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IAPT CHROMOSOME DATA

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IAPT chromosome data 35/1

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All materials CHN; vouchers in UB.

ASTERACEAE

Eremanthus veadeiroensis H.Rob., 2*n* = 34; Brasil, Goiás, *A.D. Silveira 49*.

EUPHORBIACEAE

Manihot appanii M.J.Silva, 2*n* = 36; Brazil, Goiás, *A.D. Silveira 81*.
Manihot purpureocostata Pohl, 2*n* = 36; Brazil, Goiás, *A.D. Silveira 92*.

FABACEAE

Mimosa venatorum Barneby, 2*n* = 26; Brazil, Goiás, *A.D. Silveira 40*.

LAMIACEAE

Oocephalus grazielae Harley, 2*n* = 28; Brazil, Distrito Federal, *A.D. Silveira 43*.
Oocephalus niveus (Epling) Harley & J.F.B.Pastore, 2*n* = 28; Brazil, Goiás, *A.D. Silveira 61*.

LYTHRACEAE

Cuphea cunninghamiifolia T.B.Cavalc., 2*n* = 16; Brazil, Goiás, *A.D. Silveira 25*.
Diplusodon adpressipilus Lourteig, 2*n* = 30; Brazil, Goiás, *A.D. Silveira 46*.
Diplusodon leucocalycinus Lourteig, 2*n* = 30; Brazil, Goiás, *A.D. Silveira 37*.
Diplusodon rosmarinifolius A.St.-Hil., 2*n* = 30; Brazil, Distrito Federal, *A.D. Silveira 44*.

MYRTACEAE

Myrcia rhodeosepala Kiaersk., 2*n* = 22; Brazil, Distrito Federal, *A.D. Silveira 12*.
Psidium ratterianum Proença & Soares-Silva, 2*n* = 22; Brazil, Distrito Federal, *A.D. Silveira 67*.

IAPT chromosome data 35/2

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All materials CHN. Samples of species of violets (*Viola* L., Violaceae) reported in this communication are cultivated in the collections of the Central Siberian Botanical Garden of the SB RAS, Novosibirsk (by T.V. Elisafenko).

LAMIACEAE

Nepeta mariae Regel, 2*n* = 18; Tajikistan, Sughd Province (Sogdijskaya Oblasť), *A.V. Grebenjuk & A.Yu. Astashenkov s.n.* (NSK NSK0086194).
Nepeta pseudokokanica Pojark., 2*n* = 36; Kyrgyzstan, Oş oblusu (Oshskaya Oblasť), *A.Yu. Astashenkov, V.A. Cheryomushkina & A.V. Grebenjuk s.n.* (NSK NSK0086192).
Scutellaria ocellata Juz., 2*n* = 18; Tajikistan, Sughd Province (Sogdijskaya Oblasť), *V.A. Cheryomushkina, A.V. Grebenjuk & A. Yu. Astashenkov s.n.* (NSK NSK0086193).

PLANTAGINACEAE

Veronica officinalis L., 2*n* = 18; Russian Federation, Irkutskaya Oblasť, *T.V. Elisafenko s.n.* (NSK NSK0086185).

ROSACEAE

Coluria geoides (Pall.) Ledeb., 2*n* = 12, 14; Russian Federation, Republic of Altai, *T.V. Elisafenko s.n.* (NSK NSK0086183).

VIOLACEAE

Viola acuminata Ledeb., 2*n* = 40; Russian Federation, Chitinskaya Oblasť, *T.V. Elisafenko s.n.* (NSK NSK0086186).
Viola collina Besser, 2*n* = 20; Russian Federation, Altaiskii Krai, *T.V. Elisafenko s.n.* (NSK NSK0086189), *T.V. Elisafenko s.n.* (NSK NSK0086188), *T.V. Elisafenko s.n.* (NSK NSK0086187); Russian Federation, Primorskii Krai, *T.V. Elisafenko s.n.* (NSK NSK0086190).
Viola dactyloides Schult., 2*n* = 24; Russian Federation, Republic of Buryatia, *T.V. Elisafenko s.n.* (NSK NSK0086191), *T.V. Elisafenko s.n.* (NSK NSK0086184).
Viola taynensis Elisafenko & Ovczinnikova, 2*n* = 20; Russian Federation, Altaiskii Krai, *T.V. Elisafenko s.n.* (NSK NSK0000653).

IAPT chromosome data 35/3

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All materials CHN; vouchers in NS.

LILIACEAE

Tulipa cinnabarina K.Perss., 2*n* = 24; Turkey, Konya Province, *A.S. Erst, T.V. Erst, O. Çeçen & Z. Aytaç TU-2021-4*.

PAPAVERACEAE

Corydalis bracteata (Stephan ex Willd.) Pers., 2*n* = 16; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-19*.

PRIMULACEAE

Cyclamen cilicium Boiss. & Heldr., 2*n* = 30; Turkey, Antalya Province, *A.S. Erst, T.V. Erst & Z. Aytaç TU-2021-13*.

Cyclamen coum Mill., 2*n* = 30; Turkey, Bolu Province, *A.S. Erst, T.V. Erst & Z. Aytaç TU-2021-1*.

RANUNCULACEAE

Aconitum anthoroideum DC., 2*n* = 16; Russian Federation, Krasnoyarskii Krai, *T.V. Leonova HAK-2020-34*.

Aconitum septentrionale Koelle, 2*n* = 16; Russian Federation, Krasnoyarskii Krai, *T.V. Leonova HAK-2020-29*, *T.V. Leonova HAK-2020-27*.

Adonis vernalis L., 2*n* = 16; Bulgaria, *A.N. Tashev & S.T. Bancheva BU-2021-13*, *A.N. Tashev & S.T. Bancheva BU-2021-15*; Russian Federation, Altaiskii Krai, 17 May 2020, *S.V. Smirnov & D.-V. Zolotov s.n.*; Russian Federation, Novosibirskaya Oblasť, 07 May 2020, *A.S. Erst & T.V. Erst s.n.*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-15*.

Adonis volgensis Steven ex DC., 2*n* = 16; Bulgaria, *A.N. Tashev & S.T. Bancheva BU-2021-05*; Russian Federation, Altaiskii Krai, *S.V. Smirnov & D.V. Zolotov 3-2020*; Russian Federation, Altaiskii Krai, 17 May 2020, *S.V. Smirnov & D.V. Zolotov s.n.*

Anemone altaica Fisch. ex C.A.Mey., 2*n* = 32; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-18*.

Anemone amurensis (Korsh.) Kom., 2*n* = 48; Russian Federation, Amurskaya Oblasť, 06 May 2020, *T.N. Veklich s.n.*, 08 May 2021, *T.N. Veklich s.n*.

Anemone pavonina Lam., 2*n* = 16; Bulgaria, *A.N. Tashev & S.T. Bancheva BU-2021-03*.

Anemone raddeana Regel, 2*n* = 40; Russian Federation, Sakhalinskaya Oblasť, 19 Apr 2020, *M.G. Ivanchikova s.n*.

Anemone ranunculoides L., 2*n* = 32; Bulgaria, *A.N. Tashev & S.T. Bancheva BU-2021-09*.

Anemone sylvestris L., 2*n* = 16; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-09*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-13*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-8*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-10*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-11*; Russian Federation, Amurskaya Oblasť, 31 May 2020, *T.N. Veklich s.n.*

Delphinium elatum L., 2*n* = 16; Russian Federation, Krasnoyarskii Krai, *T.V. Leonova HAK-2020-35*.

Delphinium grandiflorum L., 2*n* = 16; Russian Federation, Krasnoyarskii Krai, *T.V. Leonova HAK-2020-32*.

Eranthis cilicica Schott & Kotschy, 2*n* = 24; Turkey, Hakkâri Province, *A.S. Erst, T.V. Erst, Ş. Alp TU-2021-19*.

Eranthis hyemalis (L.) Salisb., 2*n* = 16; Hungary, *A. Mesterházy HU-2020-1* (NS), *A. Mesterházy HU-2020-2*.

Halerpestes salsuginosa Greene, 2*n* = 48; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-27* (NS); Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-25*.

Halerpestes sarmentosa (Adams) Kom., 2*n* = 16; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-11*, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-30*.

Pulsatilla cernua (Thunb.) Bercht. & J.Presl, 2*n* = 16; Russian Federation, Amurskaya Oblasť, 01 May 2020, *T.N. Veklich s.n*.

Pulsatilla dahurica (Fisch. ex DC.) Spreng., 2*n* = 16; Russian Federation, Amurskaya Oblasť, 06 May 2020, *T.N. Veklich s.n*.

Pulsatilla flavescens (Zucc.) Juz., 2*n* = 16; Russian Federation, Novosibirskaya Oblasť, 07 May 2020, *A.S. Erst & T.V. Erst s.n*.

Pulsatilla multifida (E.Pritz.) Juz., 2*n* = 16; Russian Federation, Amurskaya Oblasť, 07 May 2020, *T.N. Veklich s.n.*; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-10*, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-34*; Russian Federation, Khakassia Republic, *T.V. Leonova HAK-2020-6*; Russian Federation, Krasnoyarskii Krai, *T.V. Leonova HAK-2020-1*.

Pulsatilla turczaninovii Krylov & Serg., 2*n* = 16; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-34*; Russian Federation, Altai Republic, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-37*; Russian Federation, Amurskaya Oblasť, 27 Apr 2020, *T.N. Veklich s.n*.

IAPT chromosome data 35/4

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All materials CHN; collectors: *AG* = A.A. Gnutikov, *RU* = R.A. Ufimov; vouchers in LE.

POACEAE

Agrostis clavata Trin., 2*n* = 42; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-2*.

Agrostis stolonifera L., 2*n* = 28; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-2*.

Alopecurus pratensis L., 2*n* = 28; Russian Federation, Stavropolskii Krai, *AG & RU Stp11-3*.

Brachypodium pubescens (Peterm.) Mussajev, 2*n* = 18; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-1*.

Brachypodium sylvaticum (Huds.) P.Beauv., 2*n* = 18; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-1*.

Bromus japonicus Houtt., 2*n* = 14; Russian Federation, Stavropolskii Krai, *AG & RU Stp11-1*.

Calamagrostis glomerata Boiss. & Buhse, 2*n* = 28; Russian Federation, Krasnodarskii Krai, *RU Kr10-3*.
Dactylis glomerata L., 2*n* = 28; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-3*.
Dactylis polygama Horv., 2*n* = 14; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-4*.
Elytrigia elongatiformis (Drobow) Nevski, 2*n* = 42; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-5*.
Eriochloa procera (Retz.) C.E.Hubb. s.l., 2*n* = 36; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-4*.
Melica picta K.Koch, 2*n* = 18; Russian Federation, Stavropolskii Krai, *AG & RU Stp11-2*.
Panicum virgatum L., 2*n* = 36; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-6*.
Phleum montanum K.Koch, 2*n* = 14; Russian Federation, Stavropolskii Krai, *AG & RU Stp11-4*.
Phleum paniculatum Huds., 2*n* = 28; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-5*.
Phleum pratense L., 2*n* = 42; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-7*.
Phleum tzvelevii Dubovik, 2*n* = 28; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-6*.
Poa compressa L., 2*n* = 42; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-8*.
Psathyrostachys juncea (Fisch.) Nevski, 2*n* = 14; Russian Federation, Krasnodarskii Krai, *AG & RU Kr14-9*.
Schedonorus giganteus (L.) Holub, 2*n* = 42; Russian Federation, Krasnodarskii Krai, *AG & RU Kr10-7*.

IAPT chromosome data 35/5

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All materials CHN; collectors: *JS* = *Jaswant Singh*, *MK* = *Maninder Kaur*; vouchers in PUN.

BALSAMINACEAE
Impatiens micranthemum Edgew., *n* = 9; India, Himachal Pradesh, *MK 31892*.
Impatiens puberula DC., *n* = 10; India, Himachal Pradesh, *MK 31640*.

BERBERIDACEAE
Berberis koehneana C.K.Schneid., *n* = 14; India, Himachal Pradesh, *MK 32251*.

CARYOPHYLLACEAE
Silene gallica L., *n* = 12; India, Himachal Pradesh, *MK 29453*.

CUCURBITACEAE
Herpetospermum pedunculosum (Ser.) C.B.Clarke (= *H. caudigerum* Wall. ex Chakrav.), *n* = 10; India, Himachal Pradesh, *MK 31896*.

HYPERICACEAE
Hypericum himalaicum N.Robson, *n* = 9; India, Himachal Pradesh, *MK 32270*.

MAZACEAE
Mazus surculosus D.Don, *n* = 20; India, Himachal Pradesh, *MK 31674*.

ONAGRACEAE
Circaea alpina L., *n* = 24; India, Himachal Pradesh, *MK 31620*.
Oenothera rosea L.'Hér ex Aiton, *n* = 14; India, Himachal Pradesh, *MK 32274*.

POACEAE
Elymus himalayanus (Nevski) Tzvelev, *n* = 21; India, Uttarakhand, *JS 33912*.
Elymus nutans Griseb., *n* = 21; India, Uttarakhand, *JS 33923*.
Elymus semicostatus (Nees ex Steud.) Melderis, *n* = 14; India, Uttarakhand, *JS 33909*.
Melica scaberrima (Steud.) Hook.f., *n* = 9; India, Uttarakhand, *JS 33917*.
Phacelurus speciosus (Steud.) C.E.Hubb., *n* = 20; India, Uttarakhand, *JS 33903*. *n* = 30; India, Uttarakhand, *JS 33932*.

ROSACEAE
Filipendula vestita (Wall. ex G.Don) Maxim., *n* = 14; India, Himachal Pradesh, *MK 32220*.
Geum rivale L., *n* = 21; India, Himachal Pradesh, *MK 29471*.
Potentilla sericea var. *polychista* (Boiss) Lehm., *n* = 42; India, Himachal Pradesh, *MK 32213*.

URTICACEAE
Urtica dioica L., *n* = 13; India, Himachal Pradesh, *MK 32291*.

IAPT chromosome data 35/6

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

POACEAE
Apluda blatteri Sur, *n* = 10; *NK 33806*.
Aristida funiculata Trin. & Rupr., *n* = 22; *NK 31991*.
Cenchrus rajasthanensis K.C.Kanodia & P.C.Nanda, *n* = 18; *NK 33828*.
Digitaria abludens (Roem. & Schult) Veldk. (= *D. granularis* (Trin. ex Spreng.) Henrard), *n* = 9; *NK 31960*.
Echinochloa frumentacea Link, *n* = 9; *NK 33854*.
Panicum antidotale Retz., *n* = 16; *NK 33805*.
Pennisetum pedicellatum subsp. *unispiculum* Brunken, *n* = 18; *NK 31910*.

Setaria italica (L.) P.Beauv., *n* = 18; *NK 33860*.
Sporobolus helvolus (Trin.) T.Durand & Schinz, *n* = 12; *NK 33868*.

IAPT chromosome data 35/7

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All materials CHN.

ASTERACEAE (COMPOSITAE)

Achillea alpina L. (≡ *Ptarmica alpina* (L.) DC.), 2*n* = 36; Russian Federation, Primorskii Krai, *V.V. Kotseruba & M.O. Burlyayeva 2014-114* (LE), *V.V. Kotseruba & M.O. Burlyaeva 2014-115* (LE).
Arctogeron gramineum (L.) DC., 2*n* = 18; Mongolia, Khovsgol Aimag, *N.V. Vlasova 52938* (IRK, NSK).
Artemisia anethifolia Weber ex Stechm., 2*n* = 18; Russian Federation, Republic of Buryatia, *M.N. Lomonosova 04-03* (LE). 2*n* = 36; Russian Federation, Republic of Tyva, *A.Yu. Korolyuk & E.A. Korolyuk 2014-54* (LE).
Artemisia annua L., 2*n* = 18; Kyrgyzstan, *T.V. Kostritsyna 2020-15* (LE).
Artemisia arenaria DC., 2*n* = ca. 28; Russian Federation, Stavropolskii Krai, *A.I. Krupkina & V.V. Shvanova 2015-03* (LE).
Artemisia argyrophylla Ledeb., 2*n* = 18, 36; Russian Federation, Republic of Altai, *A.A. Gnutikov 2013-55* (LE). 2*n* = 27; Russian Federation, Republic of Altai, *A.A. Gnutikov 2013-65* (LE).
Artemisia caespitosa Ledeb., 2*n* = 18; Russian Federation, Republic of Tyva, *A.Yu. Korolyuk & E.A. Korolyuk 2014-55* (LE).
Artemisia campestris L., 2*n* = 36; Russian Federation, Saint Petersburg city, *A.A. Korobkov 2020-04* (LE).
Artemisia campestris subsp. *borealis* (Pall.) H.M.Hall & Clem. (≡ *A. borealis* Pall.), 2*n* = 36; Russian Federation, Republic of Sakha (Yakutia), *T.M. Korolova 2013-19* (LE).
Artemisia czekanowskiana Trautv., 2*n* = 54; Russian Federation, Republic of Sakha (Yakutia), *T.M. Korolova 2013-18* (LE). 2*n* = 72; Russian Federation, Republic of Sakha (Yakutia), *T.M. Korolova 2013-18* (LE).
Artemisia depauperata Krasch. (= *A. pycnorrhiza* Ledeb.), 2*n* = 36; Russian Federation, Republic of Altai, *D.G. Melnikov & G.A. Tyusov 2020-06* (LE), *D.G. Melnikov & G.A. Tyusov 2020-07* (LE).
Artemisia gmelinii Weber ex Stechm., 2*n* = ca. 34; Russian Federation, Altaiskii Krai, *A.A. Korobkov 99-214* (LE).
Artemisia halodendron Turcz. ex Besser, 2*n* = 36; Mongolia, Dornod Aimag, *A.A. Korobkov 09-62* (LE).
Artemisia macrocephala Jacquem. ex Besser, 2*n* = 18; Kyrgyzstan, *T.V. Kostritsyna 2020-17* (LE).
Artemisia marschalliana Spreng., 2*n* = 36; Russian Federation, Republic of Altai, *A.A. Korobkov 2014-100* (LE).
Artemisia nitrosa Weber ex Stechm., 2*n* = 36; Russian Federation, Saratovskaya Oblasť, *A.A. Korobkov 09-25* (LE), *A.A. Korobkov 09-63* (LE).
Artemisia obtusiloba Ledeb., 2*n* = 18; Russian Federation, Republic of Altai, *A.A. Korobkov 99-217* (LE). 2*n* = 36; Russian Federation, Republic of Tyva, *A.A. Korobkov 04-131* (LE), *A.A. Korobkov 04-132* (LE).
Artemisia phaeolepis Krasch., 2*n* = 36; Russian Federation, Republic of Altai, *D.G. Melnikov & G.A. Tyusov 2020-08* (LE).
Artemisia pontica L., 2*n* = 36, 54; Russian Federation, Altaiskii Krai, *A.A. Korobkov 2014-107* (LE).
Artemisia pubescens var. *monostachya* (Bunge ex Maxim.) Y.R.Ling (≡ *A. monostachya* Bunge ex Maxim.). 2*n* = 36; Russian Federation, Zabaikalskii Krai, *O.M. Afonina 2012-93* (LE), *O.M. Afonina 2012-94* (LE).
Artemisia rupestris subsp. *viridis* (Willd. ex DC.) V.P.Ameljczenko (≡ *A. viridis* Willd. ex DC.), 2*n* = 18; Kyrgyzstan, *T.V. Kostritsyna 2020-14* (LE).
Artemisia rutifolia Steph. ex Spreng., 2*n* = 18; Kyrgyzstan, *T.V. Kostritsyna 2020-10* (LE).
Artemisia scoparia Waldst. & Kit., 2*n* = 16; Peoples Republic of China, Province Jilin, *V.V. Kotseruba & M.O. Burlyaeva 2014-37* (LE).
Artemisia sieversiana Ehrh. ex Willd., 2*n* = 18; Kyrgyzstan, *T.V. Kostritsyna 2020-13* (LE).
Artemisia stolonifera (Maxim.) Kom. (= *A. argyi* H.Lév. & Vaniot), 2*n* = 36; Russian Federation, Khabarovskii Krai, *A.A. Korobkov 05-13* (LE), *A.A. Korobkov 05-148* (LE), *A.A. Korobkov 05-149* (LE).
Artemisia subulata Nakai, 2*n* = 18; Russian Federation, Amurskaya Oblasť, *A.A. Korobkov 07-187* (LE).
Artemisia tournefortiana Rchb., 2*n* = 18; Russian Federation, Voronezhskaya Oblasť, *V. Agofonov 2020-01* (LE).
Artemisia vulgaris L., 2*n* = 16; Kyrgyzstan, *T.V. Kostritsyna 2020-11* (LE), *T.V. Kostritsyna 2020-12* (LE); Russian Federation, Kaliningradskaya Oblasť, *E.B. Portenier 2020-03* (LE), *E.B. Portenier 2020-12* (LE).
Dendranthema mongolicum (Ling) Tzvelev (= *Chrysanthemum zawadzkii* subsp. *peleiolepis* (Trautv.) Zuev), 2*n* = 36; Russian Federation, Sakhalinskaya Oblasť, *D.A. Krivenko 2016-122* (LE).

CARYOPHYLLACEAE

Sabulina stricta (Sw.) Rchb., 2*n* = 30; Mongolia, Khovsgol Aimag, *N.V. Vlasova 52932* (IRK, NSK).

FABACEAE (LEGUMINOSAE)

Astragalus apricus Bunge (= *A. polyphyllus* Bunge), 2*n* = 16; Russian Federation, Republic of Dagestan, 05 Aug 2017, *R.A. Murtazaliev s.n*. (DAG).
Astragalus beckerianus Trautv., 2*n* = 32; Russian Federation, Republic of Dagestan, 05 Aug 2017, *R.A. Murtazaliev s.n*. (DAG).
Astragalus brachycarpus M.Bieb., 2*n* = 32; Russian Federation, Stavropolskii Krai, 23 Jul 2018, *V.N. Belous s.n*. (SPI).
Astragalus buchtormensis Pall. (= *A. henningii* (Steven) Boriss.), 2*n* = 16; Russian Federation, Stavropolskii Krai, 10 May 2015, *V.N. Belous s.n*. (SPI), 24 May 2015, *V.N. Belous s.n*. (SPI).
Astragalus calycinus M.Bieb., 2*n* = 16; Russian Federation, Stavropolskii Krai, 23 Jul 2018, *V.N. Belous s.n*. (SPI).
Astragalus captiosus Boriss. (= *A. interpositus* Boriss.), 2*n* = 16 + 2B; Russian Federation, Republic of Dagestan, *Z.A. Guseynova 61063* (IRK).

