IOPB COLUMN

Edited by Karol Marhold & Ilse Breitwieser

IAPT/IOPB chromosome data 11

Edited by Karol Marhold

Matthias Baltisberger

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All material CHN; vouchers in COLO, Z/ZT.

All chromosome numbers have been counted by the late *Walter Huber*.

ASTERACEAE

Erigeron elatior (A. Gray) Greene, 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18774*.
Erigeron eximius Greene [= *E. peregrinus* subsp. *callianthemus* (Greene) Cronquist], 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18839*.
Erigeron formosissimus Greene, 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18767*.
Erigeron glabellus Nutt., 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18792*; 2*n* = 18, 27; U.S.A., Colorado, *W.A. Weber 18782*.
Erigeron lonchophyllus Hook., 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18769*.
Erigeron simplex Greene, 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18773*.
Erigeron speciosus (Lindl.) DC., 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18776*; 2*n* = 19, 21, 22, 22+1B, 23, 24, 25; U.S.A., Colorado, *W.A. Weber 18783*.
Erigeron subtrinervis Rydb., 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18768*, *W.A. Weber 18791*.
Erigeron ursinus D.C. Eaton, 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18771*.
Erigeron vetensis Rydb., 2*n* = 18; U.S.A., Colorado, *W.A. Weber 18687*.

Matthias Baltisberger* & Alex Widmer

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All material CHN; collectors: *MB* = Matthias Baltisberger, *AW* = Alex Widmer; vouchers in Z/ZT.

BRASSICACEAE

Arabis alpina L., 2*n* = 16; Italy, *MB & AW 13613, MB & AW 13733*.
Draba dolomitica Buttler, 2*n* = 32; Italy, *MB & AW 13603*, *MB & AW 13658*.
Draba fladnizensis Wulfen, 2*n* = 16; Switzerland, *MB & U. Müller 13782*, *MB & U. Müller 13805*; 2*n* = 32; Switzerland, *MB, R. Füchter & AW 13581*.

GERANIACEAE

Geranium sylvaticum L., 2*n* = 28; Switzerland, *AW 13496*.

LAMIACEAE

Betonica alopecuros L., 2*n* = 16; Italy, *MB & AW 13620*, *MB & AW 13770*, *MB & AW 13678*, *MB & AW 13803*.
Betonica hirsuta L., 2*n* = 16; Italy, *MB & AW 13680*, *MB & AW 13804*.
Horminum pyrenaicum L., 2*n* = 12; Italy, *AW 13486*.

POACEAE

Trisetum distichophyllum (Vill.) P. Beauv., 2*n* = 42; Switzerland, *MB & AW 13204*, *MB & AW 13516*.

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All materials CHN; collectors: *A* = R.D. Almada *B* = D. Baumgratz, *D* = J.R. Daviña, *Hojs* = D.H. Hojsgaard, *Jcc* = J.C. Cerutti, *MG* = M. Grabiele, *R* = J. Radins.

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ORCHIDACEAE

Mesadenella cuspidata (Lindl.) Garay, 2*n* = 46; Argentina, Misiones, *Hojs, MG & Jcc 349* (MNES); Argentina, Corrientes, *Jcc 68* (CTES, MNES).
Pelexia bonariensis (Lindl.) Schltr., 2*n* = 46; Argentina, Misiones, *Jcc 29* (MNES), *Hojs 289* (CTES, MNES, SI).
Pelexia ekmanii (Kraenzl.) Schltr., 2*n* = 46; Argentina, Misiones, *R 15* (MNES).
Pelexia lindmanii Kraenzl., 2*n* = 46; Argentina, Misiones, *D 123* (MNES).

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.

Sacoila lanceolata (Aubl.) Garay, 2*n* = 46; Argentina, Misiones, *R 55* (MNES).
Sarcoglottis fasciculata (Vell.) Schltr., 2*n* = 46; Argentina, Misiones, *Hojs 291B* (MNES).
Sarcoglottis grandiflora (Lindl.) Klotzsch, 2*n* = 46; Argentina, Misiones, *Jcc 56* (MNES); Argentina, Corrientes, *A 174* (MNES).
Sarcoglottis ventricosa (Vell.) Hoehne, 2*n* = 46; Argentina, Misiones, *Hojs 255* (MNES).
Skeptrostachys paraguayensis (Rchb. f.) Garay, 2*n* = 46; Argentina, Misiones, *B 19* (MNES).

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All materials gathered in situ, cultivated and counted by L. Hardion, R. Verlaque and B. Vila; cytometry flow conducted by A. Fridlender; vouchers in MARS.

FCM: Internal standard (*Petunia hybrida* PxPC6, 2C = 2.85 pg) was used to determine DNA content by flow cytometry (Partec CyFlow 532 nm laser cytometer).

This study was supported by the town community of Fréjus-Saint-Raphaël and the Société Botanique de France. Authors are grateful to colleagues that helped us in plant localisation and sampling.

** New chromosome number (cytotype) for the species

POACEAE

Arundo donax L.
2n = ca. 108–110, CHN. Spain, *Hardion D2/09-95*; Tunisia, *Hardion D3/09-94*; France, *Fridlender 09-22*.
2n ~ 18*x*, FCM. 2C DNA = 4.5–4.8 pg, France, *Verlaque D1*; Tunisia, *Hardion D3*; Greece, Crete, *Vila D4*; Spain, *Hardion D2*.
Arundo plinii Turra s.l.
****2n* = ca. 70–72, CHN. Algeria, *Baumel C9/09-78*, *Baumel C10/09-81*; Greece, Crete, *Vila C2/10-93*.
****2n* = ca. 76, CHN. Italy, *Hardion C7/10-15, Hardion C8c/10-16, Hardion C8a/10-22, Hardion C5/10–93*.
****2n* = ca. 108, CHN. France, *Hardion, Verlaque & Vila A7/09-17, Hardion, Verlaque & Vila B11/10-07, Hardion, Verlaque & Vila B1/09-24*, *Hardion, Verlaque & Vila B6/09-77*, *Hardion, Verlaque & Vila C6/09-98*.
2n ~ 12*x*, FCM. 2C DNA = 3.1–3.3 pg, Italy, *Hardion C4, Hardion C7, Hardion C8a, Hardion C8b, Hardion C8c*, *Hardion C5*; Greece, Crete, *Vila C2*; Algeria, *Baumel C9*.
2n ~ 18*x*, FCM. 2C DNA = 4.6–4.8 pg, France, *Hardion, Verlaque & Vila A1, Hardion, Verlaque & Vila A2, Hardion, Verlaque & Vila A3, Hardion, Verlaque & Vila A4, Hardion, Verlaque & Vila A5, Hardion, Verlaque & Vila A6, Hardion, Verlaque & Vila A7, Hardion, Verlaque & Vila A8, Hardion, Verlaque & Vila A9, Hardion, Verlaque & Vila A10, Hardion, Verlaque & Vila B1, Hardion, Verlaque & Vila B2, Hardion, Verlaque & Vila B3, Hardion, Verlaque & Vila B4, Hardion, Verlaque & Vila B5, Hardion, Verlaque & Vila B6, Hardion, Verlaque & Vila B7, Hardion, Verlaque & Vila B8, Hardion, Verlaque & Vila B9, Hardion, Verlaque & Vila B10, Hardion, Verlaque & Vila B11, Hardion, Verlaque & Vila B12, Hardion, Verlaque & Vila B13*, *Hardion, Verlaque & Vila C6*.

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ALISMATACEAE

Alisma plantago-aquatica L., *n* = 14; *NM 27184*.

POACEAE

Alopecurus nepalensis Trin. ex Steud., *n* = 21; *NM 27181*.
Echinochloa colonum (L.) Link, *n* = 27; *HK 27032*.
Imperata cylindrica (L.) P. Beauv., *n* = 10; *HK 24854*.
Koeleria macrantha (Ledeb.) Schult., *n* = 7; *NM 27182*.
Lolium temulentum L., *n* = 7; *HK 24861*.
Paspalum distichum L., *n* = 25; *HK 24846*, *HK 24847*.
Pennisetum lanatum Klotzsch, *n* = 21; *HK 25048*.
Pennisetum purpureum Schumach., *n* = 18; *HK 27167*; *n* = 21; *HK 25602*.
Poa supina Schrad., *n* = 7; *NM 27183*.
Setaria palmifolia (J. König) Stapf, *n* = 27; *HK 27154*.

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ASTERACEAE

Brachiactis ciliata (Ledeb.) Ledeb., 2*n* = 18; Russia, Altaiskii Krai, 19 Sep 2009, *EK s.n.*
Erigeron acris L., 2*n* = 18; Russia, Novosibirskaya Oblast', 25 Aug 2008, *EK s.n.*
Galatella altaica Tzvelev, 2*n* = 36; Russia, Republic of Altai, 1 Aug 2008, *EK s.n.*
Galatella angustissima (Tausch) Novopokr., 2*n* = 18; Russia, Novosibirskaya Oblast', 12 Aug 2008, *EK s.n.*; Russia, Novosibirskaya Oblast', *EK L53*; Russia, Republic of Tuva, *Shaulo, Erst & Zhirova 67*.
Galatella biflora (L.) Nees, *2n* = 36; Russia, Altaiskii Krai, 14 Sep 2009, *EK s.n.*; Russia, Republic of Altai, *EK 500AK*; Russia, Novosibirskaya Oblast', 21 Sep 2009, *EK s.n.*
Galatella punctata (Waldst. & Kit.) Nees, *2n* = 18; Russia, Altaiskii Krai, 17 Sep 2009, *EK s.n.*; Russia, Novosibirskaya Oblast', 1 Aug 2008, *EK s.n.*
Heteropappus altaicus (Willd.) Novopokr., 2*n* = 18; Russia, Republic of Altai, *EK L9*; Russia, Altayskyi krai, 15 Sep 2009, *EK s.n.*; Russia, Khakassia, *Lomonosova 653*. 2*n* = 36; Russia, Republic

of Altai, *EK L56, EK L79*; Russia, Altaiskii Krai, *Krasnikov & Zhirova 9*.

Heteropappus biennis (Willd.) Tamamsch. ex Grub., 2*n* = 18; Russia, Khakassia, 25 Aug 2008, *Cheremuschkina s.n.*

Heteropappus medius (Krylov) Tamamsch., 2*n* = 18; Russia, Republic of Altai, 19 Aug 2008, *EK s.n.*

Tripolium vulgare Nees, 2*n* = 18; Russia, Altaiskii Krai, 20 Sept 2009, *EK s.n.*

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All materials CHN; collectors: *DK* = D.A. *K*rivenko, *SK* = S.G. Kazanovsky, *AV* = A.V. *V*erkhozina; vouchers in IRK.

CARYOPHYLLACEAE

Oberna behen (L.) Ikonn., 2*n* = 12; Russia, Irkutskaya Oblast', *DK & M.A. Markaryan 15722*.

FABACEAE

Astragalus austrosibiricus Schischk., 2*n* = 32; Russia, Irkutskaya Oblast', *DK 15734*.

Astragalus bifidus Turcz., 2*n* = 32; Russia, Irkutskaya Oblast', *AV, M.E. Ineshina & I.V. Enuschchenko 4195*, *SK 8849*.

Astragalus chorinensis Bunge, 2*n* = 16; Russia, Irkutskaya Oblast', *DK & S. Rolfsmeier 15778*.

Astragalus kaufmannii Krylov, 2*n* = 16; Russia, Irkutskaya Oblast', *SK 15672*.

Astragalus lupulinus Pall., 2*n* = 16; Russia, Irkutskaya Oblast', *SK & DK 15779*.

Astragalus olchonensis Gontsch., 2*n* = 32; Russia, Irkutskaya Oblast', *AV & Yu.N. Pochinchik 9608*.

Astragalus suffruticosus DC., 2*n*= 16; Russia, Irkutskaya Oblast', *DK 15652*.

Astragalus versicolor Pall., 2*n* = 16; Russia, Irkutskaya Oblast', *SK 8823*, *DK 15776*.

Caragana jubata (Pall.) Poir., 2*n* = 16; Russia, Buryatiya, *SK 15777*.

Caragana pygmaea (L.) DC., 2*n* = 16; Russia, Irkutskaya Oblast', *DK 15627*.

Hedysarum turczaninovii Peschkova, 2*n* = 14; Russia, Irkutskaya Oblast', *SK & DK 14260*.

Lupinaster pentaphyllus Moench, 2*n* = 32; Russia, Irkutskaya Oblast', *DK 15780*.

Medicago falcata L., 2*n* = 16; Russia, Irkutskaya Oblast', *DK 15634*.

Oxytropis coerulea (Pall.) DC., 2*n* = 32; Russia, Irkutskaya Oblast', *DK 15775*, *DK 15649*.

