ASTERACEAE

Antennaria dioica (L.) Gaertn.

2*n* = 28, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), SE of Mt. Osinovskii Golets, alpine meadow, 1677 m, 51.41106°N, 104.16936°E, 31 Jul 2017, *M. Protopopova, V. Pavlichenko & E. Zolotovskaya Cl663* (IRKU).

Cirsium helenioides (L.) Hill

2*n* = 34, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl635* (IRKU).

Doronicum altaicum Pall.

2*n* = 60, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl647* (IRKU).

Jacobaea nemorensis (L.) E.Wiebe

2*n* = 40, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 1 Aug 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl673* (IRKU).

Parasenecio hastatus (L.) H.Koyama

2*n* = 60, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 1 Aug 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov Cl672* (IRKU).

Rhaponticum chamarense Peschkova (≡ *Rhaponticum carthamoides* var. *chamarense* (Peschkova) O.S.Zhirova)

2*n* = 26, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1651* (IRKU).

Saussurea latifolia Ledeb.

2*n* = 26, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1637* (IRKU).

Solidago dahurica Kitag.

2*n* = 18, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1639* (IRKU); Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), SE of Mt. Osinovskii Golets, alpine meadow, 1677 m, 51.41106°N, 104.16936°E, 31 Jul 2017, *M. Protopopova, V. Pavlichenko & E. Zolotovskaya C1667* (IRKU).

BORAGINACEAE

Myosotis palustris (L.) L.

2*n* = 22, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 30 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1657* (IRKU).

BRASSICACEAE

Cardamine macrophylla Willd.

2*n* = 64, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 30 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1656* (IRKU).

CARYOPHYLLACEAE

Dianthus superbus L.

2*n* = 30, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), SE of Mt. Osinovskii Golets, alpine meadow, 1677 m, 51.41106°N, 104.16936°E, 31 Jul 2017, *M. Protopopova, V. Pavlichenko & E. Zolotovskaya C1665* (IRKU).

CELASTRACEAE

Parnassia palustris L.

2*n* = 36, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 30 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1660* (IRKU).

GERANIACEAE

Geranium krylovii Tzvelev

2*n* = 28, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, the upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1655* (IRKU).

LAMIACEAE

Prunella vulgaris L.

2*n* = 28, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1640* (IRKU).

MELANTHIACEAE

Veratrum lobelianum Bernh.

2*n* = 32, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1653* (IRKU).

ONAGRACEAE

Circaea alpina L.

2*n* = 22, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 1 Aug 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1670* (IRKU).

OROBANCHACEAE

Pedicularis incarnata L.

2*n* = 16, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 30 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1658* (IRKU).

POACEAE

**Poa ×intricata* Wein (*P. nemoralis* L. × *P. palustris* L.)

2*n* = 28, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 1 Aug 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1674* (IRKU). Plants determined by M. Olonova (Tomsk State University, Russia).

POLYGONACEAE

Rumex alpestris Jacq.

2*n* = 14, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1652* (IRKU).

PRIMULACEAE

Primula pallasii Lehm.

2*n* = 22, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1644* (IRKU).

RANUNCULACEAE

Aconitum baicalense Turcz. ex Rapaics

2*n* = 32, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1636* (IRKU).

Aconitum rubicundum Fisch. ex Steud.

2*n* = 16, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1638* (IRKU).

Anemone baicalensis Turcz.

2*n* = 28, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, middle course of the Bolshaya Osinovka River (near the confluence of the Pravaya Osinovka and Levaya Osinovka rivers), 7.5 km S of the Lake Baikal, mountain forest, 791 m, 51.43661°N, 104.22295°E, 26 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1643* (IRKU); Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1645* (IRKU).

Aquilegia glandulosa Fisch. ex Link

2*n* = 14, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), SE of Mt, Osinovskii Golets, alpine meadow, 1677 m, 51.41106°N, 104.16936°E, 31 Jul 2017, *M. Protopopova, V. Pavlichenko & E. Zolotovskaya C1668* (IRKU).

Caltha palustris L.

2*n* = 32, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 30 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1662* (IRKU).

VIOLACEAE

Viola biflora L.

2*n* = 12, CHN. Russia, Eastern Siberia, Irkutskaya Oblast', Sludyanskii Raion, the Khamar-Daban Ridge, upper course of the Irkut River (tributary of the Khara-Murin River), wet meadow at a stream bank, 1384 m, 51.40333°N, 104.15485°E, 29 Jul 2017, *M. Protopopova, V. Pavlichenko, E. Zolotovskaya & A. Konovalov C1649* (IRKU).

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Chromosomes were counted in 2018 by L. Mártonfiová. DNA ploidy levels were estimated in 2018 by P. Mereďa, Jr. Authors thank to M. Zaliberová for assistance in the field.

This study was supported by the Grant Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic and Slovak Academy of Sciences VEGA (grant no. 2/0131/16).

POACEAE

Sesleria heufleriana Schur

2*n* = 4*x* = 28, CHN. Romania, Apuseni Mts, Cluj County, Petreştii de Jos village, Turzii Gorges, 46°34′12″N, 23°40′16″E, 530–560 m, 17 May 2018, *I. Hodálová*, *P. Mereďa*, *Jr. & M. Zaliberová 137-1* (SAV) [Fig. 4A].

2*n* ~ 4*x* ~ 28, FCM. Romania, Apuseni Mts, Cluj County, Petreştii de Jos village, Turzii Gorges, 46°34′12″N, 23°40′16″E, 530–560 m, 17 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-3* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-4* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-5* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-6* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-7* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-8* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-9* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-10* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-11* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-12* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-13* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-14* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 137-15* (SAV). Romania, Apuseni Mts, Alba County, Colţeşti village, Piatra Secuiului Mt., 46°25′56″N, 23°34′56″E, 740–840 m, 18 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-5* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-6* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-7* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-8* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-9* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-10* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-11* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-12* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-14* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 141-15* (SAV). Romania, Southern Carpathians, Sibiu County, Tălmaciu town, Măgura hill, 45°38′38″N, 24°16′55″E, ca. 500 m (type locality of *S. heufleriana*), 18 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-3* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-4* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová*

142-5 (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-6* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-7* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-8* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-9* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-10* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-11* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-12* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-13* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-14* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 142-15* (SAV).

Sesleria rigida Rchb.

2*n* = 4*x* = 28, CHN. Romania, Apuseni Mts, Alba County, Poşaga de Sus village, Poşegii Gorges, 46°27′36″N, 23°23′52″E, ca. 560 m, 17 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-1* (SAV) [Fig. 4B].

2*n* ~ 4*x* ~ 28, FCM. Romania, Apuseni Mts, Alba County, Runc village, Runcului Gorges, 46°30′27″N, 23°26′29″E, 550–560 m, 17 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-3* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-4* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-5* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-6* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-7* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-8* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-9* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-10* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 138-11* (SAV). Romania, Apuseni Mts, Alba County, Poşaga de Sus village, Poşegii Gorges, 46°27′36″N, 23°23′52″E, ca 560 m, 17 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-3* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-4* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-5* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-6* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 139-7* (SAV). Romania, Apuseni Mts, Alba County, Colţeşti village, Piatra Secuiului Mt., 46°25′56″N, 23°34′56″E, ca. 750 m, 18 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 140-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 140-2* (SAV). Romania, Apuseni Mts, Alba County, Vălişoara, Vălişoarei Gorges, 46°22′31″N, 23°35′02″E, ca. 460 m, 18 May 2018, *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 143-1* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 143-2* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 143-4* (SAV), *I. Hodálová, P. Mereďa, Jr. & M. Zaliberová 143-5* (SAV). Romania, Southern Carpathians, Braşov County, Braşov town, Stejărişul Mare Protected Area from N-W Postăvaru Massif, 45°38′02″N, 25°33′08″E, ca. 930 m, 19 May 2018, *P. Mereďa, Jr. 144-1* (SAV), *P. Mereďa, Jr. 144-2* (SAV), *P. Mereďa, Jr. 144-3* (SAV), *P. Mereďa, Jr. 144-4* (SAV), *P. Mereďa, Jr. 144-5* (SAV), *P. Mereďa, Jr. 144-6* (SAV), *P. Mereďa, Jr. 144-7* (SAV), *P. Mereďa, Jr. 144-8* (SAV), *P. Mereďa, Jr. 144-9* (SAV), *P. Mereďa, Jr. 144-10* (SAV), *P. Mereďa, Jr. 144-11* (SAV), *P. Mereďa, Jr. 144-12* (SAV), *P. Mereďa, Jr. 144-13* (SAV), *P. Mereďa, Jr. 144-14* (SAV).

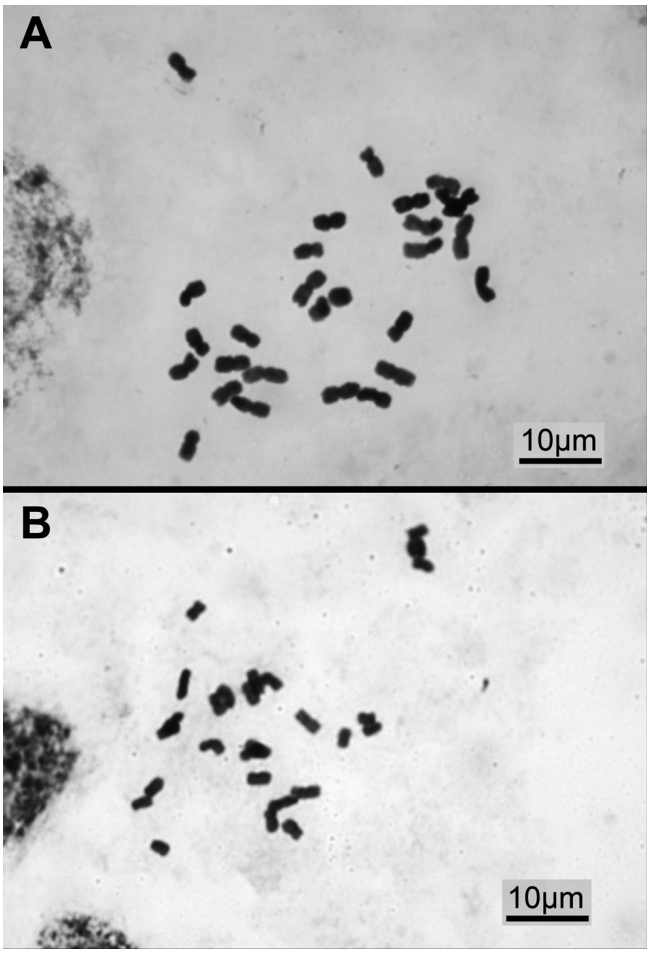

Fig. 4. Mitotic metaphase. **A,** *Sesleria heufleriana* Schur, 2*n* = 28; **B,** *S. rigida* Rchb., 2*n* = 28.

CHN

For the chromosome counts, root tip meristems of potted plants were employed. The actively growing root tips were pre-treated in a 0.002 M water solution of 8-hydroxyquinoline at 4°C for about 16 hours (overnight), fixed in a 1:3 mixture of 98% acetic acid and 96% ethanol for 1–24 hours, washed in distilled water and then in citrate buffer with the pH 5.8. They were macerated in the mixture of enzymes: 0.5% cellulase ("Onozuka R-10" from *Trichoderma viride* 1.3 U/mg) and 0.5% pectinase (from *Aspergillus niger* 0.2 U/mg; Serva, Germany) in citrate buffer (pH 5.8) at 37°C for 4 hours. Then the roots were washed in the citrate buffer overnight at 4°C. After washing the root-tips were hydrolyzed in 1 N HCl at 60°C for 8 min and washed in distilled water. Squashes were made using the cellophane squash 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 HDCE-X5 and software ScopeImage v.9.0.

FCM

DAPI. Fresh leaf tissue were used. The sample preparation and FCM procedure followed that of Budzáková & al. (2014). Internal reference: *Pisum sativum* 'Ctirad', 2C = 8.76 pg (Trávníček & al., 2015). Fluorescence intensity for *S. heufleriana* varied from 0.748 to 0.778 (mean 0.758) and for *S. rigida* from 0.686 to 0.705 (mean 0.692). Coefficients of variation (CVs) of samples and internal standard were 1.27%–3.09% (mean 2.35%) and 1.05%–3.18% (mean 1.75%), respectively.

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The study is supported by financial grant under DRS SAP I, SAP II and SAP III of UGC; UGC-BSR Indira Gandhi Single Girl Child Fellowship (Award letter no. F7-152/2007 BSR, dated 16/12/2013) to Navjot Kaur and IPLS-DBT project (Project no. BT/PR-4548/INF/22/146/2012) sanctioned to Punjabi University, Patiala for using the facilities and financial support of this study.

* First chromosome count for the species.
** New cytotype for the species.
▼ First chromosome report for an Indian accession.

ASPARAGACEAE

***Asparagus racemosus* Willd.

n = 30, CHN. India, Rajasthan, Udaipur, 24°34′31.58″N, 73°41′35.97″E, 600 m, Gulab bagh, 16 Sep 2015, *N. Kaur 33823* (PUN 60936) [Fig. 5A].

Previously, this species was known to have chromosome number of *n* = 10 (Kamble, 1997), 2*n* = 20 (Sastry, 1981) from India and also 2*n* = 20, 40 (Sheidai & Inamdar, 1997) from outside of India.

CANNACEAE

***Canna indica* L.

n = 18, CHN. India, Rajasthan, Sriganganagar, 29°56′50.57″N, 73°53′52.58″E, 178 m, 26 Oct 2015, *N. Kaur 33893* (PUN 61126) [Fig. 5B].

Previously, this species was known to have chromosome number of *n* = 9 (Khoshoo & Mukherjee, 1970) from India and 2*n* = 18 from outside India (Hanson & al., 2001).

COMMELINACEAE

***Commelina attenuata* Vahl

n = 12, CHN. India, Rajasthan, Udaipur, Gulab bagh, 24°34′31.58″N, 73°41′35.97″E, 600 m, 15 Sep 2015, *N. Kaur 33825* (PUN 60938) [Fig. 5C].

Previously, this species was reported to have 2*n* = 44 by Renugadevi & Sampathkumar (1983, 1986) from India.

***Commelina diffusa* Burm.f.

n = 60, CHN. India, Rajasthan, Mount Abu, Naki lake, 24°35′40.41″N, 72°42′22.41″E, 1220 m, 30 Feb 2016, *N. Kaur 33801* (PUN 60779) [Fig. 5D].

Previously, the species was reported with *n* = 15 (Alam & Sharma, 1984; Patwary & al., 1987; Umoh & al., 1991), 2*n* = 18 (Zheng & al., 1989), 2*n* = 28 (Palomino & al., 1990), 2*n* = 30 (Cristobal de Hinojo & al., 1998), *n* = 45 (Grabiele, 2005) and 2*n* = 72 (Faden & Suda, 1980).

▼ *Commelina forskalaei* Vahl.

n = 45, CHN. India, Rajasthan, Jhalawar, Gagron fort, 24°37′40.99″N, 76°11′09.76″E, 312 m, 21 Aug 2014, *N. Kaur 33824* (PUN 60937) [Fig. 5E].

For this species, it was previously reported 2*n* = 28 from West Africa (Morton 1967) and 2*n* = 30 from United States by Faden (1993).

***Commelina hasskarlii* C.B.Clarke (= *C. caroliniana* Walter)

n = 60, CHN. India, Rajasthan, Mount Abu, Naki lake, 24°35′40.41″N, 72°42′22.41″E, 1220 m, 31 Aug 2016, *N. Kaur 33887* (PUN 61120) [Fig. 5F]; India, Rajasthan, Udaipur, 24°35′07.60″N, 73°42′44.92″E, 600 m, 16 Aug 2015, *N. Kaur 33888* (PUN 61121).

Previously, this species was reported with *n* = 15 (Patwary & al., 1987) and 2*n* = 90 (Raghavan & Rao, 1961) from different parts of India.

***Commelina paludosa* Blume

n = 15, CHN. India, Rajasthan, Pali, 25°46′25.77″N, 73°19′27.75″E, 218 m, 30 Aug 2014, *N. Kaur 33883* (PUN 61116) [Fig. 5G]; India, Rajasthan, 24°35′35.99″N, 73°38′21.45″E, 850 m, 15 Sep 2015, *N. Kaur 33884* (PUN 61117).

Previously, this species was reported with *n* = 30 by Patwary & al. (1987), 2*n* = 60 by Renugadevi & Sampathkumar (1986), *n* = 56, 60 by Bhattacharya (1975) and 2*n* = 75 by Baquar & Saeed (1977).

***Commelina suffruticosa* Blume

n = 15, CHN. India, Rajasthan, Mount Abu, 24°35′34.98″N, 72°42′58.23″E, 1220 m, 30 Aug 2016, *N. Kaur 33889* (PUN 61122) [Fig. 5H].

Previously, this species was recorded only with 2*n* = 64 by Alam & Sharma (1984).

***Cyanotis cristata* (L.) D.Don

n = 11, CHN. India, Rajasthan, Jhalawar, Bheem Sagar dam, 24°33′46.43″N, 76°20′05.52″E, 312 m, 24 Aug 2014, *N. Kaur 33882* (PUN 61115) [Fig. 5I].

Previously, this species was observed with *n* = 12 by Alam & Sharma (1984) and 2*n* = 24 (Bhattacharya, 1975; Renugadevi & Sampathkumar, 1986; Lalithambika Bai & Kuriachan, 1997) from different parts of India.

***Murdannia nudiflora* (L.) Brenan

n = 40, CHN. India, Rajasthan, Mount Abu, Dilwara Temple, 24°36′33.95″N, 72°43′22.71″E, 1230 m, 1 Sep 2016, *N. Kaur 33886* (PUN 61119) [Fig. 5J].

This species was previously reported with chromosome numbers of *n* = 10 (Bhattacharya, 1975), 2*n* = 20 (Bhatt, 1976; Alam & Sharma, 1984; Renugadevi & Sampathkumar, 1986) from India and from outside of India.

POACEAE

***Brachiaria deflexa* (Schumach.) C.E.Hubb. ex Robyns

n = 18, CHN. India, Rajasthan, Jhalawar, Jhalrapatan, 24°33′02.25″N, 76°10′15.15″E, 312 m, 13 Aug 2013, *N. Kaur 31979* (PUN 60211) [Fig. 5K]; India, Rajasthan, Udaipur, Railway station, 24°34′35.29″N, 73°42′03.21″E, 600 m, 15 Sep 2015, *N. Kaur 31985* (PUN 60217).

This species was previously reported with chromosome numbers of *n* = 9 by Basappa & al. (1987) from India and by Hoshino & Davidse (1988) from southern Africa, *n* = 18 from Pakistan (Ahsan & al., 1994), and 2*n* = 18 (Basappa & Muniyamma, 1981) from India.

▼ *Chloris prieurii* Kunth (≡ *Enteropogon prieurii* (Kunth) Clayton)

n = 10, CHN. India, Rajasthan, Udaipur, Monsoon Palace, 24°35′35.90″N, 73°38′21.23″E, 850 m, 27 Aug 2014, *N. Kaur 31932* (PUN 60164) [Fig. 5L]; India, Rajasthan, Churu, 28°17′32.71″N, 74°57′44.12″E, 292 m, 19 Oct 2013, *N. Kaur 31954* (PUN 60186).

Previously, this species was reported with chromosome number of 2*n* = 40 by Miege & Josserand (1972) from outside of India.

**Chloris quinquesetica* Bhide

n = 10, CHN. India, Rajasthan, Pali, 25°44′59.45″N, 73°20′03.81″E, 214 m, 15 Mar 2015, *N. Kaur 31976* (PUN 60208) [Fig. 5M].

▼ *Eragrostis aspera* (Jacq.) Nees,

n = 10, CHN. India, Rajasthan, Mount Abu, 24°35′33.88″N, 72°42′58.84″E, 1220 m, 30 Aug 2016, *N. Kaur 33848* (PUN 60980) [Fig. 5N].

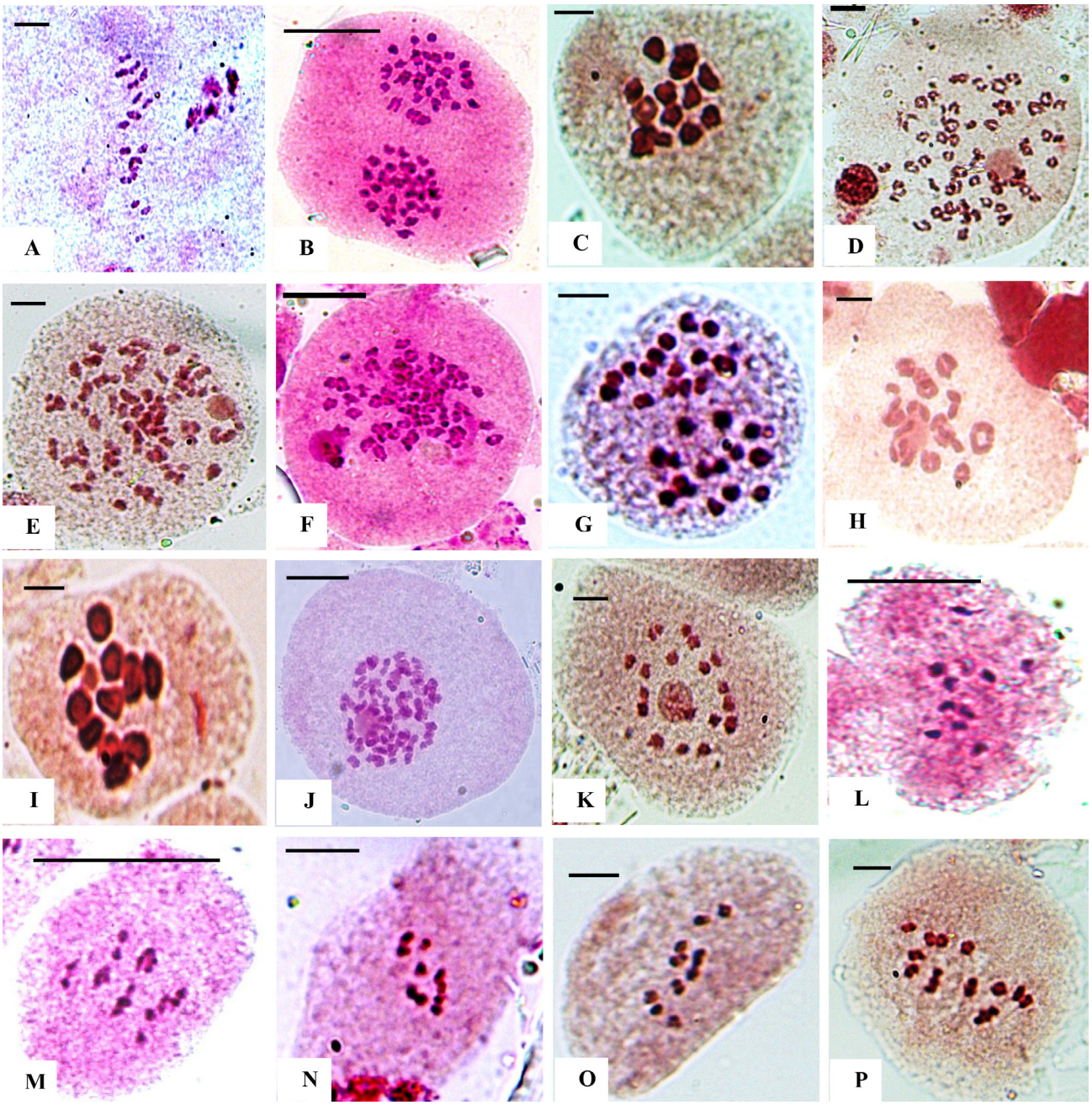

Fig. 5. A, *Asparagus racemosus*, meiotic anaphase-I, *n* = 30 (PUN 60936); **B,** *Canna indica*, meiotic metaphase-I, *n* = 18 (PUN 61126); **C,** *Commelina attenuata*, meiotic metaphase-I, *n* = 12 (PUN 60938); **D,** *C. diffusa*, meiotic diakinesis *n* = 60 (PUN 60779); **E,** *C. forskalaei*, meiotic diakinesis, *n* = 45 (PUN 60937); **F,** *C. hasskarlii*, meiotic diakinesis, *n* = 60 (PUN 61120); **G,** *C. paludosa*, meiotic anaphase-I, *n* = 15 (PUN 61116); **H,** *C. suffruticosa*, meiotic diakinesis, *n* = 15 (PUN 61122); **I,** *Cyanotis cristata*, meiotic metaphase-I, *n* = 11 (PUN 61115); **J,** *Murdannia nudiflora*, meiotic diakinesis, *n* = 40 (PUN 61119); **K,** *Brachiaria deflexa*, meiotic diakinesis, *n* = 18 (PUN 60211); **L,** *Chloris prieurii*, meiotic metaphase-I, *n* = 10 (PUN 60164); **M,** *C. quinquesetica*, meiotic metaphase-I, *n* = 10 (PUN 60208); **N,** *Eragrostis aspera*, meiotic metaphase-I, *n* = 10 (PUN 60980); **O,** *Leptothrium senegalense*, meiotic metaphase-I, *n* = 10 (PUN 60149); **P,** *Sporobolus coromandelianus*, meiotic metaphase-I, *n* = 24 (PUN 60167)

For this species the chromosome number of $2n = 20$ was reported by Moffett & Hurcombe (1949) from outside of India.

▼ *Leptothrium senegalense* (Kunth) Clayton

$n = 10$, CHN. India, Rajasthan, Churu, wild life sanctuary, 27°47′55.91″N, 74°27′40.97″E, 292 m, 20 Oct 2014, *N. Kaur 319I7* (PUN 60149) [Fig. 5O].

Previously, this species was recorded with $n = 10$ by Moinuddin & al. (1994) from Pakistan.

** *Sporobolus coromandelianus* (Retz.) Kunth

$n = 24$, CHN. India, Rajasthan, Pali, Hemawas Dam, 25°24′42.82″N, 73°15′18.50″E, 218 m, 30 Aug 2014, *N. Kaur 31935* (PUN 60167) [Fig. 5P].

This species was reported previously with $n = 18$ (Bir & Sahni, 1985; Bir & al., 1988) from India and from outside of India by Moinuddin & al. (1994). Gupta & al. (2014) observed also $2n = 36$ from India.

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* The first chromosome count and genome size (C-values) for the taxon.

This study was supported by the Grant Agency VEGA, Bratislava, Slovak Republic (grant no. VEGA 2/0088/15).

PRIMULACEAE

Soldanella angusta L.B.Zhang

The coefficient of variation (CV) of samples and internal standard ranged from 1.66% to 3.09% (mean 2.52%) and from 1.64% to 3.14% (mean 2.62%), respectively.

$2n = 4x = 40$, CHN. Ukraine, Zakarpatskaya oblasť, Polonina Borzhava Mts., Gemba Mt., 48°38′03.9″N, 23°15′52.3″E, 1400 m, 10 May 2018, *M. Valachovič UA8/13* (SAV) [Fig. 6A].