Astragalus dolichophyllus Pall., 2*n* = 32; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62494* (IRK).

Astragalus guttatus Banks & Sol., 2*n* = 16; Russian Federation, Stavropolskii Krai, 24 May 2015, *V.N. Belous s.n.* (SPI). 2*n* = 16 + 0–2B; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62503* (IRK).

Astragalus incertus Ledeb., 2*n* = 32; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 63656* (IRK).

Astragalus kazbeki Kharadze, 2*n* = 16; Russian Federation, Republic of Ingushetia, 18 Jun 2014, *V.N. Belous s.n.* (SPI).

Astragalus lehmannianus Bunge, 2*n* = 16; Russian Federation, Republic of Dagestan, *D.A. Krivenko & R.A. Murtazaliev 59087* (IRK).

Astragalus onobrychis L., 2*n* = 16; Russian Federation, Altaiskii Krai, *E.V. Zhmud 16673* (IRK).

Astragalus physodes L., 2*n* = 16 + 0–2B; Russian Federation, Stavropolskii Krai, 24 May 2015, *V.N. Belous s.n.* (SPI).

Astragalus pseudotataricus Boriss., 2*n* = 64; Russian Federation, Stavropolskii Krai, 23 Jul 2018, *V.N. Belous s.n.* (SPI).

Astragalus sanguinolentus M.Bieb., 2*n* = 16; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62498* (IRK).

Astragalus somcheticus K.Koch, 2*n* = 16; Russian Federation, Republic of Dagestan, 05 Jul 2012, *R.A. Murtazaliev s.n.* (DAG, LE)

Astragalus sytinii Belous & Laktionov, 2*n* = 64; Russian Federation, Stavropolskii Krai, 24 May 2015, *V.N. Belous s.n.* (SPI).

Astragalus testiculatus Pall., 2*n* = 16; Russian Federation, Republic of Altai, *E.V. Zhmud 21096* (IRK).

Cicer minutum Boiss. & Hohen., 2*n* = 16; Russian Federation, Republic of Dagestan, 05 Aug 2017, *R.A. Murtazaliev s.n.* (DAG).

Coronilla securidaca L. (≡ *Securigera securidaca* (L.) Degen & Dörfl.), 2*n* = 12; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62506* (IRK).

Eremosparton aphyllum (Pall.) Fisch. & C.A.Mey., 2*n* = 16; Russian Federation, Republic of Dagestan, *D.A. Krivenko & R.A. Murtazaliev 62071* (IRK).

Hedysarum theinum Krasnob., 2*n* = 14; Russian Federation, Republic of Altai, *E.V. Zhmud 21089* (IRK).

Lathyrus komarovii Ohwi, 2*n* = 14; Russian Federation, Primorskii Krai, *V.V. Kotseruba & E.V. Vrzosek 52180* (IRK).

Lathyrus oleraceus Lam. (= *Pisum elatius* M.Bieb.), 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62510* (IRK).

Lathyrus sphaericus Retz., 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62502* (IRK).

Medicago cancellata M.Bieb., 2*n* = 48; Russian Federation, Stavropolskii Krai, 30 Jun 2018, *V.N. Belous s.n.* (SPI).

Medicago minima (L.) Bartal., 2*n* = 16; Russian Federation, Republic of Dagestan, *Z.A. Guseynova 61062* (IRK).

Medicago polymorpha L., 2*n* = 16; Russian Federation, Republic of Dagestan, *Z.A. Guseynova 61060* (IRK).

Medicago rigidula (L.) All., 2*n* = 14; Russian Federation, Republic of Dagestan, *Z.A. Guseynova 61061* (IRK).

Medicago ×varia Martyn, 2*n* = 32; Russian Federation, Republic of Dagestan, *D.A. Krivenko & Z.A. Guseynova 63025* (IRK), *D.A. Krivenko & Z.A. Guseynova 63026* (IRK), *D.A. Krivenko & Z.A. Guseynova 63028* (IRK), *D.A. Krivenko & Z.A. Guseynova 63030* (IRK).

Melilotus indicus (L.) All., 2*n* = 16; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62507* (IRK).

Onobrychis bobrovii Grossh. (= *O. radiata* (Desf.) M.Bieb. agg.), 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62499* (IRK).

Onobrychis caput-galli (L.) Lam., 2*n* = 14; Russian Federation, Republic of Dagestan, *Z.A. Guseynova 61059* (DAG, IRK, LE).

Onobrychis majorovii Grossh., 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62500* (IRK).

Onobrychis petraea (M.Bieb. ex Willd.) Fisch., 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62496* (IRK).

Oxytropis albana Steven, 2*n* = 16; Russian Federation, Republic of Dagestan, *D.A. Krivenko & Z.A. Guseynova 62748* (IRK).

Oxytropis lapponica (Wahlenb.) Gay, 2*n* = 16; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62497* (IRK).

Oxytropis owerinii Bunge, 2*n* = 32; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 63658* (IRK).

Oxytropis pilosa (L.) DC., 2*n* = 16; Russian Federation, Altaiskii Krai, *E.V. Zhmud 16681* (IRK).

Trifolium lappaceum L., 2*n* = ca. 16; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62508* (IRK).

Trifolium trichocephalum M.Bieb., 2*n* = ca. 80; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62850* (IRK, LE, NSK).

Vavilovia formosa (Steven) Fed., 2*n* = 14; Russian Federation, Republic of North Ossetia – Alania, *A.P. Pukhaev & K.P. Popov 45634* (IRK); Russian Federation, Republic of Dagestan, 05 Aug 2017, *R.A. Murtazaliev s.n.* (DAG).

Vicia alpestris Steven, 2*n* = 28; Russian Federation, Republic of Dagestan, *D.A. Krivenko & Z.A. Guseynova 62864* (IRK).

Vicia hirsuta (L.) Gray, 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62501* (IRK).

Vicia lathyroides L., 2*n* = 12; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62504* (IRK).

Vicia ramuliflora (Maxim.) Ohwi, 2*n* = 12; Russian Federation, Primorskii Krai, *V.V. Kotseruba & E.V. Vrzosek 52193* (IRK).

Vicia tetrasperma (L.) Schreb., 2*n* = 14; Russian Federation, Republic of Dagestan, *R.A. Murtazaliev 62509* (IRK).

ORCHIDACEAE

Epipactis helleborine (L.) Crantz, 2*n* = 40; Russian Federation, Irkutskaya Oblasť, *D.A. Krivenko & E.V. Zhmud 23517* (IRK), *D.A. Krivenko & E.V. Zhmud 27172* (IRK).

PAPAVERACEAE

Chelidonium asiaticum (Hara) Krahulc., 2*n* = 10; Russian Federation, Khabarovskii Krai, *M.I. Vernoslova 54285* (IRK), *D.A. Krivenko 51277* (IRK); Russian Federation, Primorskii Krai, *D.A. Krivenko 33289* (IRK), *D.A. Krivenko 51295* (IRK), *V.V. Kotseruba 51282* (IRK).

Chelidonium majus L., 2*n* = 12; Armenia, *D.A. Krivenko & al. 58919* (IRK); Bulgaria, *E.V. Zhmud 64217-7* (IRK), *E.V. Zhmud 64217-8* (IRK), *E.V. Zhmud 64217-9* (IRK); Czech Republic, *E.V. Zhmud 64245-1* (IRK), *E.V. Zhmud 64245-2* (IRK), *E.V. Zhmud 64245-3* (IRK), *E.V. Zhmud 64245-4* (IRK), *E.V. Zhmud 64245-5* (IRK), *E.V. Zhmud 64246-6* (IRK), *E.V. Zhmud 64246-7* (IRK), *E.V. Zhmud 64246-8* (IRK), *E.V. Zhmud 64246-9* (IRK); Georgia, *D.A. Krivenko & al. 58920* (IRK), *D.A. Krivenko & al. 58922* (IRK), *D.A. Krivenko & al. 58924* (IRK), *D.A. Krivenko & al. 58927* (IRK); Kazakhstan, Pavlodarskaya Oblasť, *D.A. Krivenko 33299* (IRK); Russian Federation, Altaiskii Krai, *D.A. Krivenko 51410* (IRK); Russian Federation, Kemerovskaya Oblasť, *D.A. Krivenko 51135* (IRK); Russian Federation, Moskovskaya Oblasť, *M.V. Kostina 51252* (IRK); Russian Federation, Novosibirskaya Oblasť, *D.A. Krivenko 51289* (IRK), *D.A. Krivenko 51294* (IRK); Russian Federation, Republic of Altai, *N.K. Kovtonyuk & al. 31389* (IRK, NSK), *D.A. Krivenko 33409* (IRK); Russian Federation, Republic of Dagestan, *N. Nuradinova 58830* (IRK); Russian Federation, Saratovskaya Oblasť, *M.V. Kostina 51253* (IRK), *M.V. Kostina 51254* (IRK), *M.V. Kostina 51250* (IRK), *M.V. Kostina 52281* (IRK); Russian Federation, Sverdlovskaya Oblasť, *O.S. Dymshakova 33414* (IRK), *O.S. Dymshakova 33415* (IRK), *O.S. Dymshakova 33416* (IRK); Russian Federation, Tambovskaya Oblasť, *M.O. Burlyaeva 52296* (IRK); Russian Federation, Tomskaya Oblasť, *D.A. Krivenko 51269* (IRK); Slovak Republic, *Yu.K. Vinogradova 51258* (IRK).

PRIMULACEAE

Androsace fedtschenkoi Ovcz., 2*n* = 20; Mongolia, Khovsgol Aimag, *N.V. Vlasova 52927* (IRK, NSK).

Androsace septentrionalis L., 2*n* = 20; Mongolia, Arkhangai Aimag, *N.V. Vlasova 52942* (IRK, NSK).

IAPT chromosome data 35/8

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All materials CHN; vouchers in CORD.

DRYOPTERIDACEAE

Polystichum andinum Phil., *n* = 82, *x* = 41; Argentina, Chubut, *Morero 380*.

Polystichum chilense (Christ) Diels, *n* = 82, *x* = 41; Argentina, Neuquén, *Morero 391*.

Polystichum montevidense (Spreng.) Rosenst., *n* = 41, *x* = 41; Argentina, Tucumán, *Morero 349*.

Polystichum multifidum (Mett.) T.Moore, *n* = 82, *x* = 41; Argentina, Neuquén, *Morero 306*.

Polystichum platyphyllum (Willd.) C.Presl, *n* = 41, *x* = 41; Argentina, Tucumán, *Morero 352*.

Polystichum plicatum (Poepp. ex Kunze) Hicken ex Hosseus, *n* = 82, *x* = 41; Argentina, Neuquén, *Morero 387*.

Polystichum pycnolepis (Kunze ex Klotzsch) Hieron., *n* = 41, *x* = 41; Argentina, Córdoba, *Morero & C-X Li 427*.

Polystichum tetragonum Fée, *n* = 82, *x* = 41; Chile, Archipiélago de Juan Fernández, Isla Robinson Crusoe, *Morero 323*.

IAPT chromosome data 35/9

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All materials CHN.

LORANTHACEAE

Amyema congener (Schult. & Schult.f.) Tiegh., 2*n* = 18; Australia, Queensland, *M.J.M. Christenhusz 7353* (EAN).

Amyema miquelii (Lehm. ex Miq.) Tiegh., 2*n* = 18; Australia, Queensland, *M.J.M. Christenhusz 7363* (EAN).

Dendrophthoe vitellina (F.Muell.) Tiegh., 2*n* = 18; Australia, Queensland, *M.J.M. Christenhusz 7362* (EAN).

Passovia pyrifolia (Kunth) Tiegh., 2*n* = 16; Brazil, Paraíba, *J.A.L. Neves 31* (EAN).

Psittacanthus cordatus (Hoffmanns.) G.Don, 2*n* = 16; Brazil, Bahia, *L.P. Felix 18158* (EAN).

Psittacanthus dichroos (Mart.) Mart., 2*n* = 16; Brazil, Bahia, *L.P. Felix 18061* (EAN).

Struthanthus flexicaulis (Mart. ex Schult.f.) Mart., 2*n* = 16; Brazil, Paraíba, *L.P. Felix 17350* (EAN).

Struthanthus marginatus (Desr.) G.Don, 2*n* = 16; Brazil, Paraíba, *J.A.L. Neves 30* (EAN).

Struthanthus podopterus (Cham. & Schltdl.) G.Don, 2*n* = 16; Brazil, Sergipe, *L.P. Felix 18045* (EAN).

Struthanthus thyrsiflorus (Cham. & Schltdl.) Kuijt, 2*n* = 16; Brazil, Bahia, Morro do Chapéu, *L.P. Felix 18140* (EAN). 2*n* = 28; Brazil, Sergipe, *L.P. Felix 18049* (EAN).

SANTALACEAE

Phoradendron dipterum Eichler, 2*n* = 16; Brazil, Sergipe, *L.P. Felix 18035* (EAN).

Phoradendron obtusissimum (Miq.) Eichler, 2*n* = 56; Brazil, Pernambuco, *L.P. Felix 17305* (EAN).

Phoradendron perrottetii (DC.) Eichler, 2*n* = 28; Brazil, Bahia, *L.P. Felix 18137* (EAN).

Phoradendron pteroneuron Eichler, 2*n* = 28; Brazil, Pernambuco, *L.P. Felix 17976* (EAN).

Phoradendron quadrangulare (Kunth) Griseb., *n* = 28; Brazil, Paraíba, *L.P. Felix 17111* (EAN).

Phoradendron strongyloclados Eichler, 2*n* = 28; Brazil, Paraíba *L.P. Felix 17119* (EAN).

Phoradendron tunaeforme (DC.) Eichler, *n* = 14; Brazil, Alagoas, *L.P. Felix 18014* (EAN).

Santalum lanceolatum R.Br, 2*n* = 28; Australia, Queensland, *M.J.M. Christenhusz 7366* (PG).

IAPT chromosome data 35/10

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All materials CHN; collected in Pamir (Gorno-Badakhshan Autonomous region, Republic of Tajikistan); collector: Marina Olonova (all *s.n.*).

* indicates mixoploidy (only modal numbers are given).

POACEAE

Poa albertii Regel
2*n* = 32*, 36* (TK 16-14).
Poa relaxa Ovcz.
2*n* = 22*, 44* (TK 17-10).
2*n* = 24, 32, 34, 36 (TK 17-50).
2*n* = 32 (TK 17-56).
2*n* = 35*, 42* (TK 17-23).
2*n* = 35*, 42* (TK 17-53).
2*n* = 36*, 42* (TK 16-28).
2*n* = 42 (TK 17-27).
2*n* = 42, 56 (TK 17-36).
2*n* = 56 (TK 17-46).

IAPT chromosome data 35/11

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This study was financed by the Fundação Universidade Federal de Mato Grosso do Sul – UFMS/MEC – Brazil; Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq – CASADINHO/PROCAD – Brasil) and Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul (FUNDECT, Brasil).

All materials CHN.

APOCYNACEAE
Subfamily Apocynoideae
Tribe Rhabdadenieae

Rhabdadenia biflora (Jacq.) Müll.Arg., 2*n* = 30; Brazil, Pará, *S.S. Viana 9* (IAN 193015).
Rhabdadenia madida (Vell.) Miers, 2*n* = 10; Brazil, Mato Grosso do Sul, *A.P. de Souza 33* (CGMS).
Rhabdadenia ragonesei Woodson, 2*n* = 30; Argentina, Corrientes, *H.A. Keller & G. Morillo 12298* (CTES).

Subfamily Asclepiadoideae
Tribe Asclepiadeae

Schubertia grandiflora Mart., 2*n* = 22; Brazil, Mato Grosso do Sul, *M.A. Farinaccio & al. 928* (CGMS).

IAPT chromosome data 35/12

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All materials CHN; collectors: *APE* = A.P. Efimova, *EVB* = E.V. Banaev, *TAP* = T.A. Poliakova; voucher specimens (= herbarium specimens and seeds) are deposited in the Vavilov Institute of General Genetics of RAS (VIGG), Laboratory of Population Genetics, Moscow.

ROSACEAE

Spiraea betulifolia Pall., 2*n* = 18; Russian Federation, Irkutskaya Oblasť, *TAP 10713*.
Spiraea chamaedryfolia L., 2*n* = 36; Russian Federation, Novosibirsk, *EVB 30915*; Russian Federation, Krasnoyarskii Krai, *TAP 10916*.
Spiraea crenata L., 2*n* = 18; Russian Federation, Karachay-Cherkess Republic, *TAP 11018*; Russian Federation, Karachay-Cherkess Republic, *TAP 21018*; Russian Federation, Volgogradskaya Oblasť, *TAP 11019*; Russian Federation, Republic of Dagestan, *TAP 21019*.
Spiraea dahurica (Rupr.) Maxim., 2*n* = 18; Russian Federation, Republic of Sakha (Yakutia), *TAP & APE 11215*, *TAP & APE 21215*, *TAP & APE 31215*, *TAP & APE 41215*.
Spiraea hypericifolia L., 2*n* = 18; Russian Federation, Republic of Dagestan, *TAP 11719*.
Spiraea media Schmidt, 2*n* = 18; Russian Federation, Amurskaya Oblasť, *TAP 71902*, *TAP 11913*; Russian Federation, Primorskii Krai, *TAP 11909*; Russian Federation, Irkutskaya Oblasť, *TAP 21913*; Russian Federation, Republic of Sakha (Yakutia), *TAP & APE 11915*; Russian Federation, Krasnoyarskii Krai, *TAP 11916*.
Spiraea ussuriensis Pojark., 2*n* = 18; Russian Federation, Irkutskaya Oblasť, *TAP 12813*; Russian Federation, Primorskii Krai, *TAP 12809*.

IAPT chromosome data 35/13

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All materials CHN.

CONVOLVULACEAE

Ipomoea acanthocarpa (Choisy) Asch. & Schweinf., 2*n* = 30; Brazil, Alagoas, *J.A.A.M. Lourenço 60* (PEUFR).
Ipomoea bonsai D.Santos & Alencar, 2*n* = 30; Brazil, Ceará, *S.L. Costa 88* (PEUFR).
Ipomoea queirozii J.R.I.Wood & L.V.Vasconc., 2*n* = 30; Brazil, Bahia, *L.P. Felix 18198* (EAN).
Jacquemontia corymbulosa Benth., 2*n* = 18; Brazil, Paraíba, *L.P. Felix 17657* (EAN).
Jacquemontia evolvuloides (Moric.) Meisn., 2*n* = 18; Brazil, Bahia, *R. Staples 1690* (PEUFR).

Jacquemontia mucronifera (Choisy) Hallier f., 2*n* = 36; Brazil, Pernambuco, *R. Staples 1718* (PEUFR).
Jacquemontia nodiflora (Desr.) G.Don, 2*n* = 20; Brazil, Bahia, *R. Staples 1661* (PEUFR).
Jacquemontia pentanthos (Jacq.) G.Don, 2*n* = 36; Brazil, Paraíba, *L.P. Felix 17648* (EAN).
Jacquemontia sphaerostigma (Cav.) Rusby, 2*n* = 20; Brazil, Bahia, *R. Staples 1703* (PEUFR).
Operculina hamiltonii (G.Don) D.F.Austin & Staples, 2*n* = 30; Brazil, Paraíba, *A.M. Santos 29* (EAN).

IAPT chromosome data 35 – Extended version

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IAPT chromosome data 35/1

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* First chromosome count for the species.

ASTERACEAE

Eremanthus veadeiroensis H.Rob.

*2*n* = 34, CHN. Brazil, Goiás, Chapada dos Veadeiros, 13°58′19.0″S, 47°29′17.0″W, Jul 2019, *A.D. Silveira 49* (UB) [Fig. 1A].

EUPHORBIACEAE

Manihot appanii M.J.Silva

*2*n* = 36, CHN. Brazil, Goiás, Chapada dos Veadeiros, 14°07′59.2″S, 47°32′20.0″W, Dec 2019, *A.D. Silveira 81* (UB) [Fig. 1B].

Manihot purpureocostata Pohl

*2*n* = 36, CHN. Brazil, Goiás, Chapada dos Veadeiros, 14°09′52.8″S, 47°47′24.4″W, Dec 2019, *A.D. Silveira 92* (UB) [Fig. 1C].