Oxytropis lanata (Pall.) DC., 2*n*= 16; Russia, Irkutskaya Oblast', *DK 15331*.

Oxytropis muricata (Pall.) DC., 2*n*= 32; Russia, Irkutskaya Oblast', *DK 15774*.

Oxytropis oxyphylloides Popov, 2*n* = 16; Russia, Irkutskaya Oblast', *SK 15576*.

Oxytropis popoviana Peschkova, 2*n* = 16; Russia, Irkutskaya Oblast', *SK 3363*.

Oxytropis tragacanthoides Fisch., 2*n* = 32; Russia, Irkutskaya Oblast', *DK 15330*.

Oxytropis triphylla (Pall.) Pers., 2*n* = 16; Russia, Irkutskaya Oblast', *DK 15785*.

Oxytropis turczaninovii Jurtzev, 2*n* = 16; Russia, Irkutskaya Oblast', *DK 15786*.

Thermopsis lanceolata subsp. *sibirica* (Czefr.) Kurbatski, 2*n* = 18; *AV*, *Yu.N. Pochinchik & DK 9580*.

Vicia amoena Fisch., 2*n* = 24; Russia, Irkutskaya Oblast', *DK 15745*.

Vicia cracca L., 2*n* = 14; Russia, Irkutskaya Oblast', *DK 15650*.

Vicia unijuga A. Br., 2*n* = 12; Russia, Irkutskaya Oblast', *DK 15744*.

HEMEROCALLIDACEAE

Hemerocallis minor Mill., 2*n* = 22; Russia, Irkutskaya Oblast', *DK 15782*.

IRIDACEAE

Iris humilis Georgi, 2*n*= 28; Russia, Irkutskaya Oblast', *DK 15781*.

LILIACEAE

Lilium pumilum Delile, 2*n* = 24; Russia, Irkutskaya Oblast', *DK 15783*.

LINACEAE

Linum perenne L., 2*n* = 16; Russia, Irkutskaya Oblast', *DK 15784*.

RANUNCULACEAE

Delphinium grandiflorum L., 2*n* = 20; Russia, Irkutskaya Oblast', *DK 15633*.

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Chromosome numbers counted and ploidy level estimated by *JK* = J. Kučera and *MS* = M. Slovák; vouchers are deposited in SAV.

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CARYOPHYLLACEAE

Stellaria holostea L.
2*n* = 26, CHN. Slovakia, *JK & MS JOV1*.
2*n* ~ 2*x* ~ 26, FCM. Slovakia, *JK & MS MAN1*, *JK & MS MAN3, JK & MS JOV1*, *JK & MS JOV2*, *JK & MS JOV3*, *JK & MS KRI1*, *JK & MS KRI2*, *JK & MS KRI3*, *JK KOZ1*, *JK KOZ3*, *JK & MS RAB1*, *JK & MS RAB2*, *JK & MS RAB3*, *JK & MS ZOB1*, *JK & MS ZOB2*, *JK & MS ZOB3*, *JK & MS GOL1*, *JK & MS GOL2*, *JK & MS GOL3, JK & MS BUR1*, *JK & MS BUR2*, *JK & MS BUR3*, *JK & MS CEN1*; Czech Republic, *JK & MS SME1*, *JK & MS SME2*.

Stellaria nemorum L. subsp. *nemorum*
2*n* = 26, CHN. Slovakia, *JK & MS BYSN2*.
2*n* ~ 2*x* ~ 26, FCM. Slovakia, *JK & MS TLS1*, *JK & MS TLS4*, *JK & MS BYSN2*, *JK & MS BYSN4*, *JK & MS LOM1*, *JK & MS LOM3*, *JK & MS POL3*, *JK & MS CEK3*, *JK & MS KRM1*.

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All materials CHN; collectors: *GI* = G. Iiriti, *FF* = F. Frignani; vouchers both in CAG and SIENA

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IRIDACEAE

Romulea bulbocodium (L.) Sebast. & Mauri, 2*n* = 36; Italy, Sicily, ‘ 8 March 2009, *GI & FF s.n.*

Romulea linaresii Parl. subsp. *linaresii*, 2*n* = 36; Italy, Sicily, 7 March 2009, *GI & FF s.n.*; 8 March 2009, *GI & FF s.n.*

Romulea melitensis Bég., 2*n* = 36; Italy, Sicily, 28 February 2010, *GI & FF*; Malta, 26 February 2010, *GI & FF s.n.*

Romulea ramiflora Ten., 2*n* = 36; Italy, Sicily, 8 March 2009, *GI & FF s.n.*

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Walter Huber was a senior scientist at our institute working mainly on *Ranunculus* (e.g., Huber, 1985, 1988) and on *Erigeron* (e.g., Huber & Zhang, 1991; Huber & Leuchtmann, 1992; Huber, 1993, 1994; Oberhänsli & Huber, 1993) as well as on floristic aspects in Switzerland (e.g., Huber, 1992; Huber & Bolliger, 1994). He was born in 1958 and died very young in 1994. He left valuable unpublished material. Recently, some of his herbarium specimens were checked. As they include valuable cytological informations (including drawings of metaphases) these data are published here in memory of *Walter Huber*.

The cytological investigations have been carried out on root tips of cultivated plants (method see Huber, 1993). Of each population, the chromosomes of 10 plants were counted. The karyotypes are described following the nomenclature of Levan & al. (1964).

ASTERACEAE

Erigeron elatior (A. Gray) Greene

2*n* = 18, CHN. U.S.A., Colorado, Park, South Park, forest road from Jefferson to summit of Georgia Pass, openings in spruce forest, 3000 m, 2 Aug 1993, *W.A. Weber 18774* (COLO, Z/ZT).

Erigeron eximius Greene [= *E.peregrinus* subsp. *callianthemus* (Greene) Cronquist]

2*n* = 18, CHN. U.S.A., Colorado, Pitkin, Roaring Fork Valley between Independence Pass and Aspen, spruce forest at Lost Man Campground, 3100 m, 12 Sep 1993, *W.A. Weber 18839* (COLO, Z/ZT).

Erigeron formosissimus Greene

2*n* = 18, CHN. U.S.A., Colorado, Jefferson, Conifer, locally abundant in roadside meadows, 2 Aug 1993, *W.A. Weber 18767* (COLO, Z/ZT).

Erigeron glabellus Nutt.

2*n* = 18, CHN. U.S.A., Colorado, Lake, Lake Creek Valley, base of east side Independence Pass, on level ground along highway, 23 Aug 1993, *W.A. Weber 18792* (COLO, Z/ZT).

2*n* = 18, 27, CHN. U.S.A., Colorado, Pitkin, Aspen woodland above riparian zone, Lewis home along Roaring Fork River on east edge of Aspen, 23 Aug 1993, *W.A. Weber 18782* (COLO, Z/ZT).

Erigeron lonchophyllus Hook.

2*n* = 18, CHN. U.S.A., Colorado, Park, South Park, High Creek Fen, 10 miles south of Fairplay, common in alkaline depressions where there is no competition, and also fairly abundant on the roadside adjacent the fen, 2900 m, 2 Aug 1993, *W.A. Weber 18769* (COLO, Z/ZT).

Erigeron simplex Greene

2*n* = 18, CHN. U.S.A., Colorado, Park, South Park, summit of Georgia Pass, at base of Guyot Peak, north of Jefferson, alpine tundra, 3500 m, 2 Aug 1993, *W.A. Weber 18773* (COLO, Z/ZT), *W.A. Weber 12999* (Z/ZT).

Erigeron speciosus (Lindl.) DC.

2*n* = 18, CHN. U.S.A., Colorado, Boulder, Front Range Foothills west of Boulder, 4 miles below junction Gold Hill-Ward on road from Wall Street, locally abundant on sunny mountainsides, 6 Aug 1993, *W.A. Weber 18776* (COLO, Z/ZT).

2*n* = 19, 21, 22, 22+1B, 23, 24, 25, CHN. U.S.A., Colorado, Pitkin, Aspen woodland above riparian zone, Lewis home along Roaring Fork River on east edge of Aspen, 23 Aug 1993, *W.A. Weber 18783* (COLO, Z/ZT).

Erigeron subtrinervis Rydb.

2*n* = 18, CHN. U.S.A., Colorado, Park, North Fork South Platte River west of Grant, edge of *Populus tremuloides* groves, 2 Aug 1993, *W.A. Weber 18768* (COLO, Z/ZT); U.S.A., Colorado, Lake, Lake Creek Valley, base of east side Independence Pass, on level ground along highway, 23 Aug 1993, *W.A. Weber 18791* (COLO, Z/ZT).

Erigeron ursinus D.C. Eaton

2*n* = 18, CHN. U.S.A., Colorado, Park, South Park, forest road between Jefferson and Georgia Pass, openings on moderate slope in *Picea* forest, 3200 m, 2 Aug 1993, *W.A. Weber 18771* (COLO, Z/ZT), *W.A. Weber 13077* (Z/ZT).

Erigeron vetensis Rydb.

2*n* = 18, CHN. U.S.A., Colorado, Park, South Park, 12 miles south of Fairplay, common on gravelly roadside, 2900 m, 29 Jun 1993, *W.A. Weber & Wittmann 18687* (COLO, Z/ZT), *W.A. Weber & Wittmann 13078* (Z/ZT).

Chromosome numbers in literature were checked using Goldblatt & Johnson (1979+). With 2*n* = 18 most of the plants investigated here are diploid. Other numbers than 18 were found in one plant of *E. glabellus* (*W.A. Weber 18782* with 2*n* = 27) and in all 10 plants of one origin of *E. speciosus* (*W.A. Weber 18783*, one plant each with 2*n* = 19, 21, and 23, two plants each with 2*n* = 22 [one of them with 1 B chromosome], and 24, and three plants with 2*n* = 25).

With a size of 2–3 µm the chromosomes are rather small. With the exception of two populations (*E. speciosus*, *W.A. Weber 18783*; and

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.

E. subtrinervis, *W.A. Weber 18791*) karyotypes were established on plants of all origins. Four different karyotypes have been found (Fig. 1):

(1) six metacentric, ten submetacentric (two of them with satellites), and two subtelocentric chromosomes: 6m 8sm $2sm_{SAT}$ 2st (*E. eximius*);

(2) two metacentric and sixteen submetacentric chromosomes (four of the latter with satellites): 2m 12sm $4sm_{SAT}$ (*E. elatior*);

(3) four metacentric and fourteen submetacentric chromosomes (four of the latter with satellites): 4m 10sm $4sm_{SAT}$ (*E. glabellus*, *E. formosissimus*, *E. speciosus*, *E. subtrinervis*, *E. vetensis*);

(4) four metacentric and fourteen submetacentric chromosomes (two of the latter with satellites): 4m 12sm $2sm_{SAT}$ (*E. lonchophyllus*, *E. simplex*, *E. ursinus*)

The genus *Erigeron* comprises about 400 species, and a major center of origin with many species is in North America (Nesom & Robinson, 2007). This is also reflected in the variability of karyotypes. Within the only ten North American species investigated here, four different karyotypes were established by Walter Huber. In contrast, less than ten species are native to the Alps in central Europe, all of which uniformly show the same karyotype 4m 12sm $2sm_{SAT}$ (Huber, 1993), which is the same karyotype as in the American *E. lonchophyllus*, *E. simplex*, and *E. ursinus*. It is unclear if these similar karyotypes indicate a phylogenetic relationship between these American and European species. Similar to the genus *Ranunculus*, *Erigeron* shows a broad variation concerning morphology, life cycle, ecology, geographic distribution as well as karyotypes. It would be of interest to check if karyotypes provide a useful tool to support the phylogeny of the genus as it seems to be the case within *Ranunculus* (Baltisberger & Widmer, 2009).

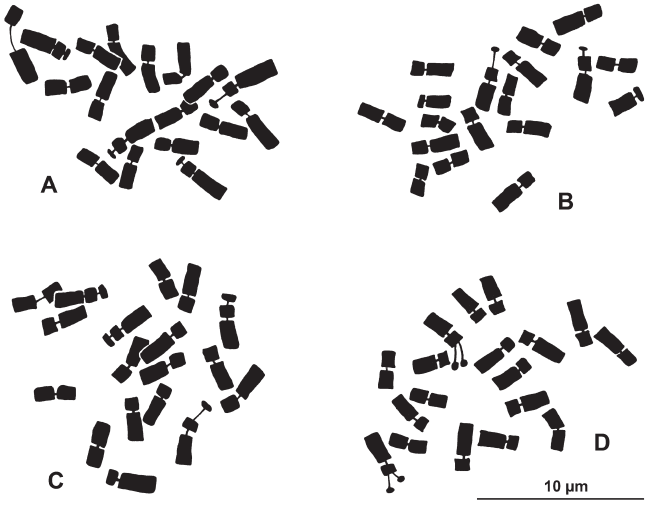

Fig. 1. Somatic metaphases, all with $2n = 18$ chromosomes. **A,** *Erigeron elatior* (*W.A. Weber 18774*) with 2m 12sm $4sm_{SAT}$; **B,** *E. eximius* (*W.A. Weber 18839*) with 6m 8sm $2sm_{SAT}$ 2st; **C,** *E. glabellus* (*W.A. Weber 18792*) with 4m 10sm $4sm_{SAT}$; **D,** *E. lonchophyllus* (*W.A. Weber 18769*) with 4m 12sm $2sm_{SAT}$.