$2n \sim 4x \sim 40$, 2C = 3.32–3.36 pg, FCM. Ukraine, Zakarpatskaya oblasť, Skhidni Beskidi Mts., Pikui Mt., 48°49′56.4″N, 22°59′47.8″E, 1400 m, 8 May 2018, *M. Valachovič UA6/2* (SAV), *M. Valachovič UA6/5* (SAV), *M. Valachovič UA6/15* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.32–3.38 pg, FCM. Ukraine, Zakarpatskaya oblasť, Gorgany Mts., Horb Mt., 48°27′38.2″N, 23°41′43.4″E, 1700 m, 9 May 2018, *M. Valachovič UA7/4* (SAV), *M. Valachovič UA7/7* (SAV), *M. Valachovič UA7/9* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.31–3.35 pg, FCM. Ukraine, Zakarpatskaya oblasť, Polonina Borzhava Mts., Gemba Mt., 48°38′03.9″N, 23°15′52.3″E, 1400 m, 10 May 2018, *M. Valachovič UA8/11* (SAV), *M. Valachovič UA8/13* (SAV), *M. Valachovič UA8/14* (SAV).

Soldanella alpina L. subsp. *alpina*

The CV of samples and internal standard ranged from 1.49% to 3.52% (mean 2.42%) and from 1.5% to 3.49% (mean 2.49%), respectively.

$2n = 4x = 40$, CHN. Austria, Vorarlberg, Damüls village, Furkajoch saddle, 47°16′00.0″N, 09°49′59.3″E, 1784 m, 13 Aug 2018, *J. Kučera & M. Slovák AT39/2* (SAV) [Fig. 6B]; Switzerland, Valais, Conthey town, Col du Sanetsch saddle, 46°19′55.4″N, 07°17′00.4″E, 2258 m, 15 Aug 2018, *J. Kučera & M. Slovák SW5/5* (SAV) [Fig. 6C].

$2n \sim 4x \sim 40$, 2C = 3.61–3.67 pg, FCM. Austria, Nordtirol, Imst town, Hahntennjoch saddle, 47°17′08.7″N, 10°40′23.0″E, 1768 m, 13 Aug 2018, *J. Kučera & M. Slovák AT37/1* (SAV), *J. Kučera & M. Slovák AT37/2* (SAV), *J. Kučera & M. Slovák AT37/5* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.59–3.64 pg, FCM. Austria, Nordtirol, Arlberg village, Flexenpass saddle, 47°09′55.9″N, 10°09′50.2″E, 1733 m, 13 Aug 2018, *J. Kučera & M. Slovák AT38/1* (SAV), *J. Kučera & M. Slovák AT38/2* (SAV), *J. Kučera & M. Slovák AT38/3* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.62–3.65 pg, FCM. Austria, Vorarlberg, Damüls village, Furkajoch saddle, 47°16′00.0″N, 09°49′59.3″E, 1784 m, 13 Aug 2018, *J. Kučera & M. Slovák AT39/1* (SAV), *J. Kučera & M. Slovák AT39/2* (SAV), *J. Kučera & M. Slovák AT39/3* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.52–3.60 pg, FCM. France, Rhône Alpes, Grenoble town, Lac du Crozet, 45°10′23.0″N, 05°56′11.3″E, 1985 m, 21 Aug 2018, *J. Smyčka FR2/1* (SAV), *J. Smyčka FR2/2* (SAV), *J. Smyčka FR2/3* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.65–3.68 pg, FCM. France, Rhône Alpes, Saligniere village, Le Taillefer, along the path from Lac de Poursollet to refuge de Taillefer, 45°03′48.3″N, 05°55′43.9″E, 2035 m, 24 Aug 2018, *J. Smyčka FR3/1* (SAV), *J. Smyčka FR3/2* (SAV), *J. Smyčka FR3/3* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.56–3.57 pg, FCM. Italy, Südtirol, Trafoi village, Stilfserjoch saddle, 46°31′43.7″N, 10°27′41.5″E, 2469 m, 16 Aug 2018, *J. Kučera & M. Slovák IT22/1* (SAV), *J. Kučera & M. Slovák IT22/2* (SAV), *J. Kučera & M. Slovák IT22/3* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.56–3.61 pg, FCM. Switzerland, Ticino, Hospental village, St. Gotthard pass saddle, 46°35′38.1″N, 08°33′43.6″E, 1745 m, 14 Aug 2018, *J. Kučera & M. Slovák SW2/1* (SAV), *J. Kučera & M. Slovák SW2/2* (SAV), *J. Kučera & M. Slovák SW2/4* (SAV).

$2n \sim 4x \sim 40$, 2C = 3.63–3.64 pg, FCM. Switzerland, Valais, Wichel village, Nufenen pass saddle, 46°28′20.8″N, 08°22′57.0″E, 2307 m, 14

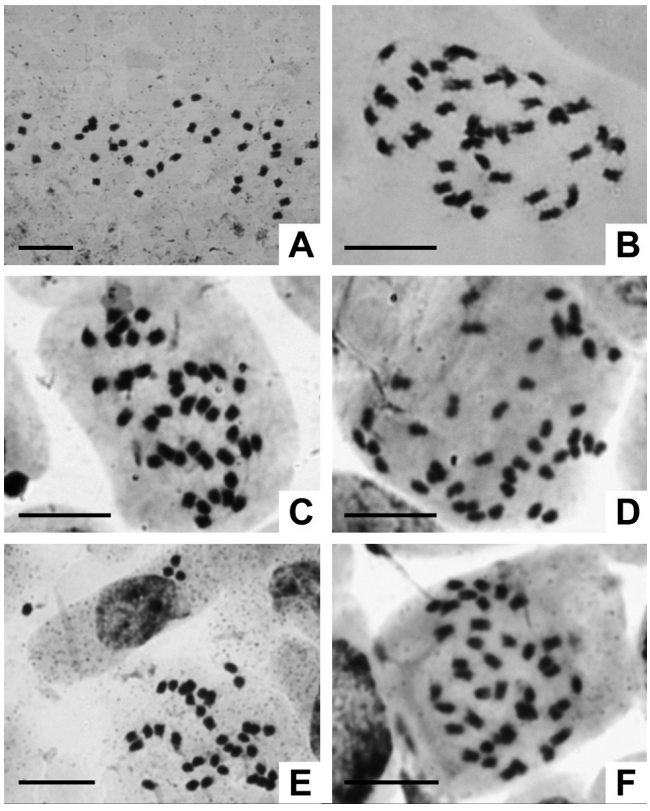

Fig. 6. Mitotic metaphases of *Soldanella* species. **A,** *S. angusta* (pop. UA8), $2n = 4x = 40$; **B,** *S. alpina* subsp. *alpina* (pop. AT39), $2n = 4x = 40$; **C,** *S. alpina* subsp. *alpina* (pop. SW5), $2n = 4x = 40$; **D,** *S. major* (pop. RO23), $2n = 4x = 40$; **E,** *S. pusilla* subsp. *alpicola* (pop. SW3), $2n = 4x = 40$; **F,** *S.* ×*hybrida* (pop. SW4), $2n = 4x = 40$. — Scale bars 10 µm.

Aug 2018, *J. Kučera & M. Slovák SW4/1* (SAV), *J. Kučera & M. Slovák SW4/2* (SAV), *J. Kučera & M. Slovák SW4/3* (SAV) [Fig. 7D].

2*n* ~ 4*x* ~ 40, 2C = 3.58–3.63 pg, FCM. Switzerland, Valais, Conthey town, Col du Sanetsch saddle, 46°19′55.4″N, 07°17′00.4″E, 2258 m, 15 Aug 2018, *J. Kučera & M. Slovák SW5/2* (SAV), *J. Kučera & M. Slovák SW5/3* (SAV), *J. Kučera & M. Slovák SW5/5* (SAV).

Soldanella major (Nielr.) Vierh.

CVs of samples and internal standard ranged from 2.08% to 2.99% (mean 2.59%) and from 2.15% to 2.99% (mean 2.71%), respectively. Our results confirm a previously published chromosome number (2*n* = 40) for this taxon (Kress, 1984; Štubňová & al., 2017).

2*n* = 4*x* = 40, CHN. Romania, Cozia Mts., near Călimănești village, 45°18′52.9″N, 24°20′51.4″E, 1400 m, 29 Aug 2018, *E. Štubňová RO23/3* (SAV) [Fig. 6D].

2*n* ~ 4*x* ~ 40, 2C = 3.28–3.32 pg, FCM. Romania, Cozia Mts., near Călimănești village, 45°18′52.9″N, 24°20′51.4″E, 1400 m, 29 Aug 2018, *E. Štubňová RO23/1* (SAV), *E. Štubňová RO23/2* (SAV), *E. Štubňová RO23/3* (SAV).

Soldanella minima Hoppe

The CV of samples and internal standard ranged from 2.51% to 3.16% (mean 2.97%) and from 2.14% to 2,89% (mean 2.51%), respectively.

2*n* ~ 4*x* ~ 40, 2C = 3.63–3.68 pg, FCM. Austria, Nordtirol, Mutters village, Nockspitze, 47°11′26.8″N, 11°19′26.5″E, 2369 m, 14 Aug 2018, *F. Kolář AT42/1* (SAV), *F. Kolář AT42/2* (SAV).

Soldanella pusilla subsp. *alpicola* (F.K.Mey.) Chrtek

CVs of samples and internal standard ranged from 1.57% to 3.04% (mean 2.29%) and from 2.25% to 3.42% (mean 2.89%), respectively. Our results are in accordance with our previously published chromosome number (2*n* = 40) for this taxon (Štubňová & al., 2017).

2*n* = 4*x* = 40, CHN. Switzerland, Ticino, St. Gotthard pass saddle, near Lago di San Carlo, 46°33′29.3″N, 08°33′25.5″E, 2116 m, 14 Aug 2018, *J. Kučera & M. Slovák SW3/2* (SAV) [Fig. 6E].

2*n* ~ 4*x* ~ 40, 2C = 3.48–3.49 pg, FCM. Austria, Nordtirol, Kaunertal valley, near Weisssee glacial lake, 46°52′12.5″N, 10°42′44.8″E, 2505 m, 25 Jul 2018, *J. Kučera AT35/1* (SAV), *J. Kučera AT35/2* (SAV), *J. Kučera AT35/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.45–3.47 pg, FCM. Austria, Nordtirol, Fiss village, Zwölferkopf Mt., 47°04′25.5″N, 10°34′49.1″E, 2546 m, 27 Jul 2018, *J. Kučera AT36/1* (SAV), *J. Kučera AT36/2* (SAV), *J. Kučera AT36/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.43–3.48 pg, FCM. Switzerland, Graubünden, Vals village, above Zervriela lake, 46°34′16.8″N, 09°06′45.8″E, 1948 m, 14 Aug 2018, *J. Kučera & M. Slovák SW1/1* (SAV), *J. Kučera & M. Slovák SW1/2* (SAV), *J. Kučera & M. Slovák SW1/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.44–3.49 pg, FCM. Switzerland, Graubünden, Realp village, Furkapass saddle, 46°34′22.8″N, 08°24′49.9″E, 2467 m, 15 Aug 2018, *J. Kučera & M. Slovák SW6/1*, (SAV), *J. Kučera & M. Slovák SW6/2* (SAV), *J. Kučera & M. Slovák SW6/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.46–3.52 pg, FCM. Switzerland, Graubünden, Waseen village, Süstenpass saddle, 46°44′11.4″N, 08°26′59.5″E, 2203 m, 15 Aug 2018, *J. Kučera & M. Slovák SW7/1* (SAV), *J. Kučera & M. Slovák SW7/3* (SAV), *J. Kučera & M. Slovák SW7/5* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.46–3.50 pg, FCM. Switzerland, Graubünden, Silvaplana village, Julierpass saddle, 46°28′13.3″N, 09°43′08.8″E, 2248 m, 16 Aug 2018, *J. Kučera & M. Slovák SW8/1* (SAV), *J. Kučera & M. Slovák SW8/2* (SAV), *J. Kučera & M. Slovák SW8/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.47–3.49 pg, FCM. Switzerland, Ticino, St. Gotthard pass saddle, near Lago di San Carlo, 46°33′29.3″N, 08°33′25.5″E, 2116 m, 14 Aug 2018, *J. Kučera & M. Slovák SW3/1* (SAV), *J. Kučera & M. Slovák SW3/2* (SAV), *J. Kučera & M. Slovák SW3/3* (SAV).

2*n* ~ 4*x* ~ 40, 2C = 3.48–3.52 pg, FCM. Switzerland, Valais, Wichel village, Nufenen pass saddle, 46°28′20.8″N, 08°22′57.0″E, 2307 m, 14 Aug 2018, *J. Kučera & M. Slovák SW4/7* (SAV), *J. Kučera & M. Slovák SW4/8* (SAV), *J. Kučera & M. Slovák SW4/9* (SAV) [Fig. 7F].

Soldanella ×*hybrida* A.Kern

The CV of samples and internal standard ranged from 2.05% to 3.01% (mean 2.61%) and from 2.33% to 3.14% (mean 2.71%), respectively.

* 2*n* = 4*x* = 40, CHN. Switzerland, Valais, Wichel village, Nufenen pass saddle, 46°28′20.8″N, 08°22′57.0″E, 2307 m, 14 Aug 2018, *J. Kučera & M. Slovák SW4/4* (SAV) [Fig. 6F]

* 2*n* ~ 4*x* ~ 40, 2C = 3.57–3.62 pg, FCM. Switzerland, Valais, Wichel village, Nufenen pass saddle, 46°28′20.8″N, 08°22′57.0″E, 2307 m, 14 Aug 2018, *J. Kučera & M. Slovák SW4/4* (SAV), *J. Kučera & M. Slovák SW4/5* (SAV), *J. Kučera & M. Slovák SW4/6* (SAV) [Fig. 7E].

Soldanella ×*wettsteinii* Vierh.

The CV of samples and internal standard ranged from 2.02% to 2.88% (mean 2.52%) and from 2.10% to 3.16% (mean 2.78%), respectively.

* 2*n* ~ 4*x* ~ 40, 2C = 3.51–3.56 pg, FCM. Austria, Niederösterreich, Hochschneeberg Mt., Ochsenboden, 47°45′56.0″N, 15°48′36.4″E, 1909 m, 20 Jul 2017, *J. Kučera, M. Slovák & E. Štubňová AT40/1* (SAV), *J. Kučera, M. Slovák & E. Štubňová AT40/2* (SAV), *J. Kučera, M. Slovák & E. Štubňová AT40/3* (SAV), *J. Kučera, M. Slovák & E. Štubňová AT40/4* (SAV) [Fig. 7B].

Members of the genus *Soldanella* L. (snowbells, Primulaceae) are perennial, evergreen caespitose herbs with funnel- or bell-shaped flowers and leathery rounded leaves. The genus *Soldanella* is endemic to the European continent and its species occupy understory of mid-altitudinal forests or eventually higher alpine habitats in the large mountain ranges. Following the most recent taxonomic concepts, the genus harbours up to 24 taxa (Zhang & al., 2001; Zhang & Kadereit, 2002).

The karyological variation of the genus, including chromosome numbers and absolute genome size (AGS) was recently investigated by Štubňová & al. (2017). The study confirmed that snowbells are karyologically rather invariable since only two cytotypes, specifically the euploid 2*n* = 40 and dysploid one with 2*n* = 38, were detected within the whole genus (Štubňová & al., 2017). Rare aneuploid chromosome numbers reported elsewhere (e.g., Mattick, 1950; Kress, 1969, 1984; Pawłowska, 1963; Peev, 1976; Zhang & Kadereit, 2002; Rice & al., 2015) were, however, not confirmed. Flow cytometry analyses uncovered a limited absolute genome size (AGS) variation in snowbells ranging between 2.97 and 3.99 pg (25.6% overall variation). Beside this, significantly higher AGS (2C = 12.4 pg) has been reported for *S. pusilla* Baumg. by Veselý & al. (2012). Although authors attempted to analyse all taxa and to cover their distribution range within the study performed by Štubňová & al. (2017), certain parts of the distribution area of several taxa remain unsampled. This was especially a case of *S. alpina* subsp. *alpina* and *S. pusilla* subsp. *alpicola* from the central and western Alps. Furthermore, the study did not include any of the previously reported hybrids between snowbell species (Zhang & Kadereit, 2002).

The herein presented chromosomal report attempts to fill the gap in the knowledge of karyological variation of the genus with

respect to important but unsampled parts of the distribution area of selected taxa and morphologically intermediate, presumably hybrid individuals. Altogether we analysed 23 populations from the Alps and Carpathians, namely nine populations per *S. alpina* subsp. *alpina*, eight populations per *S. pusilla* subsp. *alpicola* originating from the south-western Austria, Switzerland, north Italy, and eastern France, one population *S. minima* s.l. from Austria, three populations of *S. angusta* from south-eastern part of Ukrainian Carpathians, and the single population of *S. major* from the Southern Carpathians. Along with pure taxa, we also investigated the karyological variation of two populations with morphologically intermediate, hybrid individuals, namely a single population *S.* ×*hybrida* A.Kern (*S. alpina* subsp. *alpina* × *S. pusilla* subsp. *alpicola*; Fig. 7D–F) and one population of *S.* ×*wettsteinii* Vierh. (*S. alpina* subsp. *alpina* × *S. minima* subsp. *austriaca*; Fig. 7A–C)). We tested here whether the analysed populations harbour additional (unique) cytotypes beside the ones detected previously and/or possess AGS which would deviate significantly from already gathered and published data.

DIRECT CHROMOSOME COUNTING

Chromosome numbers were determined from the root tips of plants transplanted from the field and cultivated in experimental greenhouses in the Plant Science and Biodiversity Centre of the Slovak Academy of Sciences. The laboratory protocol was as follows: fresh root tips were pre-treated in 0.002 M aqueous solution of hydroxyquinoline overnight; fixed in a fresh solution of 96% ethanol and 100% acetic acid (3 : 1) for at least 1 hour; rinsed with distilled water; macerated in a mixture of 35% HCl and 96% ethanol (1 : 1) for about 3 minutes in ambient conditions and finally rinsed with distilled water. Permanent squashes were made using the cellophane squash method (Murín, 1960), stained with a 7% Giemsa solution in Sörensen phosphate buffer (Fluka Analytical, Munich, Germany), washed, dried, mounted, and observed with a high-power oil immersion objective (Mártonfi & al., 1999).

FLOW CYTOMETRY

To estimate the AGS in analysed snowbell populations, we used flow propidium iodide cytometry. All analyses were performed on a flow cytometer CyFlow SL (Partec, Münster, Germany) equipped with a green laser. *Solanum pseudocapsicum* (2C DNA = 2.59 pg, Temsch & al., 2010) was used as the internal standard. Samples were prepared from fresh, intact leaves in a two-step laboratory procedure. First, the sample and standard were co-chopped with a sharp razor blade in a Petri dish in 0.9 to 1 ml of ice-cold Otto I buffer solution and the cell suspension was filtered through a 42-µm nylon mesh. Then, the filtered solution was supplemented with Otto II buffer, propidium iodide as a fluorochrome, RNAse, and β-mercaptoethanol and analysed. For each measurement 5000 nuclei were recorded. To

Fig. 7. Investigated hybrids and their parental species of the genus *Soldanella*. **A,** *S. alpina* (pop. AT40), $2n = 4x = 40$; **B,** *S.* ×*wettsteinii* (pop. AT40), $2n \sim 4x \sim 40$; **C,** *S. minima* subsp. *austriaca* (pop. AT40), $2n = 4x = 40$; **D,** *S. alpina* (pop. SW4), $2n = 4x = 40$; **E,** *S.* ×*hybrida* (pop. SW4), $2n = 4x = 40$; **F,** *S. pusilla* subsp. *alpicola* (pop. SW4), $2n = 4x = 40$. — Credits to J. Kučera.

avoid potential biases caused by random instrumental drift and/or presence of secondary metabolites we performed following tests: (i) the AGS of each individual was measured independently three times during different days; (ii) the coefficient of variation (CV) of sample and standard were accepted only if they did not exceed 3% in snowbell sample and 5% in standard; (iii) the between-day difference among particular measurements did not exceed critical threshold of 2% otherwise was measurement discarded and sample reanalysed.

NOTES ON KARYOLOGICAL VARIATION OF ANALYSED *SOLDANELLA* POPULATIONS

Chromosome numbers detected in analysed snowbells were in accordance with all chromosome number records published to date (Bogenrieder, 1972; Chichiricco & Tammaro, 1980; Kress, 1969, 1984; Larsen, 1954; Lippert, 2006; Štubňová & al., 2017). Although we did not obtain a chromosome count for *S.* ×*wettsteinii*, the detected AGS values indicate that a shift in chromosome number in this species is improbable. In general, the obtained AGS values fit essentially well to AGS value ranges previously reported for a specific taxon (cf. Štubňová & al., 2017; AGS ranges detected by Štubňová & al., 2017 are in brackets): *S. alpina* subsp. *alpina* – 2C = 3.52–3.67 pg (2C = 3.47–3.65 pg); *S. angusta* – 2C = 3.31–3.38 pg (2C = 3.29–3.41 pg); *S. major* – 2C = 3.28–3.32 pg (2C = 3.35–3.48 pg); *S. pusilla* subsp. *alpicola* – 2C = 3.43–3.52 pg (2C = 3.44–3.49 pg). The exception represent values for *S. minima* s.l. from southwestern Austria. The detected AGS values, 2C = 3.63–3.68 pg fit to the AGS range previously reported for *S. minima* subsp. *austriaca* (2C = 3.50–3.65 pg; Štubňová & al., 2017). However, based on published distribution data this subspecies should not occur in southwestern Austria and its distribution range is shifted more eastwards (Zhang & al., 2001; Zhang & Kadereit, 2002). On the other hand AGS range of *S. minima* subsp. *minima*, which is reported from this region were detected to be lower and ranged between 3.39–3.44 pg (Štubňová & al., 2017).

We paid particular attention to potential hybrids between two pairs of higher-alpine snowbell species (*Soldanella* ×*hybrida* and *Soldanella* ×*wettsteinii*). Although we have no obvious genetic evidence of their hybridity, the analysed plants originated from sympatric populations and their morphological intermediacy was inalienable. *Soldanella alpina* s.l. represents one of the potential parents for both hybrids and is a typical example of the member of traditionally recognised *Soldanella* sect. *Soldanella*. This section is morphologically characterised by the more robust habit, bearing of several (3 to 8) funnel-shaped pink-violet to blue-violet flowers, the presence of floral scales and well-developed stamen appendages. In contrast, another two potentially parental taxa, *S. minima*, and *S. pusilla,* are members of traditionally recognised *Soldanella* sect. *Tubiflores* Borb. which harbours dwarf plants with reduced floral morphology, i.e., they possess mostly single, bell-shaped, white or pinkish flower, without floral scales and rudimentary stamen appendages (Zhang & al., 2001; Zhang & Kadereit, 2002). Plants which we consider here hybrids were morphologically intermediate and share traits from both parental taxa. In the case of *S.* ×*hybrida*, AGS values of the potential hybrid ranged between 2C = 3.57–3.62 pg what clearly fits the AGS range detected for *S. alpina* subsp. *alpina* – 2C = 3.47–3.67. Another potential parent, *S. pusilla* subsp. *alpicola* possesses rather smaller AGS – 2C = 3.43–3.49 pg. In contrast, three individuals assignable to *S.* ×*wettsteinii* with AGS ranging between 2C = 3.51–3.56 pg perfectly fit AGS variation of both parental taxa (*S. minima* subsp. *austriaca* – 2C = 3.50–3.65 pg and see above for *S. alpina* subsp. *alpina*). Although we analysed here the only limited number of morphologically intermediate hybrid individuals, it seems that hybridisation did not cause significant shifts in AGS of hybrids compared to their parental taxa. The huge AGS values reported for *S. pusilla* (Veselý & al., 2012) were found neither in this taxon nor in whichever of other analysed (sub-)species or hybrids. Thus, the potential scenario involving the whole chromosome doubling and the evolution of allopolyploid entities was not evidenced.

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The study was supported by financial grant under DRS SAP I, SAP II and SAP III of University Grant Commision (UGC), New Delhi, India; Women Scientist Fellowship Scheme (WOS-A) of Department of Science and Technology, Government of India (GOI) to Vandna Kumari, Rajiv Gandhi National Fellowship Scheme of UGC to Rohit Kumar (award letter no. F1-17.1/2012-13 /RGNF-2012-13-SC HIM-18573) and IPLS project of Department of Biotechnology, GOI (BT/PR4548/INF/22/146/ 2012) sanctioned to Punjabi University Patiala, Punjab for using the facilities and financial support of this study.

* First chromosome count for the species.
** New chromosome number (cytotype) for the species.
▼ First chromosome count for an Indian accession.

BRASSICACEAE

***Turritis glabra* L.

n = 7, CHN. India, Uttarakhand, Uttarkashi, Gangotri-Gomukh Trek, 30°59′17.68″N, 79°00′17.57″E, 3500 m, found in open stony, partly shaded slopes, *R. Kumar 34335* (PUN 61593) [Fig. 8A].

The other chromosome number reports for this species are 2*n* = 12 (Titz, 1967; Taylor & Mulligan, 1968; Rodman & Bhargava, 1976; Arohonka, 1982; Dobeš & al., 1997; Koch & al., 1999; Lövkvist & Hultgård, 1999; Kumar & Singhal, 2011), 2*n* = 16 (Titz, 1968; Hill, 1982) and 2*n* = 16, 32 (Titz, 1966).

CARYOPHYLLACEAE

**Arenaria festucoides* Benth.

n = 11, CHN. India, Uttarakhand, Uttarkashi, Nelang, 31°06′38.08″N, 78°59′59.42″E, 3500 m, found in moist, open or partly shaded places along streams in meadows, *Rohit Kumar 34336* (PUN 61594) [Fig. 8B].

FABACEAE

**Astragalus uttaranchalensis* L.B.Chowdhary & Z.H.Khan

n = 8, CHN. India, Uttarakhand, Uttarkashi, Gangotri, 30°59′42.61″N, 78°56′24.04″E, 3500 m, rarely found in open dry slopes in particular areas, *R. Kumar 34862* (PUN 61720) [Fig. 8C].

▼ *Medicago edgeworthii* Širj.

n = 8, CHN. India, Uttarakhand, Uttarkashi, Nelang, 31°06′38.08″N, 78°59′59.42″E, 3500 m, grows as isolated individuals in open and partly shaded slopes, *Rohit Kumar 34903* (PUN 61761) [Fig. 8D].

The current chromosome number report is in agreement with the previous one, 2*n* = 16 (Zhou & al., 2000).

▼ *Thermopsis barbata* Benth.

n = 9, CHN. India, Uttarakhand, Uttarkashi, Har-ki-Dun, 31°08′30.76″N, 78°24′37.43″E, 3600 m, grows as isolated individuals in open grassy slopes, *R. Kumar 34916* (PUN 61774) [Fig. 8E].

Diploid chromosome count of 2*n* = 18 for this species has been previously reported by Chen & al. (1992).

HYPERICACEAE

***Hypericum elodeoides* Choisy

n = 10, CHN. India, Uttarakhand, Uttarkashi, Taluka, 31°04′59.83″N, 78°15′31.50″E, 2100 m, found in along roadsides, rocky slopes, damp meadows and grassy grounds, *R. Kumar 34358* (PUN 61616) [Fig. 8G].

There are several different chromosome number reports for this species, e.g., 2*n* = 16 (Suguira, 1941, 1944; Al-Bermani & al., 1993; Kumar, 2012), 2*n* = 18 (Gupta & al., 2014; Kumar & Singhal, 2011; Jeelani & al., 2014; Kaur, 2017) and 2*n* = 32 (Sandhu & Mann, 1989; Kumar, 2012).

PAPAVERACEAE

* *Corydalis stracheyi* Duthie ex Prain

n = 8, CHN. India, Uttarakhand, Uttarkashi, Dodi Tal, 30°53′50.09″N, 78°31′38.74″E, 3050 m, found in moist grassy slopes along streams in meadows, *R. Kumar 34310* (PUN 61568) [Fig. 8F].