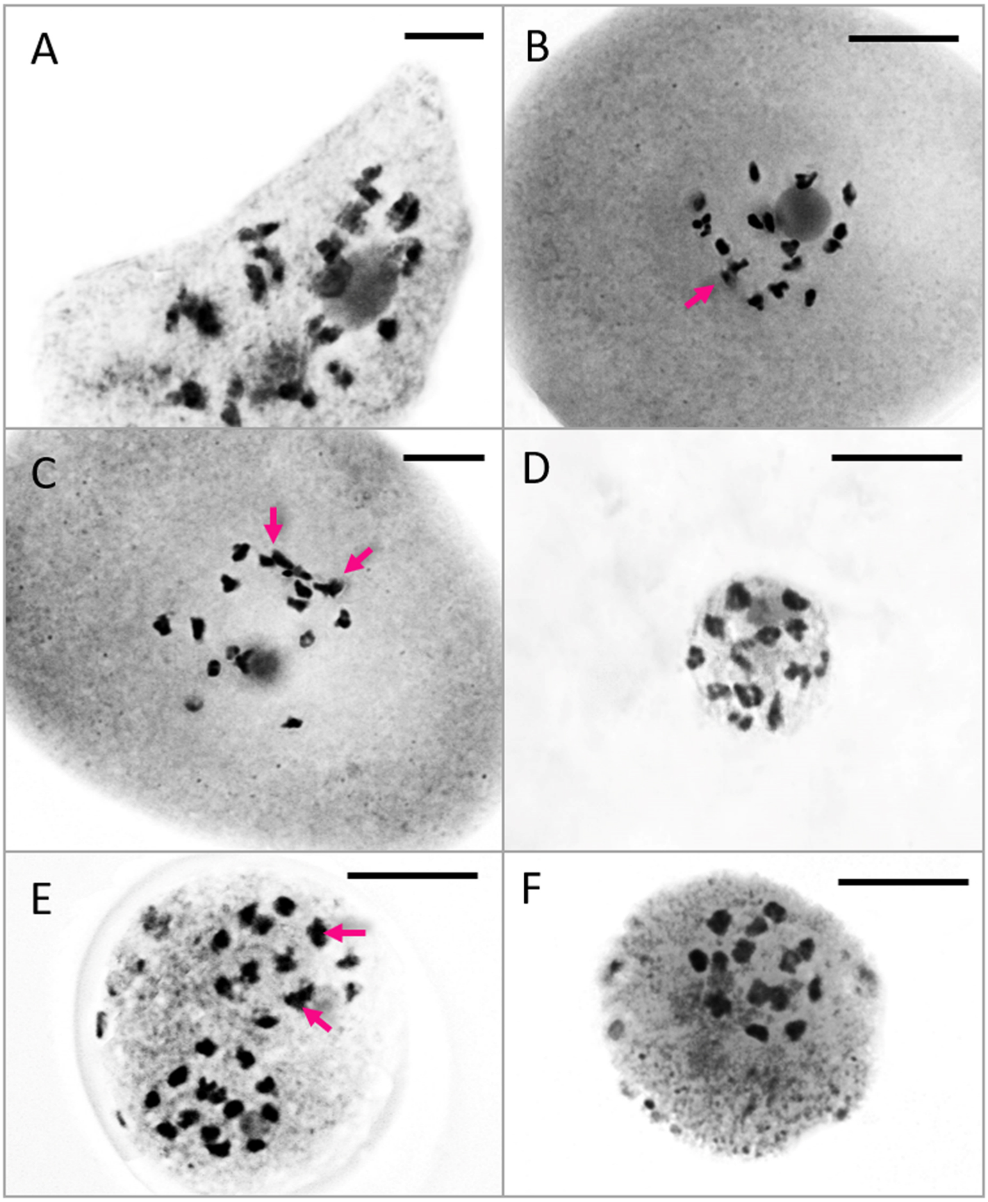

Fig. 1. **A**, *Eremanthus veadeiroensis* (2*n* = 34); **B**, *Manihot appanii* (2*n* = 36); **C**, *Manihot purpureocostata* (2*n* = 36); **D**, *Mimosa venatorum* (2*n* = 26); **E**, *Oocephalus grazielae* (2*n* = 28). **F**, *Oocephalus niveus* (2*n* = 28). All arrows indicate overlap of two bivalent chromosomes. — Scale bars = 10 µm.

FABACEAE

Mimosa venatorum Barneby

*2*n* = 26, CHN. Brazil, Goiás, Chapada dos Veadeiros, 14°09′30.3″S, 47°35′44.6″W, Jun 2019, *A.D. Silveira 40* (UB) [Fig. 1D].

LAMIACEAE

Oocephalus grazielae Harley

*2*n* = 28, CHN. Brazil, Distrito Federal, Brasília, Jardim Botânico de Brasília, 15°52′45.2″S, 47°49′44.1″W, May 2019, *A.D. Silveira 43* (UB) [Fig. 1E].

Oocephalus niveus (Epling) Harley & J.F.B.Pastore

*2*n* = 28, CHN. Brazil, Goiás, Alto Paraíso, Chapada dos Veadeiros, 14°07′59.2″S, 47°32′20.0″W, Sep 2019, *A.D. Silveira 61* (UB) [Fig. 1F]. IUCN Status EN B1ab (i,ii,iii,v) + 2ab (i,ii,iii,v).

LYTHRACEAE

Cuphea cunninghamiifolia T.B.Cavalc.

*2*n* = 16, CHN. Brazil, Goiás, Teresina de Goiás, Poço Encantado, 13°52′27.9″S, 47°15′45.4″W, Sep 2019, *A.D. Silveira 25* (UB) [Fig. 2A]. IUCN status EN B2ab (i,ii,iii).

Diplusodon adpressipilus Lourteig

*2*n* = 30, CHN. Brazil, Goiás, Chapada dos Veadeiros, 14°07′50.7″S, 47°41′14.8″W, Jul 2019, *A.D. Silveira 46* (UB) [Fig. 2B]. IUCN status EN B1ab (i,ii,iii) + 2ab (i,ii,iii).

Diplusodon leucocalycinus Lourteig

*2*n* = 30, CHN. Brazil, Goiás, Cavalcante, 13°53′44.6″S, 47°21′33.9″W, May 2019, *A.D. Silveira 37* (UB) [Fig. 2C]. IUCN status VU B1ab (i,ii,iii).

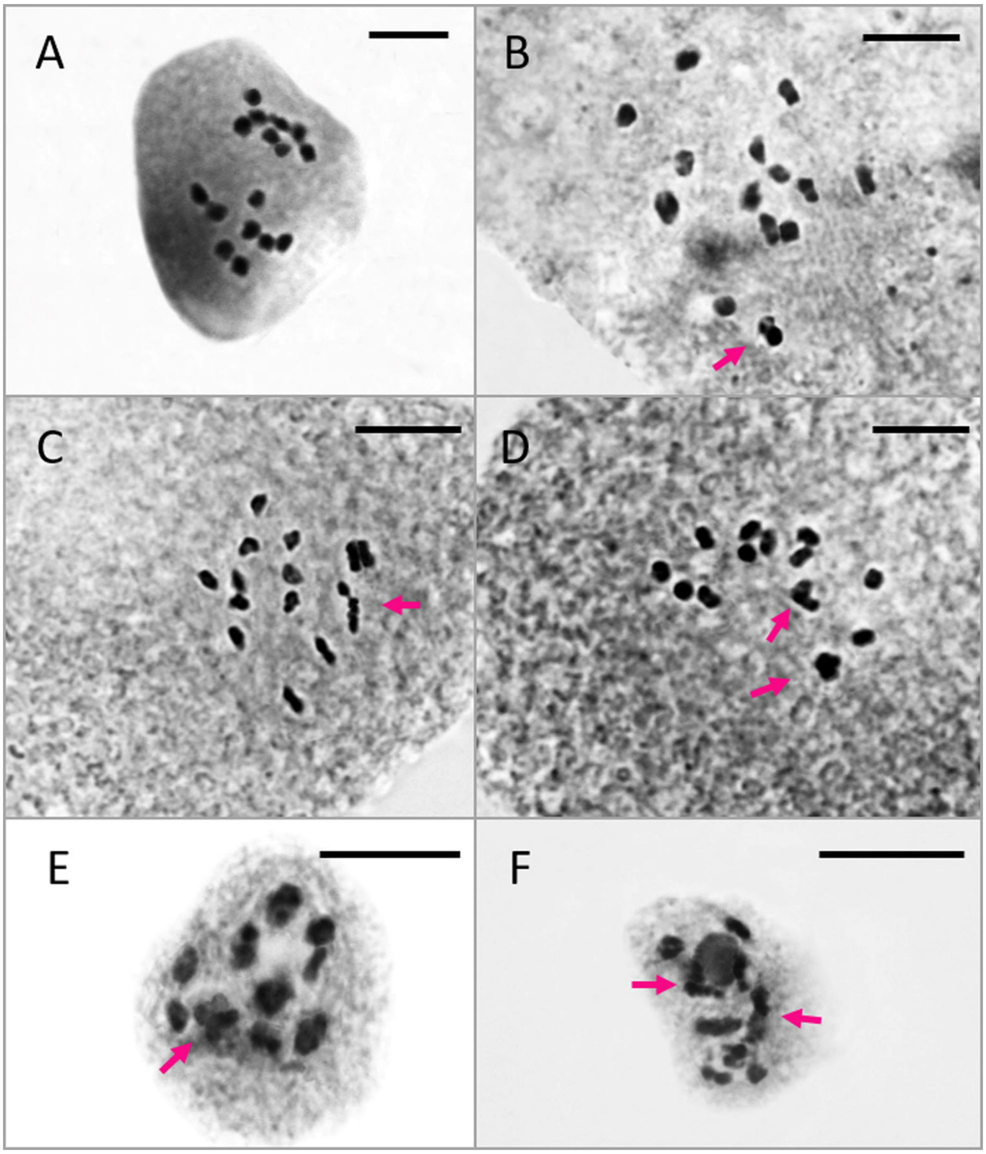

Fig. 2. **A**, *Cuphea cunninghamiifolia* (2*n* = 16); **B**, *Diplusodon adpressipilus* (2*n* = 30); **C**, *Diplusodon leucocalycinus* (2*n* = 30); **D**, *Diplusodon rosmarinifolius* (2*n* = 30); **E**, *Myrcia rhodeosepala* (2*n* = 22); **F**, *Psidium ratterianum* (2*n* = 22). All arrows indicate overlap of two bivalent chromosomes (diakinesis or metaphase I) or two chromosomes (anaphase I). — Scale bars = 10 µm.

Diplusodon rosmarinifolius A.St.-Hil.

*2*n* = 30, CHN. Brazil, Distrito Federal, Brasília, Jardim Botânico de Brasília, 15°52′45.2″S, 47°49′44.1″W, May 2019, *A.D. Silveira 44* (UB) [Fig. 2D]. IUCN status LC.

MYRTACEAE

Myrcia rhodeosepala Kiaersk.

*2*n* = 22, CHN. Brazil, Distrito Federal, Brasília, Parque Ecológico Ermida Dom Bosco, 15°47′49.1″S, 47°48′27.8″W, Oct 2018, *A.D. Silveira 12* (UB) [Fig. 2E].

Psidium ratterianum Proença & Soares-Silva

*2*n* = 22, CHN. Brazil, Distrito Federal, Brasília, Jardim Botânico de Brasília, 15°52′33.6″S, 47°49′30.2″W, May 2019, *A.D. Silveira 67* (UB). [Fig. 2F].

The savannah of Central Brazil (Cerrado biome) comprises high species richness and endemism and is a global biodiversity hotspot (Myers & al., 2000). Our study includes first chromosome counts for 12 narrow-endemic Cerrado species (four of which are in Brazil's red list of endangered plant species) from six angiosperm families with high levels of narrow endemism (Asteraceae, Euphorbiaceae, Fabaceae, Lamiaceae, Lythraceae and Myrtaceae). Results are presented and discussed below in alphabetical order by family.

Eremanthus Less. (33 species; Asteraceae) is currently the second-largest genus in the Neotropical subtribe Lychnophorinae (Loeuille & al., 2019); 22 of its species are endemic to the Cerrado or Campo Rupestre vegetation of Central Brazil (Loeuille & al., 2015). The chromosome count found by us for *E. veadeiroensis* is 2*n* = 34 (Fig. 1A); this count has been previously recorded for *E. erythropappus* (DC.) MacLeish (Salles de Melo & al., 2010). Four possible basic numbers (*x* = 15, 17, 18 or 19) have been suggested for *Eremanthus* (Turner & al., 1979; Jones, 1982; Mansanares & al., 2007; Watanabe & al., 2007).

Manihot Mill. (98 species; Euphorbiaceae) is a Neotropical genus (Rogers & Appan, 1973). Its primary centre of diversity (41 species in the Cerrado biome states of Goiás and Distrito Federal) is in Central Brazil (Duputié & al., 2011). The two species studied by us, *M. appanii* and *M. purpureocostata*, both had chromosome counts of 2*n* = 36 (Fig. 2B,C). The chromosome number 2*n* = 36 is apparently universal in the genus *Manihot* (Carvalho & Guerra, 2002).

Mimosa L. (530 species; Fabaceae) is a pantropical genus (Barneby, 1991; Simon & al., 2011). Central Brazil is the primary centre of diversity, with 74% of the species of the genus occurring there, of which about half are narrow endemics (Simon & Proença, 2000). The basic chromosome number of *x* = 13 has been proposed for *Mimosa* probably derived by dysploidy from *x* = 14 that is prevalent in the Mimosoideae clade, now in subfamily Caesalpinoideae (Goldblatt, 1981; LPWG, 2017). Our count for *M. venatorum* was 2*n* = 26 (Fig. 2D), suggesting diploidy.

Oocephalus (Benth.) Harley & J.F.B.Pastore (18 species; Lamiaceae) is a Neotropical genus belonging to the subtribe Hyptidinae (Harley & Pastore, 2012). It is endemic to Central Brazil, extending into montane areas of southeastern Brazil, such as the Espinhaço Mountain chain (Harley, 2015). In *O. grazielae* and *O. niveus*, we found 2*n* = 28 (Fig. 1E,F) chromosomes for both species. Establishing the basic number in the Hyptidinae is not trivial: chromosome counts found were 2*n* = 32, 30, 28, 26, 20, 16 and 12 (Pastore & al., 2011). Since the count 2*n* = 32 chromosomes has been found in all the major Hyptidinae lineages, it has been tentatively suggested that these numbers have been derived from an ancient 2*n* = 32 polyploid by aneuploidy (Harley & Heywood, 1992; Pastore & al., 2011).

Cuphea P.Browne (260 species; Lythraceae) is a Neotropical genus with one of its centres of diversity in the Cerrado biome and the other in Mexico (Graham & al., 2006). *Cuphea* is one of the most diverse genera of its family in chromosome numbers. Our count for *C. cunninghamiifolia* was 2*n* = 16 (Fig. 2A), suggesting diploidy. The basic chromosome number of *x* = 8 has been suggested for *Cuphea* based on c. 49% of the species, although there is high diversity of chromosome numbers in the genus, which vary from *n* = 6 to c. 86 (Graham, 1989, 1992; Graham & Cavalcanti, 2001).

Diplusodon J.St.-Hil. (c. 103 species; Lythraceae) is a Neotropical genus almost endemic to the Cerrado biome and the second-largest genus of Lythraceae (Inglis & Cavalcanti, 2018). The counts found for *D. adpressipilus*, *D. leucocalycinus* and *D. rosmarinifolius* were all 2*n* = 30 chromosomes (Fig. 2B–D), providing additional support to the pattern that this chromosome number is uniform in this genus. The only chromosome number recorded in the literature for *Diplusodon* until now is *n* = 15; this number may represent an ancient reduction from *n* = 16 (Graham & Cavalcanti, 2001).

Myrcia DC. (c. 800 species; Myrtaceae) is a widely distributed Neotropical genus (Lucas & al., 2018). Our count for *M. rhodeosepala* was 2*n* = 22 chromosomes (Fig. 2E), suggesting diploidy. In the Neotropical Myrtaceae, 2*n* = 22 is highly conserved and has been recorded in all the Neotropical genera sampled, sometimes exclusively (Costa & al., 2008; Amorim, 2012). Forni-Martins & Martins (2000) reported the first chromosome counts for two species of *Myrcia*, both 2*n* = 22. Fourteen species of *Myrcia* have now been sampled, and the chromosome number of 2*n* = 22 has been recorded in 13 of them (Costa & Forni-Martins, 2007; Costa & al., 2008; Amorim, 2012).

Psidium L. (c. 100 species; Myrtaceae) is a Neotropical genus with its centre of diversity in the Atlantic Forest of Brazil; 29 species occur in the Cerrado biome (Landrum & Proença, 2015; Tuler & al., 2020). Although (as stated above) in Myrtaceae 2*n* = 22 chromosomes is highly conserved, *Psidium* has the highest rate of euploidy recorded in the family (Costa & Forni-Martins, 2006). Polyploids in *Psidium* are multiples of 11 or 22 (2*n* = 22, 33, 44, 55, 66, 77, 88, 110 and 132; Machado, 2016) that confirm the long-established basic chromosome number of *x* = 11 for Myrtaceae (Atchison, 1947; Raven, 1975). Our count for *P. ratterianum* was 2*n* = 22 (Fig. 2F), suggesting diploidy, rare in this genus (Costa & Forni-Martins, 2006, 2007; Costa & al., 2008).

METHODS

Chromosome numbers were determined by methods described by Guerra & Souza (2002). The samples were obtained from the anthers of young inflorescences fixed in 3 : 1 (v/v) absolute ethanol and glacial acetic acid for 24 hours at room temperature, and then stored in 70% aqueous ethanol at 4°C. Cytological slides were prepared by crushing the anthers to disperse the cells and staining with a drop of 2% acetocarmine. At least 10 meiocytes with clear chromosome separation were examined. Slides were inspected until cells suitable for counting were found, and images were captured using a Leica DM750 microscope with an integrated camera using the Leica Application Suite (v.4.5) software.

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IAPT chromosome data 35/2

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* First chromosome count for the species.

METHODS

Mitotic chromosomes were examined in root tips obtained from germinating seeds, except *Coluria geoides* (Pall.) Ledeb. and *Veronica officinalis* L. In the latter, the roots of adult generative plants were used. Actively growing seedlings or root tips were kept for 2 hours at room temperature in 0.2% colchicine solution, fixed in acetic acid alcohol (3 : 1 ethanol + acetic acid). The preparations were stained with acetohematoxilin or 2% aceto-orcein, examined with a Carl Zeiss Axio Scope A1 microscope with the Axiocam 506 color camera and ZEN2012 (blue edition) software.

LAMIACEAE

Nepeta mariae Regel

2*n* = 18, CHN. Tajikistan, Sughd Province (Sogdiiskaya Oblasťʹ), Zeravshansky ridge, Fan mountains, surroundings village of Markit, lake of Marguzor, 39°07′03″N, 67°53′19″E, 3213 m, rocky slope, steppe belt, 03 Aug 2019, *A.V. Grebenjuk & A.Yu. Astashenkov s.n*. (NSK NSK0086194) [Fig. 3A].

**Nepeta pseudokokanica* Pojark.

2*n* = 36, CHN. Kyrgyzstan, Oş oblusu (Oshskaya Oblasť), Ferghansky ridge, upper reaches of Ak-Boguz River, 40°20′39″N, 73° 49′59″E, 2638 m, river bank, 08 Aug 2018, *A.Yu. Astashenkov, V.A. Cheryomushkina & A.V. Grebenjuk s.n*. (NSK NSK0086192) [Fig. 3B].

**Scutellaria ocellata* Juz.

2*n* = 18, CHN. Tajikistan, Sughd Province (Sogdiiskaya Oblasť), Zeravshansky ridge, surroundings village of Padrud, 39°10′15″N, 67° 49′56″E, 1961 m, rocky slope, 31 Jul 2019, *V.A. Cheryomushkina, A.V. Grebenjuk & A.Yu. Astashenkov s.n*. (NSK NSK0086193) [Fig. 3C].

PLANTAGINACEAE

Veronica officinalis L.

2*n* = 18, CHN. Russian Federation, Irkutskaya Oblasť, Khara-Murin River, 51.445°N, 104.288°E, meadow, *T.V. Elisafenko s.n*. [Fig. 3D]. Analysed from the plants grown in the collection “Rare and endangered species of Siberia” of Central Siberian Botanical Garden of the Siberian Branch of the Russian Academy of Sciences, collected on 22 Jul 2020 by *T.V. Elisafenko s.n*. (NSK NSK0086185).

ROSACEAE

Coluria geoides (Pall.) Ledeb.

2*n* = 12, 14, CHN. Russian Federation, Republic of Altai, Ongudaiskii Raion, near the mouth of the Aigulak River, 50.357°N, 87.231°E, rocky, settled meadow slope [Fig. 3E]. Analysed from the plants grown in the collection “Rare and endangered species of Siberia” of Central Siberian Botanical Garden of the Siberian Branch of the Russian Academy of Sciences, collected on 03 Jul 2020, by *T.V. Elisafenko s.n*. (NSK NSK0086183).

VIOLACEAE

Viola acuminata Ledeb.

2*n* = 40, CHN. Russian Federation, Chitinskaya Oblasť, Baleyskii Raion, Podoinitsyno village, left bank of river Unda, 54.657°N, 116.802°E, brush wood of alder [Fig. 3F]. Analysed from the plants grown in the collection “Rare and endangered species of Siberia” of Central Siberian Botanical Garden of the Siberian Branch of the Russian Academy of Sciences, collected on 31 May 2012 by *T.V. Elisafenko s.n*. (NSK NSK0086186).

Viola collina Besser

2*n* = 20, CHN. Russian Federation, Altaiskii Krai, Smolenskii Raion, city of Belokurikha, 51.979°N, 84.952°E, wooded slope near the funicular, 22 Jun 2012, *T.V. Elisafenko s.n*. (NSK NSK0086189); Russian Federation, Altaiskii Krai, Biyskii Raion, vicinity village of Srostki, mount Picket, 52.413°N, 85.715°E, birch forest, 28 May 2015, *T.V. Elisafenko s.n*. (NSK NSK0086188) [Fig. 3G]; Russian Federation, Altaiskii Krai, Kuryinskii Raion, near the village of March 8, Mount Sinyukha, 51.291°N, 82.589°E, mixed various grass forest with moss cover, 13 Jul 2015, *T.V. Elisafenko s.n*. (NSK NSK0086187); Russian Federation, Primorskii Krai, Khasanskii Raion, Gamov Peninsula, Vityaz Bay, 45.595°N, 131.182°E, broadleaf forest, 12 Oct 2014, *T.V. Elisafenko s.n*. (NSK NSK0086190).

Viola dactyloides Schult.

2*n* = 24, CHN. Russian Federation, Republic of Buryatia, Tunkinskii Raion, near the village of Zun-Murino, right bank of the Margasan River, slope, 51.721°N, 102.868°E, mixed forest, 22 Aug 2009, *T.V. Elisafenko s.n*. (NSK NSK0086191); Russian Federation, Republic of Buryatia, Tunkinskii District, the mouth of the White Irkut, left bank, 51°46′11″N, 100°42′18″E, 1553 m, steep forest slope, 24 Aug 2015, *T.V. Elisafenko & S.G. Kazanovsky s.n*. (NSK NSK0086184) [Fig. 3H].

**Viola taynensis* Elisafenko & Ovczinnikova

2*n* = 20, CHN. Russian Federation, Altaiskii Krai, Krasnogorsk District, near vil. Tayna, fern-tall aspen, 52°10′N, 86°21′E, 346 m, 29 Apr 2012, *T.V. Elisafenko s.n*. (NSK NSK0000653) [Fig. 3I].