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The cytological investigations have been carried out on root tips of cultivated plants (method see Baltisberger & Widmer, 2009). Of each population the chromosomes of at least three plants have been counted. Chromosome numbers in literature were checked using Goldblatt & Johnson (1979+). The nomenclature for chromosome morphology follows Levan & al. (1964).

BRASSICACEAE

Arabis alpina L.

$2n = 16$, CHN. Italy, Alpi Dolomitiche, on the path from Rifugio Contrin to Passo Marmolada, scree near Passo Ombretta, 2500–2600 m, 26 Jul 2000, *M. Baltisberger & A. Widmer 13613*, *M. Baltisberger & A. Widmer 13733* (Z/ZT).

Draba dolomitica Buttler

$2n = 32$, CHN. Italy, Alpi Dolomitiche, on the path from Rifugio Contrin to Passo Marmolada, scree near Passo Ombretta, 2600 m, 26 Jul 2000, *M. Baltisberger & A. Widmer 13603* (Z/ZT); Italy, Alpi Dolomitiche, on the path from Rifugio Forcla Pordoi to Piz Poè, north of Passo Pordoi, scree, 2900 m, 29 Jul 2000, *M. Baltisberger & A. Widmer 13658* (Z/ZT).

Draba fladnizensis Wulfen

$2n = 16$, CHN. Switzerland, ct. Grisons, SSW slope of Piz Beverin, rocks and scree, 2830–2840 m, 31 Jul 2001, *M. Baltisberger & U. Müller 13782*, *M. Baltisberger & U. Müller 13805* (Z/ZT).

$2n = 32$, CHN. Switzerland, ct. Berne, NNW of Grindelwald, summit region of Faulhorn, rocks and scree, 2650–2680 m, 22 Jul 2000, *M. Baltisberger, R. Füchter & A. Widmer 13581* (Z/ZT).

The chromosomes of all three investigated taxa of the family Brassicaceae are very small (most of them less than 1 µm). The

numbers of *Arabis alpina* (Fig. 2A) and *Draba dolomitica* (Fig. 2B) correspond with the indications in literature. For *D. fladnizensis*, a widespread species circumpolar in the arctic region as well as in the European Alps, only the diploid number $2n = 16$ is given in literature (alpine plants, e.g., Merxmüller & Buttler, 1965, and Buttler, 1969; arctic plants, e.g., Brochmann, 1993). The same number was found by us in plants from Piz Beverin (Fig. 2C). The tetraploid level ($2n = 32$), found in plants from Faulhorn, is a new ploidy level for this species (Fig. 2D). Nevertheless, although *D. fladnizensis* is widespread in the arctic region, it is only diploid in this area, and shows limited morphological, ecological, and genetic diversity, it comprises there several (probably many) cryptic biological species (Grundt & al., 2005). In central Europe *D. fladnizensis* is rather scattered over the Alps growing on high mountain peaks and the respective sites being often far away from each other. Besides the geographic isolation of the respective sites the different ploidy levels (diploid versus tetraploid) are an additional isolating factor within the Alps, therefore cryptic species within *D. fladnizensis* can also be expected here.

GERANIACEAE

Geranium sylvaticum L.

$2n = 28$, CHN. Switzerland, ct. Berne, Kandersteg, meadow, 1180 m, Apr 1997, *A. Widmer 13496* (Z/ZT).

The plants showed $2n = 28$ chromosomes (Fig. 2E) which corresponds with the indications in literature.

LAMIACEAE

Betonica alopecuros L.

$2n = 16$, CHN. Italy, Alpi Dolomitiche, Marmolada, on the path from Rifugio Contrin to Passo Ombretta, meadow, 2150 m, 26 Jul 2000, *M. Baltisberger & A. Widmer 13620*, *M. Baltisberger & A. Widmer 13770* (Z/ZT); Italy, east of Lago di Garda, Monte Baldo, surroundings of the top station of funicular from Malcesine, meadow, 1650–1750 m, *M. Baltisberger & A. Widmer 13678*, *M. Baltisberger & A. Widmer 13803* (Z/ZT).

Betonica hirsuta L.

$2n = 16$, CHN. Italy, east of Lago di Garda, Monte Baldo, surroundings of the top station of funicular from Malcesine, meadow, 1650–1750 m, *M. Baltisberger & A. Widmer 13680*, *M. Baltisberger & A. Widmer 13804* (Z/ZT).

Both investigated species of *Betonica* show the diploid chromosome number $2n = 16$ (Fig. 1F–G) and thus confirm the numbers given in literature. About 10–15 species of the genus *Betonica* are mostly included within the large genus *Stachys* (with about 300 species; Krestovskaja, 2004) and there treated as either section or subgenus. But distinct characteristics exist between *Betonica* and the other species of *Stachys* (Baltisberger, 1989) including morphological as well as cytological features. *Betonica* uniformly shows the basic chromosome number $n = 8$ which is very rare in species of *Stachys*. Additionally, *Betonica* shows rather large, meta- to submetacentric chromosomes (mostly more than 3 µm) whereas *Stachys* has small chromosomes (mostly less than 2 µm) with hardly visible centromeres. *Stachys*, one of the largest genera in Lamiaceae, has been shown in an existing phylogeny to be polyphyletic (Lindqvist & Albert, 2002), and several related genera have to be included within *Stachys* (e.g., *Sideritis* with about 140 species) and thus the genus *Stachys* would grow to more than 500 species. But following this phylogeny (Lindqvist & Albert, 2002) *Betonica* clearly has to be separated from *Stachys* which is supported by morphological characters as well as by our cytological data.

Horminum pyrenaicum L.

$2n = 12$, CHN. Italy, Valtellina, on the road from Bormio to Valle del Braulia, stony meadow, 2180 m, Jun 1997, *A. Widmer 13486* (Z/ZT).

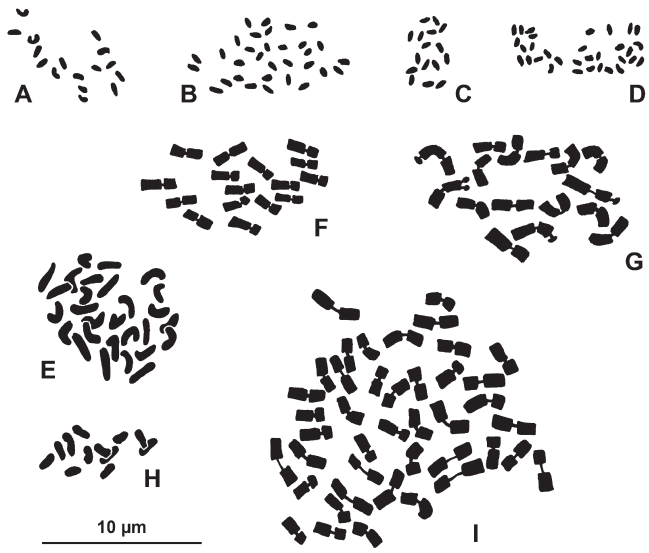

Fig. 2. Somatic metaphases. **A,** *Arabis alpina*, $2n = 16$; **B,** *Draba dolomitica* (*M. Baltisberger & A. Widmer 13603*), $2n = 32$; **C,** *Draba fladnizensis*, $2n = 16$; **D,** *Draba fladnizensis*, $2n = 32$; **E,** *Geranium sylvaticum*, $2n = 28$; **F,** *Betonica alopecuros* (*M. Baltisberger & A. Widmer 13678*), $2n = 16$; **G,** *Betonica hirsuta*, $2n = 16$; **H,** *Horminum pyrenaicum*, $2n = 12$; **I,** *Trisetum distichophyllum*, $2n = 42$.

The plants showed $2n = 12$ chromosomes (Fig. 2H) which corresponds with the indications in literature.

POACEAE

Trisetum distichophyllum (Vill.) P. Beauv.

$2n = 42$, CHN. Switzerland, ct. Valais, Val d'Hérens, ENE of Les Haudères, between Liapey d'Enfer and Serra Neire, scree, 2550–2650 m, 8 Aug 1996, *M. Baltisberger & A. Widmer 13204*, *M. Baltisberger & A. Widmer 13516* (Z/ZT).

There are two indications in literature, Favarger (1959) with tetraploid ($2n = 28$) and octoploid ($2n = 56$) plants as well as Lippert (2006) with tetraploid plants ($2n = 28$). With $2n = 42$ chromsomes (Fig. 2I) the plants investigated here were hexaploid which represents a new ploidy level for this species.

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Methods are described in Daviña & al. (2009) and Grabiele & al. (2005, 2010). Asymmetry indexes: A_1 and A_2 (Romero Zarco, 1986); r > 2 and R (Stebbins, 1971); i (centromeric mean). Abbreviations: m, metacentric; sm, submetacentric; st, subtelocentric.

This contribution belongs to the series "Chromosome studies in Orchidaceae from Argentina, II". For all taxa, these are the first reports on their karyotypes.

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ORCHIDACEAE

Mesadenella cuspidata (Lindl.) Garay

2*n* = 46, CHN (Fig. 3I). Argentina, Misiones Province, Capital Department, Garupá, 2 km W of Garupá stream, in forest shade, 27°28′S, 55°50′W, 4 Jul 2004, *Hojsgaard, Grabiele & Cerutti 349* (MNES); Argentina, Corrientes Province, Ituzaingó Department, Garapé, at the coast of the Paraná river, in forest shade, 27°36′S, 56°22′W, 20 May 2001, *Cerutti 68* (CTES, MNES).

This species occurs in Argentina (restricted to Misiones and Corrientes), Brazil and Paraguay (Correa, 1996; Johnson, 2001) and only this cytotype is known (Martinez, 1985; Daviña & al., 2009). The chromosome lengths range from 1.32 (m) to 4.42 (sm) µm with a mean of 1.77 µm and haploid genome length 40.8 µm. The karyotype, 38 m+8 sm, is distinctly bimodal (A_2 = 0.34; R = 3.35) and symmetrical (A_1 = 0.19; r > 2 = 0.09; i = 44.23) (2B Stebbins) with the pair no. 20 (sm) carrying a terminal macrosatellite on the short arm (Fig. 3P). This species is included in Appendix II of CITES.

Pelexia bonariensis (Lindl.) Schltr.

2*n* = 46, CHN (Fig. 3A). Argentina, Misiones Province, Capital Department, Posadas, at the coast of Paraná river, in open field, 27°21′S, 56°00′W, 10 Jun 2003, *Cerutti 29* (MNES); Argentina, Misiones Province, Candelaria Department, Parque Provincial Cañadon de Profundidad, 2 km W of Garupá stream, in open field, 27°33′S, 55°42′W, 29 May 2003, *Hojsgaard 289* (CTES, MNES, SI).

This is a southern South American taxon that extends in its distribution to the northern and central regions of Argentina (Correa, 1996), constantly possessing this cytotype (Martinez, 1985; Dematteis & Daviña, 1999; Daviña & al., 2009). The chromosome lengths range from 1.38 (m) to 3.31 (m) µm with a mean of 1.84 µm and haploid genome length 42.2 µm. The karyotype, 36 m+10 sm, is slightly bimodal (A_2 = 0.25; R = 2.41) and symmetrical (A_1 = 0.23; r > 2 = 0.04; i = 43.06) (2B Stebbins) with the pair no. 2 (m) carrying a terminal macrosatellite on the short arm (Fig. 3J). This species is included in Appendix II of CITES.

Pelexia ekmanii (Kraenzl.) Schltr.

2*n* = 46, CHN (Fig. 3B). Argentina, Misiones Province, Capital Department, Garupá, 2 km W of Garupá stream, in open field, 27°28′S, 55°50′W, 02 Jun 2002, *Radins 15* (MNES).