POACEAE

***Digitaria abludens* (Roem. & Schult.) Veldkamp

n = 36, CHN. India, Himachal Pradesh, Kullu District, Sheela Village, 32°00′23″N, 77°22′44″E, 2650 m, found in weedy places and roadsides, *V. Kumari 32435* (PUN 60309) [Fig. 8H].

Previous chromosome number reports for this species from the Indian Himalayas were 2*n* = 36 (Sharma & Sharma, 1979; Mehra, 1982).

***Festuca sibirica* Hack. ex Boiss.

n = 21, CHN. India, Himachal Pradesh, Kullu District, Gulaba, 32°20′27″N, 77°13′06″E, 3200 m, found on stony slopes, among rocks and sometimes in sandy areas, *V. Kumari 34676* (PUN 61325) [Fig. 8I].

Previous reports for the species were 2*n* = 28 recorded by (Chepinoga & al., 2008; Probatova & al., 2012).

▼ *Hordeum murinum* L.

n = 7, CHN. India, Himachal Pradesh, Kullu District, Jalori Pass, 31°32′13″N, 77°22′23″E, 3223 m, found in fields and along roadsides, *V. Kumari 34705* (PUN 61254) [Fig. 8J].

The current chromosome number report is in agreement with the previous ones of 2*n* = 14 as reported by Morrison (1959), Strid & Franzén (1981), Faruqi & al. (1987) and Nazarova (2004).

***Leptochloa chinensis* (L.) Nees

n = 9, CHN. India, Himachal Pradesh, Kullu District, Bhuntar, 31°53′02″N, 77°08′42″E, 1100 m, found in the moist places, *V. Kumari 34712* (PUN 61261) [Fig. 8K].

Several other chromosome numbers were reported for this species, namely 2*n* = 36 (Mehra & Kalia, 1975), 2*n* = 40 (Avdulov, 1928; Chen & Hsu, 1962; Mehra, 1982; Bir & Sahni, 1986) and 2*n* = 54 (Christopher & Abraham, 1974).

** *Microstegium vimineum* (Trin.) A.Camus

n = 10, CHN. India, Tosh, 32°03′08″N, 77°26′58″E, 2400 m, found in forest margins, moist grassy places, *V. Kumari 34711* (PUN 61260) [Fig. 8L].

Previous reports for the species is 2*n* = 40 (Tateoka, 1967; Mehra & Kalia, 1976; Mehra, 1982). The present report of 2*n* = 20 adds a new diploid cytotype for the species at world level.

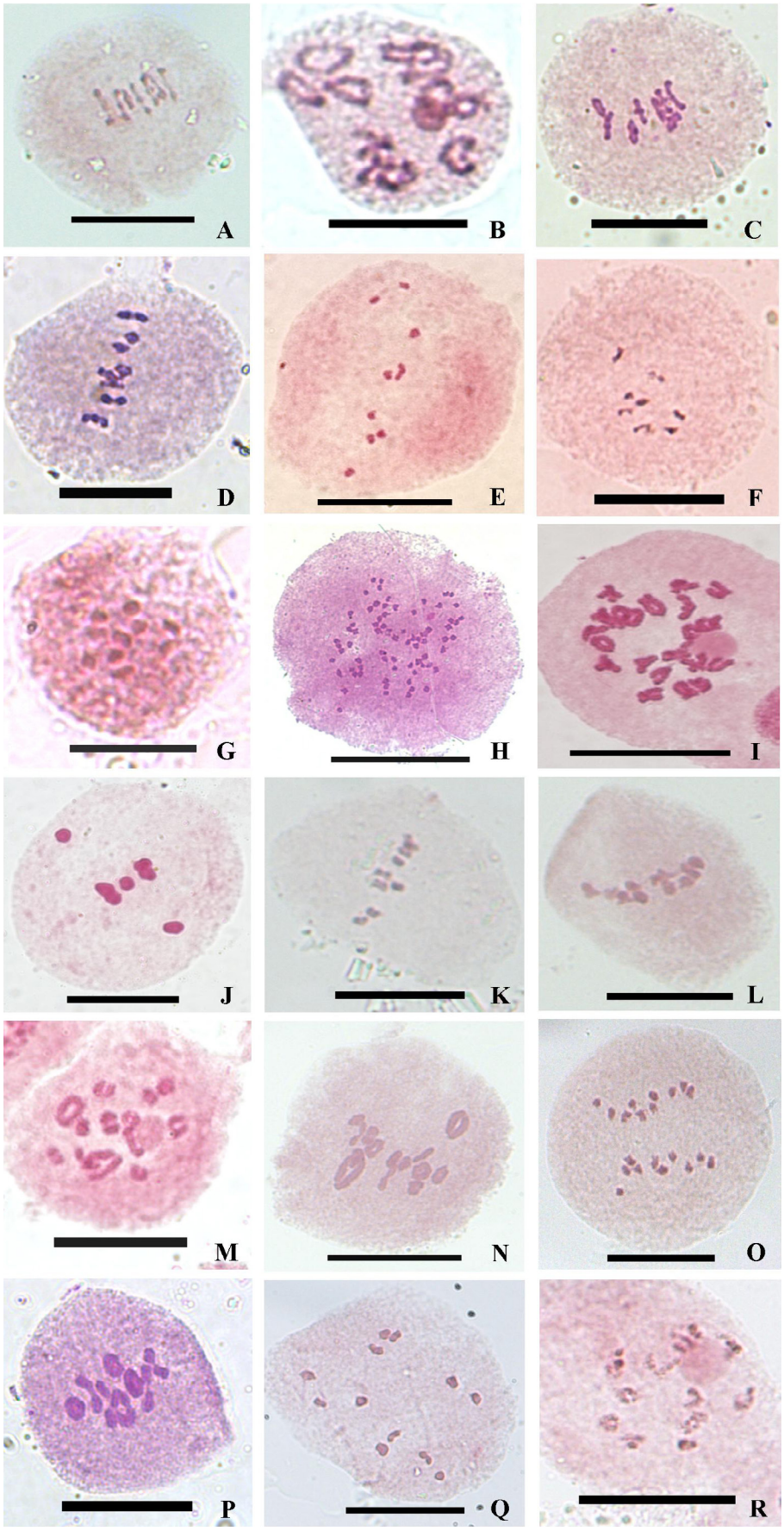

Fig. 8. Meiosis. **A,** *Turritis glabra*, PMC showing 7 bivalents at metaphase-I (M-I), $n = 7$ (PUN 61593); **B,** *Arenaria festucoides*, PMC showing 11 bivalents at diakinesis, $n = 11$ (PUN 61594); **C,** *Astragalus uttaranchalensis*, PMC showing 8 bivalents at M-I, $n = 8$ (PUN 61720); **D,** *Medicago edgeworthii*, PMC showing 8 bivalents at M-I, $n = 8$ (PUN 61761); **E,** *Thermopsis barbata*, PMC showing 9 bivalents at M-I, $n = 9$ (PUN 61774); **F,** *Corydalis stracheyi*, PMC showing 8 bivalents at M-I, $n = 8$ (PUN 61568); **G,** *Hypericum elodeoides*, PMC showing 10 bivalents at M-I, $n = 10$ (PUN 61616); **H,** *Digitaria abludens*, PMC showing equal distribution of 36 : 36 chromosomes at anaphase-I (A-I), $n = 36$ (PUN 60309); **I,** *Festuca sibirica*, PMC showing 21 bivalents at diakinesis, $n = 21$ (PUN 61325); **J,** *Hordeum murinum*, PMC showing 7 bivalents (4 bivalents in groups of two each + 3 bivalents) at M-I, $n = 7$ (PUN 61254); **K,** *Leptochloa chinensis*, PMC showing 9 bivalents at M-I, $n = 9$ (PUN 61261); **L,** *Microstegium vimineum*, PMC showing 10 bivalents at M-I, $n = 10$ (PUN 61260); **M,** *Poa setulosa*, PMC showing 14 bivalents (3 large-sized and 11 normal-sized) at diakinesis $n = 14$ (PUN 61188); **N,** *Puccinellia himalaica*, PMC showing 14 bivalents (2 large-sized ring-shaped and 12 normal-sized) at M-I, $n = 14$ (PUN 61238); **O,** *Stipa jacquemontii*, PMC showing equal distribution of 10 : 10 chromosomes at A-I, $n = 10$ (PUN 61243); **P,** *Saxifraga pedemontana* subsp. *cymosa*, PMC showing 8 bivalents at M-I, $n = 8$ (PUN 61854); **Q,** *Myricaria elegans*, PMC showing 12 bivalents at M-I, $n = 12$ (PUN 61862); **R,** *M. rosea*, PMC showing 12 bivalents at diakinesis, $n = 12$ (PUN 61863). — Scale bars = 10 µm.

***Poa setulosa* Bor

n = 14, CHN. India, Himachal Pradesh, Kullu, Kothi, 32°18′52.77″N, 77°11′24.76″E, 2500 m, found on stony slopes, among rocks and sometimes in sandy areas, *V. Kumari 34740* (PUN 61188) [Fig. 8M].

Previous chromosome number report for this species was 2*n* = 14 **(**Kaur & al., 2011).

**Puccinellia himalaica* Tzvelev

n = 14, CHN. India, Himachal Pradesh, Kullu District, Jalori Pass, 31°32′13″N, 77°22′23″E, 3223 m, found in moist and sandy places, *V. Kumari 34689* (PUN 61238) [Fig. 8N].

***Stipa jacquemontii* Jaub. & Spach

n = 10, CHN. India, Himachal Pradesh, Kullu, Bijali Mahadev, 31°55′30″N, 77°09′01″E, 2435 m, found in arid soils and rock crevices, *V. Kumari 34694* (PUN 61243) [Fig. 8O].

Previously different chromosome numbers were reported for this species: 2*n* = 24 (Mehra & Sharma, 1975) and 2*n* = 42 (Gupta & al., 2014).

SAXIFRAGACEAE

* *Saxifraga pedemontana* subsp. *cymosa* Engl.

n = 8, CHN. India, Uttarakhand, Uttarkashi, Har-ki-Dun Trek, 31°08′10.67″N, 78°23′58.06″E, 3460 m, rarely found in grassy slopes in meadows, *R. Kumar 34981* (PUN 61854) [Fig. 8P].

TAMARICACEAE

**Myricaria elegans* Royle

n = 12, CHN. India, Uttarakhand, Uttarkashi, Chirwasa, 31°08′10.67″N, 78°23′58.06″E, 3560 m, grows in stony or boulder-strewn places along river beds or streams and open dry slopes, *R. Kumar 34988* (PUN 61862) [Fig. 8Q].

**Myricaria rosea* W.W.Sm.

n = 12, CHN. India, Uttarakhand, Uttarkashi, Har-ki-Dun, 31°08′30.76″N, 78°24′37.43″E, 3600 m, rarely found in open dry, boulder-strewn slopes, along river banks, *R. Kumar 34990* (PUN 61863) [Fig. 8R].

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Funding was provided by CONICET, FONCyT, and SECyT-UNC (FCEFyN) from Argentina.

* First chromosome counts from the given regions.

CACTACEAE

**Arrojadoa rhodantha* (Gürke) Britton & Rose
$2n$ = 22, x = 11, CHN. Brasil, Rio de Contas, 13°38′09″S, 41°39′08″W, 15 Mar 2007, *Urdampilleta & al. 379* (CORD) [Fig. 9A].

Cereus aethiops Haw.
$2n$ = 22, x = 11, CHN. Argentina, Mendoza, Dpt. Lujan de Cuyo, 33°01′01″S, 68°11′07″W, 29 Jan 2006, *Chiarini 614* (CORD) [Fig. 10A].

Cleistocactus smaragdiflorus (F.A.C.Weber) Britton & Rose
$2n$ = 22, x = 11, CHN. Argentina, Salta, Dpt. Guachipas, 25°32′14″S, 65°31′10″W, 15 Jan 2006, *Las Peñas & Uñates 279* (CORD) [Fig. 10B].

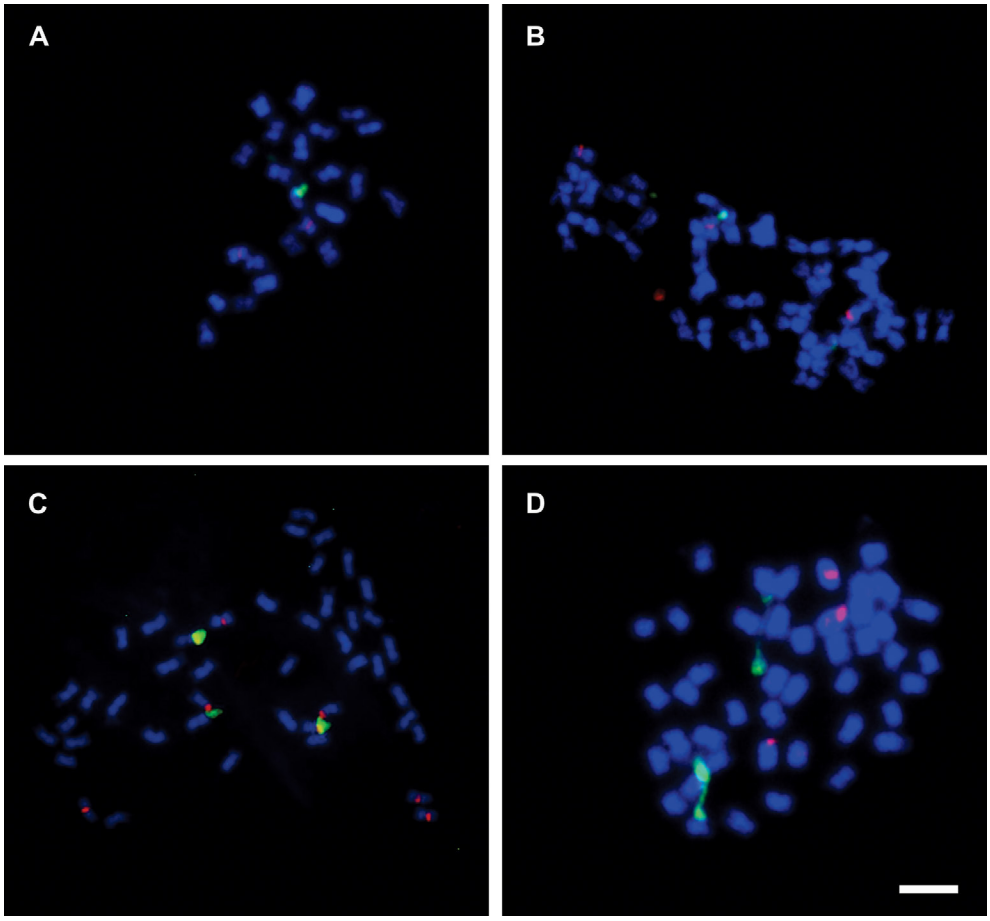

Fig. 9. FISH of 18S-5.8S-26S and 5S rDNA to metaphase chromosomes in Cactaceae simultaneously detected in all species. **A,** *Arrojadoa rhodantha*; **B,** *Melocactus bahiensis*; **C,** *Pachycereus pringlei*; **D,** *Tacinga inamoena*. — Scale bar = 5 µm (all of the images are at the same scale).

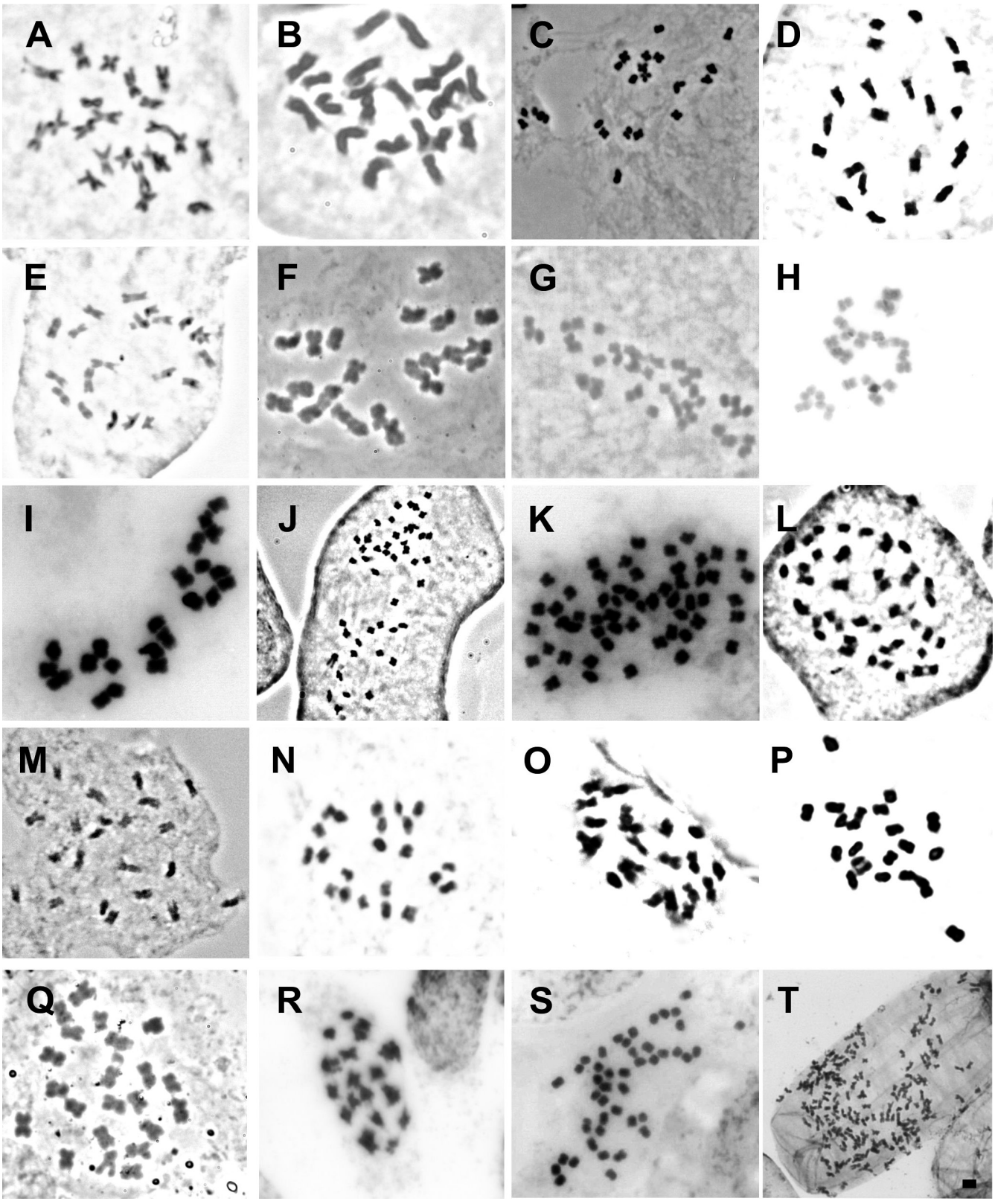

Fig. 10. Photomicrographs of mitotic metaphases of Cactaceae species. **A,** *Cereus aethiops*; **B,** *Cleistocactus smaragdiflorus*; **C,** *Denmoza rhodacantha*; **D,** *Echinopsis aurea* var. *dobeana*; **E,** *Echinopsis leucantha*; **F,** *Gymnocalycium monvillei* subsp. achirasense; **G,** *Harrisia pomanensis*; **H,** *Harrisia hahniana*; **I,** *Lobivia saltensis*; **J,** *Maihueniopsis glomerata*; **K,** *Maihueniopsis darwinii*; **L,** *Maihueniopsis ovata*; **M,** *Oreocereus trollii*; **N,** *Rhipsalis lumbricoides*; **O,** *Trichocereus arboricola*; **P,** *Trichocereus atacamensis*; **Q,** *Trichocereus thelegonus*; **R,** *Trichocereus macrogonus*; **S,** *Pachycereus pringlei*; **T,** *Quiabentia verticillata*. — Scale bar = 2 µm (all of the images are at the same scale).

Denmoza rhodacantha (Salm-Dyck) Britton & Rose
2*n* = 22, *x* = 11, CHN. Argentina, La Rioja, Dpt. Chilecito, 34°00′00″S, 68°54′22″W, 5 Dec 2005, *Las Peñas & Chiarini 212* (CORD) [Fig. 10C].

Echinopsis aurea var. *dobeana* (Dölz) J.Ullmann
2*n* = 22, *x* = 11, CHN. Argentina, Catamarca, Dpt. Ancasti, 28°48′13″S, 68°30′42″W, 30 Nov 2004, *Las Peñas 125* (CORD) [Fig. 10D].

Echinopsis aurea var. *falax* (Oehme) J.Ullmann
2*n* = 22, *x* = 11, CHN. Argentina, La Rioja, Dpt. Independencia, 28°21′19″S, 64°11′08″W, 5 Dec 2005, *Las Peñas & Chiarini 203* (CORD).

Echinopsis leucantha (Gillies ex Salm-Dyck) Walp.
2*n* = 22, *x* = 11, CHN. Argentina, San Juan, Dpt. Albardón, 31°27′58″S, 68°38′08″W, 14 Mar 2004, *Las Peñas & Uñates 87* (CORD) [Fig. 10E].

**Gymnocalycium andreae* (Boed.) Backeb.
2*n* = 44, *x* = 11, CHN. Argentina, Córdoba, Dpt. San Alberto, 31°23′42″S, 64°46′48″W, 25 Jan 2004, *Las Peñas & Uñates 23* (CORD).

**Gymnocalycium monvillei* subsp. *achirasense* (H.Till & Schatzl) H.Till
2*n* = 22, *x* = 11, CHN. Argentina, Cordoba, Dpt. Rió Cuarto, 32°52′21″S, 64°53′11″W, 26 Aug 2007, *Las Peñas & al. 363* (CORD) [Fig. 10F].

**Gymnocalycium monvillei* (Lem.) Britton & Rose subsp. *monvillei*
2*n* = 44, *x* = 11, CHN. Argentina, Córdoba, Dpt. San Alberto, 31°23′41″S, 64°46′48″W, 26 Aug 2007, *Las Peñas & Uñates 232* (CORD).

Harrisia hahniana (Backeb.) Kimnach & Hutchison ex Kimnach
2*n* = 22, *x* = 11, CHN. Paraguay, Dpt. Presidente Hayes, Irala Fernandez, 22°48′49.3″S, 59°34′25.3″W, 10 Oct 2014, *Las Peñas 588* (CORD) [Fig. 10H].

Harrisia pomanensis (F.A.C.Weber ex K.Schum.) Britton & Rose
2*n* = 44, *x* = 11, CHN. Argentina, San Luis, Dpt. Ayacucho, 32°14′52″S, 65°46′11″W, 30 Nov 2004, *Las Peñas & Uñates 100* (CORD) [Fig. 10G].

Lobivia saltensis (Speg.) Britton & Rose
2*n* = 22, *x* = 11, CHN. Argentina, Salta, Dpt. Cafayate, 26°05′54.77″S, 65°57′02.50″W, 10 Dec 2004, *Las Peñas138* (CORD) [Fig. 10I].

Maihueniopsis darwinii (Hensl.) F.Ritter
2*n* = 55, *x* = 11, CHN. Argentina, Chubut, Dpt. Biedma, 42°45′57″S, 64°08′46″W, 30 Jan 2003, *Las Peñas & Uñates 349* (CORD) [Fig. 10K].

Maihueniopsis glomerata (Haw.) R.Kiesling
2*n* = 44, *x* = 11, CHN. Argentina San Juan, Dpt. Iglesia, 29°45′57″S, 69°26′16.77″W, 16 Apr 2005, *Las Peñas & Uñates 178* (CORD) [Fig. 10J].

Maihueniopsis ovata (Pfeiff.) F.Ritter
2*n* = 44, *x* = 11, CHN. Argentina San Juan, Dpt. Iglesia, 29°45′57″S, 69°26′16.77″W, 16 Apr 2005, *Las Peñas & Uñates 181* (CORD) [Fig. 10L].

**Melocactus bahiensis* (Britton & Rose) Luetzelb.
2*n* = 44, *x* = 11, CHN. Brasil, Rio de Contas, 13°20′19″S, 41°29′52″W, 15 Mar 2007, *Urdampilleta & al. 387* (CORD) [Fig. 9B].

Opuntia quimilo K.Schum.
2*n* = 22, *x* = 11, CHN. Argentina, La Rioja, Dpt. Chamical, 30°09′14″S, 66°28′44″W, 18 Sep 2012, *Las Peñas & al. 539* (CORD).

Oreocereus celsianus (Lem. ex Salm-Dyck) Riccob.
2*n* = 44, *x* = 11, CHN. Argentina, Jujuy, Dpt. Tumbaya, 23°51′28″S, 65°28′08″W, 15 Jan 2006, *Las Peñas & Uñates 274* (CORD).

Oreocereus trollii (Kupper) Backeb.
2*n* = 22, *x* = 11, CHN. Argentina, Jujuy, Dpt. Tumbaya, 23°51′28″S, 65°28′08″W, 15 Jan 2006, *Las Peñas & Uñates 339* (CORD) [Fig. 10M].

**Pachycereus pringlei* (S.Watson) Britton & Rose
2*n* = 22, *x* = 11, CHN. México, Dpt. La Paz, 24°01′26″S, 110°33′39″W, 10 Sep 2015, *Las Peñas 714* (CORD) [Fig. 9C, Fig. 10S].

Quiabentia verticillata (Vaupel) Vaupel ex A.Berger
2*n* = ca. 187, *x* = 11, CHN. Bolivia, Dpt. Mizque, 56°16′04″S, 65°18′39″W, 28 Apr 2011, *Urdampilleta & al. 542* (CORD) [Fig. 10T].

**Rhipsalis lumbricoides* (Lem.) Lem. ex Salm-Dyck
2*n* = 22, *x* = 11, CHN. Argentina, Misiones, Dpt. Posadas, 14 Apr 2004, *Las Peñas & Uñates 56* (CORD) [Fig. 10N].

Tacinga inamoena (K.Schum.) N.P.Taylor & Stuppy
2*n* = 44, *x* = 11, CHN. Brasil, Rio de Contas, 13°49′53″S, 41°35′05″W, 15 Mar 2007, *Urdampilleta & al. 385* (CORD) [Fig. 9D].

Trichocereus arboricola Kimnach.
2*n* = 22, *x* = 11, CHN. Argentina, Salta, Dpt. Capital, El Baritú, 24°55′32″S, 65°38′30″W, 15 Mar 2017, *Las Peñas & Chiarini 715* (CORD) [Fig. 10O].

**Trichocereus atacamensis* (Phil.) W.T.Marshall & T.M.Bock
2*n* = 22, *x* = 11, CHN. Argentina, Salta, Dpt. Cachi, 25°05′57″S, 66°16′44″W, 15 Jan 2006, *Las Peñas & al. 319* (CORD) [Fig. 10P].

Trichocereus macrogonus Salm-Dyck) Riccob.
2*n* = 22, *x* = 11, CHN. Perú, Dpt. La Paz, 16°28′09″S, 67°55′58″W, 25 Dec 2005, *Las Peñas 122* (CORD) [Fig. 10R].

Trichocereus thelegonus (F.A.C.Weber) Britton & Rose
2*n* = 22, *x* = 11, CHN. Argentina, Salta, 25°38′11″S, 65°39′11″W, 15 Jan 2006, *Las Peñas & al. 283* (CORD) [Fig. 10Q].