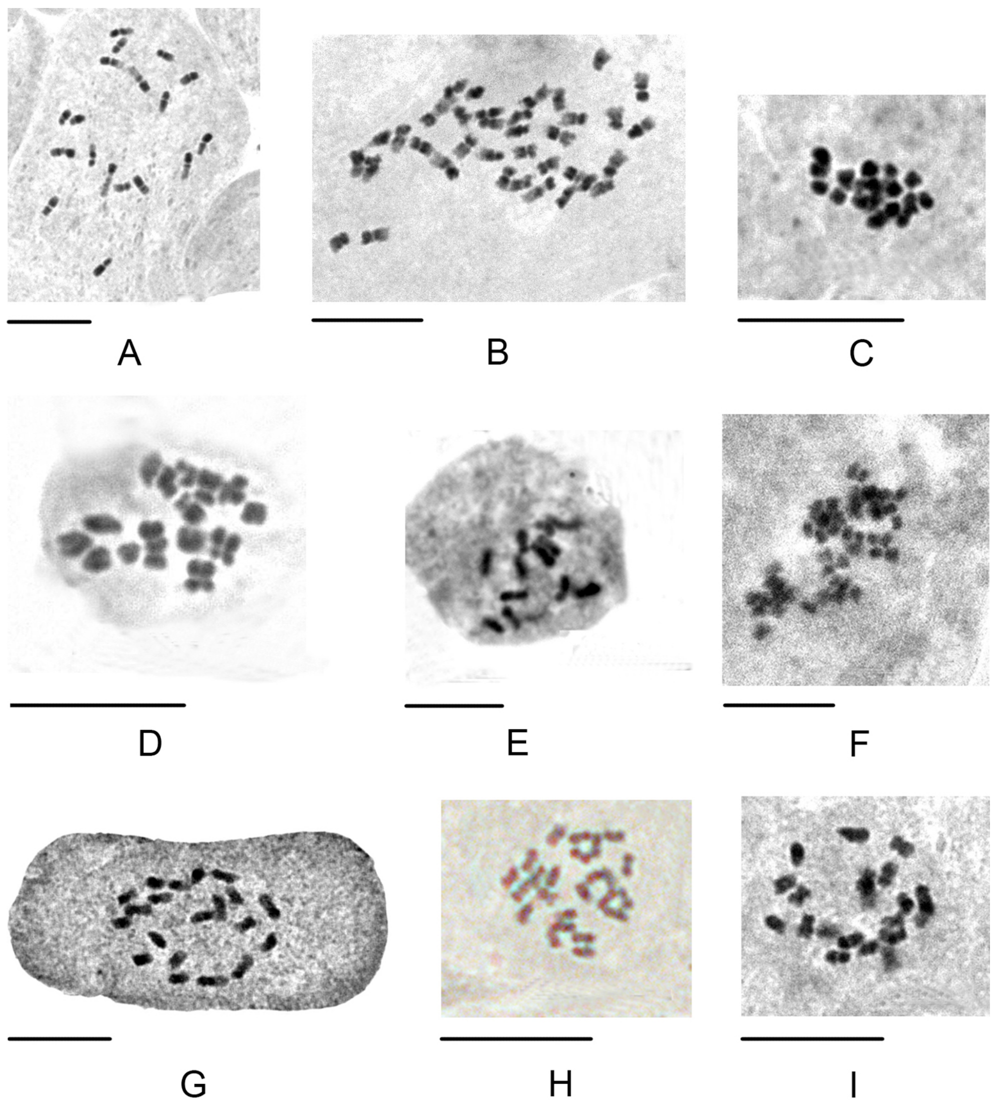

Fig. 3. Mitotic metaphases. **A**, *Nepeta mariae*, 2*n* = 18; **B**, *Nepeta pseudokokanica*, 2*n* = 36; **C**, *Scutellaria ocellata*, 2*n* = 18; **D**, *Veronica officinalis*, 2*n* = 18; **E**, *Coluria geoides*, 2*n* = 12; **F**, *Viola acuminata*, 2*n* = 40; **G**, *Viola collina*, 2*n* = 20; **H**, *Viola dactyloides*, 2*n* = 24; **I**, *Viola taynensis*, 2*n* = 20. — Scale bars = 10 µm.

This unique stoloniferous species from the genus *Viola* in Siberia was described in 2015 (Elisafenko, 2015; Elisafenko & Ovchinnikova, 2015). It is endemic to Altaiskii Krai. Only a single, small population has been found. Currently, *Viola taynensis* plants are cultivated in the Central Siberian Botanical Garden of the Siberian Branch of the Russian Academy of Sciences, Novosibirsk.

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IAPT chromosome data 35/3

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Mitotic metaphase chromosomes were examined in root tips of seedlings, bulbs or young leaves. The method followed Smirnov (1968). Chromosome numbers in literature were checked using CCDB v.1.45 (Rice & al., 2015).

* First chromosome count for the species.

LILIACEAE

Tulipa cinnabarina K.Perss.

2*n* = 24, CHN. Turkey, Konya Province, between Taşkent and Başyayla, at the Feslikan Plateau, high mountain steppe with *Ornithoghalum lanceolatum* Labill., *Eranthis cilicica* Schott & Kotschy and *Ranunculus* L. sp., 1726 m, 36°50′45.0″N, 32°33′36.0″E, 24 Apr 2021, *A.S. Erst, T.V. Erst, O. Çeçen & Z. Aytaç TU-2021-4* (NS).

PAPAVERACEAE

Corydalis bracteata (Stephan ex Willd.) Pers.

2*n* = 16, CHN. Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, near Priiskovoe village, 54°38′05.7″N, 88° 37′19.9″E, 30 May 2020, *T.V. Leonova HAK-2020-19* (NS).

PRIMULACEAE

Cyclamen cilicium Boiss. & Heldr.

2*n* = 30, CHN. Turkey, Antalya Province, near Yarpuz village, juniper forest edge, 1738 m, 37°10′06.5″N, 31°54′15.3″E, 26 Apr 2021, *A.S. Erst, T.V. Erst & Z. Aytaç TU-2021-13* (NS).

Cyclamen coum Mill.

2*n* = 30, CHN. Turkey, Bolu Province, Orencik, Mudurnu, mixed forest with *Fagus orientalis* Lipsky and *Pinus sylvestris* L., 1343 m, 40°36′08.0″N, 31°16′11.1″E, 23 Apr 2021, *A.S. Erst, T.V. Erst & Z. Aytaç TU-2021-1* (NS).

RANUNCULACEAE

Aconitum anthoroideum DC.

2*n* = 16, CHN. Russian Federation, Krasnoyarskii Krai, Uzhurskii Raion, near Kamyshta village, meadow, 55°04′49.9″N, 89°40′ 37.2″E, 23 Jul 2020, *T.V. Leonova HAK-2020-34* (NS).

Aconitum septentrionale Koelle

2*n* = 16, CHN. Russian Federation, Krasnoyarskii Krai, Ermakovskii Raion, "Ergaki", along the Tushkanchik River, mixed forest, 52°46′56.1″N, 93°23′21.1″E, 01 Jul 2020, *T.V. Leonova HAK-2020-29* (NS); Russian Federation, Krasnoyarskii Krai, Ermakovskii Raion, "Ergaki", along the Tushkanchik River, mixed forest, 52°46′ 15.7″N, 93°21′19.1E″, 01 Jul 2020, *T.V. Leonova HAK-2020-27* (NS).

Adonis vernalis L.

2*n* = 16, CHN. Bulgaria, Kostinbrod, Beledie Khan, bushes, 901 m, 42°54′40.8″N, 23°09′40.2″E, 22 Apr 2021, *A.N. Tashev & S.T. Bancheva BU-2021-13* (NS); Bulgaria, Golemo Malovo, Mt. Chepan, open grassy meadow, 716 m, 42°56′14.1″N, 22°56′ 54.9″E, 22 Apr 2021, *A.N. Tashev & S.T. Bancheva BU-2021-15* (NS); Russian Federation, Altaiskii Krai, Pavlovskii Raion, near Chernopyatovo village, Krasnyi Mai, steppe slopes, 180 m, 53°22′ 14.9″N, 83°08′23.9″E, 17 May 2020, *S.V. Smirnov & D.V. Zolotov s.n.* (NS); Russian Federation, Novosibirskaya Oblasť, Iskitimskii Raion, Sosnovka village, 54°40′14.4″N, 82°55′45.9″E, 07 May 2020, *A.S. Erst & T.V. Erst s.n.* (NS); Russian Federation, Khakassia Republic, Tashtipskii Raion, 52°28′17.3″N, 90°03′31.7″E, 24 May 2020, *T.V. Leonova HAK-2020-15* (NS).

Adonis volgensis Steven ex DC.

2*n* = 16, CHN. Bulgaria, Kavarna, northern Black See coast, between Balgarevo village and Cape Kaliakra, Kavarna Municipality, meadow with bushes, 81 m, 43°23′22.2″N, 28°26′03.6″E, 06 Apr 2021, *A.N. Tashev & S.T. Bancheva BU-2021-05* (NS); Russian Federation, Altaiskii Krai, Pavlovskii Raion, near Pavlovsk city, upper part of the Karnyauzikha River log, steppe slopes, 195 m, 53°16′ 21.4″N, 82°59′34.6″E, 17 May 2020, *S.V. Smirnov & D.V. Zolotov 3-2020* (NS); Russian Federation, Altaiskii Krai, Pavlovskii Raion, near Pavlovsk city, upper part of the Karnyauzikha River log, steppe slopes, 195 m, 53°16′21.38″N, 82°59′34.56E, 17 May 2020, *S.V. Smirnov & D.V. Zolotov s.n.* (NS).

Anemone altaica Fisch. ex C.A.Mey.

2*n* = 32, CHN. Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, near Priiskovoe village 54°38′05.7″N, 88°37′ 19.9″E, 30 May 2020, *T.V. Leonova HAK-2020-18* (NS).

Anemone amurensis (Korsh.) Kom.

2*n* = 48, CHN. Russian Federation, Amurskaya Oblasť, Bureiskii Raion, right riverside of the Bureya River, floodplain forest, 111 m, 49°41′25.9″N, 129°45′11.2″E, 06 May 2020, *T.N. Veklich s.n.* (NS); Russian Federation, Amurskaya Oblasť, Bureiskii Raion, right riverside of the Dikan River, floodplain forest, 123 m, 49°46′40.5″N, 129°55′42.4″E, 08 May 2021, *T.N. Veklich s.n.* (NS).

Anemone pavonina Lam.

2*n* = 16, CHN. Bulgaria, Primorsko, southern Black See coast, sand, Ropotamo River, near forest, 11 m, 42°19′34.1″N, 27°43′ 43.1″E, 05 Apr 2021, *A.N. Tashev & S.T. Bancheva BU-2021-03* (NS).

Anemone raddeana Regel

2*n* = 40, CHN. Russian Federation, Sakhalinskaya Oblasť, Nevelskii Raion, near the Salute River, near road, 46°50′10.0″N, 141° 56′21.2″E, 19 Apr 2020, *M.G. Ivanchikova s.n.* (NS).

Anemone ranunculoides L.

2*n* = 32, CHN. Bulgaria, Berkovitsa Municipality, Stara Planina, Barzia village, bushes, 557 m, 43°11′09.9″N, 23°09′12.2″E, 08 Apr 2021, *A.N. Tashev & S.T. Bancheva BU-2021-09* (NS).

Anemone sylvestris L

2*n* = 16, CHN. Russian Federation, Altai Republic, Usť-Kanskii Raion, Usť-Kan village, edge of larch forest, northern slope, 1020 m, 50°56′05″N, 84°43′47″E, 04 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-09* (NS); Russian Federation, Khakassia Republic, Askizskii Raion, steppe meadow, 52°58′48.3″N, 90°15′35.7″E, 24 May 2020, *T.V. Leonova HAK-2020-13* (NS); Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, 54°52′14.0″N, 89°

20′53.6″E, 16 May 2020, *T.V. Leonova HAK-2020-8* (NS); Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, on the road between Kopievo and Sarala, near the road, 54°53′52.8″N, 89° 13′41.8″E, 17 May 2020, *T.V. Leonova HAK-2020-10* (NS); Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, near Bol'shoi Syutik village, territory of haymaking meadow, 55°00′ 10.1″N, 89°55′11.0″E, 17 May 2020, *T.V. Leonova HAK-2020-11* (NS); Russian Federation, Amurskaya Oblast', Blagoveshchenskii Raion, near Gryaznushka village, *Artemisia* and grass meadow, 166 m, 50°38′46.1″N, 127°27′23.4″E, 31 May 2020, *T.N. Veklich s.n.* (NS).

Delphinium elatum L.
2*n* = 16, CHN. Russian Federation, Krasnoyarskii Krai, Uzhurskii Raion, near Kamyshta village, mixed forest, 55°04′16.9″N, 89° 40′36.3″E, 23 Jul 2020, *T.V. Leonova HAK-2020-35* (NS).

Delphinium grandiflorum L.
2*n* = 16, CHN. Russian Federation, Krasnoyarskii Krai, Uzhurskii Raion, near Uchum Lake, meadow, 55°04′45.9″N, 89°40′40.2″E, 23 Jul 2020, *T.V. Leonova HAK-2020-32* (NS).

Eranthis cilicica Schott & Kotschy
2*n* = 24, CHN. Turkey, Hakkâri Province, near Demirkonak village, meadow, 1881 m, 37°31′43.0″N, 44°21′49.7″E, 28 Apr 2021, *A.S. Erst, T.V. Erst, Ş. Alp TU-2021-19* (NS).

Eranthis hyemalis (L.) Salisb.
2*n* = 16, CHN. Hungary, Nagykapornak, park with remains of *Quercus-Carpinus* forest, 163 m, 46°49′13″N, 16°59′33″E, 15 Feb 2020, *A. Mesterházy HU-2020-1* (NS); Hungary, Aszófő, *Quercus-Carpinus* forest in a valley, 150 m, 46°56′18″N, 17°49′31″E, 18 Feb 2020, *A. Mesterházy HU-2020-2* (NS).

Halerpestes salsuginosa Greene
2*n* = 48, CHN. Russian Federation, Altai Republic, Koh-Agachskii Raion, near Ortolyk village, near Chui creek, 1750 m, 50°01′49″N, 88°30′07″E, 07 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-27* (NS); Russian Federation, Khakassia Republic, Altaiskii Raion, near Trekhozerki Lake, wet meadow, 53°18′23.8″ N, 91°28′03.0″E, 29 Jun 2020, *T.V. Leonova HAK-2020-25* (NS).

Halerpestes sarmentosa (Adams) Kom.
2*n* = 16, CHN. Russian Federation, Altai Republic, Ust'-Kanskii Raion, Vladimirovka village, the southeast slope on the right bank of the Charysh River, 740 m, 50°03′14″N, 84°11′24″E, 04 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-11* (NS); Russian Federation, Altai Republic, Kosh-Agachskii Raion, near Kuray village, steppe, 1570 m, 50°11′19″N, 88°06′33″E, 07 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-30* (NS).

Pulsatilla cernua (Thunb.) Bercht. & J.Presl
2*n* = 16, CHN. Russian Federation, Amurskaya Oblast', Blagoveshchenskii Raion, 30 km of Blagoveshchensk (on the road between Blagoveshchensk and Belogor'e village), steppe (wormwood and herb), southeast slope, 135 m, 50°24′26.4″N, 127°40′37.2″E, 01 May 2020, *T.N. Veklich s.n.* (NS).

Pulsatilla dahurica (Fisch. ex DC.) Spreng.
2*n* = 16, CHN. Russian Federation, Amurskaya Oblast', Bureiskii Raion, high right riverside of the Bureya River, anthropogenically disturbed habitat, 107 m, 49°45′58.2″N, 129°49′55.6″E, 06 May 2020, *T.N. Veklich s.n.* (NS).

Pulsatilla flavescens (Zucc.) Juz.
2*n* = 16, CHN. Russian Federation, Novosibirskaya Oblast', Iskitimskii Raion, Sosnovka village, 54°40′14.4″N, 82°55′45.9″E, 07 May 2020, *A.S. Erst & T.V. Erst s.n.* (NS).

Pulsatilla multifida (E.Pritz.) Juz.
2*n* = 16, CHN. Russian Federation, Amurskaya Oblast', Blagoveshchenskii Raion, neighborhood of the Belogor'e village, oak wood (Mongolian oak), southeast slope, 199 m, 50°25′45.3″N, 127°42′28.7″E, 07 May 2020, *T.N. Veklich s.n.* (NS); Russian Federation, Altai Republic, Ust'-Kanskii Raion, road 84K-109 between Ust'-Kan and Korgon, 3 km of Tudrala village to the right of the road, southern steppe slope, 800 m, 50°00′36″N, 84°26′29″E, 04 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-10* (NS); Russian Federation, Altai Republic, Kosh-Agachskii Raion, near Boguty Lake, northern steppe slope, 2480 m, 49°42′21″N, 89°30′48″E, 08 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-34* (NS); Russian Federation, Khakassia Republic, Ordzhonikidzevskii Raion, mixed forest, meadow, 54°52′04.5″N, 89°21′33.8″E, 16 May 2020, *T.V. Leonova HAK-2020-6* (NS); Russian Federation, Krasnoyarskii Krai, Minusinskii Raion, near Presnoe Lake, pine forest, 53°39′04″N, 91°45′25″E, 13 May 2020, *T.V. Leonova HAK-2020-1* (NS).

Pulsatilla turczaninovii Krylov & Serg.
2*n* = 16, CHN. Russian Federation, Altai Republic, Kosh-Agachskii Raion, near Boguty Lake, northern steppe slope, 2480 m, 49°42′21″N, 89°30′48″E, 08 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-34* (NS); Russian Federation, Altai Republic, Kosh-Agachskii Raion, near Boguty Lake, 2400 m, 49°46′11″N, 89° 26′32″E, 08 Jun 2020, *A.S. Erst, T.V. Erst & E.V. Boltenkov 2020-37* (NS); Russian Federation, Amurskaya Oblast', Blagoveshchenskii Raion, neighborhood of Verkhneblagoveshchenskoe village, steppe southern slope, 168 m, 50°18′20.7″N, 127°23′29.7″E, 27 Apr 2020, *T.N. Veklich s.n.* (NS).

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IAPT chromosome data 35/4

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POACEAE

Agrostis clavata Trin.

2*n* = 42, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Tuapsinskii Raion, vicinity of Agoy village, in the oak forest, by the stream, 28 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-2* (LE).

Agrostis stolonifera L.

2*n* = 28, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-2* (LE).

Alopecurus pratensis L.

2*n* = 28, CHN. Russian Federation, North Caucasus, Stavropolskii Krai, vicinity of Pyatigorsk city, Mt. Mashuk, along the trail, 30 Jul 2011, *A. Gnutikov & R. Ufimov Stp11-3* (LE).

Brachypodium pubescens (Peterm.) Mussajev

2*n* = 18, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, vicinity of Gaikodzor village, at the border of Utrish reserve, along the trail, 22 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-1* (LE).

Brachypodium sylvaticum (Huds.) P.Beauv.

2*n* = 18, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Tuapsinskii Raion, vicinity of Agoy village, in the oak forest, by the stream, 28 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-1* (LE).

Bromus japonicus Houtt.

2*n* = 14, CHN. Russian Federation, North Caucasus, Stavropolskii Krai, vicinity of Pyatigorsk city, Mt. Mashuk, along the trail, 30 Jul 2011, *A. Gnutikov & R. Ufimov Stp11-1* (LE).

Calamagrostis glomerata Boiss. & Buhse

2*n* = 28, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Severskii Raion, vicinity of Ubinskaya village (stanitsa), floodplain of the Ubin River, 07 Aug 2010, *R. Ufimov Kr10-3* (LE).

Dactylis glomerata L.

2*n* = 28, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-3* (LE).

Dactylis polygama Horv.

2*n* = 14, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-4* (LE).

Elytrigia elongatiformis (Drobow) Nevski

2*n* = 42, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-5* (LE).

Eriochloa procera (Retz.) C.E.Hubb. s.l.

2*n* = 36, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Tuapsinskii Raion, vicinity of Agoy village, in the oak forest, by the stream, 28 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-4* (LE).

Melica picta K.Koch

2*n* = 18, CHN. Russian Federation, North Caucasus, Stavropolskii Krai, vicinity of Pyatigorsk city, Mt. Mashuk, along the trail, 30 Jul 2011, *A. Gnutikov & R. Ufimov Stp11-2* (LE).

Panicum virgatum L.

2*n* = 36, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-6* (LE).

Phleum montanum K.Koch

2*n* = 14, CHN. Russian Federation, North Caucasus, Stavropolskii Krai, vicinity of Pyatigorsk city, Mt. Mashuk, along the trail, 30 Jul 2011, *A. Gnutikov & R. Ufimov Stp11-4* (LE).

Phleum paniculatum Huds.

2*n* = 28, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Tuapsinskii Raion, vicinity of Agoy village, in the oak forest, rock talus, 28 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-5* (LE).

Phleum pratense L.

2*n* = 42, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, along the shore of the Sukko Pond, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-7* (LE).

Phleum tzvelevii Dubovik

2*n* = 28, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Tuapsinskii Raion, vicinity of Agoy village, in the oak forest, 28 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-6* (LE).

Poa compressa L.

2*n* = 42, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, on the side of the road, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-8* (LE).

Psathyrostachys juncea (Fisch.) Nevski

2*n* = 14, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Anapskii Raion, 2 km N of Sukko village, right tributary of the Sukko River, on a rocky slope, 25 Aug 2014, *A. Gnutikov & R. Ufimov Kr14-9* (LE).

Schedonorus giganteus (L.) Holub

2*n* = 42, CHN. Russian Federation, North Caucasus, Krasnodarskii Krai, Mostovskii Raion, vicinity of Solyanoe village, 11 km SE of Psebay village, floodplain of the Andruk River, wet meadow, 21 Jul 2010, *A. Gnutikov & R. Ufimov Kr10-7* (LE).

IAPT chromosome data 35/5

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4278/SA-III/Website) and UGC-BSR-Fellowship to Jaswant Singh (Award letter no. 15610/Research/03/06/2015).

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

BALSAMINACEAE

Impatiens micranthemum Edgew.

n = 9, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Schnag, 32°14′22″N, 77°11′19″E, 2450 m, along water streams, 08 Oct 2010, *Maninder Kaur 31892* (PUN 59301) [Fig. 4A].

The chromosome number of *n* = 9 is in agreement with the diploid chromosome number count reported from the individuals from Kullu, Himachal Pradesh, India (Himshikha & al., 2017).