This species inhabits Brazil, Paraguay and NE Argentina (Correa, 1996) and this is the only chromosome number reported for it (Daviña & al., 2009). The chromosome lengths range from 1.51 (m) to 3.73 (m) µm with a mean of 2.14 µm and haploid genome length 49.3 µm. The karyotype, 36 m+10 sm, is somewhat bimodal (A_2 = 0.25; R = 2.47) and symmetrical (A_1 = 0.23; r > 2 = 0.22; i = 42.83) (2B Stebbins) with the pairs nos. 2 and 4 carrying terminal macrosatellites on the large and short arms, respectively (Fig. 3L). This species is included in Appendix II of CITES.

Pelexia lindmanii Kraenzl.

2*n* = 46, CHN (Fig. 3C). Argentina, Misiones Province, San Pedro Department, Parque Provincial Moconá, at the coast of the Uruguay river, in forest shade, 27°09′S, 53°54′W, 18 Dec 1992, *Daviña 123* (MNES).

This taxon is present from Río Grande do Sul (Brazil) to Paraguay and NE Argentina (Correa, 1996; Johnson, 2001) and this is the only chromosome number reported for it in literature (Daviña & al., 2009). The chromosome lengths range from 1.23 (m) to 3.73 (m) µm with a mean of 1.72 µm and haploid genome length 39.5 µm. The karyotype, 42 m+4 sm, is bimodal (A_2 = 0.30; R = 3.04) and symmetrical (A_1 = 0.17; r > 2 = 0.00; i = 45.11) (1B Stebbins) (Fig. 3N). This species is included in Appendix II of CITES.

Sacoila lanceolata (Aubl.) Garay

2*n* = 46, CHN (Fig. 3H). Argentina, Misiones Province, Capital Department, Garupá, 2 km W of Garupá stream, in open field, 27°28′S, 55°50′W, 14 Jan 2003, *Radins 55* (MNES).

This species is widely distributed from Central America to northern and central regions of Argentina (Correa, 1996; Johnson, 2001) and this is the only cytotype reported for it (Cocucci, 1955; Martínez, 1985; Felix & Guerra, 2005; Daviña & al., 2009). The chromosome lengths range from 1.25 (m) to 4.37 (sm) µm with a mean length of 1.72 µm and haploid genome length 39.6 µm. The karyotype, 38 m+8 sm, is markedly bimodal (A_2 = 0.34; R = 3.49) and symmetrical (A_1 = 0.19; r > 2 = 0.13; i = 44.11) (2B Stebbins) with the pair no. 20 carrying a terminal macrosatellite on the short arm (Fig. 3R). This species is included in Appendix II of CITES.

Sarcoglottis fasciculata (Vell.) Schltr.

2*n* = 46, CHN (Fig. 3F). Argentina, Misiones Province, Capital Department, Posadas, at the coast of Paraná river, in forest shade, 27°21′S, 56°00′W, 10 Apr 2003, *Hojsgaard 291B* (MNES).

This taxon is present at Argentina (restricted to Misiones), Brazil and Paraguay (Correa, 1996). This chromosome number is regular (Martínez, 1985; Felix & Guerra, 2005) but the presence of B chromosomes was also recorded (Daviña & al., 2009). The chromosome lengths range from 1.19 (m) to 3.44 (m) µm with a mean of 1.71 µm and haploid genome length 39.2 µm. The karyotype, 32 m+12 sm+2 st, is bimodal (A_2 = 0.26; R = 2.90) and symmetrical (A_1 = 0.27; r > 2 = 0.26; i = 41.30) (2B Stebbins) with the pairs nos. 1 and 3 carrying terminal macrosatellites on the short and large arms, respectively (Fig. 3K).

Sarcoglottis grandiflora (Lindl.) Klotzsch

2*n* = 46, CHN (Fig. 3E). Argentina, Misiones Province, Capital Department, Posadas, at the coast of Paraná river, in open field, 27°21′S, 56°00′W, 21 Aug 2003, *Cerutti 56* (MNES); Argentina,

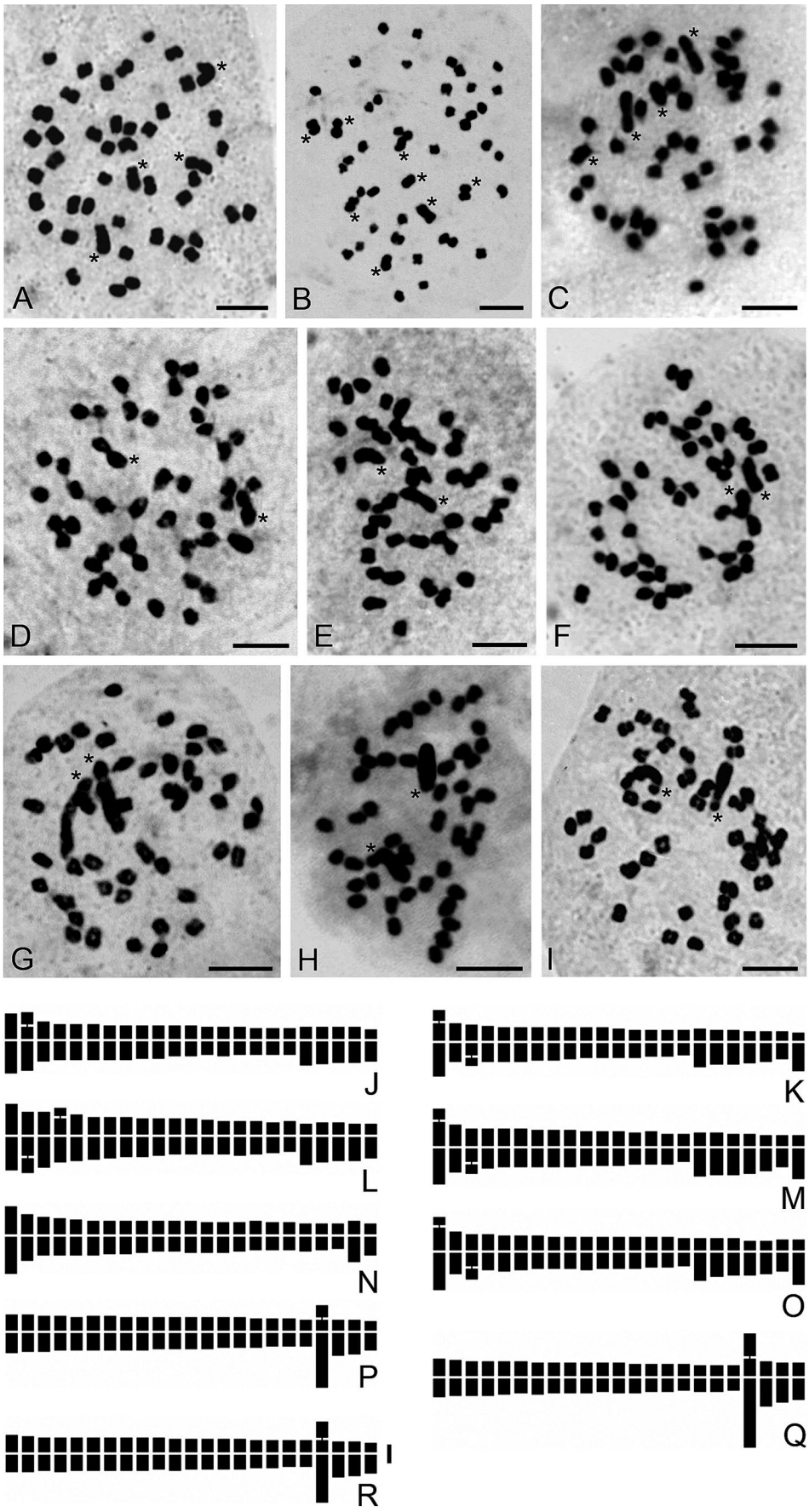

Fig. 3. Mitotic metaphases and idiograms of all taxa ($2n = 46$). **A, J,** *Pelexia bonariensis*; **B, L,** *P. ekmanii*; **C, N,** *P. lindmanii*; **D, O,** *Sarcoglottis ventricosa*; **E, M,** *S. grandiflora*; **F, K,** *S. fasciculata*; **G, Q,** *Skeptrostachys paraguayensis*; **H, R,** *Sacoila lanceolata*; **I, P,** *Mesadenella cuspidata*. Asterisks point out the largest chromosomes of the karyotype. Scale bar is 5 µm for the mitotic metaphases and 1 µm for the idiograms.

Corrientes Province, Ituzaingó Department, Garapé, at the coast of the Paraná river, in forest shade, 27°36′S, 56°22′W, 10 May 2003, *Almada 174* (MNES).

This species inhabits Brazil, Paraguay and N Argentina (Correa, 1996) and is always represented by this cytotype (Martínez, 1985; Daviña & al., 2009). The chromosome lengths range from 1.39 (m) to 3.99 (m) µm with a mean of 2.03 µm and haploid genome length 46.8 µm. The karyotype, 32 m+12 sm+2 st, is bimodal (A_2 = 0.25; R = 2.86) and symmetrical (A_1 = 0.27; r > 2 = 0.26; i = 41.22) (2B Stebbins) with the pairs nos. 1 and 3 carrying terminal macrosatellites on the short and large arms, respectively (Fig. 3M).

Sarcoglottis ventricosa (Vell.) Hoehne

2*n* = 46, CHN (Fig. 3D). Argentina, Misiones Province, Montecarlo Department, Caraguatay island, at the Paraná river, in forest shade, 26°35′S, 54°47′W, 31 Dec 2002, *Hojsgaard 255* (MNES).

This taxon is present at Argentina (restricted to Misiones) and SE Brazil (Correa, 1996), constantly being represented by this cytotype (Martínez, 1985; Daviña & al., 2009). The chromosome lengths range from 1.38 (m) to 3.86 (m) µm with a mean of 1.88 µm and haploid genome length 43.1 µm. The karyotype, 32 m+12 sm+2 st, is bimodal (A_2 = 0.27; R = 2.80) and symmetrical (A_1 = 0.30; r > 2 = 0.26; i = 40.37) (2B Stebbins) with the pairs nos. 1 and 3 carrying terminal macrosatellites on the short and large arms, respectively (Fig. 3O).

Skeptrostachys paraguayensis (Rchb. f.) Garay

2*n* = 46, CHN (Fig. 3G). Argentina, Misiones Province, Apóstoles Department, San José, in open field, 27°46′S, 55°45′W, 09 May 1993, *Baumgratz 19* (MNES).

This species is native to Brazil, Paraguay and N Argentina (Correa, 1996) and only this chromosome number was reported in literature (Daviña & al., 2009). The chromosome lengths range from 1.19 (m) to 6.38 (sm) µm, with a mean of 1.80 µm and haploid genome length 41.4 µm. The karyotype, 38 m+8 sm, is remarkably bimodal (A_2 = 0.57; R = 5.37) and symmetrical (A_1 = 0.23; r > 2 = 0.09; i = 43.16) (2C Stebbins) with the pair no. 20 carrying a terminal macrosatellite on the short arm (Fig. 3Q). This species is included in Appendix II of CITES.

All these terrestrial orchids share the chromosome number 2*n* = 46 and a bimodal and symmetrical karyotype configuration, with one or a few chromosome pairs relatively larger than the rest, many carrying the NORs and mean centromeric indexes decidedly metacentric, respectively. Additionally, a similar mean chromosome length (1.85 ± 0.15 µm) and a comparable genome size (42.43 ± 3.49 µm) are common features to all of them.

These novel cytological evidences along with previous ones (Grabiele & al., 2010) support the conclusions of the morphological and molecular approaches of Salazar & al. (2003) and Figueroa & al. (2008 and references therein) about the inclusion of *Mesadenella* Pabst & Garay, *Pelexia* Poit. ex Lindl., *Sacoila* Raf., *Sarcoglottis* C. Presl, and *Skeptrostachys* Garay within the subtribe *Spiranthinae* Lindl. Furthermore, the division of *Spiranthinae* in clades of lower rank, with *Mesadenella*, *Sacoila*, and *Skeptrostachys* in a group and *Pelexia* with *Sarcoglottis* segregating together (Figueroa & al., 2008 and references therein) is also supported by our cytological data.

Karyotype orthoselection processes may be accountable for the comparable karyotype features, particularly marked within *Sarcoglottis* and the group of *Mesadenella*, *Sacoila*, and *Skeptrostachys*.

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All materials gathered in situ, cultivated and counted by L. Hardion, R. Verlaque and B. Vila; cytometry flow conducted by A. Fridlender.

FCM: Internal standard (*Petunia hybrida* PxPC6, 2C = 2.85 pg; Marie & Brown, 1993) was used to determine DNA content by flow cytometry (Partec CyFlow 532 nm laser cytometer) following the technique described by Fridlender & al. (2002).

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** New chromosome number (cytotype) for the species

POACEAE

Arundo donax L.