The chromosome numbers of 28 and karyotype features of 17 taxa of Cactaceae are presented. Preparation of metaphase chromosomes was done from adventitious root tips pretreated with 2 mM 8-hydroxyquinoline for 24 h at 4°C and fixed in 3 : 1 ethanol : acetic acid, washed in distilled water, digested 45 min at 37° C with Pectinex SP ULTRA (Novozymes, Villa Regina, Rio Negro, Argentina),

and squashed in a drop of 45% acetic acid. Slides were stained with Giemsa. At least ten metaphases of each species were photographed with phase contrast in a Zeiss Axiophot microscope. Photographs were used to take the following measurements for each chromosome pair: s (short arm), l (long arm), and c (average total chromosome length). The arm ratio (r = l/s) was then calculated and used to classify the chromosomes as recognized by Levan & al. (1964). In addition, total haploid chromosome length of the karyotype (TL) based on the mean chromosome lengths was calculated. Karyotype asymmetry was estimated using Romero Zarco's (1986) indices (A_1 = intrachromosomal asymmetry index, and A_2 = interchromosomal asymmetry index). Figure 10 shows the range of chromosomes morphologies found. Idiograms representing the haploid complement were based on the mean values for each species. In situ hybridization followed Schwarzacher & Heslop-Harrison (2000) with modifications. For details of elaboration and labelling of rDNA probes see Las Peñas & al. (2017).

Our chromosome counts are the first report for 18 species and 2 varieties, while the remaining counts confirm previously published data. Chromosome features are summarized in Table 1. Almost all species were diploid, with $2n = 22$, except for 11 taxa which exhibited polyploidy with $2n = 44$, 55 and 187 ca. (Table 1, Fig. 10). Our results confirmed that the basic chromosome number for Cactaceae is $x = 11$ (Pinkava, 2002; Goldblatt & Johnson, 2013; Las Peñas & al., 2017). Polyploidy has been reported for ca. 25% of the cacti investigated so far (Pinkava, 2002; Las Peñas & al., 2009); particularly, it seems to have played an important role in the evolution of Opuntioideae where it reaches a percentage of 64% (Pinkava, 2002; Las Peñas & al., 2017; our data). The chromosomes were small, 2.51 µm being the average chromosome length for all taxa, and species analyzed here fall within the range expected for the family (Las Peñas & al., 2009, 2014). The karyotypes of 17 taxa studied are reported for the first time. Karyotypes were symmetrical, considering both centromere position (most are *m* with 1 or 2 *sm* pairs). Subtelocentric (*st*) chromosomes are

Table 1. Chromosomal data of the Cactaceae species studied.

Taxa	2*n*	KF	TL	c	r	A_1	A_2
Arrojadoa rhodantha	22*	10 *m* + 1 *sm*	25.40	2.30	1.21	0.20	0.18
Cereus aethiops	22	10 *m* + 1 *sm*	27.37	2.51	1.31	0.22	0.19
Cleistocactus smaragdiflorus	22	10 *m* + 1 *sm*	28.70	2.54	1.40	0.20	0.21
Denmoza rhodacantha	22	9 *m* + 1 *sm* + 1 *st*	19.93	1.81	1.29	0.19	0.09
Echinopsis aurea var. *dobeana*	22	10 *m* + 1 *sm*	26.90	2.45	1.29	0.2	0.24
Echinopsis aurea var. *falax*	22	10 *m* + 1 *sm*	26.70	2.30	1.20	0.19	0.21
Echinopsis leucantha	22	10 *m* + 1 *sm*	27.65	2.55	1.29	0.22	0.12
Gymnocalycium andreae	44*	–	–	–	–	–	–
Gymnocalycium monvillei subsp. *achirasense*	22*	10 *m* + 1 *sm*	34.66	3.15	1.22	0.17	0.07
Gymnocalycium monvillei subsp. *monvillei*	44*	–	–	–	–	–	–
Harrisia hahniana	22	10 *m* + 1 *sm*	22.73	2.06	1.25	0.18	0.17
Harrisia pomanensis	44	–	–	–	–	–	–
Lobivia saltensis	22	10 *m* + 1 *sm*	37.25	3.33	1.24	0.17	0.15
Maihueniopsis darwinii	55	–	–	–	–	–	–
Maihueniopsis glomerata	44	–	–	–	–	–	–
Maihueniopsis ovata	44	–	–	–	–	–	–
Melocactus bahiensis	44*	–	–	–	–	–	–
Opuntia quimilo	22*	11 *m*	23.95	2.17	1.21	0.15	0.09
Oreocereus celsianus	44	–	–	–	–	–	–
Oreocereus trollii	22	10 *m* + 1 *sm*	31.25	2.80	1.20	0.18	0.19
Pachycereus pringlei	44	–	–	–	–	–	–
Quiabentia verticillata	187 ca.	–	–	–	–	–	–
Rhipsalis lumbricoides	22*	10 *m* + 1 *sm*	24.25	2.20	1.42	0.28	0.17
Tacinga inamoena	44	–	–	–	–	–	–
Trichocereus arboricola	22	9 *m* + 2 *sm*	38.58	2.95	1.48	0.26	0.28
Trichocereus atacamensis	22*	9 *m* + 2 *sm*	28.15	2.58	1.42	0.25	0.24
Trichocereus macrogonus	22	10 *m* + 1 *sm*	26.55	2.41	1.42	0.28	0.17
Trichocereus thelegonus	22	9 *m* + 2 *sm*	28.46	2.58	1.26	0.18	0.12

2*n* = somatic chromosome number; KF = karyotype formula; TL = total haploid chromosome length of the karyotype in µm; c = average total chromosome length in µm; A_1 = intrachromosomal asymmetry index; A_2 = interchromosomal asymmetry index. * Previous chromosome count.

not common in Cactaceae (Las Peñas & al., 2008); with a single pair seen in *Denmoza rhodacantha*. This is expressed by the asymmetry indices: A_1 ranges from 0.15 to 0.28 and A_2 from 0.09 to 0.28. The r value varies from 1.20 to 1.48 (Table 1). More karyotypes, however, are needed in order to establish hypotheses of chromosome evolution across this ornamental, and important family.

Physical mapping by FISH for four species (*Arrojadoa rhodacantha*, *Melocactus bahiensis*, *Pachycereus pringlei*, *Tacinga inamoena*) were here performed for the first time in metaphase chromosomes (Fig. 9). Sites of 18S-5.8S-26S genes located in terminal regions of short chromosome arms are frequent in angiosperms (Acosta & al., 2016; Chiarini & al., 2017). The number of 18S-5.8S-26S rDNA increases with the ploidy level (except *Tacinga inamoena*, Fig. 9). The number of 5S sites was one per haploid genome and were proximally located only on the short arms of the chromosomes. In addition, the 5S rDNA loci have a variable position in the family (Las Peñas & al., 2014, 2017; Moreno & al., 2015).

ACKNOWLEDGEMENTS

The authors thank Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Agencia Nacional de Promoción Científica y Tecnológica (FONCyT), SECyT (Universidad Nacional de Córdoba, Argentina), and FCEFy N for finantial support. Diego Uñates helped with the illustrations and Juan Urdampilleta provided some samples from Brasil and Bolivia.

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* First chromosome count for the species.
** New chromosome number (cytotype) for the species.

Authors express thanks to Head, Department of Botany, Shivaji University, Kolhapur for providing laboratory facilities, SERB (File No.: SB/FT/LS-130/2012).

ACANTHACEAE

***Barleria gibsonii* Dalzell

2*n* = 44, CHN. India, Maharashtra, Nandurbar District, Toranmal, 1000 m, 21°53′55.56″N, 74°28′00.64″E, 26 Oct 2014, *K.V.C. Gosavi 126* (SUK) [Fig. 11A].

**Barleria prattensis* Santapau

2*n* = 44, CHN. India, Maharashtra, Nandurbar District, Toranmal, Kalapani, 852 m, 21°51′09.44″N, 74°27′57.77″E, 26 Oct 2014, *K.V.C. Gosavi 125* (SUK) [Fig. 11B].

**Pleocaulus sessilis* (Nees) Bremek.

2*n* = 30, CHN. India, Maharashtra, Satara, Kas Plateu, 1237 m, 17°43′14.99″N, 73°49′25.37″E, 10 Mar 2016, *R.N. Mane 56* (SUK) [Fig. 11C].

**Ruellia urens* Roth

2*n* = 30, CHN. India, Maharashtra, Kolhapur, Shivaji University Campus, 608 m, 16°40′40.89″N, 74°15′19.93″E, 18 Apr 2016, *R.N. Mane 54* (SUK) [Fig. 11D].

***Strobilanthes callosa* Nees

2*n* = 30, CHN. India, Maharashtra, Nashik District, Anjaneri 880 m, 19°55′35.83″N, 73°34′32.88″E, 24 Apr 2016, *K.V.C. Gosavi 452* (SUK) [Fig. 11E].

ARECACEAE

**Trachycarpus takil* Becc.

2*n* = 36, CHN. India, Uttarakhand, Pithoragarh, 2000 m, 29°34′58.29″N, 80°13′05.47″E, 17 Jun 2016, *S.R. Yadav 226* (SUK) [Fig. 11F].

DIPTEROCARPACEAE

* *Vatica chinensis* L.

2*n* = 22, CHN. India, Karnataka, Mangalore, Pilikula Nisargadhama, Vamanjoor, 78 m, 12°55′38.57″N, 74°53′57.45″E, 30 Aug 2016, *R.N. Mane 67* (SUK) [Fig. 1lG].

FABACEAE

Clitoria biflora Dalzell

2*n* = 14, CHN. India, Maharashtra, Nandurbar District, Toranmal, Leghapani, 765 m, 21°06′41.85″N, 73°46′19.72″E, 25 Sep 2015, *K.V.C. Gosavi 186* (SUK) [Fig. 1lH].

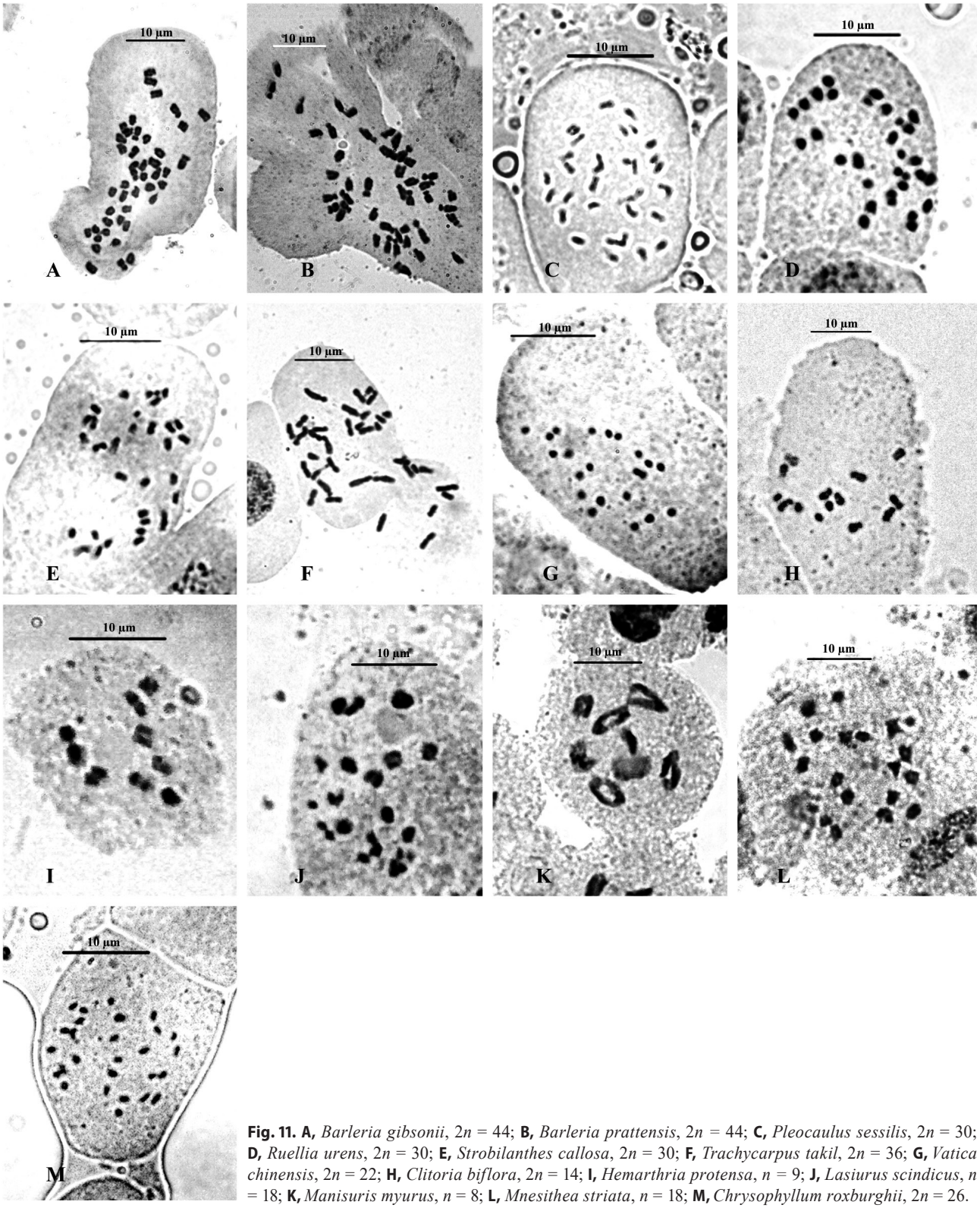

Fig. 11. A, *Barleria gibsonii*, 2*n* = 44; **B,** *Barleria prattensis*, 2*n* = 44; **C,** *Pleocaulus sessilis*, 2*n* = 30; **D,** *Ruellia urens*, 2*n* = 30; **E,** *Strobilanthes callosa*, 2*n* = 30; **F,** *Trachycarpus takil*, 2*n* = 36; **G,** *Vatica chinensis*, 2*n* = 22; **H,** *Clitoria biflora*, 2*n* = 14; **I,** *Hemarthria protensa*, *n* = 9; **J,** *Lasiurus scindicus*, *n* = 18; **K,** *Manisuris myurus*, *n* = 8; **L,** *Mnesithea striata*, *n* = 18; **M,** *Chrysophyllum roxburghii*, 2*n* = 26.

POACEAE

Hemarthria protensa Nees ex Steud.

n = 9, CHN. India, Assam, Guwhati, Deepor Bheel, 52 m, 26°06′52.71″N, 91°39′03.71″E, 19 Apr 2014, *K.V.C. Gosavi 171* (SUK) [Fig. 1I].

***Lasiurus scindicus* Henrard

n = 18, CHN. India, Rajasthan, Jaisalmer District, Jaisalmer, 190 m, 18 Jan 2015, 26°57′42.24″N, 71°19′17.05″E, *K.N. Koli 167* (SUK) [Fig. 1J].

Manisuris myurus L.

n = 8, CHN. India, Tamil Nadu, Kanchipurum District, Wadajabad, 56 m, 12°48′28.89″N, 79°49′22.92″E, 10 Oct 2015, *K.V.C. Gosavi 196* (SUK) [Fig. 1K].

Mnesithea striata (Nees ex Steud.) de Koning & Sosef

n = 18, CHN. India, Meghalaya, Jowai, on the way, 1237 m, 25°27′23.57″N, 92°11′26.50″E, 12 Dec 2015, *K.V.C. Gosavi 235* (SUK) [Fig. 1L].

SAPOTACEAE

**Chrysophyllum roxburghii* G.Don

2*n* = 26, CHN. India, Karnataka, Anmod Ghat, 629 m, 15°56′24.22″N, 73°59′41.66″E, 4 Jun 2017, *R.N. Mane 61* (SUK) [Fig. 1M].

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* New cytotype for the species.
** First chromosome count for the species.
*** First chromosome count for the genus.
! First chromosome count for the subfamily.

Initials of the contributor(s) for each count appear as a superscript at the end of the corresponding species name. Meiotic configurations of chromosomes (I: monovalent, II: bivalent, III: trivalent, IV: tetravalent) are reported after the diploid number.

Here we report chromosome number counts from the sedge family (Cyperaceae), most of which correspond to genus *Carex* from the Nearctic and western Palearctic. In addition, counts are reported for some Neotropical and Afrotropical sedges. We provide the first known chromosome counts for the subfamily Mapanioideae, 5 genera (*Lagenocarpus*, *Afroscirpoides*, *Dracoscirpoides*, *Trianoptiles, Calyptrocarya*) and 45 species.

CYPERACEAE
SUBFAMILY CYPEROIDEAE
TRIBE ABILDGAARDIEAE

Fimbristylis spadicea (L.) Vahl [ML]

2*n* = 20 (10^{II}), CHN. Brazil, Pernambuco, Porto de Galinhas, 15 Aug 1996, *Luceño & al. s.n.* (UFP).

TRIBE BISBOECKELEREAE

****Calyptrocarya glomerulata* (Brongn.) Urb. [ML]

2*n* = 20 (10^{II}), CHN. Brazil, Pernambuco, Cabo, Ecological Reserve of Gurjaú, atlantic forest, 1995, *Luceño & al. s.n.* (UFP) [Fig. 12X].

TRIBE CARICEAE

***Carex acidicola* Naczi [RN]

2*n* = 50 (25^{II}), CHN. U.S.A., Georgia, Clarke County, 1 mi ESE of Athens, 0.5 mi S of end of Rock and Shoals Road, 19 Apr 1988, *Naczi 1783* (MICH, NY).

***Carex aethiopica* Schkuhr [ML]

2*n* = 74 (37^{II}), CHN. South Africa, Western Cape Province, Cape Town, Table Mountain, 12 Sep 2009, *Luceño & al. s.n.* (BOL).

A chromosome number of 2*n* = 76 (38^{II}) [Fig. 12A] was also found in a specimen of the same population.

** *Carex amphibola* Steud. [RN]

2*n* = 56 (28^{II}), CHN. U.S.A., Arkansas, Scott County, 2 mi N of Y City along W side of route 71, just S of Fourche LaFave River, 14 May 1991, *Naczi 2829* (MICH, NY).

** *Carex asynchrona* Naczi [RN]

2*n* = 52 (26^{II}), CHN. Mexico, Tamaulipas, 7 km WNW of Gómez Farias, vicinity of Rancho del Cielo Biological Station, 10 Apr 1992, *Naczi 2949* (MICH).

***Carex bolanderi* Olney [KSC,ME,AH]

2*n* = 50 (25^{II}), CHN. U.S.A., Oregon, Clackamas County, south slope of Mt. Hood, above Timberline Lodge access road, 45°18′24.00″N, 121°54′42.00″W, 13 Sep 2009, *Zika 24689* (MOR).

2*n* = 58 (29^{II}), CHN. U.S.A., Greenhouse collection grown in Illinois, DuPage County, The Morton Arboretum, from material sent by collaborator; greenhouse voucher: *Norris 43* (MOR). Original population information: New Mexico, Catron County, Gila National Forest, Mogollon Mountains, Bursum Road above Mogollon, 33.370918°N, 108.721147°W, 23 Jul 2008, *Norris, Kleinman & Walkup 2008-7-23-43* (SNM).

** *Carex borbonica* Lam. [ML]

$2n = 68$ (34^{II}), CHN. France, La Réunion, Plaine de Remparts, surroundings of Commerson crater, 21°13′15.00″S, 55°38′44.00″E, 2280 m, 1 Jan 2009, *Luceño & Guzmán 1ML09* (UPOS-3635) [Fig. 12B].

** *Carex borbonica* Lam. × *C. boryana* Schkuhr [ML]

$2n = 68$ (34^{II}), CHN. France, La Réunion, Cirque de Mafate, Le Maïdo, 21°04′29.40″S, 55°23′14.50″E, 2180–2200 m, 6 Jan 2009, *Luceño & Guzmán 20ML09* (UPOS-3724) [Fig. 12C].

Carex boryana and *C. borbonica* constitute two ecologically and morphologically well-defined species (Escudero & Luceño, 2011). However, genetic differentiation has been shown to be scarce (Escudero & Luceño, 2009) and their chromosome number is herein reported to be the same. As this specimen presents morphological traits clearly intermediate between both species, it is worth mentioning that there were no irregularities found in the meiotic pairing (shown in Fig. 12C). Future genomic studies are required on these species, which might shed light on the apparently contrasting pattern of high morphological vs. low genetic/cytogenetic divergence.

** *Carex boryana* Schkuhr [ML]

$2n = 68$ (34^{II}), CHN. France, La Réunion, Les Makes, La Fenêtre, 21°11′07.80″S, 55°25′57.80″E, 1500–1650 m, 5 Jan 2009, *Luceño & Guzmán 14ML09* (UPOS-3641) [Fig. 12D].

Carex brevior (Dewey) Mack. ex Lunell [KSC,AH]

$2n = 60$ (30^{II}), CHN. U.S.A., Iowa, Boone County, 42°01′24.348″N, 93°43′09.012″W, 322 m, 10 Jul 2008, *Norris & Thompson s.n.* (MOR).

** *Carex brysonii* Naczi [RN]

$2n = 50$ (25^{II}), CHN. U.S.A., Alabama, Winston County, 10 mi N of Double Springs, Sipsey River Recreation Area of Bankhead National Forest, 10 Apr 1992, *Naczi 2950* (MICH, NY).

** *Carex bulbostylis* Mack. [RN]

$2n = 54$ (27^{II}), CHN. U.S.A., Texas, Denton County, 4.2 mi W of junction of I-35 and Road 455 in Sanger, S of Road 455, along E side of Clear Creek, 26 Apr 1990, *Naczi 2328* (MICH, NY).

** *Carex calcifugens* Naczi [RN]

$2n = 52$ (26^{II}), CHN. U.S.A., South Carolina, Dorchester County, 6 mi SW of Summerville, along E side of Ashley River, N of route 17A, 22 Apr 1989, *Naczi 2059* (MICH, NY, PH).

Carex cespitosa L. [PJM,ML]

$2n = 78$ (39^{II}), CHN. Spain, Navarra, Lesaka, Zalain, 43°16′33.50″N, 01°41′48.60″W, 30 m, 16 Jul 2006, *Jiménez-Mejías & al. 99PJM06* (UPOS-1930).

** *Carex conoidea* Schkuhr ex Willd. [RN]

$2n = 68$ (34^{II}), CHN. Canada, New Brunswick, York County, Kings Landing, above St. John River, 26 Apr 1990, *Naczi 2347* (MICH, NY).

** *Carex corrugata* Fernald [RN]

$2n = 58$ (29^{II}), CHN. U.S.A., Virginia, Sussex County, 2 mi W of Homeville, along E side of Nottoway River, 0.3 mi N of route 40 crossing, 10 Jun 1989, *Naczi 2238* (MICH, NY).

** *Carex cusickii* Mack. ex Piper & Beattie [KSC,ME,AH]

$2n = 63$ ($30^{II}+1^{III}$), CHN. U.S.A., California, Butte County, Pat's Meadow, along Butte Creek, 0.6 mi W of Cherry Creek Campground, 40°05′55.50″N, 121°30′33.54″W, 19 Jul 2008, *Janeway & Gog 3197C* (MOR).

Carex demissa Hornem. [PJM]

$2n = 70$, CHN. Portugal, Sintra, Colares, 38°46′40.00″N, 09°26′15.00″W, 351 m, 3 Jan 2005, *Jiménez-Mejías & al. 06PJM05* (UPOS); 2 May 2005, *Jiménez-Mejías & al. 185PJM05* (UPOS-2866); Spain, Ávila, Sierra de Gredos, trail to Laguna Grande, 1915 m, 5 Jul 2004, *Jiménez-Mejías & al. 201PJM04* (UPOS-3518); Spain, Cádiz, Tarifa, 36°04′34.30″N, 05°31′50.40″W, 364 m, 16 Nov 2003, *Jiménez-Mejías & al. 28PJM03* (UPOS).

Carex demissa Hornem. × *C. lepidocarpa* Tausch [PJM]

$2n = 68$ (34^{II}), CHN. Spain, Asturias, Cangas de Onís, Ercina lake, 2 Sep 2004, *Marín 15504JMM* (UPOS-3577); Spain, Asturias, Somiedo mountain pass, 19 Jul 2005, *Jiménez-Mejías & al. 451PJM05* (UPOS-2615).

$2n = 70$ (35^{II}), CHN. Spain, Lleida, Val d'Arán, Baños de Tredós, 1800 m, 16 Aug 2005, *Luceño & al. 9205MLbis* (UPOS-1405).

** *Carex densa* (L.H.Bailey) L.H.Bailey [KSC,ME,AH]

$2n = 54$ (27^{II}), CHN. U.S.A., California, Butte County, Bidwell Park, 39°46′33.72″N, 121°45′47.04″W, 18 Jul 2008, *Janeway & Gog 3183A* (MOR).

Carex distans L. [ML,SMB]

$2n = 70$ (35^{II}), CHN. Turkey, Karaman, Sarıveliler, 36°41′32.40″N, 32°31′57.00″E, 1615 m, 29 Mar 2010, *Martín-Bravo & al. 112SMB10* (UPOS-7401) [Fig. 12F].

** *Carex ecklonii* Nees [ML]

$2n = 64$ (32^{II}), CHN. South Africa, Western Cape, Gordons bay, 8 m, 12 Sep 2009, *Luceño & al. s.n.* (UPOS-6503) [Fig. 12E].

** *Carex edwardsiana* E.L.Bridges & Orzell [RN]

$2n = 52$ (26^{II}), CHN. U.S.A., Texas, Bandera County, 4 mi N of Vanderpool, along E side of Sabinal River, just SE of Road 187, 26 Apr 1990, *Naczi 2321* (MICH, NY).

** *Carex flaccosperma* Dewey [RN]

$2n = 46$ (23^{II}), CHN. U.S.A., Arkansas, Cleveland County, 2 mi NW of New Edinburg, at junction of routes 97 and 8, Marks' Mill Battleground historic monument, 9 Apr 1991, *Naczi 2733* (MICH, NY).

** *Carex fracta* Mack. [KSC,AH]

$2n = 70$ (35^{II}), CHN. U.S.A., Oregon, Deschutes County, 44°27′17.928″N, 121°46′43.463″W, 3925 ft, 16 Aug 2008, *Wilson & Otting 15143* (MOR).

Carex glaucodea Tuck. ex Olney [RN]

$2n = 44$ (22^{II}), CHN. Canada, Ontario, Essex County, 3.5 mi ENE of Harrow, Colchester South Township, Concession III, lot 17, 10 Apr 1992, *Naczi 2954* (MICH, NY).

Agrees with counts of $2n = 22^{II}$ reported by Wahl (1940) from two plants.