Impatiens puberula DC.

n = 10, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Palchan, 32°18′47″N, 77°09′48″E, 2400 m, undisturbed places, 12 Aug 2011, *Maninder Kaur 31640* (PUN 59542) [Fig. 4B].

The present report is in agreement with the chromosome number of 2*n* = 20 recorded from Nepal Himalaya (Akiyama & al., 1992; Wakabayashi, 1992). The other known chromosome numbers for this species are *n* = 9 from Kullu, Himachal Pradesh, India (Singhal & al., 2017) and *n* = 14 from Golpole Dade, Nepal (Malla & al., 1977).

BERBERIDACEAE

**Berberis koehneana* C.K.Schneid.

n = 14, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Palchan, 32°18′47″N, 77°09′48″E, 2400 m, alongside the forests, 30 Jun 2012, *Maninder Kaur 32251* (PUN 59361) [Fig. 4C].

CARYOPHYLLACEAE

Silene gallica L.

n = 12, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Vashisht Village, 32°15′32″N, 77°11′24″E, 2475 m, undisturbed places, 24 May 2011, *Maninder Kaur 29453* (PUN 59214) [Fig. 4D].

The chromosome number of *n* = 12 is the first record from India and is in line with the earlier reports of 2*n* = 24 from outside of India (Slavík & al., 1993; Runemark, 1996; Yildiz & Çirpici, 1996; Valdés & al., 1997).

CUCURBITACEAE

Herpetospermum pedunculosum (Ser.) C.B.Clarke
(= *H. caudigerum* Wall. ex Chakrav.)

n = 10, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Schnag, 32°14′22″N, 77°11′19″E, 2450 m, along roadside slopes, 12 Aug 2012, *Maninder Kaur 31896* (PUN 59304) [Fig. 4E].

The current report is in agreement with the earlier report from Parvati Valley, Kullu, India (Himshikha & al., 2017).

HYPERICACEAE

**Hypericum himalaicum* N.Robson

n = 9, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Palchan, 32°18′47″N, 77°09′48″E, 2400 m, moist shady slopes, 30 Jun 2011, *Maninder Kaur 32270* (PUN 59453) [Fig. 4F].

MAZACEAE

***Mazus surculosus* D.Don

n = 20, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Bahang, 32°16′25″N, 77°10′51″E, 2450 m, moist and shady places, 05 Aug 2013, *Maninder Kaur 31674* (PUN 60459) [Fig. 4G].

The tetraploid chromosome number of *n* = 20 from Solang Valley, Kullu is a new cytotype for the species. Previously, only the diploid cytotype with *n* = 10 has been reported from the Nainital region of Uttarakhand State, India (Mehra & Vasudevan, 1972; Vasudevan, 1975).

ONAGRACEAE

***Circaea alpina* L.

n = 24, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Dhundhi, 32°18′37″N, 77°08′59″E, 3050 m, moist and shady roadsides, 08 Aug 2013, *Maninder Kaur 31620* (PUN 59525) [Fig. 4H].

The report of *n* = 24 is a new tetraploid cytotype for the species. The diploid cytotype with the chromosome number of 2*n* = 22 was found outside of India (Gervais & al., 1999; Krivenko & al., 2013; Probatova & al., 2014; Gnutikov & al., 2018).

***Oenothera rosea* L.'Hér. ex Aiton

n = 14, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Schnag, 32°14′22″N, 77°11′19″E, 2450 m, along field margins, 02 Jul 2012, *Maninder Kaur 32274* (PUN 59456) [Fig. 4I].

Previously, the diploid cytotype was reported with the chromosome numbers of *n* = 7 (S. Kumar & al., 2011) from Western and 2*n* = 14 (Jash & Sharma, 1970; Chatterjee & al., 1989) from Eastern Himalayan localities in India. Similarly, the chromosome number of *n* = 7 is also known from plant accessions of Pakistani origin (Khatoon & Ali, 1993).

POACEAE

Elymus himalayanus (Nevski) Tzvelev

n = 21, CHN. India, Uttarakhand, Uttarkashi, Bhagirathi Valley, Bhojwasa, 30°57′07″N, 79°03′00″E, 3800 m, on slopes and foothill region of the valley, 11 Jul 2014, *Jaswant Singh 33912* (PUN 60471) [Fig. 4J].

The chromosome count of *n* = 21 is in conformity with the hexaploid count corresponding to basic number of *x* = 7, recorded from the other accessions from Bhagirathi Valley, Uttarakhand, India (Singhal & al., 2018a) and from individuals from Astor Valley, Gilgit, Pakistan (Lu & Bothmer, 1992; Lu, 1993).

Elymus nutans Griseb.

n = 21, CHN. India, Uttarakhand, Uttarkashi, Jadh Ganga Valley, Nelong, 31°06′37″N, 79°00′00″E, 3500 m, on open and dry slopes, 20 Jun 2015, *Jaswant Singh 33923* (PUN 60482) [Fig. 4K].

The current report of the chromosome number *n* = 21 agrees with the previous chromosome number counts from the Ladakh region of Kashmir Himalaya (Gohil & Koul, 1986) and other accessions from the Nelong region of Garhwal Himalaya (Singh & al., 2020).

Elymus semicostatus (Nees ex Steud.) Melderis

n = 14, CHN. India, Uttarakhand, Uttarkashi, Bhagirathi Valley, Bhojwasa, 30°57′05″N, 79°02′55″E, 3800 m, on slopes covered with shrubby vegetation, 11 Jul 2014, *Jaswant Singh 33909* (PUN 60468) [Fig. 4L].

The present report is in line with the previous chromosome number reports for this species, i.e., *n* = 14 from Jammu & Kashmir, Himachal Pradesh and Uttarakhand, India (Mehra & Sharma, 1972, 1975a, 1977; Sharma & Sharma, 1979; Salomon & Lu, 1994; Singhal & al., 2014, 2018a,b; K. Kumari & Saggoo, 2016).

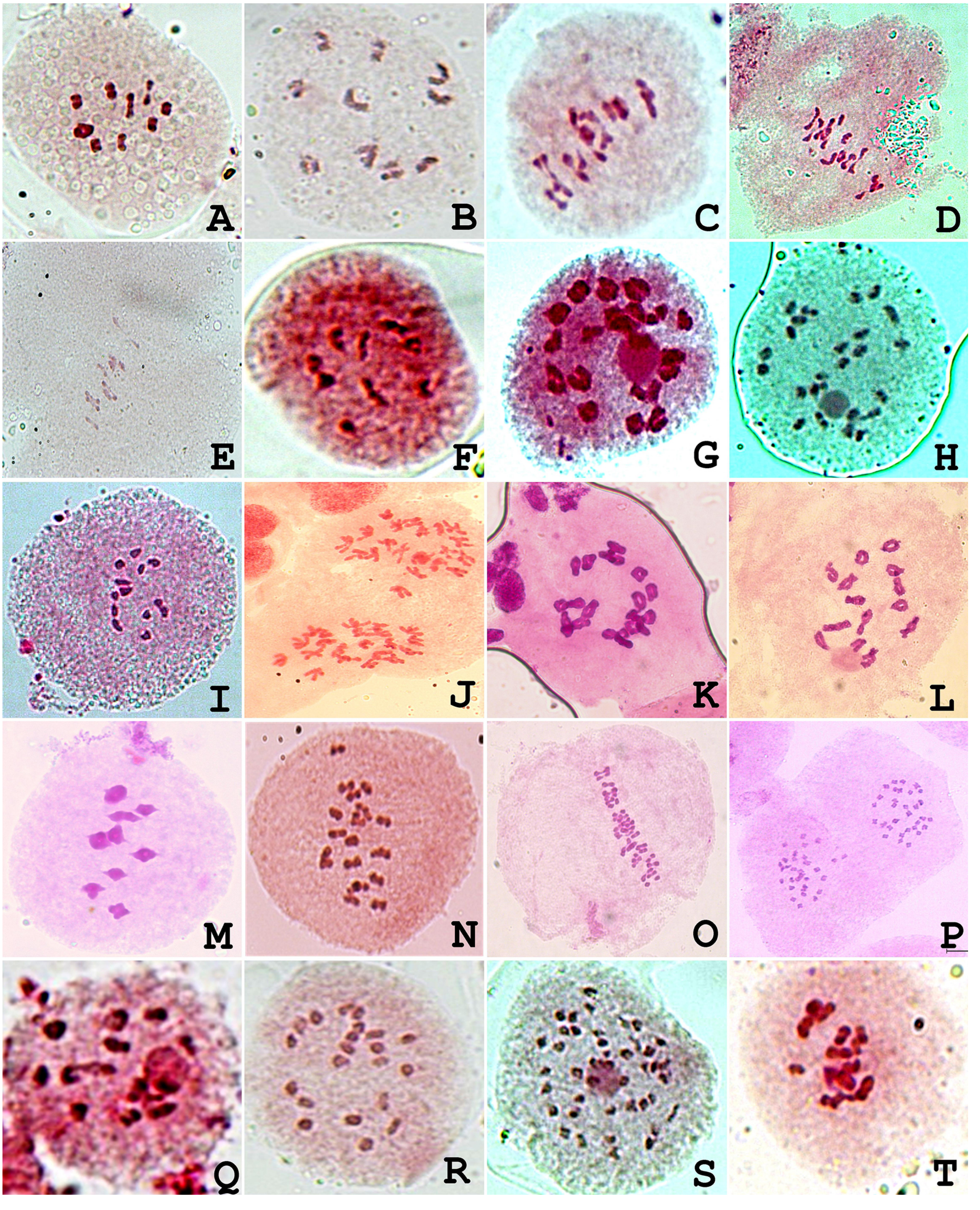

Fig. 4. **A**, *Impatiens micranthemum*, meiotic metaphase I, *n* = 9 (PUN 59301); **B**, *I. puberula*, meiotic metaphase I, *n* = 10 (PUN 59542); **C**, *Berberis koehneana*, *n* = 14, meiotic metaphase I (PUN 59361); **D**, *Silene gallica*, meiotic metaphase I, *n* = 12 (PUN 59214); **E**, *Herpetospermum pedunculosum*, meiotic metaphase I, *n* = 10 (PUN 59304); **F**, *Hypericum himalaicum*, meiotic metaphase I, *n* = 9 (PUN 59453); **G**, *Mazus surculosus*, meiotic prophase I (diakinesis), *n* = 20 (PUN 60459); **H**, *Circaea alpina*, meiotic prophase I (diakinesis), *n* = 24 (PUN 59525); **I**, *Oenothera rosea*, meiotic metaphase I, *n* = 14 (PUN 59456); **J**, *Elymus himalayanus*, meiotic anaphase I, 21 : 21 chromosomes (PUN 60471); **K**, *E. nutans*, meiotic prophase (diakinesis) I, *n* = 21 (PUN 60482); **L**, *E. semicostatus*, meiotic metaphase I, *n* = 14 (PUN 60468); **M**, *Melica scaberrima*, meiotic metaphase I, *n* = 9 (PUN 60476); **N–P**, *Phacelurus speciosus*: **N**, Meiotic metaphase I, *n* = 20 (PUN 60462); **O**, Meiotic metaphase I, *n* = 30; **P**, Meiotic anaphase I, 30 : 30 chromosomes (PUN 60491); **Q**, *Filipendula vestita*, meiotic prophase I (diakinesis), *n* = 14 (PUN 59330); **R**, *Geum rivale*, meiotic metaphase I, *n* = 21 (PUN 59239); **S**, *Potentilla sericea* var. *polyschista*, meiotic prophase I (diakinesis), *n* = 42 (PUN 59323); **T**, *Urtica dioica*, meiotic metaphase I, *n* = 13 (PUN 59248).

Melica scaberrima (Steud.) Hook.f.

n = 9, CHN. India, Uttarakhand, Uttarkashi, Har Ki Dun Valley, Osla, 31°07′06″N, 78°20′47″E, 2800 m, shady slopes, 08 Sep 2014, *Jaswant Singh 33917* (PUN 60476) [Fig. 4M].

The gametic chromosome number of *n* = 9 is in agreement with those reported for this species from the Nainital region of Uttarakhand State (Mehra & Sharma, 1972, 1975b) and Shimla region of Himachal Pradesh State (Sharma & Kumar, 1980), India.

Phacelurus speciosus (Steud.) C.E.Hubb.

n = 20, CHN. India, Uttarakhand, Uttarkashi, Bhagirathi Valley, Gangotri, 30°59′52″N, 78°55′59″E, 3200 m, along bushy forest slopes, 09 Jul 2014, *Jaswant Singh 33903* (PUN 60462) [Fig. 4N].

n = 30, India, Uttarakhand, Uttarkashi, Har Ki Dun Valley, Taluka, 31°04′39″N 78°14′52″E, 2100 m, shady slopes, 03 Sep 2015, *Jaswant Singh 33932* (PUN 60491) [Fig. 4O,P].

The tetraploid and hexaploid cytotypes of *n* = 20 and 30, respectively, are in agreement with the reports from individuals of Jammu & Kashmir and Himachal Pradesh, India (Mehra & al., 1968; Mubarik & al., 2017; V. Kumari & al., 2019).

ROSACEAE

***Filipendula vestita* (Wall. ex G.Don) Maxim. (= *Spiraea vestita* Wall. ex G.Don)

n = 14, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Palchan, 32°18′47″N, 77°09′48″E, 2400 m, along roadside vegetation, 12 Aug 2013, *Maninder Kaur 32220* (PUN 59330) [Fig. 4Q].

Previously, only diploid chromosome numbers of *n* = 7 (Jeelani & al., 2011; P. Kumar & Singhal, 2011) and *n* = 9 (Mehra & Dhawan, 1971; Jeelani & al., 2011) from the North-west Himalayas, India were known for this species.

Geum rivale L.

n = 21, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Dhundhi, 32°18′37″N, 77°08′59″E, 3050 m, moist and shady forests, *Maninder Kaur 29471* (PUN 59239) [Fig. 4R].

The chromosome number of 2*n* = 42 is also known from localities outside of India (Krasnikov, 1991; Al-Bermani & al., 1993; Dobeš & al., 1997; Lövkvist & Hultgård, 1999).

***Potentilla sericea* var. *polychista* (Boiss) Lehm.

n = 42, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Dhundhi, 32°18′37″N, 77°08′59″E, 3050 m, dry and dusty roadsides, 17 May 2011, *Maninder Kaur 32213* (PUN 59323) [Fig. 4S].

Previously, tetraploid, 2*n* = 28 (Guinochet & Lefranc, 1981; Měsíček & Soják, 1992), pentaploid, 2*n* = 35 (Měsíček & Soják, 1992), hexaploid, 2*n* = 42 (Měsíček & Soják, 1992) and octoploid, *n* = 28 (P. Kumar & Singhal, 2011) cytotypes were reported for this species. We report a new, dodecaploid cytotype with *n* = 42.

URTICACEAE

Urtica dioica L.

n = 13, CHN. India, Himachal Pradesh, Kullu, Solang Valley, Dhundhi, 32°18′37″N, 77°08′59″E, 3050 m, along roadsides, *Maninder Kaur 32291* (PUN 59248) [Fig. 4T].

Earlier, the diploid chromosome count of *n* = 13 has been reported from Pakistan (Khatoon & Ali, 1993), as well as 2*n* = 26 from individuals of some other countries (Rice & al., 2015).

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IAPT chromosome data 35/6

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

POACEAE

**Apluda blatteri* Sur

n = 10, CHN. India, Rajasthan, Mount Abu, Wildlife Sanctuary, 24°33′00″N 72°38′00″E, 1220 m, 30 Aug 2016, *N. Kaur 33806* (PUN 60783) [Fig. 5A].

***Aristida funiculata* Trin. & Rupr.

n = 22, CHN. India, Rajasthan, Jodhpur, JNV University, 26°14′42″N, 73°01′08.4″E, 231 m, 06 Dec 2014, *N. Kaur 31991* (PUN 60771) [Fig. 5B].

The present chromosome count differs from the earlier report of 2*n* = 22 (Bir & Sahni, 1984).

***Cenchrus rajasthanensis* K.C.Kanodia & P.C.Nanda

n = 18, CHN. India, Rajasthan, Jodhpur, Mandore Garden, 26°21′12.6″N, 73°01′59.16″E, 231 m, 11 Mar 2014, *N. Kaur 33828* (PUN 60960) [Fig. 5C].

**Digitaria abludens* (Roem. & Schult) Veldk. (= *D. granularis* (Trin. ex Spreng.) Henrard)

n = 9, CHN. India, Rajasthan, Jhalawar, Herbal Garden, 24°35′24″N, 76°09′36″E, 460 m, 12 Aug 2013, *N. Kaur 31960* (PUN 60192) [Fig. 5D].

Previously, this species was known to have the chromosome numbers 2*n* = 36 (Mehra, 1982) and 2*n* = 72 (H. Kaur & al., 2013) from India.

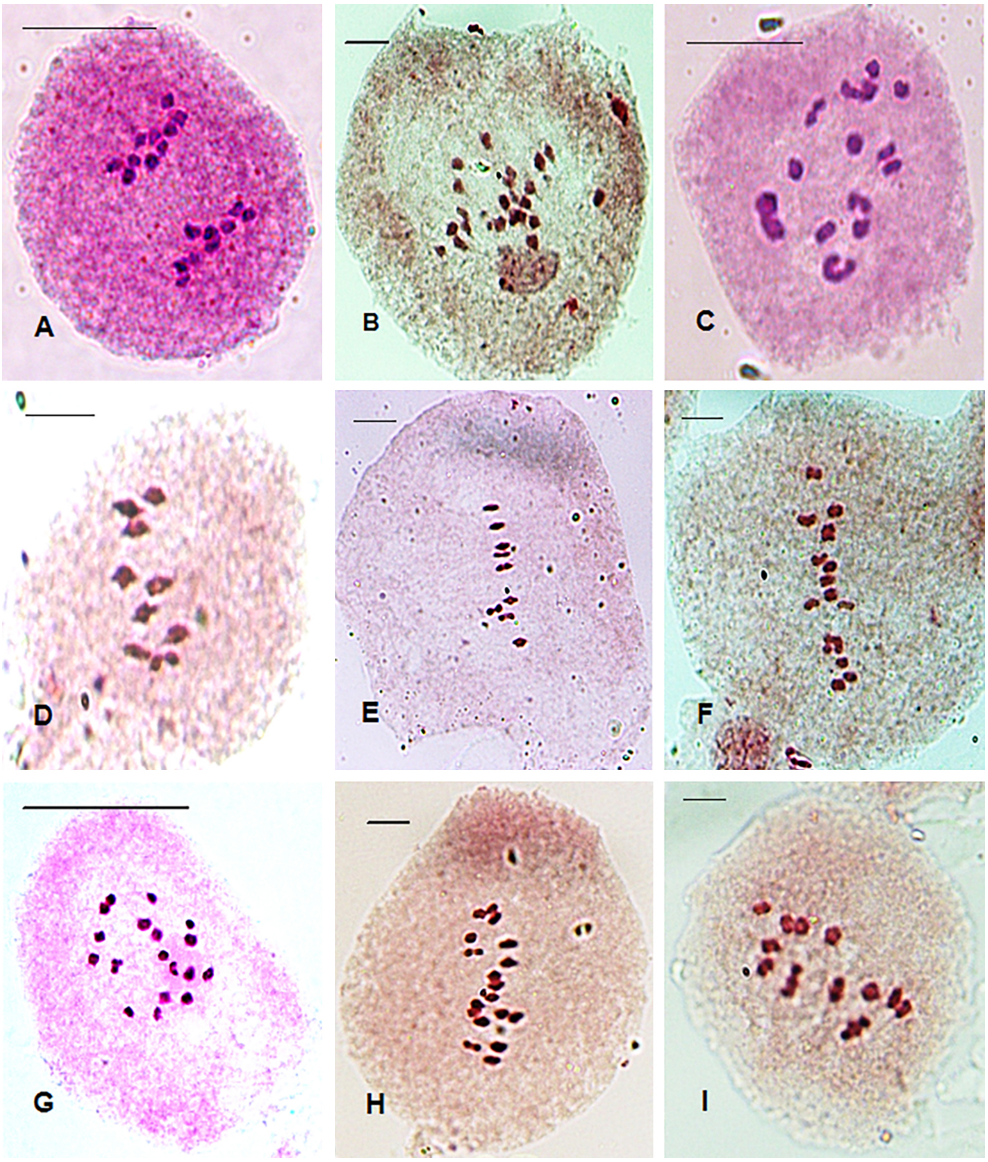

Fig. 5. A, *Apluda blatteri*, meiotic anaphase I, *n* = 10 (PUN 60783); **B**, *Aristida funiculata*, meiotic metaphase I, *n* = 22 (PUN 60771); **C**, *Cenchrus rajasthanensis*, meiotic metaphase I, *n* = 18 (PUN 60960); **D**, *Digitaria albudens* (= *D. granularis*), meiotic metaphase I, *n* = 9 (PUN 60192); **E**, *Echinochloa frumentacea*, meiotic diakinesis, *n* = 9 (PUN 60986); **F**, *Panicum antidotale*, meiotic metaphase I, *n* = 16 (PUN 60194); **G**, *Pennisetum pedicellatum* subsp. *unispiculum*, meiotic diakinesis, *n* = 18 (PUN 60142); **H**, *Setaria italica*, meiotic metaphase I, *n* = 18 (PUN 60991); **I**, *Sporobolus helvolus*, meiotic metaphase I, *n* = 12 (PUN 60999). — Scale bars = 10 µm.

**Echinochloa frumentacea* Link

n = 9, CHN. India, Rajasthan, Udaipur, 24°35′38.4″N, 73°38′20.4″E, along the forest, 17 Sep 2014, *N. Kaur 33854* (PUN 60986) [Fig. 5E].

Previously, this species was known to have the chromosome numbers 2*n* = 36 (Munshi & al., 1994) and 2*n* = 54 (H. Kaur & al., 2013) from India. From outside of India, 2*n* = 54 (Ahsan & al., 1994; Hilu, 1994; Yan & al., 2000) was reported.

**Panicum antidotale* Retz.

n = 16, CHN. India, Rajasthan, Mount Abu, Dilwara Temple, 24°36′33.5″N, 72°43′23″E, 1220 m, 12 Nov 2013, *N. Kaur 31962* (PUN 60194) [Fig. 5F].