2*n* = 18*x* = ca. 108–110, CHN. Spain, Catalonia, Amposta, on the river bank of Ebro River, 40°44′12″ N, 0°34′02″E, 01 Jan 2010,

Hardion D2/09-95 (MARS); Tunisia, Sidi Bou Said, on the roadside, 36°52′13″N, 10°20′46″E, 13 Nov 2009, *Hardion D3/09-94* (MARS) (Fig. 4A); France, Bouches-du-Rhône, Marseille, Calanques of Sugiton, in matorral, 43°12′43″N, 5°27′10″E, 29 Sep 2009, *Fridlender 09-22* (MARS).

2*n* ~ 18*x*, FCM. 2C DNA = 4.5 pg, France, Bouches-du-Rhône, Carry-le-Rouet, in wasteland, 43°20′06″N, 5°08′27″E, 08 Aug 2009, *Verlaque D1* (MARS).

2*n* ~ 18*x*, FCM. 2C DNA = 4.7 pg, Tunisia, Sidi Bou Said, on the roadside, 13 Nov 2009, *Hardion D3* (MARS); Greece, Crete, Kolymvari, 35°32′11″N, 23°47′30″E, 26 Apr 2009, *Vila D4* (MARS).

2*n* ~ 18*x*, FCM. 2C DNA = 4.8 pg, Spain, Catalonia, Amposta, on the river bank of Ebro river, 40°44′12″ N, 0°34′02″E, 01 Jan 2010, *Hardion D2* (MARS).

Arundo plinii Turra s.l.

** 2*n* = 12*x* = ca. 70–72 CHN. Algeria, Great Kabylia, Tizi-Ouzou, in urban environment, 36°52′13″N, 4°02′48″E, 30 Nov 2009, *Aït Saïd C10/09-81* (MARS) (Fig. 4D); Algeria, Tipasa, 28 Oct 2009, *Baumel C9/09-78* (MARS); Greece, Crete, Kissamos, Kolymvari, on a river bank, 35°32′11″N, 23°47′30″E, 26 Apr 2009, *Vila C2* (MARS).

** 2*n* = 12*x* = ca. 76, CHN. Italy, Emilia-Romagna, Bologna, on the Reno river bank, 44°37′06″N, 11°19′04″E, 16 Feb 2010, *Hardion C7/10-15* (MARS); Italy, Emilia-Romagna, Bologna, Montecalvo, on the river bank, 44°25′20″N, 11°23′48″E, 16 Feb 2010, *Hardion C8b/10-16* (MARS) (Fig. 4C); Italy, Emilia-Romagna, Bologna, Sasso Marconi, S-W Bologna, by the roadside, 44°22′57″N, 11°15′01″E, 16 Feb 2010, *Hardion C8a/10-22* (MARS).

** 2*n* = ca. 108, CHN. France, Var, Fréjus, Avenue Agachon, on a isolated wasteland near the cemetery, 43°26′14″N, 6°43′54″E, 24 Jan 2010, *Hardion, Verlaque & Vila B11/10-07* (MARS) (Fig. 4B); France, Var, Fréjus, halophytic Villepey ponds, 43°24′34″N, 6°43′58″E, 24 Jan 2010, *Hardion, Verlaque & Vila B1/09-24* (MARS); France, Var, Fréjus, La Gabelle on the river bank in the Vallon de Valescure, 43°25′55″N, 6°45′52″E, 24 Jan 2010, *Hardion, Verlaque & Vila A7/09-17* (MARS); France, Var, Saint-Raphaël, quary of the Petits Caous, by the roadside, 43°26′00″N, 6°49′30″E, 24 Jan 2010, *Hardion, Verlaque & Vila B6/09-77* (MARS); France, Hérault, Lespignan, at the edge of a vineyard, 43°16′30″N, 3°09′22″E, 31 Dec 2009, *Hardion C6/09-98* (MARS).

2*n* ~ 12*x*, FCM. 2C DNA = 3.1 pg; Italy, Tuscany, Volterra, at the edge of a field, 43°23′43″N, 10°52′54″E, 15 Feb 2010, *Hardion C5* (MARS); Greece, Crete, Kissamos, Kolymvari, on a river bank, 35°32′11″N, 23°47′30″E, 26 Apr 2009, *Vila C2* (MARS).

2*n* ~ 12*x*, FCM. 2C DNA = 3.2 pg; Italy, Emilia-Romagna, Bologna, on the Reno river bank, 44°32′45″N, 11°18′57″E, 16 Feb 2010, *Hardion C4* (MARS); Italy, Emilia-Romagna, Bologna, Sasso Marconi, on the roadside, 44°22′57″N, 11°15′01″E, 16 Feb 2010, *Hardion C8a* (MARS); Italy, Emilia-Romagna, Bologna, Montecalvo, on the river bank, 44°25′20″N, 11°23′48″E, 16 Feb 2010, *Hardion C8b* (MARS).

2*n* ~ 12*x*, FCM. 2C DNA = 3.3 pg; Italy, Emilia-Romagna, Bologna, on the Reno river bank, 44°37′06″N, 11°19′04″E, 16 Feb 2010, *Hardion C7* (MARS); Algeria, Tipasa, 28 Oct 2009, *Baumel C9* (MARS).

2*n* ~ 18*x*, FCM. 2C DNA = 4.6 pg, France, Hérault, Lespignan, at the edge of a vineyard, 43°16′30″N, 3°09′22″E, 31 Dec 2009, *Hardion, Verlaque & Vila C6* (MARS); France, Var, Fréjus, in humid grassland near the Buddhist Pagoda, 43°26′41″N, 6°44′59″, 24 Jan 2010, *Hardion, Verlaque & Vila B13* (MARS); France, Var, Fréjus, Rue de la Madeleine, on a small plot of isolated ruderal land, 43°25′59″N, 6°45′08″E, 24 Jan 2010, *Hardion, Verlaque & Vila A6* (MARS).

2*n* ~ 18*x*, FCM. 2C DNA = 4.7 pg, France, Var, Fréjus, in a ditch, behind the Colle de Grune cemetery, 43°28′33″N, 6°44′46″E, 24 Jan 2010, *Hardion, Verlaque & Vila A1* (MARS); France, Var, Fréjus, Secteur Gallieni, between a dwelling and the road, in waste land, 43°26′50″N, 6°45′11″E, 24 Jan 2010, *Hardion, Verlaque & Vila A2* (MARS); France, Var, Fréjus, Chemin de Casteu, between the maquis shrubland and the roadside, around a small water course, 43°26′58″N, 6°45′43″E, 24 Jan 2010, *Hardion, Verlaque & Vila A3* (MARS); France, Var, Fréjus, Rue de la Montagne, in wasteland, 43°26′26″N, 6°45′25″E, 24 Jan 2010, *Hardion, Verlaque & Vila A4* (MARS); France, Var, Fréjus, Rond-point Tabarka, between a dwelling and the road, 43°26′16″N, 6°44′57″E, 24 Jan 2010, *Hardion, Verlaque & Vila A5* (MARS); France, Var, Fréjus, Quartier de La Gabelle, on the river bank of the Vallon de Valescure in urban environment, 43°25′55″N, 6°45′52″E, 24 Jan 2010, *Hardion, Verlaque & Vila A7* (MARS); France, Var, Fréjus, between the "RD37″ roadside and Villa Aurélienne, 43°26′40″N, 6°44′22″E, 24 Jan 2010, *Hardion, Verlaque & Vila A9* (MARS); France, Var, Fréjus, Avenue Léotard, at the edge of a vineyard, 43°26′10″N, 6°45′32″E, 24 Jan 2010, *Hardion, Verlaque & Vila A10* (MARS); France, Var, Fréjus, Villepey ponds, in a halophytic place, 43°24′34″N, 6°43′58″E, 24 Jan 2010, *Hardion, Verlaque & Vila B1* (MARS); France, Var, Fréjus, Saint-Aygulf, Grand Boucharel beach, at the river mouth, 43°22′22″N, 6°42′49″E, 24 Jan 2010, *Hardion, Verlaque & Vila B2* (MARS); France, Var, Fréjus, along the Reyran river, at the edge of the quarry, 43°29′26″N, 6°44′40″E, 24 Jan 2010, *Hardion, Verlaque & Vila B4* (MARS); France, Var, Fréjus, Pont du Duc quarry, on mounds of earth, 43°28′23″N, 6°46′22″E, 24 Jan 2010, *Hardion, Verlaque & Vila B5* (MARS); France, Var, Fréjus, Pont de Barban (Estérel), in a *Nerium oleander* wadi, 43°28′31″N, 6°49′49″E, 24 Jan 2010, *Hardion, Verlaque & Vila B7* (MARS); France, Var, Fréjus, at the junction between the Real watercourse and the Chemin de Bagnols 43°29′02″N, 6°41′23″E, 24 Jan 2010, *Hardion, Verlaque & Vila B10* (MARS); France, Var, Fréjus, across the old

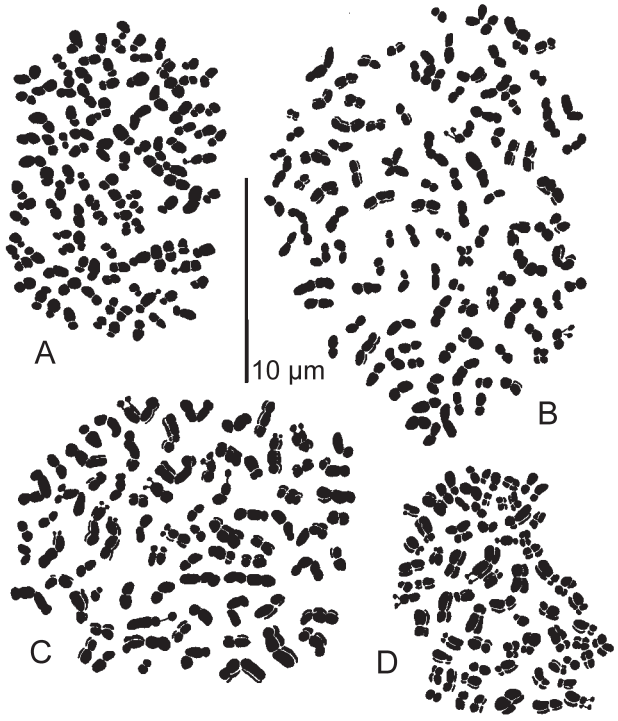

Fig. 4. A, Root tip metaphases of *Arundo donax* (2*n* = 110, Tunisia, Sidi Bou Said, *Hardion D3/09-94*) and **B–D,** *A. plinii* s.l.: **B,** 2*n* = 108, France, Var, Fréjus, *Hardion, Verlaque & Vila B11/09-17*; **C,** 2*n* = 76, Italy, Emilia-Romagna, Bologna, near Montecalvo, *Hardion C8b/10-16*; **D,** 2*n* = 70, Algeria, Great Kabylia, Tizi-Ouzou, *Aït Saïd C10/09-81*).

Roman Bridge, in a watercourse, 43°26′17″N, 6°42′24″E, 24 Jan 2010, *Hardion, Verlaque & Vila B12* (MARS); France, Var, Saint Raphaël, quarry of the Petits Caous, by the roadside, 43°26′00″N, 6°49′30″E, 24 Jan 2010, *Hardion, Verlaque & Vila B6* (MARS); France, Var, Saint Raphaël, Les Arcs/Le Muy, beside a highway, 43°27′9″N, 6°31′14″E, 24 Jan 2010, *Hardion, Verlaque & Vila B9* (MARS); France, Var, Saint Raphaël, Agay, on the railway embankment, 43°25′59″N, 6°51′24″E, 24 Jan 2010, *Hardion, Verlaque & Vila B8* (MARS); France, Var, Saint Raphaël, Puget-sur-Argens, in wasteland, around the football stadium, 43°27′14″N, 6°40′43″E, 24 Jan 2010, *Hardion, Verlaque & Vila B3* (MARS).

$2n \sim 18x$, FCM. 2C DNA = 4.8 pg, France, Var, Fréjus, Avenue de Valescure, in wasteland, 43°26′15″N, 6°45′56″E, 24 Jan 2010, *Hardion, Verlaque & Vila A8* (MARS); France, Var, Fréjus, Avenue de l'Agachon, in wasteland next to the cemetery, 43°26′14″N, 6°43′54″E, 24 Jan 2010, *Hardion, Verlaque & Vila B11* (MARS).