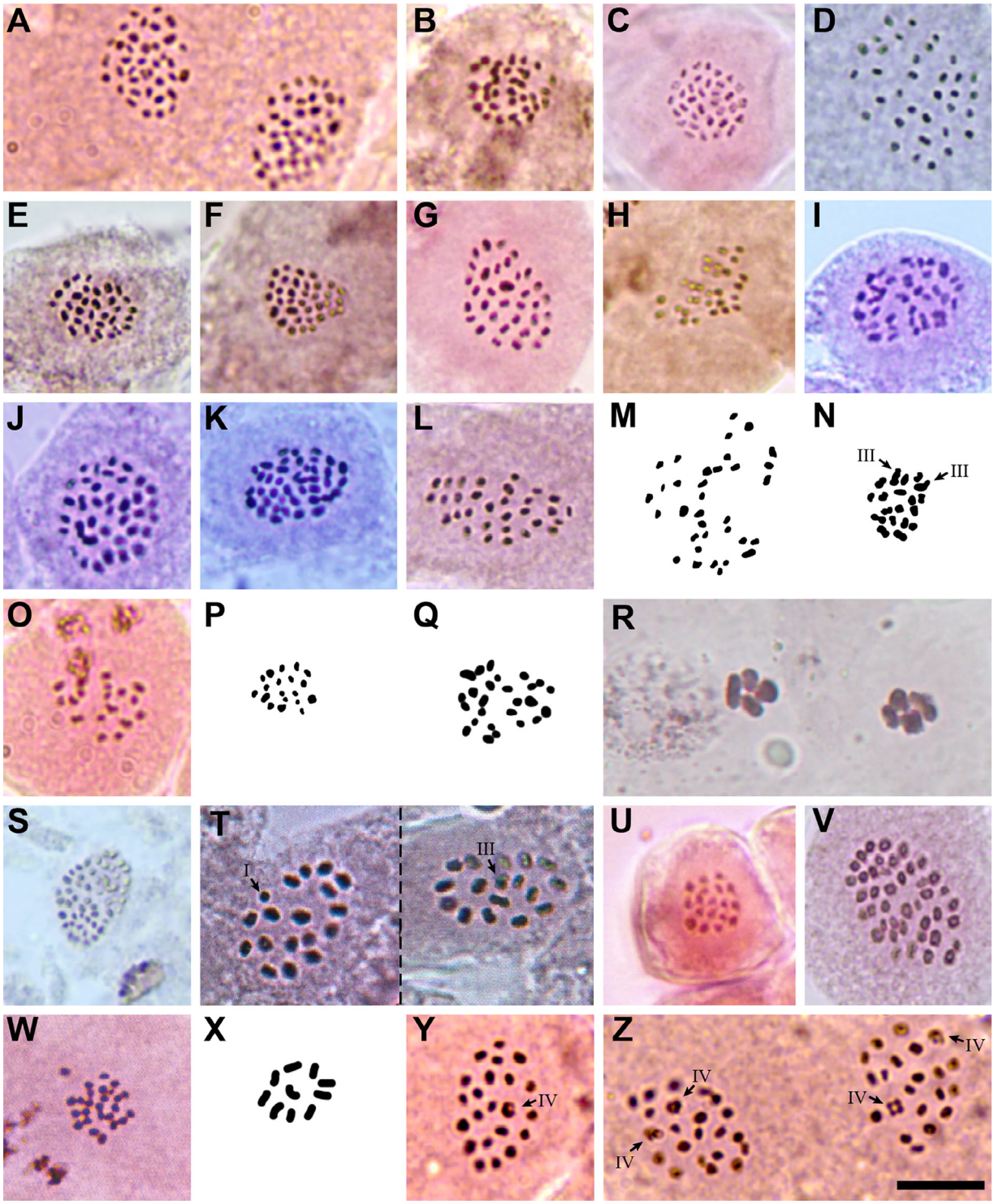

Fig. 12. Cyperaceae chromosomes. All images depict the metaphase of the meiosis I, except for *Carex rainbowii*, *Cyperus fuscus* and *Trianoptiles capensis*, taken from pollen grain mitosis. **A,** *Carex aethiopica*, $2n = 76$ (38^{II}); **B,** *C. borbonica*, $2n = 68$ (34^{II}); **C,** *C. borbonica* × *boryana*, $2n = 68$ (34^{II}); **D,** *C. boryana*, $2n = 68$ (34^{II}); **E,** *C. ecklonii*, $2n = 64$ (32^{II}); **F,** *C. distans*, $2n = 70$ (35^{II}); **G,** *C. oedipostyla*, $2n = 68$ (34^{II}); **H,** *C. rainbowii*, $n = 29$; **I,** *C. reuteriana* subsp. *mauritanica*, $2n = 74$ (37^{II}); **J,** *C. reuteriana* subsp. *mauritanica*, $2n = 74$ (37^{II}); **K,** *C. trinervis*, $2n = 82$ (41^{II}); **L,** *C. vixdentata*, $2n = 62$ (31^{II}); **M,** *Lagenocarpus guianensis*, $2n = 34$ (17^{II}); **N,** *Eleocharis confervoides* (= *Websteria submersa*), $2n = 40$ ($2^{III}+17^{II}$); **O,** *Cyperus fuscus*, $n = 18$; **P,** *C. salzmannianus* (= *Lipocarpha salzmanniana*), $2n = 38$ (19^{II}); **Q,** *C. subsquarrosus* (= *Hemicarpha micrantha*), $2n = 52$ (26^{II}); **R,** *Isolepis marginata*, $2n = 8$ (4^{II}); **S,** *Dracoscirpoides ficinioides*, $2n = 104$ (52^{II}); **T,** *Afroscirpoides dioeca* (= *Scirpoides dioeca*), $2n = 35$ ($17^{II}+1^{I}$, $1^{III}+16^{II}$); **U,** *Rhynchospora brownii*, $2n = 36$ (18II); **V,** *R. modesti-lucennoi*, $2n = 84$ (42^{II}); **W,** *Trianoptiles capensis*, $n = 26$; **X,** *Calyptrocarya glomerulata*, $2n = 20$ (10^{II}); **Y & Z,** *Chrysitrix capensis*, $2n = 46$ ($1^{IV}+21^{II}$, $2^{IV}+19^{II}$). — Scale bar = 10 µm.

** *Carex glomerabilis* V.I.Krecz. [JMC,ML]

2*n* = 60 (30^{II}), CHN. South Africa, Western Cape, Wilderness, Brown Hooded Kingfisher trail, between 33°59′01.30″S, 22°39′03.60″E and 33°58′36.90″S, 22°39′12.80″E, between 24 and 52 m, 14 Oct 2017, *Márquez-Corro & al. 196JMC17* (UPOS-9968).

** *Carex godfreyi* Naczi [RN]

2*n* = 50 (25^{II}), CHN. U.S.A., Florida, Clay County, 1 mi N of Green Cove Springs, Magnolia Springs, 0.4 mi N of route 17, W of Haven Avenue and S of stream, 13 Apr 1991, *Naczi 2740* (MICH, NY).

** *Carex grisea* Wahlenb. [RN]

2*n* = 56 (28^{II}), CHN. Canada, Québec, Deux Montagnes County, Oka, Parc Paul-Sauvé, floodplain of Lac des Deux Montagnes, near La Crête campground, 7 Apr 1988, *Naczi 1768* (MICH, NY).

The chromosome number report for *C. grisea* by Wahl (1940) is based on a misidentification. His voucher (*Wahl 15106*, BH, NCU, PAC) is *C. amphibola*.

Carex hitchcockiana Dewey [RN]

2*n* = 54 (27^{II}), CHN. Canada, Ontario, Hastings County, ca. 10 mi E of Belleville, W of Salmon River, along S side of route 401, 19 Apr 1988, *Naczi 1786* (MICH, NY).

Agrees with 2*n* = 27^{II} reported by Wahl (1940) from one plant.

** *Carex impressinervia* Bryson, Kral & Manhart [RN]

2*n* = 46 (23^{II}), CHN. U.S.A., Mississippi, Marion County, ca. 17 mi SSE of Columbia, 1 mi N of Pearl River County border, 2.3 mi E of route 43, 10 Apr 1992, *Naczi 2956* (MICH, NY).

** *Carex leporinella* Mack. [KSC,ME,AH]

2*n* = 82 (41^{II}), CHN. U.S.A., Idaho, Valley County, Snowbank Mountain, near pond beside the road up mountain, 44°25′08.472″N, 116°07′54.911″W, 20 Aug 2009, *Wilson & al. 15858* (MOR).

** *Carex mariposana* L.H.Bailey ex Mack. [KSC,ME,AH]

2*n* = 81 ($39^{II}+1^{III}$), CHN. U.S.A., California, Tuolumne County, Yosemite National Park, Gaylor Lake, 37°52′50.484″N, 119°23′53.483″W, 11 Aug 2009, *Taylor & al. 20752* (MOR).

** *Carex mesochorea* Mack. [KSC,ME,AH]

2*n* = 48 (24^{II}), CHN. U.S.A., Michigan, Washtenaw County, 14 Jul 2011, *Reznicek s.n.* (MOR).

* *Carex molesta* Mack. ex Bright [KSC,AH]

2*n* = 72 (36^{II}), CHN. U.S.A., Wisconsin, Dane County, 43°02′21.54″N, 89°25′55.2″W, 896 m, 17 Jun 2008, *Hipp & Gog 3137* (MOR).

** *Carex nervina* L.H.Bailey [KSC,ME,AH]

2*n* = 52 (26^{II}), CHN. U.S.A., California, Butte County, just E of Philbrook Reservoir, 40°01′20.28″N, 121°27′13.439″W, 18 Jul 2009, *Janeway & Gog 3195C* (MOR).

Carex nigra (L.) Reichard [PJM,ML,SMB]

2*n* = 83 ($40^{II}+1^{III}$), CHN. Portugal, Guarda, Covilha, Serra da Estrela, 40°18′51.00″N, 07°37′27.00″W, 1885 m, 1 Aug 2006, *Martín-Bravo 216SMB06* (UPOS); Spain, Ávila, Pinar de Hoyocasero, 1200 m, 3 Jul 2004, *Marín & Luceño 40JMM04* (UPOS); 12 May 2006, *Jiménez-Mejías & al. 31PJM06* (UPOS-2253); Spain, Granada, Sierra Nevada National Park, 2860 m, 19 Aug 2006, *Jiménez-Mejías & Escudero 160PJM06* (UPOS); Spain, Zamora, Puebla de Sanabria, Cubillas lagoon, 42°11′40.00″N, 06°43′41.00″W, 1800 m, 28 Aug 2007, *Martín-Bravo & al. 153SMB07* (UPOS).

2*n* = 84 (42^{II}), CHN. France, Corse, Ghisoni, 42°04′16.80″N, 09°11′12.10″E, 804 m, 4 May 2007, *Escudero & Luceño 89ME07* (UPOS); Greece, Epiro, Konitsa, Vasilitsa, 1580 m, 12 Jul 2004, *Vargas & Luceño 284PV04* (UPOS-831).

2*n* = 84 ($1^{I}+40^{II}+1^{III}$, 11 cells; $39^{II}+2^{III}$, 4 cells; 42^{II}, 1 cell), CHN. Portugal, Guarda, Covilha, Serra da Estrela, 40°18′51.00″N, 07°37′27.00″W, 1885 m, 1 Aug 2006, *Martín-Bravo 216SMB06* (UPOS).

2*n* = 84 (42^{II}), CHN. Spain, Ávila, pathway to Circo de Gredos, 13 May 2006, *Jiménez-Mejías 36PJM06* (UPOS).

2*n* = 84 (42^{II}, 2 indiv.), CHN. Spain, Almería, Bayárcal, 37°06′14.00″N, 03°00′28.00″W, 2350 m, 7 Aug 2006, *Jiménez-Mejías & García 153PJM06* (UPOS); Spain, Burgos, Sierra de Neila, 18 Jul 2006, *Jiménez-Mejías & al. 136PJM06* (UPOS-2220); Spain, Granada, Sierra Nevada National Park, 3085 m, 19 Aug 2006, *Jiménez-Mejías & Escudero 157PJM06* (UPOS).

2*n* = 84 ($39^{II}+2^{III}$+f), CHN. Spain, Soria, between Duruelo and Covaleda, 18 Jul 2006, *Jiménez-Mejías & al. 137PJM06* (UPOS-2221).

2*n* = 85 ($41^{II}+1^{III}$), CHN. Morocco, Marrakech, Oukaimedem, 31°11′04.00″N, 07°50′43.00″W, 12 May 2005, *Chaparro & al. 07AJC05* (UPOS-1632); Morocco, Rif, Djbel Tidighine, May 2007, *Jiménez-Mejías & al. 88PJM07* (UPOS-4750); Spain, Soria, Covaleda, 41°54′03.30″N, 02°49′27.60″W, 1134 m, 18 Jul 2006, *Jiménez-Mejías & al. 135PJM06* (UPOS-2218).

2*n* = 85 ($41^{II}+1^{III}$, 2 indiv.), CHN. Spain, Almería, Bayárcal, 37°06′14.00″N, 03°00′28.00″W, 2350 m, 7 Aug 2006, *Jiménez-Mejías & García 153PJM06* (UPOS).

2*n* = 86 ($41^{II}+1^{IV}$), CHN. Morocco, Rif, Djbel Tidighine, May 2007, *Jiménez-Mejías & al. 88PJM07* (UPOS-4750).

** *Carex oedipostyla* Duval-Jouve [ML]

2*n* = 68 (34^{II}), CHN. Spain, Cádiz, Alcalá de los Gazules, pathway to Aljibe peak, 36°30′42.00″N, 05°37′30.00″W, 860 m, Jul 2011, *Luceño & al. 1ML11* (UPOS-6228); 36°33′53.66″N, 05°36′06.61″W, 450 m, 23 Feb 2013, *Maguilla & al. 1EMSI3* (UPOS-5127) [Fig. 12G].

Carex oligocarpa Schkuhr ex Willd. [RN]

2*n* = 54 (27^{II}), CHN. U.S.A., Illinois, Kane County, Elgin, along W side of route 25, S of I-90, Trout Park, 14 May 1991, *Naczi 2902* (MICH, NY).

Agrees with count of 2*n* = 27^{II} reported by Wahl (1940) from one plant.

* *Carex oronensis* Fernald [KSC,AH]

2*n* = *68, *71, 74 (34^{II}, $30^{II}+2^{III}+1^{V}$, 37^{II}), CHN. U.S.A., Maine, Penobscot County, E side of Maine Hwy 2 across from Mt. Hope Cemetery in Veazie, opposite main entrance and just S of Mt. Hope Ave, 44°49′21″N, 68°43′16″W, 27 Jun 2009, *Reznicek 11968* (MOR).

** *Carex ouachitana* Kral, Manhart & Bryson [RN]

2*n* = 52 (26^{II}), CHN. U.S.A., Arkansas, Polk County, summit of Rich Mountain, N of route 88 across from fire tower, 7 Apr 1988, *Naczi 1774* (MICH, NY).

* *Carex pachycarpa* Mack. [KSC,AH]

2*n* = 70 (35^{II}), CHN. U.S.A., Oregon, Lake County, 42°03′44.712″N, 120°09′35.28″W, 5734 ft, 10 Jul 2008, *Otting & Wilson 1945B* (MOR).

42°03′35.104″N, 120°09′53.083″W, 10 Jul 2008; *Wilson & Otting 14947* (MOR), *Wilson & Otting 14948* (MOR); 42°03′29.611″N, 120°10′4.29″W, 10 Jul 2008, *Wilson & N. Otting 14949* (MOR); 42°03′35.104″N, 120°09′53.082″W, 5808 ft, 24 Jul 2008, *Wilson & Otting 15017* (MOR).

*2*n* = 74 (37^{II}), CHN. U.S.A., Oregon, Lake County, 42°03′35.104″N, 120°09′53.083″W, 24 Jul 2008, *Wilson 15018* (MOR).

* *Carex pachystachya* Cham. ex Steud. KSC,AH

2*n* = 82 (41^{II}), CHN. U.S.A., Oregon, Lake County, 43°36′50.586″N, 122°07′3.752″W, 4310 ft, 25 Jul 2008, *Wilson 15052* (MOR).

** *Carex paeninsulae* Naczi, E.L.Bridges & Orzell RN

2*n* = 48 (24^{II}), CHN. U.S.A., Florida, Clay County, 1 mi N of Green Cove Springs, Magnolia Springs, 0.4 mi N of route 17, W of Haven Avenue and S of stream, 10 Apr 1992, *Naczi 2958* (MICH, NY).

** *Carex petasata* Dewey KSC,AH

2*n* = 74 (37^{II}), CHN. U.S.A., Oregon, Lake County, 42°03′45.775″N, 120°09′18.064″W, 5749 ft, 24 Jul 2008, *Wilson 15019* (MOR).

** *Carex pigra* Naczi RN

2*n* = 56 (28^{II}), CHN. U.S.A., Alabama, Morgan County, 2 mi N of Falkville along W side of route 31, 9 Apr 1991, *Naczi 2735* (MICH, NY).

** *Carex planispicata* Naczi RN

2*n* = 50 (25^{II}), CHN. U.S.A., Alabama, Madison County, Huntsville, Monte Sano State Park, along hiking trail near the Sinks, 22 Apr 1989, *Naczi 2060* (MICH, NY).

Carex projecta Mack. KSC,AH

2*n* = 62 (31^{II}), CHN. U.S.A., Michigan, Menominee County, *Rothrock 4070* (MOR).

2*n* = 64 (32^{II}), CHN. U.S.A., Ontario, Simcoe County, *Rothrock 3971* (MOR).

2*n* = 66 (33^{II}), CHN. U.S.A., Maine, Washington County, *Rothrock 3970* (MOR). U.S.A., Wisconsin, Price County, *Rothrock 4289* (MOR).

One population of 2*n* = 66 and the counts 2*n* = 62 and 2*n* = 64 correspond to the unpublished data cited by Hipp (2007).

Carex radiata (Wahlenb.) Small KSC,AH

2*n* = 58 (29^{II}), CHN. U.S.A., Wisconsin, Dane County, 43°02′25.14″N, 89°25′50.58″W, 880 ft, 17 Jun 2008, *Hipp & Gog 3133* (MOR).

** *Carex rainbowii* Luceño, Jim.Mejías, M.Escudero & Martín-Bravo ME,ML,SMB

n = 29 (pollen grain mitosis), CHN. South Africa, KwaZulu-Natal, Rainbow gorge, 28°57′35.00″S, 29°13′34.00″E, 1525 m, 13 Nov 2011, *Martín-Bravo & Luceño 120SMB11* (UPOS-5030) [Fig. 12H].

* *Carex retroflexa* Muhl. ex Willd. KSC,ME,AH

2*n* = 42 (29^{II}), CHN. U.S.A., Michigan, Washtenaw County, Huron Parkway Nature Area, 14 Jun 2009, *Reznicek & Walters s.n.* (MOR).

Carex reuteriana subsp. *mauritanica* (Boiss. & Reut.) Jim.Mejías & Luceño PJM

2*n* = 74 (37^{II}, 2 indiv.), CHN. Spain, Huelva, La Nava, Múrtiga river, 5 Jan 2005, *Jiménez-Mejías & al. 22PJM05* (UPOS) [Fig. 12I].

2*n* = 74 (37^{II}), CHN. Spain, Córdoba, Villaviciosa de Córdoba, 38°05′03.00″N, 04°57′15.00″W, 24 Mar 2005, *Escudero & al. 4ME05* (UPOS) [Fig. 12J].

** *Carex simulata* Mack. KSC,ME,AH

2*n* = 64 (32^{II}), CHN. U.S.A., Colorado, Boulder County, Redrock Lake, 40°04′53.40″N, 105°32′23.74″W, 2 Aug 2009, *Chung & Lederer 1039* (MOR).

** *Carex subbracteata* Mack. KSC,ME,AH

2*n* = 80 (40^{II}), CHN. U.S.A., Washington, San Juan County, 48°28′48.00″N, 123°03′42.00″W, 29 Aug 2009, *Zika 24641* (MOR).

* *Carex subfusca* W.Boott KSC,ME,AH

2*n* = 82 (41^{II}), CHN. U.S.A., Oregon, Lake County, 42°29′19.383″N, 120°44′08.89″W, 6078 ft, 4 Aug 2008, *Wilson & al. 15068* (MOR).

* 2*n* = 86 (43^{II}), CHN. U.S.A., Nevada, Washoe County, Tahoe Meadows, 1.5 air km SW of Mt. Rose Highway summit, on Route 341, northern Sierra Nevada Highlands, 39°18′00.00″N, 119°54′00.00″W, 20 Aug 2009, *Zika 24619* (MOR).

** *Carex thornei* Naczi RN

2*n* = 50 (25^{II}), CHN. U.S.A., Georgia, Decatur County, Army Corps of Engineers' East Bank Campground on Lake Seminole, 14 Apr 1988, *Naczi 1779* (MICH, NY).

* *Carex tincta* (Fernald) Fernald KSC,AH

2*n* = 72 (36^{II}), CHN. U.S.A., Maine, Hancock County, 44°35′35.02″N, 68°30′36.00″W, 4 Jul 1999, *Reznicek 10919A* (MOR).

Carex tribuloides Wahlenb. KSC,AH

2*n* = 70 (35^{II}), CHN. U.S.A., Indiana, Grant County, *Rothrock 4243* (MOR). U.S.A., Indiana, St. Joseph County, *Rothrock 3839C* (MOR).

2*n* = 72 (36^{II}), CHN.U.S.A., Indiana, St. Joseph County, *Rothrock 3839A* (MOR).

* *Carex trinervis* Degl. ML

* 2*n* = * 82, 84 (41^{II}, 42^{II}), CHN. Portugal, Coimbra, Figueira da Foz, Lagoa da Vela, 4 Jan 2005, *Jiménez-Mejías & al. 10PJM05* (UPOS) [Fig. 12K].

** *Carex vernacula* L.H.Bailey KSC,ME,AH

2*n* = 52 (26^{II}), CHN. U.S.A., Colorado, Gunnison County, summit of Cement Creek, 38°58′16.536″N, 106°46′30.144″W, 4 Aug 2009, *Chung 1063* (MOR).

Carex viridula Michx. ML

2*n* = 70 (35^{II}), CHN. Greece, Pellas, Pamagista, Voras mountain, 2200 m, 15 Aug 2004, *Luceño 1404ML* (UPOS-691).

** *Carex vixdentata* (Kük.) G.A.Wheeler ML

2*n* = 62 (31^{II}), CHN. Argentina, Buenos Aires, Mar de Ajó, 3 Dec 2002, *Marín 2102JMM* (UPOS-849) [Fig. 12L].

TRIBE CARPHEAE

*** *Trianoptiles capensis* (Steud.) Harv. ML

2*n* = 52 (26^{II}), CHN. South Africa, Western Cape Province, Cape Town, Kenilworth Race Course, Sep 2009, *Muasya & al. 4549* (BOL) [Fig. 12W].

TRIBE CRYPTANGIEAE

****Lagenocarpus guianensis* Nees [ML]

2*n* = 34 (17^{II}), CHN. Brazil, Pernambuco, Dois Irmãos, Açude do Prata, 1995, *Luceño & al. s.n.* (UFP) [Fig. 12M].

TRIBE CYPEREAE

****Afroscirpoides dioeca* (Kunth) García-Madr. & Muasya (≡ *Scirpoides dioeca* (Kunth) J.Browning) [ML]

2*n* = 35 ($17^{II}+1^{I}$, $1^{III}+16^{II}$), CHN. South Africa, Western Cape Province, Yzerfontein, Sep 2009, *Muasya & al. 4557* (BOL) [Fig. 12T].

Cyperus fuscus L. [ML]

2*n* = 36 (18^{II}), CHN. Spain, Seville, Pablo de Olavide University campus, Jul 2009, *M. Luceño s.n.* (UPOS) [Fig. 12O].

***Cyperus salzmannianus* (Steud.) Bauters (= *Lipocarpha salzmanniana* Steud.) [ML]

2*n* = 38 (19^{II}), CHN. Brazil, Rio Grande do Norte, Genipabú, 1995, *M. Luceño & al. s.n.* (UFP) [Fig. 12P].

n = 18, 19, 20 (pollen grain mitosis), CHN. Brazil, Pernambuco, Porto de Galinhas, 1996, *Luceño & Guerra s.n.* (UFP).

***Cyperus sesquiflorus* (Torr.) Mattf. & Kük. (= *Kyllinga odorata* Vahl) [ML]

2*n* = 108 (54^{II}), CHN. Brazil, Pernambuco, Recife, Cidade Universitária, Universidade Federal de Pernambuco campus, 1995, *Luceño & al. s.n.* (UFP).

***Cyperus subsquarrosus* (Muhl.) Bauters (= *Hemicarpha micrantha* (Vahl) Britton) [ML]

2*n* = 52 (26^{II}), CHN. Brazil, Pernambuco, Recife, Cidade Universitária, Universidade Federal de Pernambuco campus, 1995, *Luceño & al. s.n.* (UFP) [Fig. 12Q].

2*n* = 54 (27^{II}), CHN. Brazil, Pernambuco, Recife, Cidade Universitária, Universidade Federal de Pernambuco campus, 1995, *Luceño & al. s.n.* (UFP).

The same chromosome number was found in other specimen of the same population.

****Dracoscirpoides ficinioides* (Kunth) Muasya [ML]

2*n* = 104 (52^{II}), CHN. South Africa, KwaZulu-Natal, Garden Castle, 29°45′01.10″S, 29°12′43.10″E, 1803 m, 16 Nov 2012, *Maguilla & al. 79EMSI2* (UPOS) [Fig. 12S].

***Isolepis marginata* (Thunb.) A.Dietr. [MM]

2*n* = 8 (4^{II}), CHN. South Africa, Cape Town, Rhodes Memorial, Sep 2009, *Muasya & al. 4516* (BOL) [Fig. 12R].

TRIBE ELEOCHARIDEAE

***Eleocharis confervoides* (Poir.) Steud. (= *Websteria submersa* (C.Wright) Britton) [ML]

2*n* = 38, 40, 41 (19^{II}, 1 indiv.; $2^{III}+17^{II}$, 1 indiv.; $2^{III}+17^{II}$, $1^{III}+18^{II}+1^{I}$, $1^{III}+19^{II}$, 1 indiv.), *n* = 20–21 (in pollen grain mitosis), CHN. Brazil, Pernambuco, Dois Irmãos, Açude do Prata, 1995, *Luceño & al. s.n.* (UFP) [Fig. 12N].

TRIBE RHYNCHOSPOREAE

Rhynchospora brownii Roem. & Schult. [ML]

2*n* = 36 (18^{II}), CHN. South Africa, KwaZulu-Natal, Drakensberg, Cathedral Peak, 29°56′39.20″S, 29°13′29.50″E, 1377 m, 20 Dec 2008, *Luceño & al. 125ML08* (UPOS-3707) [Fig. 12U].

***Rhynchospora modesti-lucennoi* Castrov. [ML]

2*n* = 84 (42^{II}), CHN. Portugal, Setúbal, Alcácer do Sal, 38°23′43.70″N, 08°40′05.10″W, 11 m, 30 Apr 2005, *Jiménez-Mejías & al. 113PJM05* (UPOS-1394) [Fig. 12V].

TRIBE SCHOENEAE

**Schoenus nigricans* L. [ML]

2*n* = 76 (38^{II}), CHN. Spain, Huelva, Doñana National Park, Punta del Malandar, 25 Feb 2007, *Jiménez-Mejías & al. 3PJM07* (UPOS-2857).

SUBFAMILY MAPANIOIDEAE

TRIBE CHRYSITRICHEAE

! *Chrysitrix capensis* L. [ML]

2*n* = 46 ($1^{IV}+21^{II}$, $2^{IV}+19^{II}$, $1^{III}+21^{II}+1^{I}$), CHN. South Africa, Western Cape Province, Cape Town, Table Mountain, Sep 2009, *Muasya & al. 4540* (BOL) [Fig. 12Y, Z].

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The research was supported by the state projects LIN SB RAS #AAAA-A16-116122110060-9.

HYDROCHARITACEAE

Elodea canadensis Michx.