The present chromosome count differs from the earlier reports of 2*n* = 18 (Sinha & al., 1990; Koul & Gohil, 1991; N. Kaur & Gupta, 2016) and 2*n* = 28 (Bir & Sahni, 1983). From outside India, 2*n* = 18 (Ahsan & al., 1994) was reported.

▼*Pennisetum pedicellatum* subsp. *unispiculum* Brunken

n = 18, CHN. India, Rajasthan, Udaipur, Monsoon Pahari, 24°35′38.4″N, 73°38′20.4″E, 850 m, along the road sides, 13 Sep 2015, *N. Kaur 31910* (PUN 60142) [Fig. 5G].

The present chromosome report agrees with 2*n* = 36, 45, 54 (Brunken, 1979) from outside of India.

***Setaria italica* (L.) P.Beauv.

n = 18, CHN. India, Rajasthan, Jhalawar, Herbal Garden, 24°35′24″N, 76°09′36″E, 312 m; 22 Aug 2014, *N. Kaur 33860* (PUN 60991) [Fig. 5H].

Previously, the chromosome number recorded was *n* = 9 or 2*n* = 18 (Chitara & Gupta, 1979; Mehra, 1982; Sinha & al., 1990) from India, and the same number was recorded from outside of India (Frey & al., 1981; X. Li & Chen, 1985; Zhou & al., 1989; M. Li & al., 1996; Wu & Bai, 2000; Benabdelmouna & Darmency, 2003; Ghukasyan, 2004).

***Sporobolus helvolus* (Trin.) T.Durand & Schinz

n = 12, CHN. India, Rajasthan, Jaipur, 26°54′00″N, 75°48′00″E, 431 m, 10 Oct 2014, *N. Kaur 33868* (PUN 60999) [Fig. 5I].

The present chromosome record differs from the previous records from India with 2*n* = 16, 20, 28, 32 (Bir & al., 1987) and 2*n* = 36 (Bir & al., 1988).

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IAPT chromosome data 35/7

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

ASTERACEAE (COMPOSITAE)

Achillea alpina L. (≡ *Ptarmica alpina* (L.) DC.)

2*n* = 36, CHN. Russian Federation, Primorskii Krai, vicinity of Vladivostok city, near to Far East Experimental Station of the Federal Research Center, N.I. Vavilov All-Russian Institute of Plant Genetic Resources, Bogatoe reservoir, on sandy shore, 43°14′06.4″N, 132°04′27.5″E, 26 Sep 2013, *V.V. Kotseruba & M.O. Burlyaeva 2014-114* (LE); Russian Federation, Primorskii Krai, Khasanskii Raion, vicinity of Khasan settlement, coast of Sea of Japan, 3 m, swampy meadow, among silvergrass, 42°38′10.8″N, 130°41′49.2″E, 03 Oct 2013, *V.V. Kotseruba & M.O. Burlyaeva 2014-115* (LE).

Arctogeron gramineum (L.) DC.

2*n* = 18, CHN. Mongolia, Khovsgol Aimag, Tunel sum, NW of Muren town, Mt. Khujirtin-davaa, SW slope, cryophytic steppe, 1830 m, 49°59′14″N, 99°50′24″E, 18 Jun 2018, *N.V. Vlasova 52938* (IRK, NSK).

Artemisia anethifolia Weber ex Stechm.

2*n* = 18, CHN. Russian Federation, Republic of Buryatia, Selenginskii Raion, vicinity of Tokhoi village, low coast of Solonoe (Sulfatnoe) Lake, saltwort-forb-grasses group with pea-tree shrubs, 03 Sep 2003, *M.N. Lomonosova 04-03* (LE).

2*n* = 36, CHN. Russian Federation, Republic of Tyva, Tandinskii Raion, salt lake 7–8 km W of Khadyn Lake, salt grass plant community on salt marsh, 30 Aug 2013, *A.Yu. Korolyuk & E.A. Korolyuk 2014-54* (LE).

Artemisia annua L.

2*n* = 18, CHN. Kyrgyzstan, Bishkek city, E.Z. Gareeva Botanical Garden of the National Academy of Sciences of the Kyrgyz Republic, garden area of floriculture laboratory, 02 Oct 2019, *T.V. Kostritsyna 2020-15* (LE).

Artemisia arenaria DC.

2*n* = ca. 28, CHN. Russian Federation, Stavropolskii Krai, vicinity of Kislovodsk city, 24 Nov 2014, *A.I. Krupkina & V.V. Shvanova 2015-03* (LE).

Artemisia argyrophylla Ledeb.

2*n* = 18, 36, CHN. Russian Federation, Republic of Altai, Kosh-Agachskii Raion, Kindyktykul Lake, 2485 m, 49°49′45.8″N, 89°29′31.6″E, 18 Aug 2011, *A.A. Gnutikov 2013-55* (LE).

**2*n* = 27. CHN. Russian Federation, Republic of Altai, Kosh-Agachskii Raion, right bank of the Dzhazator River, 1782 m, 49°38′18.6″N, 87°54′39.2″E, 30 Aug 2011, *A.A. Gnutikov 2013-65* (LE).

Artemisia caespitosa Ledeb.

2*n* = 18, CHN. Russian Federation, Republic of Tyva, Tes-Khemskii Raion, between Khol-Oozhu village and Kara-Khol Lake, lower reaches of the Ulug-Orug River, nanophyton desert, 04 Sep 2013, *A.Yu. Korolyuk & E.A. Korolyuk 2014-55* (LE).

Artemisia campestris L.

2*n* = 36, CHN. Russian Federation, Saint Petersburg city, Vyborgskii Raion, sports complex territory, grass-forb plant group, 15 Nov 2019, *A.A. Korobkov 2020-04* (LE).

Artemisia campestris subsp. *borealis* (Pall.) H.M.Hall & Clem. (≡ *A. borealis* Pall.)

2*n* = 36, CHN. Russian Federation, Republic of Sakha (Yakutia), Anabarskii Raion, lower reaches of the Anabar River (right bank), vicinity of Yuryung-Khaya village (5 km downstream), sandy pine forest, 10 Aug 2012, *T.M. Korolova 2013-19* (LE).

Artemisia czekanowskiana Trautv.

2*n* = 54, CHN. Russian Federation, Republic of Sakha (Yakutia), Anabarskii Raion, middle course of the Anabar River, vicinity of Saskylakh village (5 km downstream, Mt. Krasnaya, stony slope of extensive bedrock outcrops, in crevices of vertical walls, 20 Aug 2012, *T.M. Korolova 2013-18* (LE).

2*n* = 72, CHN. Russian Federation, Republic of Sakha (Yakutia), Anabarskii Raion, middle course of the Anabar River, vicinity of Saskylakh village (5 km downstream), Mt. Krasnaya, stony slope of extensive bedrock outcrops, in crevices of vertical walls, 20 Aug 2012, *T.M. Korolova 2013-18* (LE).

Artemisia depauperata Krasch. (= *A. pycnorrhiza* Ledeb.)

2*n* = 36, CHN. Russian Federation, Republic of Altai, Kosh-Agachskii Raion, Ukok plateau, Bertekskaya depression, S steep slope, forb-sagebrush-grass plant community, 2437 m, 49°18′57″N, 87°30′40″E, 29 Jul 2019, *D.G. Melnikov & G.A. Tyusov 2020-07* (LE); Russian Federation, Republic of Altai, Kosh-Agachskii Raion, Ukok plateau, Bertekskaya depression, floodplain of the Agamdzhi River, steppe sites, 49°17′03.3″N, 87°48′45.3″E, 02 Aug 2019, *D.G. Melnikov & G.A. Tyusov 2020-06* (LE).

Artemisia gmelinii Weber ex Stechm.

2*n* = ca. 34, CHN. Russian Federation, Altaiskii Krai, Zmeinogorskii Raion, N shore of Kolyvanskoe Lake, base of granite rocks, 01 Oct 1999, *A.A. Korobkov 99-214* (LE).

Artemisia halodendron Turcz. ex Besser

2*n* = 36, CHN. Mongolia, Dornod Aimag, Khalkhgol Sum, road from Buir-Yuur Lake 10 km to SE, sand mound, deep deepening, blown sand, 15 Aug 2008, *A.A. Korobkov 09-62* (LE).

Artemisia macrocephala Jacquem. ex Besser

2*n* = 36, CHN. Kyrgyzstan, Issyk-Kulskaya Oblasť, Issyk-Kulskii Raion, Ananevo village, 01 Oct 2019, *T.V. Kostritsyna 2020-17* (LE).

Artemisia marschalliana Spreng.

2*n* = 36, CHN. Russian Federation, Republic of Altai, Maiminskii Raion, mouth of Zemlyanaya River, base of rocks, rubble deposits, forb grouping, 12 Oct 2013, *A.A. Korobkov 2014-100* (LE).

Artemisia nitrosa Weber ex Stechm.

**2*n* = 36, CHN. Russian Federation, Saratovskaya Oblasť, Khvalynskii Raion, vicinity of Alekseevka settlement, terrace above floodplain at the mouth of small river, saline hollows, sagebrush plant community, 17 Oct 2008, *A.A. Korobkov 09-25* (LE), *A.A. Korobkov 09-63* (LE).

Artemisia obtusiloba Ledeb.

$2n$ = 18, CHN. Russian Federation, Republic of Altai, Ongudaiskii Raion, at the mouth of Chuya River, right bank, flat stony terrace, sagebrush plant community, 26 Sep 1999, *A.A. Korobkov 99-217* (LE).

$2n$ = 36, CHN. Russian Federation, Republic of Tyva, Erzinskii Raion, E shore of Tere-Khol Lake, Tsuger-Ellis sandy meander scar, dunes with rare caragana bushes, 13 Sep 2003, *A.A. Korobkov 04-131* (LE); Russian Federation, Republic of Tyva, Erzinskii Raion, right bank of Tes-Khem River, 20 km NW of Erzin village, foot of limestone mountains, rocks and rubble deposits, 18 Sep 2003, *A.A. Korobkov 04-132* (LE).

Artemisia phaeolepis Krasch.

$2n$ = 36, CHN. Russian Federation, Republic of Altai, Kosh-Agachskii Raion, Ukok plateau, Bertekskaya depression, slightly undulating plain, forb-sagebrush-grass plant community, 2252 m, 49°16′57″N, 87°48′33″E, 02 Aug 2019, *D.G. Melnikov & G.A. Tyusov 2020-08* (LE).

Artemisia pontica L.

**$2n$ = 54, CHN. Russian Federation, Altaiskii Krai, urban district of Barnaul city, Yuzhnyi settlement, ribbon pine barrens, forb plant community, 07 Oct 2013, *A.A. Korobkov 2014-107* (LE).

Artemisia pubescens var. *monostachya* (Bunge ex Maxim.) Y.R.Ling (≡ *A. monostachya* Bunge ex Maxim.)

$2n$ = 36, CHN. Russian Federation, Zabaikal'skii Krai, Kyrinskii Raion, Sokhondinskii Nature Reserve, mouth of Sokhondinka River, slope of S exposure, sparse steppe plant community, 22 Aug 2011, *O.M. Afonina 2012-93* (LE), *O.M. Afonina 2012-94* (LE).

Artemisia rupestris subsp. *viridis* (Willd. ex DC.) V.P.Ameljczenko (≡ *A. viridis* Willd. ex DC.)

$2n$ = 18, CHN. Kyrgyzstan, Narynskaya Oblasť, Ak-Talinskii Raion, Terskei-Torpok (Tridtsat' Tri Popugaya) pass to Song Kol Lake, 01 Oct 2019, *T.V. Kostritsyna 2020-14* (LE).

Artemisia rutifolia Steph. ex Spreng.

$2n$ = 18, CHN. Kyrgyzstan, Chuiskaya Oblasť, Keminskii Raion, Kichi-Kemin gorge, 5 km W of Ak-Tyuz village, 03 Oct 2019, *T.V. Kostritsyna 2020-10* (LE).

Artemisia scoparia Waldst. & Kit.

$2n$ = 16, CHN. Peoples Republic of China, Jilin Province, Yanbian Korean Autonomous Prefecture, Hunchun city, park on hill near of Lin Bao temple, along footpath near pine planting, 143 m, 42°53′20.3″N, 130°20′43.7″E, 29 Oct 2013, *V.V. Kotseruba & M.O. Burlyaeva 2014-37* (LE).

Artemisia sieversiana Ehrh. ex Willd.

$2n$ = 18, CHN. Kyrgyzstan, Oshskaya Oblasť, Chon-Alaiskii Raion, Daroot Kurgan settlement, 2392 m, 26 Sep 2019, *T.V. Kostritsyna 2020-13* (LE).

Artemisia stolonifera (Maxim.) Kom. (= *A. argyi* H.Lév. & Vaniot)

$2n$ = 36, CHN. Russian Federation, Khabarovskii Krai, Vaninskii Raion, Tumnin River basin, left side of valley, vicinity of Tuluchi village, base of S slope, larch-oak forest, 27 Sep 2004, *A.A. Korobkov 05-13* (LE), *A.A. Korobkov 05-148* (LE), *A.A. Korobkov 05-149* (LE).

Artemisia subulata Nakai

**$2n$ = 18, CHN. Russian Federation, Amurskaya Oblasť, Blagoveshchenskii Raion, stony cliffs to floodplain of Amur River, Sergeevskie cliffs, rubble deposits, dense grass-forb-shrub plant community, 21 Sep 2006, *A.A. Korobkov 07-187* (LE).

Artemisia tournefortiana Rchb.

$2n$ = 18, CHN. Russian Federation, Voronezhskaya Oblasť, Voronezh city, Truda Ave. 111a, utility yard, 14 Aug 2018, *V. Agofonov 2020-01* (LE).

Artemisia vulgaris L.

$2n$ = 18, CHN. Kyrgyzstan, Oshskaya Oblasť, Chon-Alaiskii Raion, Daroot Kurgan settlement, 2392 m, 26 Sep 2019, *T.V. Kostritsyna 2020-11* (LE); Kyrgyzstan, Oshskaya Oblasť, Chon-Alaiskii Raion, Kyzyl-Suu River, 2540 m, 27 Sep 2019, *T.V. Kostritsyna 2020-12* (LE); Russian Federation, Kaliningradskaya Oblasť, vicinity of Baltiisk town, N breakwater, roadside, 27 Oct 2019, *E.B. Portenier 2020-12* (LE); Russian Federation, Kaliningradskaya Oblasť, coast of Baltic Sea, vicinity of Svetlogorsk town, on seashore, 28 Oct 2019, *E.B. Portenier 2020-03* (LE).

Dendranthema mongolicum (Ling) Tzvelev (= *Chrysanthemum zawadzkii* subsp. *peleiolepis* (Trautv.) Zuev)

$2n$ = 36, CHN. Russian Federation, Sakhalinskaya Oblasť, Sakhalin island, Smirnykhovskii Raion, Vostochno-Sakhalinskie Mts, near Izvestkovyi terrain, elaborated quarry for limestone mining, on the tributary of Smuglyanka River, 49°57′08″N, 143°23′24″E, 21 Sep 2015, *D.A. Krivenko 2016-122* (LE).

CARYOPHYLLACEAE

Sabulina stricta (Sw.) Rchb.

$2n$ = 30, CHN. Mongolia, Khovsgol Aimag, Ulaan-Uul Sum, Darkhad Valley, river bank of the Gunyn-gol, near Ulaan-Uul village, pebbly shallow, 1637 m, 50°40′08″N, 99°13′50″E, 19 Jun 2018, *N.V. Vlasova 52932* (IRK, NSK).

FABACEAE (LEGUMINOSAE)

**Astragalus apricus* Bunge (= *A. polyphyllus* Bunge)

$2n$ = 16, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, vicinity of Kurush village, N slope of Mt. Nesindag, 2500 m, 41°15′51.4″N, 47°47′58.8″E, 05 Aug 2017, *R.A. Murtazaliev s.n.* (DAG).

**Astragalus beckerianus* Trautv.

$2n$ = 32, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, vicinity of Kurush village, NE slope of Mt. Ragdan, 2500 m, 41°15′18.5″N, 47°47′42.7″E, on rocks, 05 Aug 2017, *R.A. Murtazaliev s.n.* (DAG).

**Astragalus brachycarpus* M.Bieb.

$2n$ = 32, CHN. Russian Federation, Stavropolskii Krai, Grachovskii Raion, vicinity of Oktyabr farm, forb-grass (*Bothriochloa ischaemum* (L.) Keng) steppe, 284 m, 45°02′40″N, 42°48′41″E, 23 Jul 2018, *V.N. Belous s.n.* (SPI).

**Astragalus buchtormensis* Pall. (= *A. henningii* (Steven) Boriss.)

$2n$ = 16, CHN. Russian Federation, Stavropolskii Krai, Stepnovskii Raion, vicinity of Varenikovskoe village, dry forb-sod grass steppe, 179 m, 44°26′00″N, 44°18′14″E, 10 May 2015, *V.N. Belous s.n.* (SPI); Russian Federation, Stavropolskii Krai, Arzgirskii Raion, vicinity of Arzgir village, dry forb-sod grass steppe, 98 m, 45°22′39″N, 44°14′34″E, 24 May 2015, *V.N. Belous s.n*. (SPI).

Astragalus calycinus M.Bieb.
2*n* = 16, CHN. Russian Federation, Stavropolskii Krai, Grachovskii Raion, vicinity of Oktyabr farm, petrophytic variant of forb-sod grass steppe, 378 m, 44°57′07″N, 42°46′29″E, 23 Jul 2018, *V.N. Belous s.n*. (SPI).

Astragalus captiosus Boriss. (= *A. interpositus* Boriss.)
2*n* = 16 + 2B, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, left bank of the Samur River, Chakhchakh-Kazmalyar village, 41°47′13″N, 48°30′00″E, 12 Jun 2019, *Z.A. Guseynova 61063* (IRK).

**Astragalus dolichophyllus* Pall.
2*n* = 32, CHN. Russian Federation, Republic of Dagestan, Buinakskii Raion, Greater Caucasus, Narat-Tyube range, vicinity of Khinta farm, slope of S exposure, 550 m, 43°06′35.9″N, 46°57′48.3″E, 22 May 2020, *R.A. Murtazaliev 62494* (IRK).

Astragalus guttatus Banks & Sol.
2*n* = 16, CHN. Russian Federation, Stavropolskii Krai, Arzgirskii Raion, vicinity of Arzgir village, dry forb-sod grass steppe, 100 m, 45°22′41″N, 44°14′33″E, 24 May 2015, *V.N. Belous s.n*. (SPI).
**2*n* = 16 + 0–2B, CHN. Russian Federation, Republic of Dagestan, Kumtorkalinskii Raion, Greater Caucasus, Narat-Tyube range, opposite Sarykum barkhan, clay slope of E exposure, 250 m, 42°56′54.3″N, 47°26′32.7″E, 12 May 2020, *R.A. Murtazaliev 62503* (IRK).

Astragalus incertus Ledeb.
2*n* = 32, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, 3 km SSW of Kurush village, right bank of the Mullarchai River, N slope of Mt. Nesindag, alpine forb meadow, 41°15′40.00″N, 47°48′19.43″E, 15 Aug 2019, *R.A. Murtazaliev 63656* (IRK).

Astragalus kazbeki Kharadze
2*n* = 16, CHN. Russian Federation, Republic of Ingushetia, Dzheyrakhskii Raion, Targimskaya Basin, valley of the Asa River, upland steppe, 1117 m, 42°49′54″N, 44°56′06″E, 18 Jun 2014, *V.N. Belous s.n*. (SPI).

Astragalus lehmannianus Bunge
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Kumtorkalinskii Raion, left bank of the Shuraozen River, S part of Sarykum barkhan, sands, 120 m, 43°00′06″N, 47°13′44″E, 10 Aug 2019, *D.A. Krivenko* & *R.A. Murtazaliev 59087* (IRK).

Astragalus onobrychis L.
2*n* = 16, CHN. Russian Federation, Altaiskii Krai, vicinity of Yarovoe town, Bolshoe Yarovoe Lake, lake shore, steppe, 52°54′02″N, 78°33′18″E, 26 Jul 2010, *E.V. Zhmud 16673* (IRK).

Astragalus physodes L.
**2*n* = 16 + 0–2B, CHN. Russian Federation, Stavropolskii Krai, Arzgirskii Raion, vicinity of Arzgir village, dry forb-sod grass steppe, 161 m, 45°22′40″N, 44°16′30″E, 24 May 2015, *V.N. Belous s.n*. (SPI).

Astragalus pseudotataricus Boriss.
**2*n* = 64, CHN. Russian Federation, Stavropolskii Krai, Grachovskii Raion, vicinity of Oktyabr farm, petrophytic variant of forb-sod grass steppe, 234 m, 45°02′38″N, 42°48′19″E, 23 Jul 2018, *V.N. Belous s.n*. (SPI).

**Astragalus sanguinolentus* M.Bieb.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, Mt. Shalbuzdag, near the mosque, stony slope of E exposure, 3000 m, 41°21′29.1″N, 47°48′22.3″E, 09 Aug 2020, *R.A. Murtazaliev 62498* (IRK).

Astragalus somcheticus K.Koch
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Akhtynskii Raion, vicinity of Lutkun village, SW slope, 1200–1500 m, 41°29′12.7″N, 47°42′38.8″E, 05 Jul 2012, *R.A. Murtazaliev s.n*. (DAG, LE)

**Astragalus sytinii* Belous & Laktionov
2*n* = 64, CHN. Russian Federation, Stavropolskii Krai, Arzgirskii Raion, vicinity of Arzgir village, dry forb-sod grass steppe, 82 m, 45°22′41″N, 44°14′20″E, 24 May 2015, *V.N. Belous s.n*. (SPI).

Astragalus testiculatus Pall.
2*n* = 16, CHN. Russian Federation, Republic of Altai, Kosh-Agachskii Raion, bridge over Togtugen River, roadside, 14 Jul 2007, *E.V. Zhmud 21096* (IRK).

**Cicer minutum* Boiss. & Hohen.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, vicinity of Kurush village, N slope of Mt. Nesindag, 2700 m, 41°14′24.3″N, 47°48′05.4″E, 05 Aug 2017, *R.A. Murtazaliev s.n*. (DAG).

Coronilla securidaca L. (≡ *Securigera securidaca* (L.) Degen & Dörfl.)
2*n* = 12, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Samur State Nature Reserve, coast of Caspian Sea, delta of Samur River, Samur forest, coastal part, forest edge, 41°51′39.8″N, 48°33′39.5″E, 13 Jul 2020, *R.A. Murtazaliev 62506* (IRK).