Among the three basic chromosome numbers suggested for the Arundinoideae Burmeist. (x = 6, 9, 12; GPWG, 2001), like Conert (1961), we chose $x = 6$, because it is the only one arithmetically compatible with the chromosome data of the other genera of this subfamily (e.g., *Phragmites*, Gorenflot & al., 1972b; Clevering & Lissner, 1999). Until 2004, the genus *Arundo* included three species: the cosmopolitan *A. donax* L., the Asiatic endemic *A. formosana* Hackel, and the Mediterranean *A. plinii* Turra s.l. Nevertheless, in recent works, Danin (2004) and Danin & al. (2008) divided the latter species into three distinct taxa: (1) *A. plinii* s.str., a NW Mediterranean endemic species restricted to N Italy (Bologna on Reno banks: locus classicus) and Southern France (Var: Fréjus and Aude: Ste-Lucie Island); (2) *A. collina* Ten., occurring in central Mediterranean area (C & S Italy, Greece, Crete); and (3) *A. mediterranea* Danin, occurring in W, S & E Mediterranean area (Spain, N Africa, Greece, Crete, Turkey, Cyprus and Palestine).

Our study confirms the already known chromosome number of *A. donax* in the Mediterranean Basin (Pizzolongo, 1962; Fernandes & Queiros, 1962; Gorenflot & al., 1972a): $2n$ = ca. 110. Its karyotype is symmetrical, with small (0.9–1.9 µm) and generally metacentric chromosomes (Fig. 4A). However, some data indicate lower ploidy levels in Asia: $2n = 10x = 60$ in Thailand (Larsen, 1963) and $2n = 12x = 72$ in India (Christopher & Abraham, 1971).

In contrast, *A. plinii* s.l. exhibits a high variability in the Mediterranean Basin (Fig. 4B–D). We confirmed the dodecaploid level ($12x$, $2n = 72$) reported in the literature from Portugal, Coimbra (Fernandes & Queiros, 1969) and Italy, Naples (Pizzolongo, 1962). In addition to this previous euploid number, our counts showed a new ploidy level in France and strong aneuploidy events elsewhere. The frequent meiotic irregularities described by Pizzolongo (1962) probably explain these phenomena. Thus, the *A. plinii* s.l. complex is composed of at least three distinct cytotypes, nevertheless their geographical distribution differs from those of the three species proposed by Danin (2004) and Danin & al. (2008).

(1) All French individuals show a new and higher ploidy level, $2n = 18x = 108$ (Fig. 4B), and a relatively symmetrical karyotype. As suggested in numerous cases (Harlan & DeWet, 1975; Soltis & al., 2010), the most probable hypothesis for the origin of this euploid cytotype may be: the cross between a reduced gamete ($6x$) and a diplogamete ($12x$, $2n$-gamete or unreduced gamete) from progenitors having $2n = 12x = 72$.

(2) All North Italian samples are characterised by: $2n = 12x$ = ca. 76. This hyper-aneuploid cytotype possesses a relatively asymmetrical karyotype, with numerous satellites (Fig. 4C).

(3) In N Africa and Crete, we found $2n = 12x$ = ca. 70–72. The chromosomes of this hypo-aneuploid cytotype are slightly smaller than those of the two others (Fig. 4D).

As morphological and cytological studies remain particularly difficult to carry out in the *Arundo* genus, flow cytometry has allowed us to quickly examine many individuals and to easily measure their ploidy level. For example, analyses of 23 representative populations in France evidence the occurrence of only one new cytotype of *A. plinii* in Fréjus-Saint-Raphaël. Because of the variance of cytometry values, unfortunately this method does not distinguish the aneuploid cytotypes ($2n = 76$ vs. $2n = 70$–72). Thus, chromosome counts by light microscopy are essential to obtain accurate numbers.

In conclusion, to confirm and complete these first data, a broader sampling in the *A. plinii* s.l. complex is needed, involving taxonomical and phylogeographical investigations.

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

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ALISMATACEAE

Alisma plantago-aquatica L.

n = 14, CHN. India, Kashmir, Pulwama, Ratnipora, 1700 m, along water spring, 33°54′N, 74°56′E, 24 Apr 2010, *Nadeem Mubarik 27184* (PUN 55460) [Fig. 5A].

The chromosome number of *n* = 14 has been counted at metaphase II in pollen mother cells (Fig. 5A). The present chromosome count represents a new cytotype for India and is in agreement with earlier reports of 2*n* = 28 by Wulff (1950), Hendricks (1957), and Priestley (1953) from outside of India.

POACEAE

** *Alopecurus nepalensis* Trin. ex Steud.

n = 21, CHN. India, Kashmir, Anantnag, Bijbahara, 1700 m, along agricultural fields, 34°04′N, 75°19′E, 29 Mar 2010, *Nadeem Mubarik 27181* (PUN 55457) [Fig. 5B].

The chromosome number of *n* = 21 has been counted at anaphase I in pollen mother cells (Fig. 5B). This chromosome count is the first record of hexaploid cytotype for *A. nepalensis*. Diploid cytotype (2*n* = 14) by Bir & Sahni (1986, 1987) and tetraploid one (2*n* = 28) by Bir & Sahni (1984) were previously reported for this species.

Echinochloa colonum (L.) Link

n = 27, CHN. India, Himachal Pradesh, Kangra, Suliali, 553 m, shady moist places, 32°12′N, 76°03′E, 17 Jul 2010, *Harpreet Kaur 27032* (PUN 55273) [Fig. 5C].

Imperata cylindrica (L.) P. Beauv.

n = 10, CHN. India, Himachal Pradesh, Kangra, Bandla, 1266 m, along open fields, 32°06′N, 76°32′E, 28 Mar 2009, *Harpreet Kaur 24854* (PUN 52635) [Fig. 5D].

▼ *Koeleria macrantha* (Ledeb.) Schult.

n = 7, CHN. India, Kashmir, Kulgam, Aharbal, 2400 m, in open grassland, 33°38′N, 74°47′E, 14 Jun 2010, *Nadeem Mubarik 27182* (PUN 55458) [Fig. 5E].

The haploid chromosome number *n* = 7 has been counted at metaphase I in pollen mother cells (Fig. 5E). Being the first report from India, it is in agreement with earlier reports of 2*n* = 14 by Löve & Löve (1961) and Frey (1993) from outside of India.

Lolium temulentum L.

n = 7, CHN. India, Himachal Pradesh, Kangra, Bandla, 1266 m, in open fields, 32°06′N, 76°32′E, 30 Mar 2009, *Harpreet Kaur 24861* (PUN 52639) [Fig. 5F].

Paspalum distichum L.

n = 25, CHN. India, Himachal Pradesh, Kangra, Bhagsunaag, 1456 m, along water spring, 32°13′N, 76°19′E, 14 Aug 2009, *Harpreet Kaur 24846* (PUN 53540); India, Himachal Pradesh, Kangra, Dharamsala, 1345 m, near water, 32°13′N, 76°19′E, 15 Aug 2009, *Harpreet Kaur 24847* (PUN 52630) [Fig. 5G].

The chromosome number of *n* = 25 has been counted at anaphase I in pollen mother cells (Fig. 5G). The present chromosome count represents a new cytotype for India and is in agreement with the previous report of 2*n* = 50 by Echarte & al. (1992) from outside of India.

** *Pennisetum lanatum* Klotzsch

n = 21, CHN. India, Himachal Pradesh, Kangra, Dharamsala, 1345 m, waste places, 32°13′N, 76°19′E, 14 Aug 2009, *Harpreet Kaur 25048* (PUN 52595) [Fig. 5H].

The chromosome number of *n* = 21 has been counted at anaphase I in pollen mother cells (Fig. 5H). The present chromosome count represents a new cytotype for the species. Previous reports include 2*n* = 18 by Mehra & Remanandan (1973) from India and 2*n* = 36 by Ahsan & al. (1994) from outside of India.

Pennisetum purpureum Schumach.

n = 18, CHN. India, Himachal Pradesh, Kangra, Dyot, 1420 m, waste places along roadsides, 32°02′N, 76°50′E, 27 Jul 2010, *Harpreet Kaur 27167* (PUN 55379) [Fig. 5I].

The chromosome number of *n* = 18 has been counted at metaphase-I in pollen mother cells (Fig. 5I). This is the first record of a tetraploid cytotype of this species from India and is in agreement with an earlier report of 2*n* = 36 by Olorode (1974) from outside of India.

* *n* = 21, CHN. India, Himachal Pradesh, Kangra, Chhota Bhangal, 32°02′N, 76°50′E, 1489 m, along roadsides, 26 Sep 2009, *Harpreet Kaur, HK 25602* (PUN 53556) [Fig. 5J].

The chromosome number of *n* = 21 has been counted at metaphase I in pollen mother cells (Fig. 5J). This is the first record of a hexaploid cytotype for this species. Previous reports in literature comprise diploid (2*n* = 14; Mehra & Kohli, 1966; Mehra & al., 1968; Sujatha & al., 1989), tetraploid (2*n* = 28; Krishnaswamy, 1951; Nuñez, 1952; Simmonds, 1954; Chandola, 1959; Pantulu & Venkateswarlu, 1968; Ramulu, 1968; Sethi & al., 1970; Ramulu & Rangasamy, 1971; Kammacher & al., 1973; Olorode, 1974; Sujatha & al., 1989; Parihar & Tripathi, 1989; Sinha & al., 1990; Vidhya & Khan, 2003), and octoploid cytotype (2*n* = 56; Krishnaswamy & Raman, 1948; Gadella & Kliphuis, 1964; Khosla & Mehra, 1973).

Poa supina Schrad.

n = 7, CHN. India, Kashmir, Anantnag, campus of Govt. college, 1700 m, open fields, 34°04′N, 75°19′E, 14 Sep 2009, *Nadeem Mubarik 27183* (PUN 55459) [Fig. 5K].

The haploid chromosome number *n* = 7 has been counted at metaphase I in pollen mother cells (Fig. 5K). The chromosome count of *n* = 7 is reported for the first time from India and is in agreement with earlier reports of 2*n* = 14 by Nannfeldt (1937), Chrtek & Jirásek (1962), Probatova & Sokolovskaya (1984); Duckert-Henriod & Favarger (1987) and Lövkvist & Hultgård (1999) from outside of India.

Setaria palmifolia (J. König) Stapf

n = 27, CHN. India, Himachal Pradesh, Kangra, Bhanala, 800 m, on rocks along roadsides, 32°13′N, 76°10′E, 16 Aug 2010, *Harpreet Kaur 27154* (PUN 54819) [Fig. 5L].

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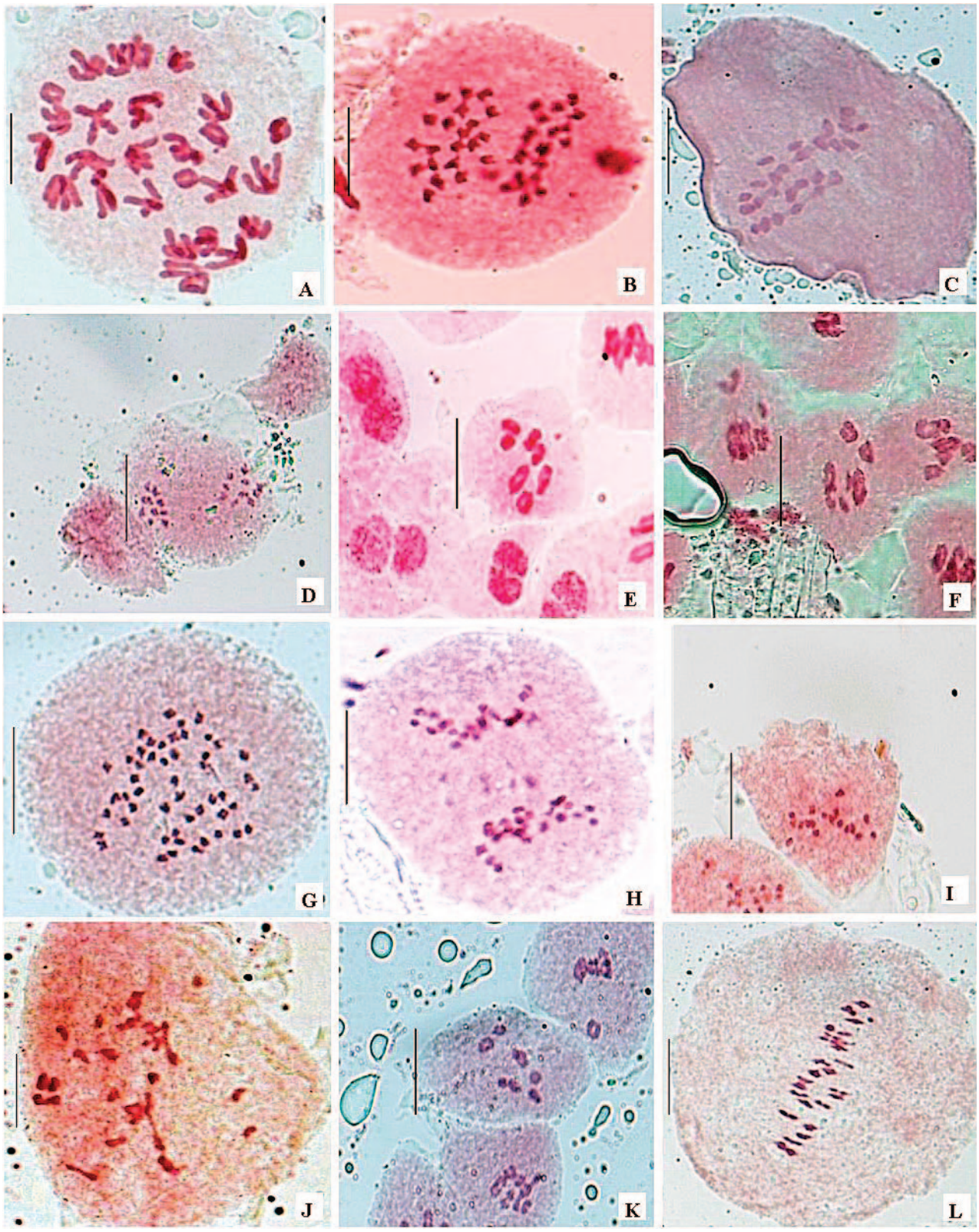