2*n* = 48, CHN. Russia, Irkutskaya Oblast', Irkutsk city, Akademgorodok, left bank of Angara River, 52°15′03″N, 104°17′00″E, in water, 10 Oct 2017, *A.V. Natyaganova & Yu.S. Bukin 50785* (IRK) [Fig. 13A]; Russia, Irkutskaya Oblast', Irkutskii District, Lake Baikal, 2 km SW of Bol'shie Koty village, opposite of Zhilishche fold, 51°53′32″N,

105°02′46″E, in water, 7 Jun 2018, *A.V. Natyaganova 50789* (IRK); Russia, Irkutskaya Oblast', Irkutsk city, Pervomaiskii microdistrict, pond near the public transport station Botanical Garden, 52°15′42″N, 104°14′35″E, in water, 10 Jul 2018, *A.V. Natyaganova 50786* (IRK) [Fig. 13B]; Russia, Irkutskaya Oblast', Ol'khonskii District, Lake Baikal, Maloe More strait, Mukhor bay, 53°03′12″N, 106°48′09″E, in water, 12 Jul 2018, *Yu.R. Zakharova & M.V. Bashenkhaeva 50791* (IRK); Russia, Irkutskaya Oblast', Irkutsk city, Novo-Leninskii lake-marsh complex, near the public transport station Uzlovaya, 52°19′43″N, 104°13′59″E, in water, 12 Jul 2018, *A.V. Natyaganova 50787* (IRK) [Fig. 13C]; Russia, Irkutskaya Oblast', Irkutskii District, Lake Baikal, Listvyanka settlement, 51°51′01″N, 104°52′02″E, in water, 20 Jul 2018, *E.V. Mincheva 50788* (IRK) [Fig. 13D]; Russia, Irkutskaya Oblast', Ust'-Kut city, right bank of Lena River, in area of bridge across the river, 56°47′27″N, 105°46′59″E, in water, 24 Jul 2018, *M.P. Tskhovrebova 50795* (IRK) [Fig. 13E]; Russia, Irkutskaya Oblast', Irkutskii District, Lake Baikal, Bol'shoe Goloustnoe settlement, at the pier of ships, 52°01′37″N, 105°24′24″E, in water, 29 Jul 2018, *A.V. Natyaganova 50796* (IRK) [Fig. 13F]; Russia, Irkutskaya Oblast', Irkutsk city, Akademgorodok, left bank of Angara River, backwater, 52°15′00″N, 104°17′05″E, 423 m, in water, 7 Aug 2018, *D.A. Krivenko & A.V. Natyaganova 50771* (IRK); Russia, Republic of Buryatiya, Barguzinskii District, Lake Baikal, Chivyrkuiskii bay, Zmeinaya cove in area of hot springs, 53°46′05″N, 109°01′20″E, in water, 2 Jun 2018, *A.V. Natyaganova 50790* (IRK); Russia, Republic of Buryatiya, Severo-Baykal'skii District, Lake Baikal, Nizhneangarsk city, at the pier of ships, 55°45′59″N, 109°33′09″E, in water, 3 Jun 2018, *A.V. Natyaganova 50792* (IRK); Russia, Republic of Buryatiya, Kabanskii District, Lake Baikal, Posolskii sor bay, 51°57′15″N, 106°08′12″E, in water, 25 Jul 2018, *L.S. Kravtsova 50793* (IRK) [Fig. 13G]; Russia, Zabaikal'skii Krai, Chitinskii District, southern part of Vitim Plateau, Ivano-Arakhleyskaya system of lakes, Shakshinskoe Lake, 52°09′21″N, 112°43′46″E, in water, 17 Jun 2014, *E.V. Mincheva 50794* (IRK); Russia, Moskovskaya Oblast', Pushchino town, Fianovskii pond, 59°49′12″N, 37°37′12″E, in water, 20 Oct 2018, *Yu.S. Bukin 51398* (IRK).

Egeria densa Planch.

2*n* = 48, CHN. Russia, Moskovskaya Oblast', Lyubertsy urban district, Kraskovo suburban village, Pekhorka River opposite Karl Marx Str. 1, 115 m, 55°39′39″N, 37°58′15″E, in water, 22 Sep 2018, *A.V. Natyaganova 51053* (IRK).

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* First chromosome count for the species.
** New chromosome number (cytotype) for the species.
▼ New chromosome count from an Indian accession.

The study is supported by financial grant under DBT-IPLS Project (Reference number: BT/PR 4548/INF/22/146/2012).

ASTERACEAE

▼ *Arctium lappa* L.

n = 17, CHN. India, Uttarakhand, Uttarkashi, way to Har ki Doon, 31°07′28.71″N, 78°22′06.10″E, 2800 m, 21 Aug 2015, *S.K. Pradhan 32112* (PUN 60928) [Fig. 14A].

The present chromosome number is in agreement with the previous report of 2*n* = 34 from outside of India (Ge & al., 1989). From India, this chromosome number is reported here for the first time. For this species also other cytotypes were reported from India, namely *n* = 16 (Bala & Gupta, 2011), *n* = 18 (Mehra, 1976) and 2*n* = 36 from outside of India (Májovský & al., 1970; Pagni & Corsi, 1979; Huang & al., 1988).

** *Carduus edelbergii* Rech.f.

n = 16, CHN. India, Uttarakhand, Uttarkashi, Bhaironghati, 31°01′40.83″N, 78°52′06.09″E, 2790 m, 15 Jun 2016, *S.K. Pradhan 32149* (PUN 60929) [Fig. 14B].

The present chromosome count is the first report of tetraploid, based on 2*n* = 16 reported from outside of India (Podlech & Dieterle, 1969). From India, *n* = 20 has also been reported (Malik & al., 2011).

* *Cremanthodium arnicoides* (DC. ex Royle) R.D.Good

n = 9, CHN. India, Uttarakhand, Uttarkashi, Bhojwasa, 30°57′06.78″N, 79°02′58.34″E, 3808 m, 17 Jun 2016, *S.K. Pradhan 32150* (PUN 60930) [Fig. 14C].

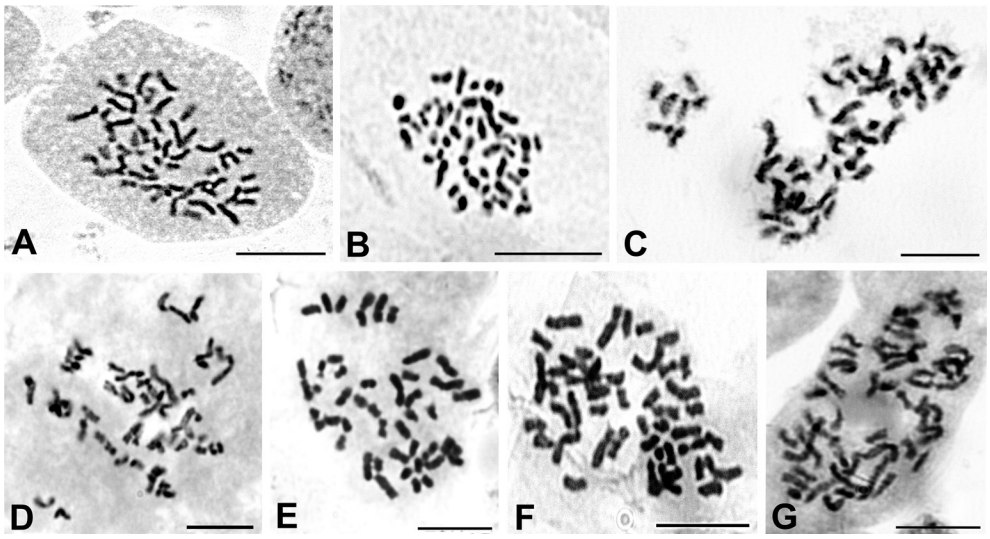

Fig. 13. Mitotic metaphases. **A–G,** *Elodea canadensis*, 2*n* = 48. — Scale bars = 10 µm.

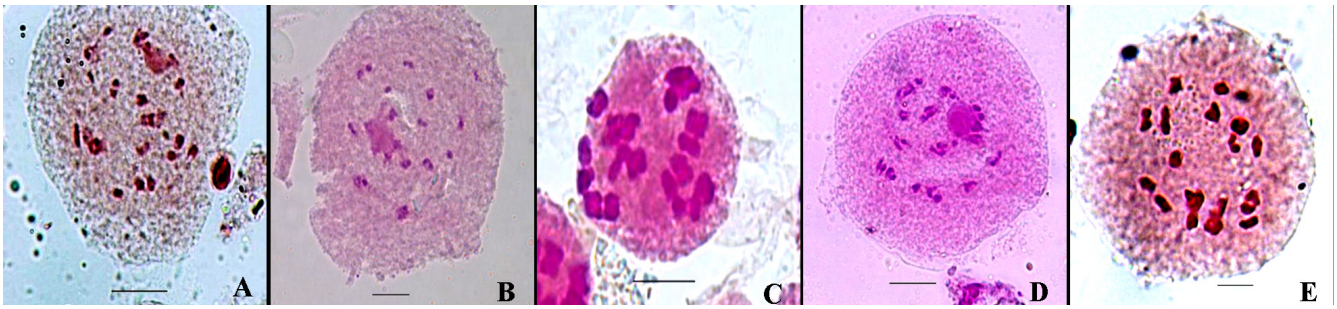

Fig. 14. A, *Arctium lappa*, PMC at diakinesis, *n* = 17 (PUN 60928); **B,** *Carduus edelbergii*, PMC at diakinesis, *n* = 16 (PUN 60929); **C,** *Cremanthodium arnicoides*, PMC at anaphase I, *n* = 9 (PUN 60930); **D,** *Saussurea auriculata*, PMC at diakinesis, *n* = 16 (PUN 60715); **E,** *Saussurea costus*, PMC at metaphase I, *n* = 17 (PUN 58869). — Scale bars = 10 µm

Saussurea auriculata (DC.) Sch.Bip.

n = 16, CHN. India, Uttarakhand, Uttarkashi, Dayara Bugyal, 3100 m, 30°51′35.38″N, 78°35′00.65″E, 30 Aug 2015, *S.K. Pradhan 32138* (PUN 60715) [Fig. 14D].

Previously, 2*n* = 32 (Singh & al., 2016) was reported from India.

** *Saussurea costus* (Falc.) Lipsch.

n = 17; India, Uttarakhand, Uttarkashi, Gangar, 31°06′24.58″N, 78°18′55.66″E, 2400 m, 20 Aug 2015, *S.K. Pradhan 32104* (PUN 58869) [Fig. 14E].

Previously the chromosome number of 2*n* = 36 (Siddique & Wafai, 1993) was reported from India.

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Financial support from CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), and INSA (Instituto Nacional do Semiárido).

Methods for chromosome analysis are according to Guerra & Souza (2002).

* First chromosome count for the species.
** New cytotype for the species.

APOCYNACEAE

** *Allamanda doniana* Müll.Arg.

2*n* = 27, CHN. Brazil, Ceará, Guaraciaba do Norte, 04°19′55″S, 40°51′08″W, 20 Apr 2014, *E.M. Almeida 1137* (EAN) [Fig. 15A].

Aspidosperma pyrifolium Mart.

2*n* = 34, CHN. Brazil, Paraíba, Areia, 06°58′12″S, 35°42′47″W, 3 Feb 2015, *A.M.S. Santos 24* (EAN) [Fig. 15B].

Mandevilla bahiensis (Woodson) M.F.Sales & Kin.-Gouv.

2*n* = 20, CHN. Brazil, Bahia, Piatã, 13°09′24″S, 41°45′53″W, 29 Apr 2015, *L.P. Felix 15520* (EAN) [Fig. 15C].

**Mandevilla catimbauensis* Souza-Silva, Rapini & J.F. Morales
2*n* = 26, CHN. Brazil, Pernambuco, Buíque, 08°35′37″S, 37°12′20″W, 30 Jul 2014, *J.M.P. Cordeiro 379* (EAN) [Fig. 15D].

Mandevilla dardanoi M.F.Sales, Kin.-Gouv. & A.O. Simões
2*n* = 20, CHN. Brazil, Alagoas, União dos Palmares, 09°02′06″S, 35°52′32″W, 30 Oct 2014, *J.M.P. Cordeiro 481* (EAN) [Fig. 15E].

**Mandevilla leptophylla* (A.DC.) K.Schum.
2*n* = 18, CHN. Brazil, Ceará, Meruoca, 03°32′03″S, 40°26′11″W, 26 Aug 2014, *L.P. Felix 15060* (EAN) [Fig. 15F].

Mandevilla tenuifolia (J.C.Mikan) Woodson
2*n* = 20, CHN. Brazil, Ceará, São Benedito, 04°07′17″S, 40°51′02″W, 20 Apr 2014, *E.M. Almeida 1165* (EAN) [Fig. 15G].

Marsdenia caatingae Morillo
2*n* = 22, CHN. Brazil, Paraíba, Esperança, 07°04′19″S, 35°58′13″W, 16 Jun 2015, *A.S. Santos 26* (EAN) [Fig. 16A].

**Marsdenia hilariana* E.Fourn.
2*n* = 22, CHN. Brazil, Ceará, Meruoca, 03°32′15″S, 40°35′37″W, 26 Aug 2014, *L.P. Felix 15063* (EAN) [Fig. 16B].

**Marsdenia megalantha* Goyder & Morillo
2*n* = 22, CHN. Brazil, Ceará, Quixadá, 03°48′29″S, 40°57′29″W, 21 Apr 2014, *E.M. Almeida 1169* (EAN) [Fig. 16C].

Peltastes peltatus (Vell.) Woodson
2*n* = 18, CHN. Brazil, Pernambuco, Taquaritinga do Norte, 07°53′28″S, 36°02′06″W, 31 Mar 2012, *L.P. Felix 13771* (EAN) [Fig. 16D].

**Petalostelma dardanoi* Fontella
2*n* = 20, CHN. Brazil, Paraíba, Cabaceiras, 07°22′39″S, 36°17′35″W, 25 Jun 2014, *J.M.P. Cordeiro 258* (EAN) [Fig. 16E].

Tabernaemontana catharinensis A.DC.
2*n* = 22, CHN. Brazil, Ceará, Poranga, 04°45′17.5″S, 40°52′02″W, 18 Apr 2014, *L.P. Felix 14943* (EAN) [Fig. 16F].

Tabernaemontana solanifolia A.DC.
2*n* = 22, CHN. Brazil, Bahia, Jacobina, 11°11′35″S, 40°29′51″W, 15 Jan 2015, *J.M.P. Cordeiro 654* (EAN) [Fig. 16G].

**Temnadenia stellaris* (Lindl.) Miers
2*n* = 18, CHN. Brazil, Paraíba, Mamanguape, 06°44′22″S, 35°10′30″W, 27 Nov 2014, *J.M.P. Cordeiro 591* (EAN) [Fig. 16H].

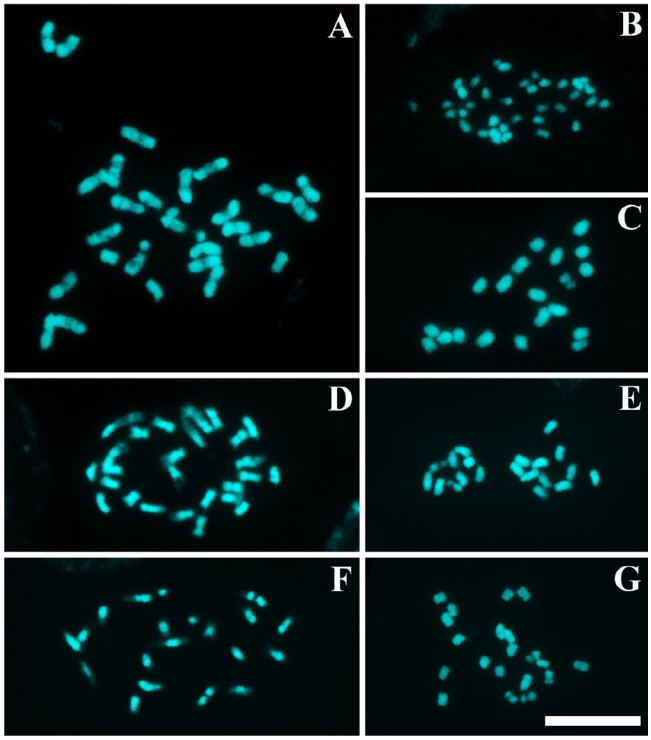

Fig. 15. Chromosome complements of species belonging to the family Apocynaceae occurring on inselbergs: **A,** *Allamanda doniana*, 2*n* = 27; **B,** *Aspidosperma pyrifolium*, 2*n* = 34; **C,** *Mandevilla bahiensis*, 2*n* = 20; **D,** *M. catimbauensis*, 2*n* = 26; **E,** *M. dardanoi*, 2*n* = 20; **F,** *M. leptophylla*, 2*n* = 18; **G,** *M. tenuifolia*, 2*n* = 20. — Scale bar in G = 10 µm.

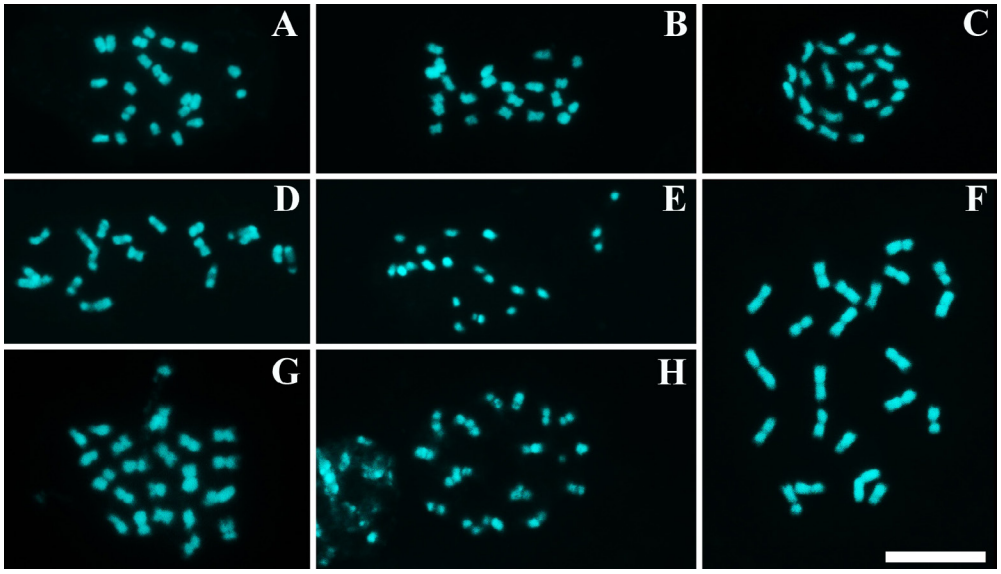

Fig. 16. Chromosome complements of species belonging to the family Apocynaceae occurring on inselbergs: **A,** *Marsdenia caatingae*, 2*n* = 22; **B,** *M. hilariana,* 2*n* = 22; **C,** *M. megalantha*, 2*n* = 22; **D,** *Peltastes peltatus*, 2*n* = 18; **E,** *Petalostelma dardanoi*, 2*n* = 20; **F,** *Tabernaemontana catharinensis*, 2*n* = 22; **G,** *T. solanifolia*, 2*n* = 22; **H,** *Temnadenia stellaris,* 2*n* = 18. — Scale bar in F = 10 µm.

ARACEAE

***Anthurium affine* Schott

2*n* = 30, CHN. Brazil, Paraíba, Areia, 07°00′31″S, 35°44′53″W, 25 Mar 2014, *E.M. Almeida 1069* (EAN) [Fig. 17A].

COMMELINACEAE

***Aneilema brasiliense* C.B.Clarke

2*n* = 24, CHN. Brazil, Paraíba, Matureia, 07°14′41″S, 37°25′10″W, 14 May 2016, *L.P. Felix 15908* (EAN) [Fig. 17B].

Commelina diffusa Burm.f.

2*n* = 30, CHN. Brazil, Paraíba, Esperança, 07°04′19″S, 35°58′13″W, 16 Jun 2015, *A.S. Santos 32* (EAN) [Fig. 17C].

2*n* = 60, CHN. Brazil, Paraiba, Areia, 07°00′31″S, 35°44′53″W, 25 Mar 2014, *E.M. Almeida 1067* (EAN) [Fig. 17D].

Commelina obliqua Vahl

2*n* = 60, CHN. Brazil, Pernambuco, Buíque, 08°35′37″S, 37°12′18″W, 1 Jul 2015, *L.P. Felix 15665* (EAN) [Fig. 17E].

Dichorisandra hexandra (Aubl.) Standl.

2*n* = 76, CHN. Brazil, Pernambuco, Bonito, 08°30′40″S, 35°43′26″W, 3 Jul 2015, *L.P. Felix 15736* (EAN) [Fig. 17F].

Tradescantia ambigua Mart.

2*n* = 24, CHN. Brazil, Paraíba, Campina Grande, 07°11′02″S, 35°59′01″W, 16 Jun 2015, *A.S. Santos 18* (EAN) [Fig. 17G].

COSTACEAE

**Chamaecostus subsessilis* (Nees & Mart.) C.D.Specht & D.W.Stev.

2*n* = 18, CHN. Brazil, Paraíba, Areia, 07°00′31″S, 35°44′53″W, 25 Mar 2014, *E.M. Almeida 1074* (EAN). [Fig. 18A]

EUPHORBIACEAE

**Cnidoscolus urens* (L.) Arthur

2*n* = 72, CHN. Brazil, Paraíba, Areia, 07°00′31″S, 35°44′53″W, 25 Mar 2014, *E.M. Almeida 1076* (EAN) [Fig. 18B].

MELASTOMATACEAE

**Tibouchina heteromalla* (D.Don) Cogn.

2*n* = 36, CHN. Brazil, Paraiba, Areia, 07°00′31″S, 35°44′53″W, 25 Mar 2014, *E.M. Almeida 1077* (EAN) [Fig. 18C].

SOLANACEAE

**Solanum polytrichum* Moric.

2*n* = 24, CHN. Brazil, Bahia, Una, 15°10′37″S, 39°03′29″W, 10 Feb 2015, *E.M. Almeida 1409* (EAN) [Fig. 18D].

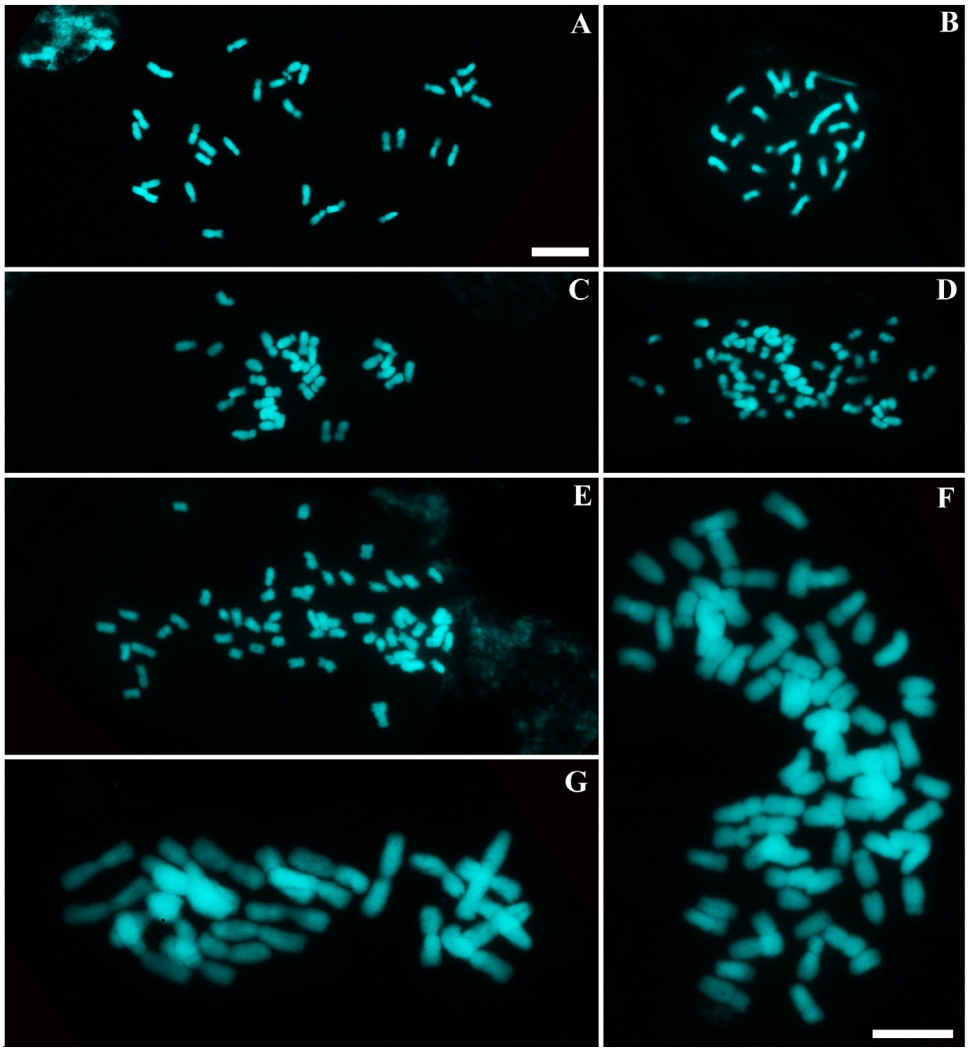

Fig. 17. Chromosome complements of species occurring on inselbergs: Araceae – **A,** *Anthurium affine*, 2*n* = 30; Commelinaceae – **B,** *Aneilema brasiliense*, 2*n* = 24; **C,** *Commelina diffusa*, 2*n* = 30; **D,** *C. diffusa*, 2*n* = 60; **E,** *C. obliqua*, 2*n* = 60; **F,** *Dichorisandra hexandra*, 2*n* = 76; **G,** *Tradescantia ambigua*, 2*n* = 24. — Scale bars in A and F = 10 µm.

VELLOZIACEAE

* *Vellozia plicata* Mart.

2*n* = 18, CHN. Brazil, Paraíba, Patos, 07°04′15.8″S, 37°13′48.2″W, 1 Nov 2013, *L.P. Felix 14525* (EAN) [Fig. 18E].

VITACEAE

Cissus decidua Lombardi

2*n* = 34, CHN. Brazil, Paraíba, Cabaceiras, 07°22′39″S, 36°17′35″W, 24 Jun 2014, *J.M.P. Cordeiro 260* (EAN) [Fig. 18F].

Inselbergs, also known as rock outcrops, are granitic or gneiss geological formations from pre-Cambrian that stand out in a flat landscape (Sarthou & al., 2010). These formations are characterized by the presence of severe edaphoclimatic conditions in relation to the surrounding environment, which are important selective pressures for plant evolution and speciation. Generally, those rock outcrops are isolated geographically in relation to other habitats, forming islands of plant species that can present morphological and chromosomal differentiation, especially polyploidy, generally related to the species diversification (Dodsworth & al., 2016). We analyzed here 27 species belonging to nine different angiosperm families, occurring on inselbergs from the Northeast region of Brazil. Emphasis in the present work was given to the families Apocynaceae and Commelinaceae, due to the number of species belonging to both families.

Root tips obtained directly from the cultivated material were pre-treated with 0.002 M 8-hydroxyquinoline (8HQ) for 24 h (except Commelinaceae that went by 4 h) in a refrigerator and subsequently fixed in Carnoy 3 : 1 (absolute ethanol : glacial acetic acid, v/v) for 24 h at room temperature and stored at −20°C. For fluorochrome staining, root tips were digested in an enzymatic solution containing 2% cellulase and 20% pectinase at 37°C for 1 h. Subsequently, they were squashed in a drop of 60% acetic acid. Coverslips were removed in liquid nitrogen. The slides were stained with DAPI (2 µg/ml) for 30 min. Slides were mounted in glycerol/McIlvaine buffer medium. The best metaphases were captured on a Zeiss light microscope using an Axio Cam MRC5 video camera and Axiovision v.4.8 software. Images were processed in Photoshop CS3.