Eremosparton aphyllum (Pall.) Fisch. & C.A.Mey.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Kumtorkalinskii Raion, left bank of the Shuraozen River, S part of Sarykum barkhan, sands, 120 m, 43°00′06″N, 47°13′44″E, 10 Aug 2019, *D.A. Krivenko & R.A. Murtazaliev 62071* (IRK).

Hedysarum theinum Krasnob.
2*n* = 14, CHN. Russian Federation, Republic of Altai, Usť-Kokskii Raion, lake near Mt. Krasnaya, lakeshore, spruce-siberian cedar rare forest, 50°06′07″N, 85°13′18″E, 21 Aug 2011, *E.V. Zhmud 21089* (IRK).

Lathyrus komarovii Ohwi
2*n* = 14, CHN. Russian Federation, Primorskii Krai, Fokino closed town, Putyatin island of Peter the Great Gulf of Sea of Japan, on the way to the 3/5 (Tri pyatykh) bay, forest, 42°50′58.57″N, 132°25′18.85″E, 15 Aug 2015, *V.V. Kotseruba & E.V. Vrzosek 52180* (IRK).

Lathyrus oleraceus Lam. (= *Pisum elatius* M.Bieb.)
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Samur State Nature Reserve, coast of Caspian Sea,

delta of Samur River, Samur forest, coastal part, forest edge, 41°51′39.8″N, 48°33′39.5″E, 13 Jul 2020, *R.A. Murtazaliev 62510* (IRK).

Lathyrus sphaericus Retz.
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Buinakskii Raion, Greater Caucasus, Narat-Tyube range, vicinity of Makhachkala city, Druzhby peak, oak forest on the slope of NE exposure, 350 m, 42°56′54.3″N, 47°26′32.7″E, 01 Jun 2020, *R.A. Murtazaliev 62502* (IRK).

Medicago cancellata M.Bieb.
2*n* = 48, CHN. Russian Federation, Stavropolskii Krai, Andropovskii Raion, vicinity of Sultan village, Mt. Bryk, forb-sod grass steppe, denuded coquina, 620 m, 44°33′18′′N, 42°36′19′′E, 30 Jun 2018, *V.N. Belous s.n*. (SPI).

Medicago minima (L.) Bartal.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, left bank of the Samur River, Chakhchakh-Kazmalyar village, 41°47′13″N, 48°30′00″E, 12 Jun 2019, *Z.A. Guseynova 61062* (IRK).

Medicago polymorpha L.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Tagirkent-Kazmalyar village, dry clay slopes overgrown with *Paliurus spina-christi* Mill., 400 m, 41°36′38.9″N, 48°18′28.9″E, 12 Jun 2019, *Z.A. Guseynova 61060* (IRK).

Medicago rigidula (L.) All.
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, left bank of the Samur River, Chakhchakh-Kazmalyar village, 41°47′13″N, 48°30′00″E, 12 Jun 2019, *Z.A. Guseynova 61061* (IRK).

Medicago ×*varia* Martyn
2*n* = 32, CHN. Russian Federation, Republic of Dagestan, W coast of Caspian Sea, Derbent city, Naryn-kala citadel, side of footpath, 180 m, 42°03′09.5″N, 48°16′26.8″E, 17 Aug 2019, *D.A. Krivenko & Z.A. Guseynova 63025* (IRK), *D.A. Krivenko & Z.A. Guseynova 63026* (IRK), *D.A. Krivenko & Z.A. Guseynova 63028* (IRK), *D.A. Krivenko & Z.A. Guseynova 63030* (IRK).

Melilotus indicus (L.) All.
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Samur State Nature Reserve, coast of Caspian Sea, delta of Samur River, Samur forest, coastal part, forest edge, 41°51′39.8″N, 48°33′39.5″E, 13 Jul 2020, *R.A. Murtazaliev 62507* (IRK).

Onobrychis bobrovii Grossh. (= *O. radiata* (Desf.) M.Bieb. agg.)
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, right bank of the Samur River, vicinity of Novoe Karakyure village, dry stony slope of NE exposure, 850 m, 41°25′57.7″N, 47°57′52.0″E, 15 Jul 2020, *R.A. Murtazaliev 62499* (IRK).

Onobrychis caput-galli (L.) Lam.
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Tagirkent-Kazmalyar village, dry clay slopes overgrown with *Paliurus spina-christi*, 400 m, 41°36′38.9″N, 48°18′28.9″E, 12 Jun 2019, *Z.A. Guseynova 61059* (DAG, IRK, LE).

Onobrychis majorovii Grossh.
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, right bank of the Samur River, vicinity of Chakhchakh-Kazmalyar village, dry slope of S exposure, 600 m, 41°47′08.0″N, 48°29′20.1″E, 15 Jul 2020, *R.A. Murtazaliev 62500* (IRK).

Onobrychis petraea (M.Bieb. ex Willd.) Fisch.
2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, Mt. Shalbuzdag, near the mosque, stony slope of E exposure, 3000 m, 41°21′29.1″N, 47°48′22.3″E, 09 Aug 2020, *R.A. Murtazaliev 62496* (IRK).

**Oxytropis albana* Steven
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, 4.5. km WNW of Kurush village, left bank of the Mullarchai River–Chechychai River basin, opposite Mt. Ragdan, steppefied meadow, 2450 m, 41°16′08″N, 47°46′51″E, 14 Aug 2019, *D.A. Krivenko & Z.A. Guseynova 62748* (IRK).

Oxytropis lapponica (Wahlenb.) Gay
2*n* = 16, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, Mt. Shalbuzdag, near the mosque, stony slope of E exposure, 3000 m, 41°21′29.1″N, 47°48′22.3″E, 09 Aug 2020, *R.A. Murtazaliev 62497* (IRK).

**Oxytropis owerinii* Bunge
2*n* = 32, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, 3 km SSW of Kurush village, right bank of the Mullarchai River, N slope of Mt. Nesindag, alpine forb meadow, 41°15′40.00″N, 47°48′19.43″E, 15 Aug 2019, *R.A. Murtazaliev 63658* (IRK).

Oxytropis pilosa (L.) DC.
2*n* = 16, CHN. Russian Federation, Altaiskii Krai, vicinity of Yarovoe town, Bolshoe Yarovoe Lake, right shore of the lake, forest belt in steppe, 52°54′31′′N, 78°33′00′′E, 13 Jun 2010, *E.V. Zhmud 16681* (IRK).

Trifolium lappaceum L.
2*n* = ca. 16, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Samur State Nature Reserve, coast of Caspian Sea, delta of Samur River, Samur forest, coastal part, forest edge, 41°51′39.8″N, 48°33′39.5″E, 13 Jul 2020, *R.A. Murtazaliev 62508* (IRK).

**Trifolium trichocephalum* M.Bieb.
2*n* = ca. 80, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, 3 km SSW of Kurush village, right bank of the Mullarchai River, N slope of Mt. Nesindag, alpine forb meadow, 41°15′40.00″N, 47°48′19.43″E, 15 Aug 2019, *R.A. Murtazaliev 62850* (IRK, LE, NSK).

Vavilovia formosa (Steven) Fed.
2*n* = 14, CHN. Russian Federation, Republic of North Ossetia – Alania, Alagirskii Raion, Greater Caucasus, Dzamarash (Dzamaras) gorge, S of Andyatkov tract, Dzamarashdon River valley of the right tributary of Bugultadon River, shale talus, 2021 m, 42°44′22.7′′N, 44°14′11.4′′E, 29 Aug 2012, *A.P. Pukhaev & K.P. Popov 45634* (IRK); Russian Federation, Republic of Dagestan, Dokuzparinskii

Raion, Greater Caucasus, vicinity of Kurush village, N slope of Mt. Nesindag, 2700 m, 41°14′24.3″N, 47°48′05.4″E, 05 Aug 2017, *R.A. Murtazaliev s.n.* (DAG).

Vicia alpestris Steven

2*n* = 28, CHN. Russian Federation, Republic of Dagestan, Dokuzparinskii Raion, Greater Caucasus, 4.5. km WNW of Kurush village, left bank of the Mullarchai River of Chechychai River basin, opposite Mt. Ragdan, steppe meadow, 2450 m, 41°16′08″N, 47°46′51″E, 14 Aug 2019, *D.A. Krivenko* & *Z.A. Guseynova 62864* (IRK).

Vicia hirsuta (L.) Gray

2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Buinakskii Raion, Greater Caucasus, Narat-Tyube range, vicinity of Makhachkala city, Druzhby peak, oak forest on the slope of NE exposure, 350 m, 42°56′54.3″N, 47°26′32.7″E, 01 Jun 2020, *R.A. Murtazaliev 62501* (IRK).

Vicia lathyroides L.

2*n* = 12, CHN. Russian Federation, Republic of Dagestan, Buinakskii Raion, vicinity of Nizhnee Kazanishche village, forest edge on the slope of E exposure, 600 m, 42°46′18.6″N, 47°08′17.9″E, 15 May 2020, *R.A. Murtazaliev 62504* (IRK).

Vicia ramuliflora (Maxim.) Ohwi

2*n* = 12, CHN. Russian Federation, Primorskii Krai, Fokino closed town, Putyatin island of Peter the Great Gulf of Sea of Japan, on the way to the 3/5 (Tri pyatykh) bay, forest, 42°50′58.57″N, 132°25′18.85″E, 15 Aug 2015, *V.V. Kotseruba & E.V. Vrzosek 52193* (IRK).

Vicia tetrasperma (L.) Schreb.

2*n* = 14, CHN. Russian Federation, Republic of Dagestan, Magaramkentskii Raion, Samur State Nature Reserve, coast of Caspian Sea, delta of Samur River, Samur forest, coastal part, forest edge, 41°51′39.8″N, 48°33′39.5″E, 13 Jul 2020, *R.A. Murtazaliev 62509* (IRK).

ORCHIDACEAE

Epipactis helleborine (L.) Crantz

2*n* = 40, CHN. Russian Federation, Irkutskaya Oblasť, Slyudyanskii Raion, SE outskirts of Solzan settlement, near the bridge over Bolshaya Osinovka River, left bank, pine forest, 475 m, 51°29′33″N, 104°14′30″E, 28 Jul 2011, *D.A. Krivenko & E.V. Zhmud 23517* (IRK); Russian Federation, Irkutskaya Oblasť, Slyudyanskii Raion, SE outskirts of Solzan settlement, near the bridge over Bolshaya Osinovka River, left bank, roadside in forb aspen forest, 475 m, 51°29′33″N, 104°14′30″E, 28 Jul 2011, *D.A. Krivenko & E.V. Zhmud 27172* (IRK).

PAPAVERACEAE

Chelidonium asiaticum (Hara) Krahulc.

2*n* = 10, CHN. Russian Federation, Khabarovskii Krai, Ayano-Maiskii Raion, Nelkan village, right bank of the Maya River, the right tributary of the Aldan River, cliff behind the garden, at fence, 57°39′15″N, 136°10′17″E, 25 Aug 2012, *M.I. Vernoslova 54285* (IRK); Russian Federation, Khabarovskii Krai, Komsomolsk-on-Amur city, near railway station, ruderalized plant groupings, 50°33′05.45″N, 136°59′16.08″E, 16 Sep 2015, *D.A. Krivenko 51277* (IRK); Russian Federation, Primorskii Krai, Vladivostok city, near Botanical Garden-Institute of the Far Eastern Branch of the Russian Academy of Sciences, ruderal plant community at fence, 43°13′26″N, 131°59′37″E, 15 Oct 2013, *D.A. Krivenko 33289* (IRK); Russian Federation, Primorskii Krai, Khasanskii Raion, Kedrovaya Pad Nature Reserve, left bank of the Kedrovaya River, forest edge, 10 m, 43°05′45″N, 131°33′37″E, 25 Aug 2015, *D.A. Krivenko 51295* (IRK); Russian Federation, Primorskii Krai, Nakhodkinskii urban district, Vostok Bay of Peter the Great Gulf of Sea of Japan, near Vostok station of the Institute of Marine Biology Far Eastern Branch of the Russian Academy of Sciences, rocks, 42°53′26.95″N, 132°44′04.43″E, 02 Sep 2015, *V.V. Kotseruba 51282* (IRK).

Chelidonium majus L.

2*n* = 12, CHN. Armenia, Erevan city, NE part of city, Avan District, Botanical Garden of the A.L. Takhtadzhyan Institute of Botany of the National Academy of Sciences of the Republic of Armenia, at the Herbarium building, weed in shrubs, 02 Aug 2019, 40°12′45.2″N, 44°33′31.1″E, *D.A. Krivenko & al. 58919* (IRK); Bulgaria, Varnenska Oblast, coast of Black Sea, Albena resort, roadside, 43°22′09″N, 28°04′52″E, 08 Jul 2018, *E.V. Zhmud 64217-7* (IRK), *E.V. Zhmud 64217-8* (IRK), *E.V. Zhmud 64217-9* (IRK); Czech Republic, Prague city, left bank of the Vltava River, Royal Garden of Prague Castle, weed alongside of footpaths, 50°05′35″N, 14°24′07″E, 20 May 2018, *E.V. Zhmud 64245-1* (IRK), *E.V. Zhmud 64245-2* (IRK), *E.V. Zhmud 64245-3* (IRK), *E.V. Zhmud 64245-4* (IRK), *E.V. Zhmud 64245-5* (IRK), *E.V. Zhmud 64246-6* (IRK), *E.V. Zhmud 64246-7* (IRK), *E.V. Zhmud 64246-8* (IRK), *E.V. Zhmud 64246-9* (IRK); Georgia, Samtskhe-Javakheti Mkhare, Akhaltsikhe municipality, left bank of the Potskhovistskhvali River, Didi-Pamaji (Bolshoi Pamach), roadside, 1185 m, 41°37′15.9″N, 42°54′06.3″E, 25 Jul 2019, *D.A. Krivenko & al. 58920* (IRK); Georgia, Samtskhe-Javakheti Mkhare, Adigeni municipality, 7.5 km N of Abastumani settlement, S slope of Meskhetskii ridge of N part of Lesser Caucasus, gorge of Otskhe (Abastumanka) River, left bank, stony river bank in coniferous forest (pine, spruce, fir), 1413 m, 41°46′33.56″N, 42°50′13.45″E, 25 Jul 2019, *D.A. Krivenko & al. 58922* (IRK); Georgia, Shida Kartli Mkhare, Gori municipality, left bank of the Tana River, near Didi Ateni village, roadside, 740 m, 41°54′38″N, 44°05′33″E, 24 Jul 2019, *D.A. Krivenko & al. 58924* (IRK); Georgia, Samtskhe-Javakheti Mkhare, Akhaltsikhe municipality, right bank of the Kura River, near Sapara monastery, grassy slope in the gorge, 1300 m, 41°36′07.39″N, 43°01′50.37″E, 23 Jul 2019, *D.A. Krivenko & al. 58927* (IRK); Kazakhstan, Pavlodarskaya Oblasť, Bayanaulskii Raion, 7–8 km along serpentine road from Toraigyr village and Dzhasybai Lake to Bayanaul village, roadside, 50°49′32″N, 75°40′22″E, 25 Jun 2013, *D.A. Krivenko 33299* (IRK); Russian Federation, Altaiskii Krai, Rubtsovskii Raion, left bank of the Alei River, Rubtsovsk town, Krasnoznamenskaya Str. 118, ruderalized plant groupings, 216 m, 51°30′55″N, 81°33′06″E, 28 Sep 2018, *D.A. Krivenko 51410* (IRK); Russian Federation, Kemerovskaya Oblasť, Mariinskii Raion, Pristan 2-ya village, Magistralnaya Str. (M53 highway), roadside near the housing, 124 m, 56°12′28.1″N, 87°48′09.3″E, 07 Oct 2018, *D.A. Krivenko 51135* (IRK); Russian Federation, Moskovskaya Oblasť, Shcholkovskii Raion, Shcholkovo city, G.Ya. Bakhchivandzhi railway stop, along footpath in fir forest, 55°53′00.71″N, 38°05′15.92″E, 06 Jul 2018, *M.V. Kostina 51252* (IRK); Russian Federation, Novosibirskaya Oblasť, Novosibirsk city, Akademgorodok, territory of the Central Siberian Botanical Garden of the Siberian Branch of the Russian Academy of Sciences, weed, 54°49′10.75″N, 83°06′19.10″E, 22 Jun 2015, *D.A. Krivenko 51289* (IRK); Russian Federation, Novosibirskaya Oblasť, Novosibirskii Raion, near Akademgorodok, birch forest, 54°47′45.54″N, 83°08′07.87″E, 22 Jun

2015, *D.A. Krivenko 51294* (IRK); Russian Federation, Republic of Altai, Ongudaiskii Raion, on the way from Inya village to Aktash village, stony talus, 775 m, 50°24′07″N, 86°41′20″E, 10 Jul 2006, *N.K. Kovtonyuk & al. 31389* (IRK, NSK); Russian Federation, Republic of Altai, Turochakskii Raion, Altai Nature Reserve, Teletskoe Lake, right shore, Baigazan cordon, 15 km E of Artybash village, pebbly lake shore, 51°45′28″N, 87°25′55″E, 23 Jun 2012, *D.A. Krivenko 33409* (IRK); Russian Federation, Republic of Dagestan, Akhtynskii Raion, Greater Caucasus, spurs of Shalbuzdag ridge, foot of Mt. Tsortsin, Dzhaba village, 1740 m, 41°25′28″N, 46°47′30″E, 15 Sep 2019, *N. Nuradinova 58830* (IRK); Russian Federation, Saratovskaya Oblasť, Engels city, left bank of the Volga River, Sozanka Lake, 51°29′55.51″N, 46°04′27.48″E, 23 Jun 2018, *M.V. Kostina 51253* (IRK); Russian Federation, Saratovskaya Oblasť, Engels city, left bank of the Volga River, Rybnaya Str., 51°30′04.50″N, 46°03′59.75″E, 22 Jun 2018, *M.V. Kostina 51254* (IRK); Russian Federation, Saratovskaya Oblasť, Saratov city, right bank of the Volga River, Lesnaya Str., 51°34′59.63″N, 45°56′33.33″E, 22 Jun 2018, *M.V. Kostina 51250* (IRK); Russian Federation, Saratovskaya Oblasť, Saratov city, right bank of the Volga River, territory of Botanical Garden of the N.G. Chernyshevsky Saratov State University, 116 m, 51°34′00″N, 46°00′22″E, 20 Jun 2018, *M.V. Kostina 52281* (IRK); Russian Federation, Sverdlovskaya Oblasť, Ekaterinburg city, territory of Institute of Plant and Animal Ecology of the Ural Branch of the Russian Academy of Sciences, at the wooden building, shrubbery, 56°49′20″N, 60°19′38″E, 06 Sep 2011, *O.S. Dymshakova 33414* (IRK); Russian Federation, Sverdlovskaya Oblasť, Artemovskii Raion, Sosnovyi Bor settlement, raspberry thickets, 57°22′59″N, 62°16′00″E, 14 Sep 2011, *O.S. Dymshakova 33415* (IRK), *O.S. Dymshakova 33416* (IRK); Russian Federation, Tambovskaya Oblasť, Nikiforovskii Raion, vicinity of Polnaya Dmitrievka urban-type settlement, right bank of the Polnyi Voronezh River, in glade near bushes, among composite and grasses, 136 m, 53°02′49″N, 40°51′30″E, 01 Aug 2017, *M.O. Burlyaeva 52296* (IRK); Russian Federation, Tomskaya Oblasť, Tomsk city, Siberian Botanical Garden of the National Research Tomsk State University, along footpath, 56°27′59.89″N, 84°56′46.62″E, 18 Jun 2015, *D.A. Krivenko 51269* (IRK); Slovak Republic, Nitriansky Kraj, Nitra city, 48°18′51.32″N, 18°04′53.17″E, 24 Oct 2018, *Yu.K. Vinogradova 51258* (IRK).

PRIMULACEAE

Androsace fedtschenkoi Ovcz.

2*n* = 20, CHN. Mongolia, Khovsgol Aimag, Ulaan-Uul Sum, Darkhad Valley, river bank of the Gunyn-gol, near Ulaan-Uul village, pebbly shallow, 1637 m, 50°40′08″N, 99°13′50″E, 19 Jun 2018, *N.V. Vlasova 52927* (IRK, NSK).

Androsace septentrionalis L.

2*n* = 20, CHN. Mongolia, Arkhangai Aimag, Tariat Sum, slope of Khorgo-Uul extinct volcano, forest-steppe zone, petrified lava overgrown with larch, 2130 m, 48°12′12″N, 99°50′56″E, 16 Jun 2018, *N.V. Vlasova 52942* (IRK, NSK).

IAPT chromosome data 35/8

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New chromosome reports for all species.

DRYOPTERIDACEAE

Polystichum andinum Phil.

n = 82, *x* = 41, CHN. Argentina, Chubut, Parque Nacional Lago Puelo, 42°10′44.25″S, 71°42′30.66″W, 30 May 2013, *Morero 380* (CORD) [Fig. 6A–C].

This chromosome number report corresponds with the sporophytic count of 2*n* = 164 by Morero & al. (2015) for the same population, corroborating tetraploid ploidy level. Meiotic chromosomes behaved regularly, although lagging chromosomes during anaphase I were rarely detected (Fig. 6B). Normal tetraspores and spores were observed at high frequency (92.4%).

Polystichum chilense (Christ) Diels

n = 82, *x* = 41, CHN. Argentina, Neuquén, Parque Nacional Nahuel Huapi, Cascada Santa Ana, 40°43′10.19″S, 71°53′25.42″W, 28 Jan 2014, *Morero 391* (CORD) [Fig. 6D–F].

This chromosome number agrees with the previous report of 2*n* = 164 by Morero & al. (2015). Meiotic chromosomes showed normal behavior with 82 bivalents (II) at diakinesis (Fig. 6D). Scarce (0.3%) spore mother cells (SMCs) were detected with off-plate chromosomes in metaphase I and lagging chromosomes in telophase I (Fig. 6E,F). Most of the tetraspores and spores observed were normal (97.7%).