Fig. 5. A, *Alisma plantago-aquatica,* PMC at M-II, *n* = 14 (PUN 55460). **B,** *Alopecurus nepalensis*, PMC at A-I, *n* = 21(PUN 55457). **C,** *Echinochloa colonum*, PMC at M-I, *n* = 27 (PUN 55273). **D,** *Imperata cylindrica*, PMC at A-I, *n* = 10 (PUN 52635). **E,** *Koeleria macrantha*, PMC at M-I, *n* = 7 (PUN 55458). **F,** *Lolium temulentum*, PMC at M-I, *n* = 7 (PUN 52639). **G,** *Paspalum distichum*, PMC at A-I, *n* = 25 (PUN 53540). **H,** *Pennisetum lanatum,* PMC at A-I, *n* = 21 (PUN 52595). **I,** *Pennisetum purpureum*, PMC at M-I, *n* = 18 (PUN 55379). **J,** *Pennisetum purpureum*, PMC at M-I, *n* = 21 (PUN 53556). **K,** *Poa supina*, PMC at M-I, *n* = 7 (PUN 55459). **L,** *Setaria palmifolia*, PMC at M-I, *n* = 27 (PUN 54819). Scale = 10µm.

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ASTERACEAE

Brachiactis ciliata (Ledeb.) Ledeb.
2*n* = 18, CHN. Russia, Altaiskii Krai, Kljuchevskoi Raion, 3 km NNW of Severka, meadow on solonchak, 52°09′N, 79°14′E, 140 m, 19 Sep 2009, *E. Korolyuk s.n.*(NS).

Erigeron acris L.
2*n* = 18, CHN; Russia, Novosibirskaya Oblast', Iskitimskii Raion, Evsino village, right riverside of Schipunikha river, petrophytic steppe, 54°33′N, 83°24′E, 200 m, 25 Aug 2008, *E. Korolyuk s.n.* (NS).

Galatella altaica Tzvelev
2*n* = 36, CHN; Russia, Republica Altay, urochishche Kizilschin, 1 Aug 2008, *E. Korolyuk s.n.* (NS).

Galatella angustissima (Tausch) Novopokr.
2*n* = 18, CHN; Russia, Novosibirskaya Oblast', Iskitimskii Raion, Evsino village, right riverside of Schipunikha river, petrophytic steppe, 54°33′N, 83°24′E, 200 m, 12 Aug 2008, *E. Korolyuk s.n.* (NS); Russia, Novosibirskaya Oblast', Toguchinskii Raion, Bugotakskie hills, 25 Aug 2008, *E. Korolyuk L53* (NS); Russia, Republic of Tuva, Bay-Taiginskii Raion, Kara-chol' Lake, the source of Alash river, varioherbal-bunch grass steppe, 15 Sep 2010, *Shaulo, Erst & Zhirova 67* (NS).

Galatella biflora (L.) Nees
2*n* = 36, CHN; Russia, Altaiskii Krai, Kamenskii Raion, 5 km NNE Lugovoe village, solontzevataya steppe, 53°35′N, 81°40′E, 120 m 14 Sep 2009, *E. Korolyuk 500AK* (NS); Russia, Novosibirskaya Oblast', Iskitimskii Raion, Evsino village, right riverside of Schipunikha river, petrophytic steppe, 54°33′N, 83°24′E, 200 m, 12 Aug 2008, *E. Korolyuk s.n.* (NS); Russia, Altaiskii krai, Burlinskii Raion, NN Pervomaiskoe village, SE Dzhisuldi Lake shore, 53°22′N, 78°15′E, 105 m, 21 Sep 2009, *E. Korolyuk L37* (NS).

Galatella punctata (Waldst. & Kit.) Nees
2*n* = 18, CHN; Russia, Altaiskii Krai, Romanovskii Raion, 52°31′N, 81°19′E, 120 m, 4 km SW of Guseletovo village, 17 Sep 2009, *E. Korolyuk s.n.* (NS); Russia, Novosibirskaya oblast', Toguchinskii Raion, Bugotakskie hills, 1 Aug 2008, *E. Korolyuk s.n.* (NS).

Heteropappus altaicus (Willd.) Novopokr.
2*n* = 18, CHN; Russia, Republic of Altai, Ongudaiskii Raion, 2 km SE of Kupchegen village, steppe, 14 Aug 2010, *E. Korolyuk L9* (NS); Russia, Altaiskii krai, Kamenskyi Raion, 5 km NNE of Lygovoe village, zalezh, 53°35′N, 81°40′E, 125 m, 15 Sep 2009, *E. Korolyuk s.n.* (NS); Russia, Khakassia, Ust-Abakanskyi Raion, Kamizyakskaya steppe, Ulug-Khol Lake, Gravel steppe, *Lomonosova 653* (NS).
2*n* = 36, CHN; Russia, Republic of Altai, Kosch-Agachskii Raion, Zhana-Aul village, road embankment, 3 Aug 2009, *E. Korolyuk L56* (NS); Russia, Republic of Altai, Kosh-Agachskii Raion, in the intermountain depression, 49°49′N, 88°56′E, 1905 m, 25 Aug 2008, *E. Korolyuk L79* (NS); Russia, Altaiskii Krai, Ust-Kalmanskii Raion, Ust-Kalmanka village, 28 Jul 2004, *Krasnikov & Zhirova 9* (NS).

Heteropappus biennis (Willd.) Tamamsch. ex Grub.
2*n* = 18, CHN. Russia, Khakassia, right riverside of Belyi Iyus river, from the bridge towards to Chernoe Ozero village, zalezh, 25 Aug 2008, *Cheremuschkina s.n.* (NS).

Heteropappus medius (Krylov) Tamamsch.
2*n* = 18, CHN; Russia, Republic of Altai, Schebalinskyi Raion, Cherga village, overgrazed steppe along the road, 51°35′N, 85°32′E, 650 m, 19 Aug 2008, *E. Korolyuk s.n.* (NS).

Tripolium vulgare Nees
2*n* = 18, CHN; Russia, Altaiskii Krai, Kulundinskii Raion, 8 km S of Kulunda village, south Ulkenkol' Lake shore, meadow on solonchak, 52°29′N, 78°54′E, 130 m, 20 Sep 2009, *E. Korolyuk s.n.* (NS).

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

CARYOPHYLLACEAE

***Oberna behen* (L.) Ikonn.
2*n* = 12, CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutsk city, Topkinsky district, in herbage, 52°20′12″N, 104°19′54″E, 10 Aug 2010, *Krivenko & M.A. Markaryan 15722* (IRK).

FABACEAE

Astragalus austrosibiricus Schischk.
2*n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, edge of pine-larch forest, meadow forb, 53°25′37″N, 107°25′03″E, 4 Sep 2010, *Krivenko 15734* (IRK).

Astragalus bifidus Turcz.
** *2n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, stony steppe, 53°25′22″N, 107°25′02″E, 4 Aug 2004, *Verkhozina*, *M.E. Ineshina & I.V. Enuschchenko 4195* (IRK); Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, coast lake, the lower part of the gravelly slope of eastern exposure, steppe, 53°24′38″N, 107°26′37″E, 28 Jul 2005, *Kazanovsky 8849* (IRK).

Astragalus chorinensis Bunge
* *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, left bank of Sarma river, stony steppe, 53°00′34″N, 106°50′12″E, 31 Jul 2010, *Krivenko & S. Rolfsmeier 15778* (IRK).

Astragalus kaufmannii Krylov
** *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, northern extremity Khoboy cape, hollow, moss-covered rocks of northern exposure, 53°24′71″N, 107°47′49″E, 28 Jul 2010, *Kazanovsky 15672* (IRK).

Astragalus lupulinus Pall.
* *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, left bank of Sarma river, Sarminskoe ravine, stony steppe, 54°07′00″N, 106°50′00″E, 31 Jul 2010, *Kazanovsky & Krivenko 15779* (IRK).

Astragalus olchonensis Gontsch.
** *2n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, Peschanaya village, on the sand dunes, 53°17′20″N, 107°35′27″E, 11 Aug 2009, *Verkhozina & Yu.N. Pochinchik 9608* (IRK).

Astragalus suffruticosus DC.
2*n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, edge of pine-larch forest, meadow forb, 53°25′37″N, 107°25′03″E, 4 Sep 2010, *Krivenko 15652* (IRK).

Astragalus versicolor Pall.
▼** *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, 0.5 km S of northern extremity Khoboy cape, the steep rocky slope of eastern exposure, 53°24′43″N, 107°47′20″E, 22 Jul 2005, *Kazanovsky 8823* (IRK); Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, 2 km S of Sagan-Khushun cape, stony steppe, 53°23′44″N, 107°44′51″E, 4 Sep 2010, *Krivenko 15776* (IRK).

Caragana jubata (Pall.) Poir.
2*n* = 16, CHN. Russia, East Siberia, East Sayan, Kitoysky ridge, Buryatia Republic, Okinsky Raion, vicinity of Samarta village, Kitoy riverhead, thicket shrubs (*Caragana jubata*, *Rhododendron* spp., *Salix* spp.), 52°03′02″N, 101°06′39″E, 28 Aug 2010, *Kazanovsky 15777* (IRK).

Caragana pygmaea (L.) DC.
▼ *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Mukhor bay, the rocky slope of south-eastern exposure, 53°02′01″N, 106°48′53″E, 3 Sep 2010, *Krivenko 15627* (IRK).

Hedysarum turczaninovii Peschkova
* *2n* = 14, CHN. Russia, East Siberia, Irkutskaya Oblast', Ust'-Ordynsky Buryatsky Okrug, Osinsky Raion, Bratskoe reservoir, Obusa bay, vicinity of Kutanka village, 2 km N grass-forb steppe. Sandy slopes of western exposure, 53°39′38″N, 103°49′50″E, 26 Jun 2010, *Kazanovsky & Krivenko 14260* (IRK).

Lupinaster pentaphyllus Moench
2*n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Mukhor bay, steppefied meadow, 53°02′55″N, 106°46′38″E, 3 Sep 2010, *Krivenko 15780* (IRK).

Medicago falcata L.
2*n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, edge of pine-larch forest, meadow forb, 53°25′37″N, 107°25′03″E, 4 Sep 2010, *Krivenko 15634* (IRK).

Oxytropis coerulea (Pall.) DC.
* *2n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Uyuga cape, rocky slope, 53°46′59″N, 106°34′33″E, 4 Sep 2010, *Krivenko 15775* (IRK); Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Oto-Khushun cape, rocky slope of south-eastern exposure, 53°20′48″N, 107°16′19″E, 4 Sep 2010, *Krivenko 15649* (IRK).

Oxytropis lanata (Pall.) DC.
2*n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast',

Olkhonskii Raion, Olkhon island on the Baikal lake, Peschanaya village, on the sands, 53°17′17″N, 107°35′36″E, 3 Sep 2010, *Krivenko 15331* (IRK).

Oxytropis muricata (Pall.) DC.
2*n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Tazheranskaya steppe, the eastern side of road, 52°56′60″N, 106°43′11″E, 30 Jul 2010, *Krivenko 15774* (IRK).

Oxytropis oxyphylloides Popov
** *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, hollow, northern tip of Khoboy cape, hollow, moss-covered rocks of northern exposure, 53°24′71″N, 107°47′49″E, 28 Jul 2010, *Kazanovsky 15576* (IRK).

Oxytropis popoviana Peschkova
* *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, stony steppe, 55°24′39″N, 107°26′32″E, 24 Jul 2007, *Kazanovsky 3363* (IRK).