The species analyzed varied from 2*n* = 18 in *Mandevilla leptophylla* (Apocynaceae, Fig. 15F), *Peltastes peltatus* (Apocynaceae, Fig. 16D) and *Temnadenia stellaris* (Apocynaceae, Fig. 16H) to 2*n* = 76 in *Dichorisandra hexandra* (Commelinaceae, Fig. 17F). The following previous counts were confirmed: In Apocynaceae by Brito & al. (2014), 2*n* = 34 for *Aspidosperma pyrifolium* (Fig. 15B), 2*n* = 20 for *Mandevilla bahiensis* (Fig. 15C), *M. dardanoi* (Fig. 15E) and *M. tenuifolia* (Fig. 15G), 2*n* = 22 for *Marsdenia caatingae* (Fig. 16A), *Tabernaemontana catharinensis* (Fig. 16F) and *T. solanifolia* (Fig. 16G). In Commelinaceae, 2*n* = 30 and 60 (Pitrez & al., 2001) for *Commelina diffusa* (Figs. 17C, D), 2*n* = 60 (Pitrez & al., 2001) for *Commelina obliqua* (Fig. 17E), 2*n* = 76 (Pitrez & al., 2001) for *Dichorisandra hexandra* (Fig. 17F), 2*n* = 24 (Pitrez & al., 2014b) for *Tradescantia ambigua* (Fig. 17G). In Vitaceae, 2*n* = 34 (Cordeiro & al., 2017) for *Cissus decidua* (Fig. 18F).

New counts are presented here for *Mandevilla catimbauensis* with 2*n* = 26 (Fig. 15D), *M. leptophylla* with 2*n* = 18 (Fig. 15F), *Marsdenia hilariana* with 2*n* = 22 (Fig. 16B), *M. megalantha* with 2*n* = 22 (Fig. 16C), *Petalostelma dardanoi* with 2*n* = 20 (Fig. 16E), *Temnadenia. stellaris* with 2*n* = 18 (Fig. 16H) (Apocynaceae); *Chamaecostus subsessilis* with 2*n* = 18 (Fig. 18A) (Costaceae); *Tibouchina heteromalla* with 2*n* = 36 (Fig. 18C) (Melastomataceae); *Vellozia plicata* with 2*n* = 18 (Fig. 18E) (Velloziaceae); Euphorbiaceae: *Cnidosculus urens* with 2*n* = 72 (Fig. 18B). New cytotypes are presented for Apocynaceae: *Allamanda doniana* with 2*n* = 27 (Fig. 15A) and *Peltastes*

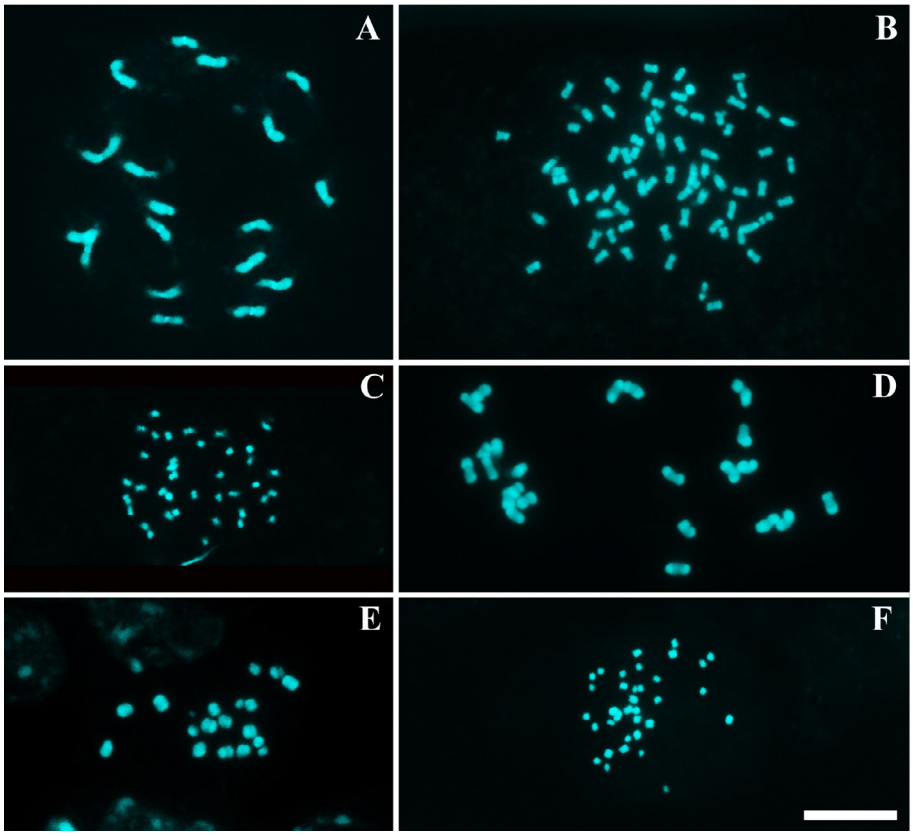

Fig. 18. Chromosome complements of species occurring on inselbergs: Costaceae – **A,** *Chamaecostus subsessilis*, 2*n* = 18; Euphorbiaceae – **B,** *Cnidoscolus urens*, 2*n* = 72; Melastomataceae – **C,** *Tibouchina heteromalla*, 2*n* = 36; Solanaceae – **D,** *Solanum polytrichum*, 2*n* = 24; Velloziaceae – **E,** *Vellozia plicata*, 2*n* = 18; Vitaceae – **F,** *Cissus decidua*, 2*n* = 34. — Scale bar in F = 10 µm.

peltatus with 2*n* = 18 (Fig. 16D); Araceae: *Anthurium affine* with 2*n* = 30 (Fig. 17A); Commelinaceae: *Aneilema brasiliense* with 2*n* = 24 (Fig. 17B).

Apocynaceae is a globally distributed family consisting of about 400 genera and 5000 species (Endress & al., 2007). In Brazil, about 750 species occur in different kinds of habitat, including inselbergs (Rapini, 2012; Pitrez & al., 2014a). The family is characterized by a remarkable diversity in chromosome numbers, ranging from 2*n* = 10 in *Rhabdadenia madida* (Vell.) Miers to 2*n* = 230 in *Vinca difformis* Pourr. The chromosome number variation in Apocynaceae indicates several polyploid and disploid series, suggesting that these events are playing an important role for the diversification of the family.

Commelinaceae present 41 genera and 650 paleo- and neotropical species (Faden, 1983). A wide range of chromosome number variation characterizes the family, as well the scarcity of chromosome numbers revisions. To date, only a review of chromosome evolution has been performed for the family, indicating several cycles of polyploidy and disploid series, with basic chromosome numbers ranging from *x* = 4 to *x* = 20 (Keith Jones & Jopling, 1972).

The genus *Commelina* presents 170 species, being considered the largest of the family (Hassemer, 2017). The genus presents a nearly cosmopolitan distribution, occurring in a great diversity of habitats, with terrestrial, rupicolous and aquatic species. *Commelina* occurs in all regions of Brazil, although only nine species are recognized, of which three are endemic (Aona & Pellegrini, 2015). Based only on the chromosome number variation, the genus is characterized by a dysploid series with *n* = 10, 11, 13, 14, 15, and a subset of chromosome numbers possibly derived by polyploidy (*n* = 21, 24, 26, 28, 29, 30, 42, 45, 60, 75). Here, *Commelina diffusa* presented 2*n* = 30 and 2*n* = 60 for different inselbergs, while *C. obliqua* presented 2*n* = 60 for all analyzed populations. In the literature there are records for other species of *Commelina*, such as 2*n* = 60 for *C. erecta* L. and 2*n* = 30 for *C. rufipes* Seub., analyzed by Pitrez & al. (2001) in populations occurring in different kinds of habitat.

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

* First chromosome count for the species.

** New chromosome count for the species.

UMBELLIFERAE/APIACEAE

Athamanta sicula L.

2*n* = 22, CHN. Italy, Sicily, prov. Trapani, Erice, 38°02′10″ N, 12°34′58″E, 720 m, rocks, 6 Jul 2012, *M.G. Pimenov 12-4* (MW); Italy, Sicily, prov. Messina, Forza d'Agro, 37°54′50.47″N, 15°20′08.11″E, 350 m, 22 Jul 2012, *M.G. Pimenov s.n.* (MW); Italy, Sicily, prov. Palermo, near Palermo, 38°04′21.23″N, 13°31′15.02″E, 220 m, 13 Jul 2012, *M.G. Pimenov s.n.* (MW) [Fig. 19A].

These determinations of chromosome numbers correspond to four previous ones for the plants from Italy (2*n* = 22) and Albania (*n* = 11). Five other studied species of the genus *Athamanta* L. have the same chromosome number (Pimenov & al., 2002).

Berula erecta (Huds.) Coville

n = 9, CHN. Greece, Ionic Islands Reg., Corfu (Κερκυρας), Benitses (Μπενιτσες), 39°31′17.24″N, 19°54′46.98″E, 29 Jun 2015, *M.G. Pimenov 15-30* (MW) [Fig. 20A].

The same number of chromosomes was reported in the majority of publications with some exceptions – 2*n* = 20 was found for the

plants from Sweden (Lövkvist, 1963) and Kazakhstan and Tajikistan (Retina & Pimenov, 1977; Shner & al., 2016). There was also a rather strange earlier determination of $n = 6$ for plants from Illinois (U.S.A.) (Bell & Constance, 1957) which was not confirmed later.

Bupleurum glumaceum Sm.

$n = 8$, CHN. Greece, Central Greece, Nomos Boeotia (Βοιωτια), Arachova (Αραχωβα), 38°29′01.90″N, 22°35′20.03″E, 800 m, 24 Jun 2015, *M.G. Pimenov 15-7* (MW) [Fig. 20H].

Chromosome numbers of this species were determined earlier at least six times; all determinations were from Greece (see Pimenov & al., 2002) and all showed $n = 8$, or $2n = 16$, which indicates the karyological stability of the species.

Chaerophyllum temulum L.

$n = 7$, CHN. Greece, North Greece, Epirus (Ηπείρος), Pindos Mts., Nomos Ioannina (Ιωαννίνων), Metsovo (Μετσβο), 39°46′25.09″N, 21°10′49.17″E, 1170 m, 3 Jul 2015, *M.G. Pimenov 15-39* (MW) [Fig. 20B].

This chromosome number was found for the most of the studied populations from different European countries. Other counts ($n = 11$, $2n = 22$, 24) were determined considerably rarer (from Germany, the Netherlands, Bulgaria, Spain, Czech Republic, and Turkey) (see Pimenov & al., 2002).

Conium divaricatum Boiss. & Orph.

$2n = 22$, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), Delphi (Δάλφι), 38°28′54.35″N, 22°39′05.41″E, 560 m, 23 Jun 2015, *M.G. Pimenov 15-4* (MW) [Fig. 19B].

The same chromosome number was reported by Constantinidis & al. (1997) from Greece too, B-chromosomes not revealed in our study, were found in some karyotypes.

Daucus carota subsp. *gummifer* (Syme) Hook.f. (= *D. carota* subsp. *hispanicus* (Gouan) Thell.)

$n = 9$, CHN. France, Provence, Marseille, Vieux Port, Bas Fort Saint-Nicolas, 43°17′30″N, 05°21′50″E, 10 m, 3 Jun 2017, *M.G. Pimenov s.n.* (MW) [Fig. 20E].

There are at least seven reports for *Daucus carota* subsp. *gummifer* and subsp. *hispanicus* (from Portugal, Spain and France) that all, with one exception, are $2n = 18$ or $n = 9$ (see Pimenov & al., 2002).

Daucus involucratus Sm.

$2n = 22$, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), municipality Amfissa (Αμφισσα), Sernikaki (Σερνικακι), Mt. Partas, 38°29′17.66″N, 22°23′44.72″E, 113 m, 25 Jun 2015, *M.G. Pimenov 15-17* (MW) [Fig. 19D].

Two chromosome numbers were previously determined for this species, namely $2n = 22$ or $n = 11$ from Greece and Cyprus (Engstrand, 1970; Vogt & Aparicio, 1999) and $2n = 20$ from Turkey (Pimenov & al., 1998).

Daucus maximus Desf. (≡ *D.carota* subsp. *maximus* (Desf.) Ball)

$2n = 18$, CHN. Turkey, Canakkale, ruines of Troya, 39°57′32.26″N, 26°14′45.23″E, 7 Aug 2014, *M.G. Pimenov s.n.* (MW) [Fig. 19E].

The chromosome number $2n = 18$, typical not only for the species in its strict sense, but also for the whole species-aggregate *D. carota*, studied from different parts of its primary and secondary area as opposed to the majority *Daucus* species that have $2n = 20$ or 22.

Eryngium campestre var. *virens* (Link) Weins

$n = 14$, CHN. Greece, Central Greece, Nomos Boeotia (Βοιωτια), Arachova (Αραχωβα), 38°29′01.90″N, 22°35′20.039″E, 800 m, 24 Jun 2015, *M.G. Pimenov 15-9* (MW) [Fig. 20D].

Two cytotypes, diploid ($2n = 14$) and tetraploid ($2n = 28$), are known for *E. campestre* (see Pimenov & al., 2002). The only other chromosome number determination under the name of var. *virens* from Turkey (Pimenov & al., 1996) showed $2n = 28$. There are no other determinations for Greek material of the species. Some botanists, however, doubt the taxonomic status of the variety (Breton, 1962; Wörz, 2011), due to broad overlapping in characters of the variety and *E. campestre* sensu stricto.

Eryngium creticum Lam.

$n = 7$, CHN. Greece, NW Greece, Ionic Islands Reg., Corfu (Κερκυρας), Benitses (Μπενιτσες), 39°31′17.24″N, 19°54′46.98″E, 29 Jun 2015, *M.G. Pimenov 15-29* (MW) [Fig. 20C].

Our record corresponds to earlier determinations for plants from Bulgaria (Češchmedjiev, 1976), Iran and Greece (Perdigo i Ariso, 1981) and Israel (Baltisberger & Widmer, 2004).

Ferula tingitana L.

$2n = 22$, CHN. Turkey, Muğla, Marmaris, among city houses, 36°50′53.35″N, 28°16′01.84″E, 30 m, 27 Jul 2014, *M.G. Pimenov 14-4* (MW) [Fig. 19H].

This chromosome number was reported for the species from Spain (Aparicio & Garcia Martin, 1986), Morocco (El Alaoui Faris,

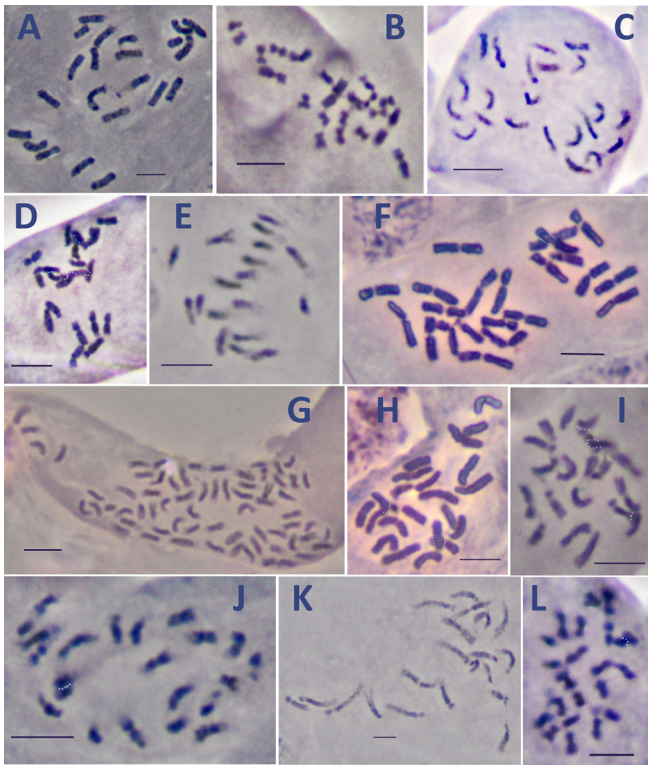

Fig. 19. Mitotic chromosomes. **A,** *Athamanta sicula*, $2n = 22$; **B,** *Conium divaricatum*, $2n = 22$; **C,** *Ferulago humilis*, $2n = 22$; **D,** *Daucus involucratus*, $2n = 22$; **E,** *Daucus maximus*, $2n = 18$; **F,** *Ferulago trojana*, $2n = 22$; **G,** *Ferulago mughlae*, $2n = 66$; **H,** *Ferula tingitana*, $2n = 22$; **I,** *Tordylium apulum*, $2n = 20$; **J,** *Heloscidium nodiflorum*, $2n = 22$; **K,** *Orlaya grandiflora*, $2n = 20$; **L,** *Ridolfia segetum*, $2n = 22$. — Scale bars = 5 µm.

2006) and Turkey (Pimenov & al., 1998; Shner & al., 2010). It is not surprising that the species has the same number 2*n* = 22, as all *Ferula* L. species (more than 100), having been studied up to now.

Ferulago humilis Boiss.

2*n* = 22, CHN. Turkey, Muğla, road from Marmaris to Datca, 40 km from Datca, 36°45′42.96″N, 27°52′12.37″E, 300 m, 28 Jul 2014, *M.G. Pimenov 14-8* (MW) [Fig. 19C].

Two previous records for the species (Strid, 1987; Pimenov & al., 1998) from different localities in Turkey showed also 2*n* = 22, the most common chromosome number for the genus *Ferulago* W.D.J.Koch.

**Ferulago mughlae* Peşmen

2*n* = 66, CHN. Turkey, Muğla, road from Marmaris to Datca, 40 km from Datca, 36°45′42.96″N, 27°52′12.37″E, 300 m, 28 Jul 2014, *M.G. Pimenov 14-9* (MW) [Fig. 19G].

This is the first chromosome number determination for the species, and the first record of hexaploidy in the genus *Ferulago.*

**Ferulago trojana* Akalın &Pimenov

2*n* = 22, CHN. Turkey, Ballkesir, Kazdağı Milli Park, Kazdağı Mts., S slope, 39°38′28.17″N, 26°55′09.98″E, 240 m, 6 Aug 2014, *M.G. Pimenov* & *E. Akalın s.n.* (MW) [Fig. 19F].

This is the first chromosome number report for the recently described rare species, narrow endemic to the Kazdağı mountain massif (Mt. Ida) in the Western Turkey.

Helosciadium nodiflorum (L.) W.D.J.Koch

2*n* = 22, CHN. Italy, Sicily, prov. Agrigento, between Porto Empedoclo and S. Leone, sea shore, 37°16′24″N, 13°34′14″E, 15 Jul 2012, *M.G. Pimenov 12-13* (MW) [Fig. 19J].

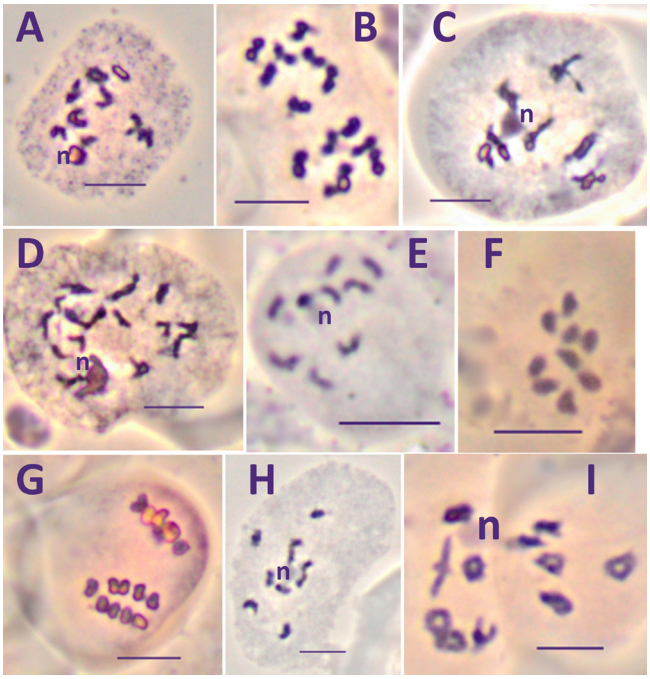

Fig. 20. Meiotic chromosomes. **A,** *Berula erecta*, *n* = 9; **B,** *Chaerophyllum temulum*, *n* = 7; **C,** *Eryngium creticum*, *n* = 7; **D,** *Eryngium campestre* var. *virens*, *n* = 14; **E,** *Daucus carota* subsp. *gummifer*, *n* = 9; **F,** *Seseli varium*, *n* = 9; **G,** *Pimpinella cretica*, *n* = 9; **H,** *Bupleurum glumaceum*, *n* = 8; **I,** *Pastinaca yildizii*, *n* = 11. — Scale bars = 10 µm; n – nucleolus.

There are at least 18 reports on chromosome number determination for the species, widely distributed from Macaronesia to Tanzania and Tajikistan. All of them characterize *H. nodiflorum* (most frequently studied under the name of *Apium nodiflorum* (L.) Lag.) as diploid with *n* = 11 (2*n* = 22).

Orlaya grandiflora (L.) Hoffm.

2*n* = 20, CHN. Greece, Ionic Islands Reg., Lefkada (Λευκαδα), near Ligia (Λυγιά) 38°47′10.06″N, 20°43′15.69″E, 20 m, 29 Jun 2015, *M.G. Pimenov 15-25* (MW) [Fig. 19K].

Our chromosome number determination, the first one for the plants of Greek origin, corresponds to the most previous ones (*n* = 10 or 2*n* = 20). Besides that, chromosome numbers 2*n* = 22 (Bulgaria), *n* = 9 (Romania), 2*n* = 16 (Morocco), and 2*n* = 14 (Croatia) are known for *O. grandiflora* (see Pimenov & al., 2002).

**Pastinaca yildizii* Dirmerci

n = 11, CHN. Turkey, Ballkesir, Kazdağı Milli Park, Kazdağı Mts., upper forest borderline, 39°41′59.57″N, 26°51′26.66″E, 1700 m, 6 Aug 2014, *M.G. Pimenov & T. Dirmerci 14-10* (MW) [Fig. 20I].

This is the first chromosome number determination for the species. It corresponds to all previous records for seven accepted species of *Pastinaca* L., excluding *P. pimpinellifolia* M.Bieb. (2*n* = 44 from Turkey, Pimenov & al., 1996) (see Pimenov & al., 2002).

Pimpinella cretica Poir.

n = 9, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), municipality Amfissa (Αμφισσα), Sernikaki (Σερνικακι), 38°29′22.71″N, 22°24′31.03″E, 23 Jun 2015, *M.G. Pimenov 15-3* (MW) [Fig. 20G].

2*n* = 18, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), municipality Amfissa (Αμφισσα), Sernikaki (Σερνικακι), Partas Mts., 38°29′17.66″N, 22°23′44.72″E, 113 m, 25 Jun 2015, *M.G. Pimenov s.n.* (MW) [Fig. 21A].

This is the third chromosome number determination for the species; the previous ones were slightly variable: *n* = 10; 2*n* = 20 (Jordan – Al-Eisawi, 1989; Crete, Greece – Pimenov & Shner, 2008) and 2*n* = 18 (Crete, Greece – Pimenov & Shner, 2008). This can be regarded as an evidence of dysploidy in karyotype evolution of the species, which is not rare in some other species of the genus (Yurtseva, 1988; Pimenov & al., 2002). 2*n* = 18 is the most widespread chromosome number in *Pimpinella* L.

Ridolfia segetum (Guss.) Moris

2*n* = 22, CHN. Italy, Sicily, prov. Agrigento, between Ribera and Seccagrande, fallow land, 37°26′41″N, 13°14′27″E, 50 m, 15 Jul 2012, *M.G. Pimenov 12-8* (MW) [Fig. 19L].

At least nine different records from Portugal, Spain, Morocco, and Algeria allow to characterize *R. segetum* as a rather stable diploid with *n* = 11 (2*n* = 22) (Pimenov & al., 2002). Only one investigation (El Alaoui Faris, 1989) showed intraspecific karyological variability of the species in Morocco (2*n* = 22 and 2*n* = 22+2B).

***Scaligeria moreana* Engstrand

2*n* = 22, CHN. Greece, Peloponnisos, Nomos Messinias (Μεσσηνία), Taigetos, NW-part of Mani, above Langada, ravine, slope of SE-facing, maquis shrubland, rocks, under rocks, cracks of rocks, 36°47.05′N, 22°20.30′E, 600 m, 5 Jul 2012, *E.A. Zakharova & U.A. Ukrainskaya 48* (MW) [Fig. 21F].

This is the second chromosome number determination for *S. moreana*. It does not correspond to the previous record of $2n$ = 20 from the same area (Mt. Taigetos) (Kyriakopoulos & al., 2014).

Scaligeria napiformis (Willd. ex Spreng.) Grande

$2n$ = 20, CHN. Greece, Ionic Islands Reg., Corfu (Κερκυρας), Benitses (Μπενιτσες), 39°31′17.24″ N, 19°54′46.98″E, 29 Jun 2015, *M.G. Pimenov 15-32* (MW); Greece, Central Greece, Nomos Phokida (Φωκις), municipality Amfissa (Αμφισσα), Sernikaki (Σερνικακι), Mt. Partas, 38°29′17.66″N, 22°23′44.72″E, 113 m, 25 Jun 2015, *M.G. Pimenov 15-20* (MW); Greece, Peloponnisos, Nomos Lakonias/Messinias (Μεσσηνία), Taigetos, Langada gorge, slope of W-NW-facing, right bank of dry stream, between 42–43 km from Kalamata, near Climbing Centre, steep, limestone rocks, 37°04.88′N, 22°18.68′E, 810 m, 6 Jul 2012, *E.A. Zakharova & U.A. Ukrainskaya 47* (MW) [Fig. 21E].

Our chromosome number determination, the fourth for the species and the second from Greece, confirms $2n$ = 20 as the most frequent number in the species (Engstrand, 1970; Vogt & Aparicio, 1999; Shner & al., 2013) and in the whole genus. One determination from Turkey $2n$ = 22 (Pimenov & al., 1998), however, showed variability in chromosome numbers in this species.

***Seseli varium* Trevir. (= *S. pallasii* Besser)

n = 9, CHN. Greece, Central Greece, Nomos Boeotia (Βοιωτια), Arachova (Αραχωβα), 38°28′56.89″N, 22°34′56.39″E, ca. 1000 m, 24 Jun 2015, *M.G. Pimenov 15-23* (MW) [Fig. 20F].

This is a new chromosome number for the species, as previous determinations gave $2n$ = 16 (from Hungary), $2n$ = 20 (from the Czech Republic, Slovakia and Italy) and $2n$ = 22 (Ukraine) (see Pimenov & al., 2002). We also determined n = 11 for the plants from Italy. Karyological data were partly published under the name *S. pallasii*, a later synonym of *S. varium*. As to n = 9 ($2n$ = 18), this chromosome number was determined many times (see Pimenov & al., 2002) for a closely related species, *S. elatum* L., distributed in southern and central Europe, and known, in particular (as *S. elatum* subsp. *gouanii* (W.D.J.Koch) P.W.Ball), from Italy to the Balkans.

Smyrnium olusatrum L.

$2n$ = 22, CHN. Greece, Ionic Islands Reg., Lefkada (Λευκαδα), near Ligia (Λυγιά), 38°47′10.06″N, 20°43′15.69″E, 28 Jun 2015, 20 m, *M.G. Pimenov s.n.* (MW) [Fig. 21B]; Italy, Sicily, prov. Palermo, W of Cefalù, 08°01′39.31″N, 14°01′35.57″E, 120 m, 13 Jul 2012, *M.G. Pimenov s.n.* (MW); Turkey, Muğla, Marmaris, among city houses, 36°50′53.35″N, 28°16′01.84″E, 30 m, 27 Jul 2014, *M.G. Pimenov s.n.* (MW).

Karyologically invariant species (n = 11; $2n$ = 22), according to numerous previous chromosome number determinations (see Pimenov & al., 2002). Our three records, among them two, from Italy and Turkey, being the first for each of these countries, confirm chromosome number stability of the species.

Smyrnium rotundifolium Mill.

$2n$ = 22, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), Delphi (Δάλφι), 38°28′54.35″N, 22°39′05.41″E, 560 m, 23 Jun 2015, *M.G. Pimenov s.n* (MW) [Fig. 21D]; Italy, Sicilia, prov. Catania, Mt. Etna (Mongbello), S slope, above Nicolosi, 37°41′34″N, 14°59′20″E, 1634 m, 17 Jul 2012, *M.G. Pimenov 12-15* (MW).

Previous records, all from Greece (see Pimenov & al., 2002; Pimenov & Shner, 2008) showed the same number $2n$ = 22 for the species. Generally, this chromosome number is the only one in *Smyrnium* L.

Thapsia garganica L.

$2n$ = 22, CHN. Italy, Sicily, prov. Trapani, Segesta, dry slope near the temple, 37°56′24″N, 12°49′57″E, 350 m, 6 Jul 2012, *M.G. Pimenov 12-1* (MW) [Fig. 21C].

Thapsia garganica belongs to the group of species within the genus, in which chromosome number variability has not been found up to now, in contrast to *T. villosa* L. in which polyploid series ($2n$ = 22, 44, 66) was revealed (see Pimenov & al., 2002).

Tordylium apulum L.

$2n$ = 20, CHN. Greece, Central Greece, Nomos Phokida (Φωκις), municipality Amfissa (Αμφισσα), Sernikaki (Σερνικακι), 38°29′22.71″N, 22°24′31.03″E, 23 Jun 2015, *M.G. Pimenov 15-2* (MW) [Fig. 19I].

Our chromosome number determination corresponds to numerous previous data from Greece, Albania and Italy (see Pimenov & al., 2002; Pimenov & Shner, 2008).

Torilis triradiata Boiss. & Heldr.

$2n$ = 12, CHN. Turkey, Muğla, between Içmeler and Turinç, 36°46′18.59″N, 28°11′50.38″E, 370 m, 27 Jul 2014, *M.G. Pimenov 14-3* (MW) [Fig. 21G].

This is the second chromosome number determination for the species, and it does not correspond to the previous report ($2n$ = 16: Shner & al., 2013), made on the Turkish material too (from Isparta Province). In that publication $2n$ = 16 is an obvious misprint, omitted by the authors in the proofs, as only 12 chromosomes are clearly seen in the microphotograph (Shner & al., 2013: fig. 15). $2n$ = 12 is one of the usual counts in *Torilis* Adans., and, for instance, in the closely related species *T. arvensis* (Huds.) Link and *T. leptophylla* (L.) Rchb.f.

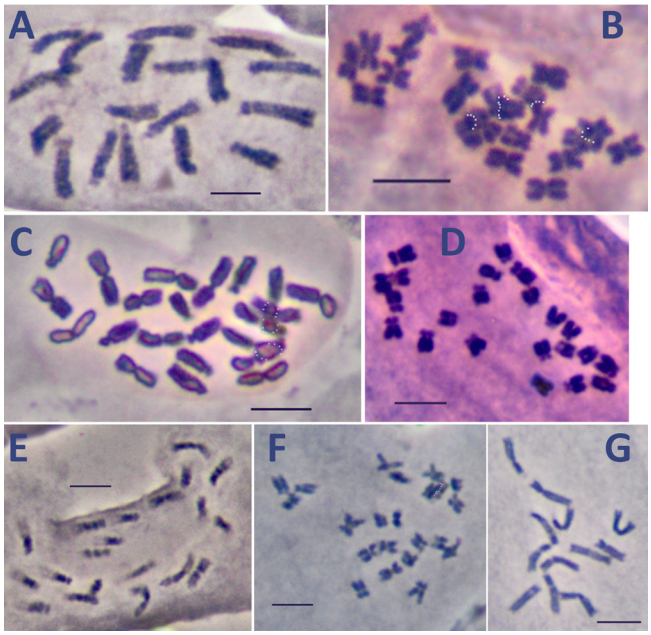

Fig. 21. Mitotic chromosomes. **A,** *Pimpinella cretica*, $2n$ = 18; **B,** *Smyrnium olusatrum*, $2n$ = 22; **C,** *Thapsia garganica*, $2n$ = 22; **D,** *Smyrnium rotundifolium*, $2n$ = 22; **E,** *Scaligeria napiformis*, $2n$ = 20; **F,** *Scaligeria moreana*, $2n$ = 22; **G,** *Torilis triradiata*, $2n$ = 12. — Scale bars = 5 µm.

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Financial support from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior/CAPES, Conselho Nacional de Desenvolvimento Científico e Tecnológico/CNPq (Proc. 312215/2013-4, 562340/2010-6 and 561768/2010-2), and Fundação de Amparo à Pesquisa do Distrito Federal/FAP-DF (Proc. 0193.000.979/2015), Brasília, Brazil.

* First chromosome count for the species.

** New cytotype for the species.

POACEAE

Paspalum centrale Chase

2*n* = 20, CHN. Brazil, Acre, Rio Branco, 8 km from Rio Branco to Senador Guiomard, 10°01′45.9″S, 67°49′42.6″W, 10 Dec 2017, *R.C. Oliveira 3405* (UB).

Paspalum convexum Humb. & Bonpl. ex Flüggé

2*n* = 32, CHN. Brazil, Distrito Federal, Brasília, Fercal, 15°31′01.4″S, 47°50′14.6″W, 14 Mar 2018, *J.F.M. Valls & R.C. Oliveira 16788* (CEN, UB), *J.F.M. Valls & M.W.S. Sousa 16789* (CEN, UB); Brazil, Goiás, Flores de Goiás, 200 m after BR-020 Hwy., left, 14°54′46.7″S, 46°57′24.7″W, 18 Mar 2015, *R.C. Oliveira & M.W.S. Sousa 3005* (UB).

* *Paspalum cordaense* Swallen.

2*n* = 40, CHN. Brazil, Bahia, Luís Eduardo Magalhães, BA-460 Hwy., ca. 13 km SE of Placas, 11°53′55.3″S, 46°10′15.3″W, 29 Mar 2017, *J.F.M. Valls & al. 16694* (CEN, UB).

* *Paspalum macranthecium* Parodi

2*n* = 20, CHN. Brazil, Bahia, Luís Eduardo Magalhães, BA-460 Hwy., ca. 13 km SE of Placas, 11°53′55.3″S, 46°10′15.3″W, 29 Mar 2017, *J.F.M. Valls & al. 16693* (CEN, UB).

* *Paspalum marmoratum* Kuhlm.

2*n* = 18, CHN. Brazil, Mato Grosso, Chapada dos Guimarães, Chapada dos Guimarães National Park, Morro São Jerônimo,

15°26′05.7″S, 55°51′25.4″W, 12 Feb 2016, *C.O. Moura & Y.F.F. Soares. 98* (UB) [Fig. 22B].

Paspalum melanospermum Desv. ex Poir.

2*n* = 20, CHN. Brazil, Amazonas, Careiro de Várzea, BR-319 Hwy., 11 km after gas station, 03°20′11.0″S, 59°52′41.8″W, 27 Apr 2015, *R.C. Oliveira & J.M. Mendoza 3025* (UB) [Fig. 22C]; Brazil, Bahia, Feira de Santana, Universidade Estadual de Feira de Santana, 12°12′01.2″S, 38°58′17.9″W, 12 Oct 2017, *R.C. Oliveira 3362* (UB); Brazil, Goiás, Monte Alegre, 300 m from córrego das Lages, along GO-118 Hwy., on road to Monte Alegre, 13°19′34.0″S, 47°00′48.0″W, 28 Mar 2017, *Valls & al. 16671* (CEN, UB).

** 2*n* = 40, CHN. Brazil, Amazonas, Presidente Figueiredo, Balbina dam, 01°57′40.9″S, 59°29′23.5″W, 25 Apr 2015, *R.C. Oliveira & J.M. Mendoza 3010* (UB); Brazil, Distrito Federal, Brasília, Farm Água Limpa, 15°56′55.5″S, 47°56′02.6″W, 7 Apr 2018, *R.C. Oliveira & al. 3443* (UB); Brazil, Goiás, Flores de Goiás, 200 m after Formosa-Flores intersection, left, 14°54′46.7″S, 46°57′24.7″W, 18 Mar 2015, *R.C. Oliveira & M.W.S. Sousa 3003* (UB); Brazil, Goiás, Alto Paraíso de Goiás, farm entrance, ca. 4.5 km S Alto Paraiso, 14°10′41.9″S, 47°30′40.5″W, 27 Mar 2017, *J.F.M. Valls. & al. 16622* (CEN, UB); Brazil, Goiás, Flores de Goiás, GO-531 Hwy., ca. 1 km from BR-020, 14°54′37.8″S, 46°57′19.5″W, 16 Mar 2016, *J.F.M. Valls & al. 16188* (CEN, UB); Brazil, Goiás, Flores de Goiás, 25 km south of Flores, GO-531 Hwy., 14°40′14.0″S, 46°59′44.0″W, 16 Mar 2016, *J.F.M. Valls. & al. 16195* (CEN, UB); Brazil, Mato Grosso, Chapada dos Guimarães, Chapada dos Guimarães National Park, Morro São Jerônimo, 15°26′05.7″S, 55°51′25.4″W, 12 Feb 2016, *C.O. Moura & Y.F.F. Soares 90* (UB); Brazil, Tocantins, Wanderlândia, BR-226 Hwy., towards Imperatriz, 06°50′57.5″S, 47°57′47.5″W, 10 Feb 2017, *M.W.S. Sousa & E.C. Antunes 87* (UB).

Paspalum plicatulum Michx.

2*n* = 40, CHN. Brazil, Distrito Federal, Brasília, Bernardo Sayão Ecological Park, 15°50′10.5″S, 47°48′40.5″W, 18 Jan 2017, *A.P.M.L. Gouveia 232* (UB); Brazil, Distrito Federal, Brasília, Brasilia National Park, 15°58′43.2″S, 47°57′18.7″W, 10 Feb 2017, *R.C. Oliveira & M.W.S. Sousa 3423* (UB).

* *Paspalum riparium* Nees

2*n* = 40, CHN. Brazil, Amazonas, Manaus, INPA, 03°05′40.4″S, 59°59′21.3″W, 25 Apr 2015, *R.C. Oliveira & J.M. Mendoza 3008* (UB) [Fig. 22D]; Brazil, Presidente Figueiredo, Balbina dam, 01°54′37.4″S, 59°27′36″W, 25 Apr 2015, *R.C. Oliveira & J.M. Mendoza 3016* (UB).

Paspalum rojasii Hack.

2*n* = 40, CHN. Brazil, Distrito Federal, Brasília, Bernardo Sayão Ecological Park, 15°50′15.4″S, 47°48′42.5″W, 17 Jan 2018, *J.F.M. Valls. & M.W.S. Sousa 16777* (CEN, UB).

METHODS

Chromosome numbers were determined from root-tip cells (mitosis) or pollen-mother cells (meiosis), following Sousa & al. (2017). Young inflorescences were collected in the field and root tips were acquired from cultivated material.

The genus *Paspalum* L. includes nearly 350 species (Sánchez-Ken, 2010) mostly in America, some in Africa, Asia and Oceania, and three or four species are considered cosmopolitan (Rua & al., 2010).

Paspalum belongs to a clade where a basic chromosome number of *x* = 10 is plesiomorphic (Rua & al., 2010; Scataglini & al., 2013), with few exceptions (Bonasora & al., 2015). Multiple intraspecific chromosome numbers frequently occur in *Paspalum* as an outcome of different ploidy levels (Quarín, 1992). The reproductive system of *Paspalum* is complex. Many species of this genus consist of sexual-diploid and apomictic-polyploid cytotypes, and several of them arose through hybridization (Quarín & Norrmann, 1990). Apparently, sexual-diploids are distributed in rather restricted areas, as well as certain hybrid combinations (Peñaloza & al., 2008).

We confirmed reported counts for *P. plicatulum* and *P. rojasii*, both with 2*n* = 40 chromosomes (Dandin & Chennaveeraiah, 1983, 1988; Honfi & al., 1990; Sinha & al., 1990; Norrmann & al., 1994; Pozzobon, 2000), and for *P. centrale*, with 2*n* = 20 (Davidse & Pohl, 1972).

The literature reports 2*n* = 20, 32, 40, and 60 chromosomes for *P. convexum* (Gould, 1966; Reeder, 1967, 1984; Pohl & Davidse, 1971; Davidse & Pohl, 1974; Selva, 1976). Our findings show that the chromosome number 2*n* = 32 [Fig. 22A] is typical of *P. convexum*, a species with broadly to very broadly obovate spikelets, distinct from all other annual species in the informal group Plicatula. Although no vouchers of diverging counts assigned to this name have been examined so far, we suggest that plants of allied species with obovate spikelets and *x* = 10 may have been taken for *P. convexum* by different authors.

The present work provides the first chromosome counts for the annual species *Paspalum cordaense*, 2*n* = 40, *P. macranthecium*, 2*n* = 20, and *P. riparium*, 2*n* = 40 [Fig. 22D]. *Paspalum riparium* is only known from river edges in the Amazon basin, while the other two are predominantly from the cerrado region.

The study showed an unusual chromosome count for *P. marmoratum*, with 2*n* = 2*x* = 18 [Fig. 22B]. This number is only known, in the same genus, for *P. commutatum* Nees (Burton, 1942) and *P. reduncum* Nees ex Steud. (Peñaloza & al., 2008).

Two ploidy levels (2*n* = 2*x* = 20 [Fig. 22C] and 2*n* = 4*x* = 40) were documented for *P. melanospermum*, both levels on a broad geographic area, including several Brazilian states. Although the diploid level was previously known the tetraploid had not been reported in the past.

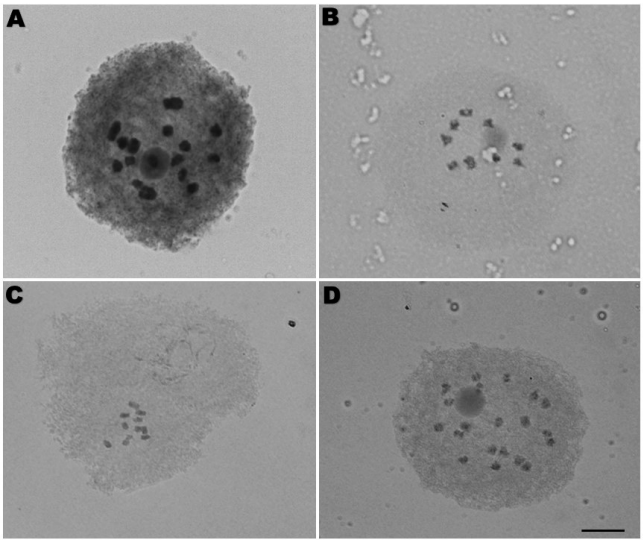

Fig. 22. Meiotic cells of *Paspalum* species. **A,** *P. convexum*, diakinesis, *J.F.M. Valls & al. 16187* (2*n* = 32); **B,** *P. marmoratum*, diakinesis, *C.O. Moura & Y.F.F. Soares 98* (2*n* = 18); **C,** *P. melanospermum*, metaphase, *R.C. Oliveira & J.M. Mendoza 3025* (2*n* = 20); **D,** *P. riparium*, diakinesis, *R.C. Oliveira & J.M. Mendoza 3008* (2*n* = 40). — Scale bar 10 µm.

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The study was financially supported by Research Institute Forests and Rangeland of Iran (grant no. 12-09-09-7701-89001). The authors are grateful to several collectors for material donation.

* First chromosome count from Iran.
** First chromosome count for the species.

APIACEAE

** *Ferulago angulata* (Schltdl.) Boiss.

2*n* = 22, CHN. Iran, Azarbayjan, Uromieh, Marmisho valley, 37°35′05.28″N, 44°38′20.49″E, 1760 m, 2 Oct 2013, *A. Ashrafi 106062* (TARI) [Fig. 23A].

ASTERACEAE

Achillea talagonica Boiss.

2*n* = 18, CHN. Iran, Tehran, Lalon-Bazrab, 35°59′45.32″N, 51°34′31.27″E, 2550–2650 m, 4 Aug 2013, *J. Mohebi 106054* (TARI) [Fig. 23B].

Anthemis tinctoria L.

2*n* = 18, CHN. Iran, Mazandaran, Befor Gachsar, 36°05′21.37″N, 51°18′53.55″E, 2100 m, 10 Oct 2013, *A. Ashrafi 106056* (TARI) [Figs. 23C, 24A] (for other chromosome number report for this species from Iran see Chehregani & Mehanfar, 2008).

** *Tanacetum abrotanifolium* (L.) Druce

2*n* = 36, CHN. Iran, Azarbayjan, Marand, Zozodagh and Koohkamar, 38°45′00.96″N, 45°30′04.96″E, 2195 m, 20 Jul 2013, *J. Mohebi 106059* (TARI) [Fig. 23D].

Tanacetum pinnatum Boiss.

2*n* = 18, CHN. Iran, Tehran, Lalon-Bazrab, 35°59′45.32″N, 51°34′31.27″E, 2550–2650 m, 21 Sep 2012, *J. Mohebi* 106057 (TARI) [Fig. 23E].

For other chromosome number report for this species from Iran, see Chehregani & Mehanfar (2008).

** *Varthemia persica* DC.

2*n* = 16, CHN. Iran, Alborz, Chalus, 35°55′37.19″N, 51°03′37.53″E, 1605–2025 m, 20 Sep 2012, *J. Mohebi 106058* (TARI) [Fig. 23F].

CAPRIFOLIACEAE

** *Centranthus longiflorus* Steven

2*n* = 32, CHN. Iran, Azarbayjan, Khoy, Ghator village, 38°28′10.46″N, 44°24′24.25″E, 1550 m, 5 Sep 2012, *J. Mohebi 106047* (TARI) [Figs. 23G, 24D].

CARYOPHYLLACEAE

** *Gypsophila bicolor* Grossh.

2*n* = 34, CHN. Iran, Kermanshah, Ghorveh to Songhor, 34°46′38.93″N, 47°26′28.37″E, 2220 m, 2 Oct 2012, *A. Ashrafi 106063* (TARI) [Figs. 23H, 24C].

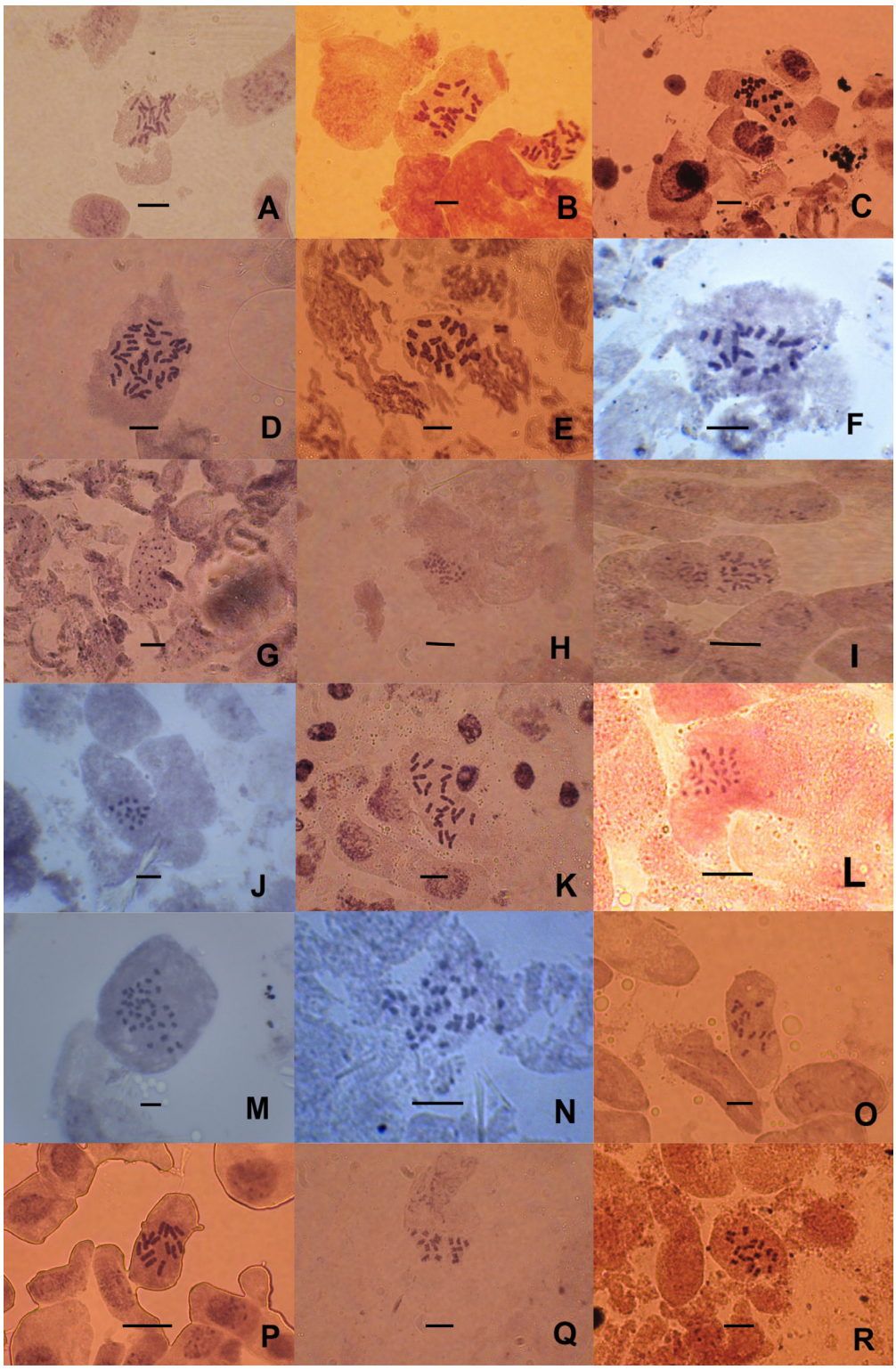

Fig. 23. Somatic metaphases. **A,** *Ferulago angulata*, 2*n* = 22; **B,** *Achillea talagonica*, 2*n* = 18; **C,** *Anthemis tinctoria*, 2*n* = 18; **D,** *Tanacetum abrotanifolium*, 2*n* = 36; **E,** *Tanacetum pinnatum*, 2*n* = 18; **F,** *Varthemia persica*, 2*n* = 16; **G,** *Centranthus longiflorus*, 2*n* = 32; **H,** *Gypsophila bicolor*, 2*n* = 34; **I,** *Hippophae rhamnoides*, 2*n* = 24; **J,** *Lallemantia canescens*, 2*n* = 14; **K,** *Phlomis olivieri*, 2*n* = 20; **L,** *Salvia hypoleuca*, 2*n* = 22; **M,** *Teucrium hircanicum*, 2*n* = 32; **N,** *Thymus persicus*, 2*n* = 30; **O,** *Sida rhombifolia*, 2*n* = 14; **P,** *Papaver bracteatum*, 2*n* = 14; **Q,** *Astragalus mesoleios*, 2*n* = 16; **R,** *Oreophysa triphylla*, 2*n* = 16. — Scale bars =10 µm.

ELAEAGNACEAE

* *Hippophae rhamnoides* L.

2*n* = 24, CHN. Iran, Mazandaran, Pole zangole to Youssh, 36°14′09.68″N, 51°26′37.65″E, 3130 m, 21 Oct 2015, *S. Mirzadeh 105207* (TARI) [Fig. 23I].

LAMIACEAE

** *Lallemantia canescens* Fisch. & C.A.Mey.

2*n* = 14, CHN. Iran, Gazvin, Taleghan, southern side of dam, 36°11′06.11″N, 50°37′40.44″E, 1860 m, 14 Aug 2013, *A. Ashrafi 106048* (TARI) [Fig. 23J, 24E].

* *Phlomis olivieri* Benth.

2*n* = 20, CHN. Iran, Fars, Shiraz to Kazeron, 29°38′17.09″N, 52°11′40.57″E, 2005 m, 20 Sep 2011, *J. Mohebi 106050* (TARI) [Fig. 23K].

Salvia hypoleuca Benth.

2*n* = 22, CHN. Iran, Tehran, Chalus, entrance of Kondor, 35°50′37.37″N, 51°05′45.58″E, 1666–2220 m, 25 Sep 2016, *S. Mirzadeh 106052* (TARI) [Fig. 23L].

** *Teucrium hircanicum* L.

2*n* = 32, CHN. Iran, Alborz, Chalus, Kiasar village, 36°02′42.40″N, 51°13′36.94″E, 2273 m, 20 Sep 2012, *J. Mohebi 106051* (TARI) [Fig. 23M].

** *Thymus persicus* (Ronniger ex Rech.f.) Jalas

2*n* = 30, CHN. Iran, Azarbayjan, Marand, Zozodagh and kamar mountain, 38°45′00.96″N, 45°30′04.96″E, 2105 m, 20 Jul 2013, *J. Mohebi 106049* (TARI) [Fig. 23N, 24F].

MALVACEAE

* *Sida rhombifolia* L.

2*n* = 14, CHN. Iran, Azarbayjan, Khoy, Ghator village, 38°28′10.46″N, 44°24′24.25″E, 1550 m, 23 Jul 2013, *J. Mohebi 106061* (TARI) [Fig. 23O, 24B].

PAPAVERACEAE

Papaver bracteatum Lindl.

2*n* = 14, CHN. Iran, Tehran, Siah bisheh, 36°12′59.37″N, 51°19′00.04″E, 2040 m, 20 Sep 2012, *J. Mohebi 106060* (TARI) [Fig. 23P].

For other chromosome number report from Iran, see Goldblatt (1974).

PAPILIONACEAE/FABACEAE

** *Astragalus mesoleios* Boiss. & Hohen.

2*n* = 16, CHN. Iran, Karaj to Chalus, Sirachal, 36°01′44.97″N, 51°18′47.56″E, 2000 m, 10 Oct 2013, *A. Ashrafi 106053* (TARI) [Fig. 23Q].

** *Oreophysa triphylla* (Bunge ex Boiss.) Bornm.

2*n* = 16, CHN. Iran, Tehran, Chalus, on the way to Kondor village, 35°50′37.37″N, 51°05′45.58″E, 2020 m, 25 Sep 2016, *S. Mirzadeh 106055* (TARI) [Fig. 23R].

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Fig. 24. Species in habitat: **A,** *Anthemis tinctoria*; **B,** *Sida rhombifolia*; **C,** *Gypsophila bicolor*; **D,** *Centranthus longiflorus*; **E,** *Lallemantia canescens*; **F,** *Thymus persicus*.