Oxytropis tragacanthoides Fisch.
2*n* = 32, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, the near of Oto-Khushun cape, stony steppe forb, 53°20′59″N, 107°16′19″E, 4 Sep 2010, *Krivenko 15330* (IRK).

Oxytropis triphylla (Pall.) Pers.
* *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, Sagan-Khushun cape, the rocky slope of south-western exposure, 53°23′29″N, 107°43′47″E, 28 Jul 2010, *Krivenko 15785* (IRK).

Oxytropis turczaninovii Jurtzev
** *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, Peschanaya village, the shore of lake, on the sands, 53°17′17″N, 107°35′36″E, 28 Jul 2010, *Krivenko 15786* (IRK).

Thermopsis lanceolata subsp. *sibirica* (Czefr.) Kurbatski
▼ *2n* = 18, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, left bank of Zunduk river, near the shore of lake, stony steppe, 53°24′17″N, 107°26′22″E, 8 Aug 2009, *Verkhozina*, *Krivenko & Yu.N. Pochinchik 9580* (IRK).

Vicia amoena Fisch.
2*n* = 24, CHN. Russia, East Siberia, Irkutskaya Oblast', Shelekhov town, vicinity of the cement producing plant, sewage ponds JBK, 52°10′29″N, 104°05′31″E, 17 Aug 2010, *Krivenko 15745* (IRK).

Vicia cracca L.
2*n* = 14, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Uyuga cape, stony isthmus, 53°46′59″N, 106°34′33″E, 4 Sep 2010, *Krivenko 15650* (IRK).

Vicia unijuga A. Br.
2*n* = 12, CHN. Russia, East Siberia, Irkutskaya Oblast', Irkutsk city, in the grass near the fence, vicinity of campus, 52°17′32″N, 104°17′06″E, 29 Aug 2010, *Krivenko 15744* (IRK).

HEMEROCALLIDACEAE
Hemerocallis minor Mill.
2*n* = 22, CHN. Russia, East Siberia, Irkutskaya Oblast', Shelekhov town, vicinity of the cement producing plant, edge of birch forest, 52°10′29″N, 104°05′31″E, 17 Aug 2010, *Krivenko 15782* (IRK).

IRIDACEAE
Iris humilis Georgi
2*n* = 28, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, Olkhon island on the Baikal lake, Sagan-Khushun cape, the rocky slope of south-western exposure, 53°23′29″N, 107°43′47″E, 28 Jul 2010, *Krivenko 15781* (IRK).

LILIACEAE
Lilium pumilum Delile
2*n* = 24, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, edge of pine-larch forests, meadow forb, 53°25′37″N, 107°25′03″E, 4 Sep 2010, *Krivenko 15783* (IRK).

LINACEAE
Linum perenne L.
** *2n* = 16, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, coast of Baikal lake, vicinity of Sahyurte village, near the ferry, forb steppe, 53°01′06″N, 106°53′53″E, 27 Jul 2010, *Krivenko 15784* (IRK).

RANUNCULACEAE
Delphinium grandiflorum L.
** *2n* = 20, CHN. Russia, East Siberia, Irkutskaya Oblast', Olkhonskii Raion, west coast of Baikal lake, Zunduk cape, right bank of Zunduk river, edge of pine-larch forests, meadow forb, 53°25′37″N, 107°25′03″E, 4 Sep 2010, *Krivenko 15633* (IRK).

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CARYOPHYLLACEAE
Stellaria holostea L.
FCM: DAPI. Samples of *S. holostea* were prepared from fresh young leaves of cultivated plants. Internal standard: *Lycopersicon esculentum* 'Stupické polní rané' (2C DNA = 1.96 pg, Doležel & al., 1992). CVs of samples and internal standard ranged from 2.18% to 3.95% (mean 2.76%) and from 2.34% to 3.74% (mean 2.76%), respectively. Samples of plants with known chromosome numbers were analysed simultaneously with an internal standard, and the ratio of their peak positions was calculated. The ploidy level of individuals with unknown chromosome numbers was estimated by their peak position to the standard peak.
Sampling area covers Slovakia, with exception of one sample which originated from the Czech Republic. Our results confirmed a previously published chromosome number (2*n* = *26*) recorded for this taxon (Marhold & al., 2007).

2*n* = 26, CHN. **Slovakia,** Vihorlat Mts., Jovsa village, Nature reserve Jovsianska hrabina, 48°49′43″N, 22°06′26″E, 190 m, 25 May 2008, *J. Kučera & M. Slovák JOV1* (SAV).
2*n* ~ 2*x* ~ 26, FCM. **Slovakia,** Strážovské vrchy Mts., Záskalie village, Mt. Veľký Manín, 49°08′04″N, 18°30′10″E, ca. 820 m, 10 May 2009, *J. Kučera & M. Slovák MAN1*, *J. Kučera & M. Slovák MAN3* (SAV); Slovakia, Vihorlat Mts., Jovsa village, Nature reserve Jovsianska hrabina, 48°49′43″N, 22°06′26″E, 190 m, 25 May 2008, *J. Kučera & M. Slovák JOV1*, *J. Kučera & M. Slovák JOV2*, *J. Kučera*

& M. Slovák JOV3 (SAV); Slovakia, Štiavnické vrchy Mts., Hronský Beňadik village, Nature reserve Krivín, 48°19′31″N, 18°33′26″E, ca. 260 m, 9 Apr 2009, *J. Kučera & M. Slovák KRI1*, *J. Kučera & M. Slovák KRI2*, *J. Kučera & M. Slovák KRI3* (SAV); Slovakia, Nízke Tatry Mts., Donovaly village, Mt. Kozí chrbát, 48°51′37″N, 19°17′24″E, 1330 m, 24 May 2008, *J. Kučera KOZ1*, *J. Kučera KOZ3* (SAV); Slovakia, Bukovské vrchy Mts., Nová Sedlica village, Mt. Rabia skala, 49°06′05″N, 22°27′39″E, ca. 1070 m, 26 May 2008, *J. Kučera & M. Slovák RAB1*, *J. Kučera & M. Slovák RAB2*, *J. Kučera & M. Slovák RAB3* (SAV); Slovakia, Tríbeč Mts., Nitra town, Nature reserve Zoborská lesostep, 48°20′57″N, 18°05′49″E, ca. 420 m, 8 Apr 2009, *J. Kučera & M. Slovák ZOB1*, *J. Kučera & M. Slovák ZOB2*, *J. Kučera & M. Slovák ZOB3* (SAV); Slovakia, Štiavnické vrchy Mts., Banská Štiavnica town, Mt. Goldberg, 48°29′26″N, 18°51′49″E, ca. 660 m, 12 Apr 2009, *J. Kučera & M. Slovák GOL1*, *J. Kučera & M. Slovák GOL2*, *J. Kučera & M. Slovák GOL3* (SAV); Slovakia, Burda Mts., Kamenica nad Hronom village, Mt. Burdov, 47°49′44″N, 18°45′23″E, ca. 310 m, 25 Apr 2009, *J. Kučera & M. Slovák BUR1*, *J. Kučera & M. Slovák BUR2*, *J. Kučera & M. Slovák BUR3* (SAV); Slovakia, Podunajská nížina lowlands, Čenkov village, 47°45′51″N, 18°31′39″E, 108 m, 25 Apr 2009, *J. Kučera & M. Slovák CEN1* (SAV). **Czech Republic,** Moravské Podhůří Vysočiny, Javůrek village, Šmelcovna settlement, 49°15′53″N, 16°21′43″E, 350 m, 11 Sep 2008, *J. Kučera & M. Slovák SME1*, *J. Kučera & M. Slovák SME2* (SAV).

Stellaria nemorum L. subsp. *nemorum*

FCM: DAPI. Samples of *S. nemorum* subsp. *nemorum* were prepared from fresh young leaves of cultivated plants. Internal standard: *Bellis perennis* (2C DNA = 3.38 pg, Schönswetter & al., 2007). CVs of samples and internal standard ranged from 2.20% to 5.08% (mean 3.35%) and from 2.13% to 3.35% (mean 2.81%), respectively.

Sampling area covers Slovak Republic. Our results confirm a previously published chromosome number ($2n = 26$) for this taxon (Marhold & al., 2007).

$2n = 26$, CHN. **Slovakia,** Nízke Tatry Mts., Bystrá village, near the Bystrianska jaskyňa cave, 48°50′26″N, 19°35′52″E, ca. 560 m, 9 Jun 2009, *J. Kučera & M. Slovák BYSN2* (SAV).

$2n \sim 2x \sim 26$, FCM. **Slovakia,** Veľká Fatra Mts., Blatnica village, Mt. Tlstá, 48°56′19″N, 18°57′54″E, ca. 1080 m, 29 May 2008, *J. Kučera & M. Slovák TLS1*, *J. Kučera & M. Slovák TLS4* (SAV); Slovakia, Nízke Tatry Mts., Bystrá village, near the Bystrianska jaskyňa cave, 48°50′26″N, 19°35′52″E, ca. 560 m, 9 Jun 2009, *J. Kučera & M. Slovák BYSN2*, *J. Kučera & M. Slovák BYSN4* (SAV); Slovakia, Veporské vrchy Mts., Lom nad Rimavicou village, Mt. Čierťaž, 48°37′34″N, 19°40′07″E, ca. 1060 m, 9 Jun 2009, *J. Kučera & M. Slovák LOM1*, *J. Kučera & M. Slovák LOM3* (SAV); Slovakia, Poľana Mts., Mt. Predná Poľana, 48°37′49″N, 19°28′15″E, ca. 1300 m, 9 Jun 2009, *J. Kučera & M. Slovák POL3* (SAV); Slovakia, Pieniny Mts., Červený kláštor village, 49°24′17″N, 20°25′00″E, ca. 470 m, 24 May 2008, *J. Kučera & M. Slovák CEK3* (SAV); Slovakia, Bukovské vrchy Mts., Nová Sedlica village, Mt. Kremenec, 49°05′17″N, 22°33′16″E, ca. 1130 m, 26 May 2008, *J. Kučera & M. Slovák KRM1* (SAV).

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Methods of chromosome counts are described in Peruzzi & al. (2011).

* First chromosome count for the species.
** New cytotype for the species.
▼ First chromosome count from Sicily.

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IRIDACEAE

▼ *Romulea bulbocodium* (L.) Sebast. & Mauri

$2n = 36$, CHN. Italy, Sicily, Palermo Province, "Zingaro" Natural Reserve, 38°07′N, 12°47′E, 8 March 2009, *Iiriti & Frignani s.n.* (CAG, SIENA).

This count confirms previous reports on this species from Tuscany (Central Italy) and Sardinia (Peruzzi & al., 2011).

** *Romulea linaresii* Parl. subsp. *linaresii*

$2n = 36$, CHN. Italy, Sicily, Palermo Province, Capo Rama, 38°08′N, 13°03′E, 7 March 2009, *Iiriti & Frignani s.n.* (CAG, SIENA); Italy, Sicily, Palermo Province, "Zingaro" Natural Reserve, 38°07′N, 12°47′E, 8 March 2009, *Iiriti & Frignani s.n.* (CAG, SIENA); Italy, Sicily, Palermo Province, between S. Vito lo Capo and the "Zingaro" Natural Reserve, 38°08′N, 12°46′E, 8 March 2009, *Iiriti & Frignani s.n.* (CAG, SIENA).

Peruzzi & al. (2011) reported a hexaploid ($2n = 54$) chromosome number for this species, based on material collected in Sicily (Mount Cofano, Trapani Province). However, plants from Mount Cofano show some remarkable phenotypic differences (larger flowers, style somewhat exserted) in respect to the plants studied here, which more closely correspond to *R. linaresii* sensu strictissimo. Indeed, the above cited localities (Capo Rama, San Vito Lo Capo, Zingaro) are close to the locus classicus of the species.

* *Romulea melitensis* Bég.

$2n = 36$, CHN. Italy, Sicily, Ragusa Province, near Sampieri, 36°42′N, 14°45′E, 28 February 2010, *Iiriti & Frignani s.n.* (CAG, SIENA). Malta, near Selmum palace, 35°57′N, 14°22′E, 26 February 2010, *Iiriti & Frignani s.n.* (CAG, SIENA).

This is the first chromosome number report for this neglected species, morphologically related to *R. ramiflora*, which is also tetraploid with $2n = 36$ (Peruzzi & al., 2011).

Romulea ramiflora Ten.

$2n = 36$, CHN. Italy, Sicily, Palermo Province, between S. Vito lo Capo Zingaro and the "Zingaro" Natural Reserve, 38°08′N, 12°46′E, 8 March 2009, *Iiriti & Frignani s.n.* (CAG, SIENA).

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