Polystichum montevidense (Spreng.) Rosenst.

n = 41, *x* = 41, CHN. Argentina, Tucumán, Cuesta del Clavillo, 27°17′52.67″S, 65°49′55.74″W, 06 Jul 2011, *Morero 349* (CORD) [Fig. 6G–I].

The current meiotic count agrees with the previous sporophytic report of 2*n* = 82 by Condack & al. (2013). This diploid species exhibited diakineses with 41 II in all analyzed SMCs (Fig. 6G), also in subsequent stages, from metaphase I to tetrads formation, no chromosomal irregularities were detected (Fig. 6H,I). Spores were normal.

Polystichum multifidum (Mett.) T.Moore

n = 82, *x* = 41, CHN. Argentina, Neuquén, Parque Nacional Nahuel Huapi, Cascada Santa Ana, 40°43′09.99″S, 71°53′28.45″W, 27 Jan 2014, *Morero 306* (CORD) [Fig. 6J–L].

This chromosome number report is in agreement with the sporophytic count of 2*n* = 164 by Morero & al. (2015). Mostly, diakinesis cells showed bivalents (56–82 II), but occasional configurations with the appearance of multivalents were observed. Meiotic behavior of SMCs had some irregularities such as chromosomes not integrated into the nuclei and chromosomes unoriented at metaphase I (Fig. 6K). Malformed scored spores represented 16% (Fig. 6L).

Polystichum platyphyllum (Willd.) C.Presl

n = 41, *x* = 41, CHN. Argentina, Tucumán, Cuesta del Clavillo, 27°21′05″S, 65°48′08.26″W, 06 Jul 2011, *Morero 352* (CORD) [Fig. 7A–C].

This chromosome record agrees with two previous sporophytic counts in specimens from Argentina (Morero & al., 2015) and Mexico (Smith & Mickel, 1977), indicating diploid level for the species. However, Smith & Foster (1984) reported a tetraploid count from Paraguay. Diakineses with 41 II (Fig. 7A) were observed in most meiotic preparations; combinations of univalents (I) and bivalents were rare (0.2%). SMCs analysis from metaphase I to tetrads did not reveal chromosomal irregularities, except for a metaphase I with non-synchronous segregation of bivalents (Fig. 7B). Spores were normal.

Polystichum plicatum (Poepp. ex Kunze) Hicken ex Hosseus
n = 82, *x* = 41, CHN. Argentina, Neuquén, Villa La Angostura, Cerro Bayo, 40°45′12.97″S, 71°36′00.86″W, 28 Jan 2014, *Morero 387* (CORD) [Fig. 7D–F].

This chromosome number report is in agreement with a previous sporophytic count of 2*n* = 164 by Morero & al. (2015). Diakineses analyzed presented 81–82 II (Fig. 7D). Chromosomal irregularities were not found in SMCs analyses from metaphase I to the stage of tetrads formation; spores were normal (Fig. 7E,F).

Polystichum pycnolepis (Kunze ex Klotzsch) Hieron.
n = 41, *x* = 41, CHN. Argentina, Córdoba, Los Gigantes, 31°23′39.62″S, 64°47′34.54″W, 04 Feb 2015, *Morero & C.-X. Li 427* (CORD) [Fig. 7G–I].

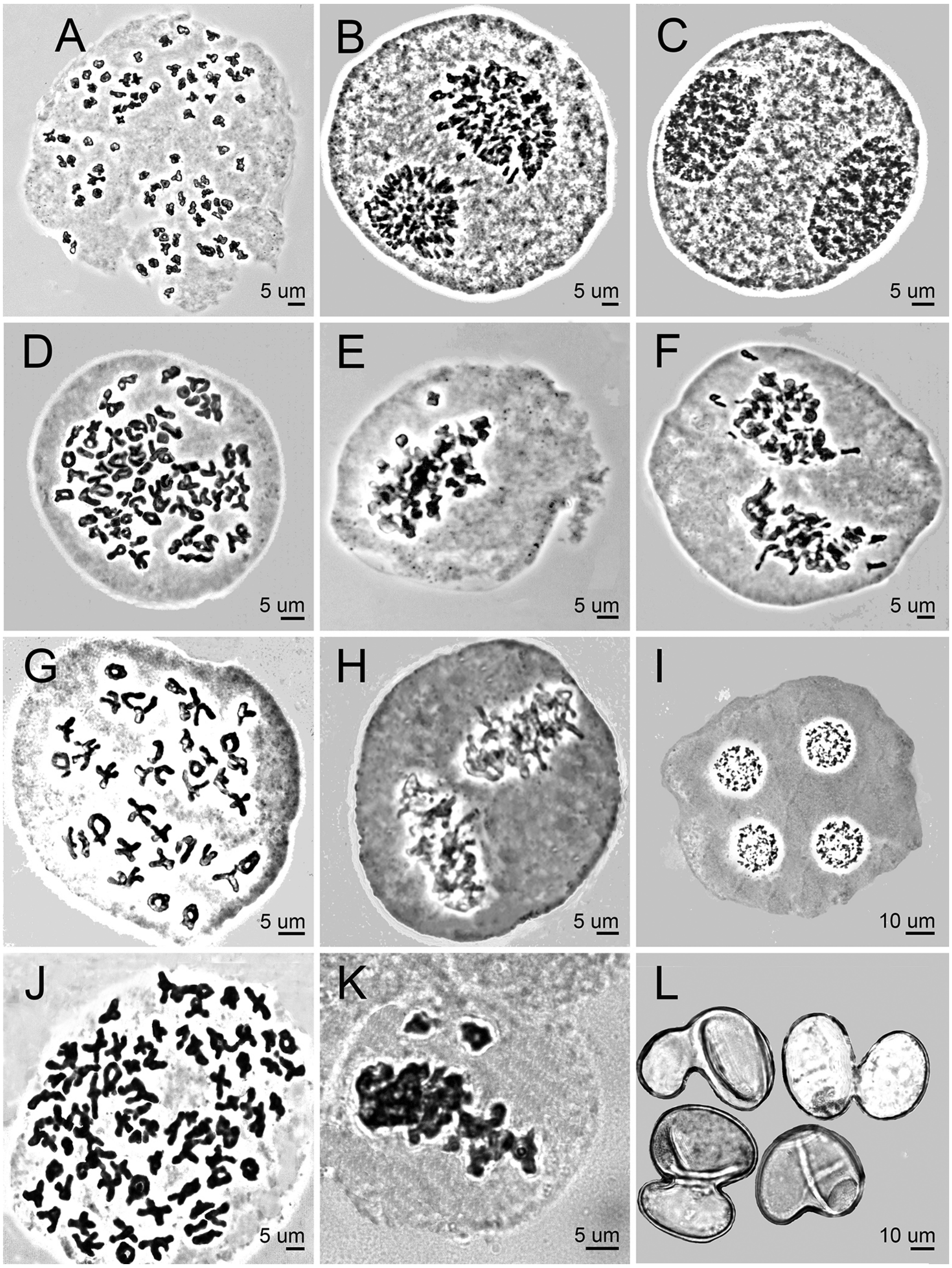

Fig. 6. Photomicrographs of spore mother cells at different meiotic stages and prespores. **A–C**, *Polystichum andinum*, *n* = 82: **A**, Diakinesis; **B**, Anaphase I showing lagging univalents; **C**, Normal telophase I. **D–F**, *Polystichum chilense*, *n* = 82: **D**, Diakinesis; **E**, Metaphase I with three out-of-plate bivalents; **F**, Anaphase I with chromosomes not integrated to the nuclei. **G–I**, *Polystichum montevidense*, *n* = 41: **G**, Diakinesis; **H**, Normal telophase I; **I**, Normal telophase II. **J–L**, *Polystichum multifidum*, *n* = 82: **J**, Diakinesis; **K**, Metaphase I with two bivalents outside the plate; **L**, Malformed prespores.

The current meiotic count agrees with the previous sporophytic report of 2*n* = 82 by Morero & al. (2015). This diploid species exhibited diakineses with 41 II in all analyzed SMCs (Fig. 7G). Also, in subsequent stages from metaphase I to tetrads formation, some chromosomal irregularities were detected at metaphase I, like chromosomes out of plate (Fig. 7H). Most of the spores were normal (96.3%).

Polystichum tetragonum Fée

n = 82, *x* = 41, CHN. Chile, Archipiélago de Juan Fernández, Isla Robinson Crusoe, 33°38′17″S, 78°50′45″W, 01 Dec 2010, *Morero 323* (CORD) [Fig. 7J–L].

This chromosome report is in agreement with that of Morero & al. (2015) for the same population. Pairing and segregation were normal (Fig. 7J) as well as SMCs stages, except for one metaphase

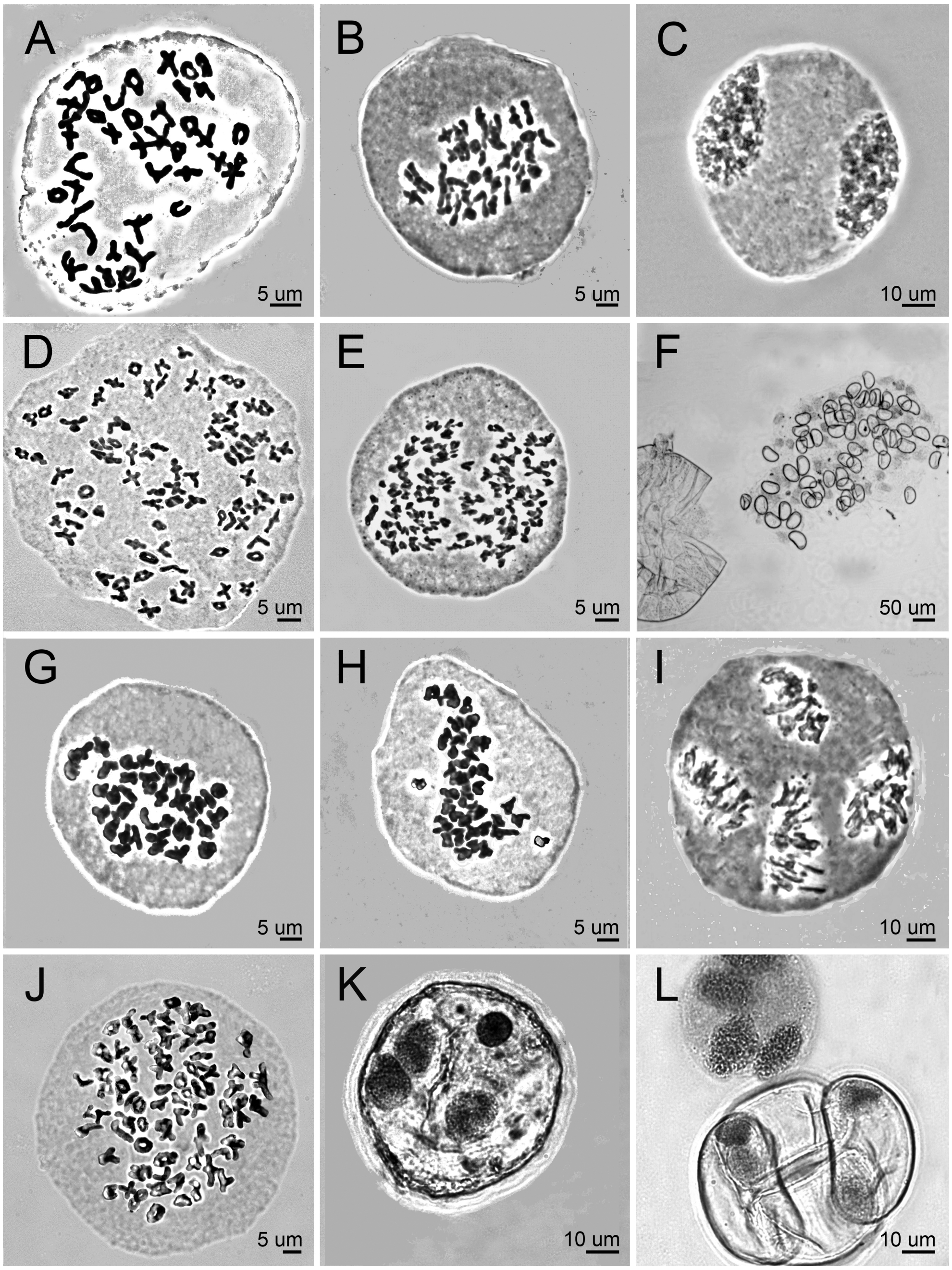

Fig. 7. Photomicrographs of spore mother cells at different meiotic stages and prespores. **A–C**, *Polystichum platyphyllum*, *n* = 41: **A**, Diakinesis; **B**, Metaphase I showing non-synchronous segregation of bivalents; **C**, Normal telophase I. **D–F**, *Polystichum plicatum*, *n* = 82: **D**, Diakinesis; **E**, Anaphase I showing chromosomes migration; **F**, Spores ejected from the sporangium. **G–I**, *Polystichum pycnolepis*, *n* = 41: **G**, Diakinesis; **H**, Late metaphase I with two out-of-plate bivalents; **I**, Normal anaphase II. **J–L**, *Polystichum tetragonum*, *n* = 82: **J**, Diakinesis; **K**, Abnormal tetrad formation; **L**, Meiocyte in telophase II (top) and tetrad of prespores (bottom).

with irregularly distributed chromosomes and two abnormal tetraspores (Fig. 7K). Most spores were normal (95.4%).

Dryopteridaceae has a nearly worldwide distribution and is one of the most species-rich fern families (±2115 species, sensu PPG I, 2016). Almost a quarter of its species (~500) are included in the genus *Polystichum* Roth (Zhang & Barrington, 2013), with southeastern Asia as the area with the highest diversity of the genus. In southern South America (Argentina and Chile), *Polystichum* diversity comprises 11 species (Morero, 2016; Rodríguez & al., 2018). In this contribution, we give information about the chromosome numbers, meiotic behavior and reproduction mode of eight species of this group.

Most homosporous ferns (up to 95%) are characterized by high polyploid chromosome numbers (Wagner & Wagner, 1980; Grant, 1981; Barker & Wolf, 2010). Within polyploids, many fern groups show prevalence of allopolyploid species, which represent the products of hybridization followed by genome doubling (Knobloch, 1996). It is generally recognized that allopolyploidization is one of the major modes of diversification and speciation in the ferns (Wood & al., 2009). Particularly in *Polystichum*, allopolyploid lineages and their diploid sexual progenitors are frequently involved in complex patterns of reticulation, which often exhibit limited morphological differentiation, complicating species delimitation and systematics of the genus (Wagner, 1973; Barrington, 1985a,b, 1990; P.S. Soltis & al., 1989, 1991; Perrie & al., 2003; Lin & al., 2011; Jorgensen & Barrington, 2017; Patel & al., 2018). In that regard, classical cytological studies remain crucial for recognizing polyploids (both auto- and allopolyploids) and apomictic lineages (Manton, 1950; Grusz, 2016).

The basic chromosome number in *Polystichum* is $x = 41$, a highly conserved base number in Dryopteridaceae (Liu & al., 2019). The most common diploid chromosome number in the genus is $2n = 82$. Polyploids exhibit an array of ploidy levels ($3x$, $4x$, $5x$, $6x$ and $8x$), tetraploids with $2n = 164$ being the most frequently represented (Goldblatt & Johnson, 1979–; Morero & al., 2015).

Our dataset comprises three diploid ($n = 41$) and five tetraploid species ($n = 82$); these records confirmed the chromosome base number of $x = 41$ for the genus. All the species studied presented sporangia with either 64 or c. 64 spores, denoting that they have normal sexual reproduction (Gastony, 1991; Werth & Windham, 1991; D.E. Soltis & Soltis, 1999). This mode of reproduction also is confirmed by the normal behavior of the meiocytes, with most chromosomes segregated as bivalents in diakinesis, in both diploids and tetraploids. Some irregularities were detected (detailed for each species above), but they did not affect the meiotic products because most of the tetrads were normal and the abortive spores were found in low percentage (<15%). As the spore production in homosporous ferns is very high, an estimated 100 million per year in an individual of *Dryopteris filix-mas* (L.) Schott (Schneller, 1979), it is to be expected that the fertility will not be reduced and, consequently, the reproductive success of the species here studied is guaranteed.

The regular meiotic pairing in the five tetraploids studied is indicative of two divergent parental genomes and gene loci with disomic inheritance that evidences its allopolyploid nature (D.E. Soltis & Soltis, 1999; P.S. Soltis & Soltis, 2000). According to Sleep (2014), *Polystichum* shows particularly high levels of bivalent pairing at meiosis, even in synthesized and wild hybrids; this behavior appears to be unusual for ferns. However, a few cases of multivalent associations were reported from East Asian *Polystichum* species (Sleep, 2014; Patel & al., 2018). Also, in this study, some associations, interpreted as multivalents in *P. multifidum*, would be a cytological manifestation of a certain degree of homology among its four sets of chromosomes.

Interestingly, the group of *Polystichum* studied exhibits two separate biogeographical stories. The three diploid species belong to the exindusiate Andean clade, which is distributed in the North and Central Andes to the Northwest and Center of Argentina (McHenry & Barrington, 2014), while the five tetraploid species belong to the Austral South American clade, a small group of endemic polyploids restricted to Argentinean-Chilean Patagonia. The Austral South American species are phylogenetically allied to the Australasian *Polystichum* and are not closely related to their congeners in the North and Central Andes. Both Austral lineages lack diploid species, suggesting that their common ancestor was tetraploid (Morero & al., 2019). In Austral regions, a similar polyploid speciation pattern that only comprises polyploids was found for Australasian *Asplenium* species (Perrie & Brownsey, 2005; Shepherd & al., 2008). Therefore, the close similarity in the ploidy patterns of *Polystichum* and *Asplenium* suggests that the Southern Hemisphere harbors two polyploid fern lineages resulting from ancient reticulation histories (Barrington, 2020).

METHODS

Abortion percentage and number of spores per sporangium were determined in 10–15 mature sporangia from each specimen. Each closed sporangium was placed in a drop of Hoyer's medium on glass slides, the sporangium was opened under the light microscope and the spores were dispersed with a dissecting needle. The slides were photographed with an Axiophot phase contrast microscope at 100×. Spores (including abortive spores) were counted with the free software ImageJ v.1.53 (Schneider & al., 2012). Spores were considered to be aborted when they were malformed and irregular in size, also when they showed wall collapse and absence of protoplast (Barrington, 1985a,b, 1990; Wagner & al., 1986; Perrie & al., 2003; Lin & al., 2011).

Meiotic chromosomes were examined in SMCs. Meiotic pairing and counts studies were done using fertile plants cultivated in greenhouse in Córdoba (Argentina), leaves with immature sporangia were fixed in 1 part glacial acetic acid : 3 parts absolute alcohol. The samples were stored at −20°C until examination. At the moment of examination, fixed material was stained with 1% acetocarmine and squashed following classical methods (Manton, 1950). At least thirty squash preparations of immature sporangia were made for each species, in which all available SMCs were detected. The chromosomal pairing was analyzed in 7–10 cells in diakinesis, recording the variation range of chromosomal associations (univalent, bivalent, multivalent). Furthermore, the meiotic behavior from metaphase I to the tetrad stage was examined in at least 10 cells in each stage. Meiotic irregularities were classified following to Seijo & Solís Neffa (2006).

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IAPT chromosome data 35/9

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

- * First chromosome count for the species.
- ** First sporophytic chromosome count for the species.
- ▼ New cytotype for the species.

LORANTHACEAE

**Amyema congener* (Schult. & Schult.f.) Tiegh.

2*n* = 18, CHN. Australia, Queensland, Bunya Mountains NP, 950 m, 26°51′57″S, 151°35′09″E, 09 Sep 2018, *M.J.M. Christenhusz 7353* (EAN) [Fig. 8A].

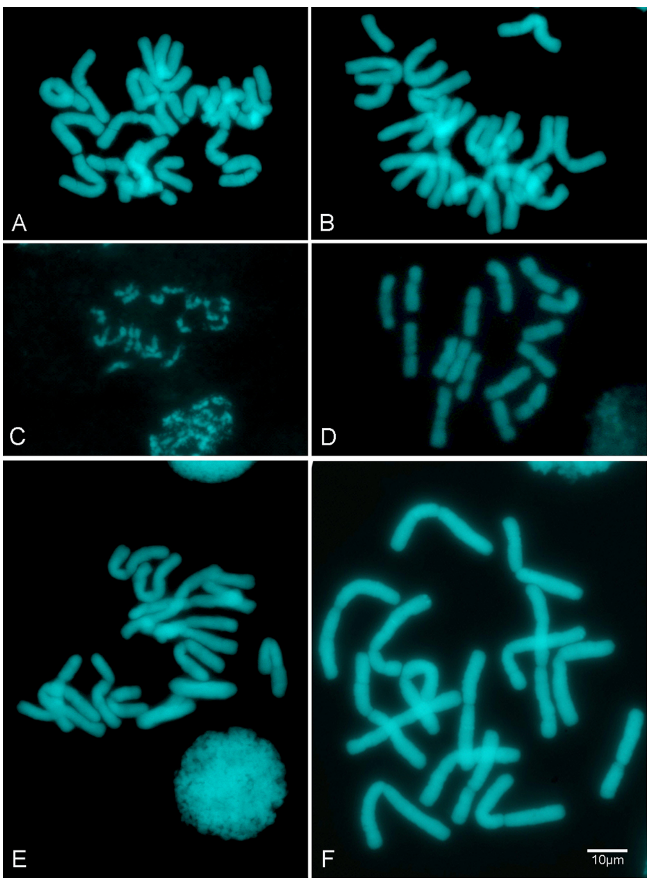

Fig. 8. Loranthaceae species, metaphases stained with DAPI. **A**, *Amyema congener* (2*n* = 18); **B**, *A. miquelii* (2*n* = 18); **C**, *Dendrophthoe vitellina* (2*n* = 18); **D**, *Passovia pyrifolia* (2*n* = 16); **E**, *Psittacanthus cordatus* (2*n* = 16); **F**, *P. dichroos* (2*n* = 16).

**Amyema miquelii* (Lehm. & Miq.) Tiegh.

2*n* = 18, CHN. Australia, Queensland, Blackall, Barcoo River, 280 m, 24°25′34″S, 145°27′15″E, 18 Sep 2018, *M.J.M. Christenhusz 7363* (EAN) [Fig. 8B].

**Dendrophthoe vitellina* (F.Muell.) Tiegh.

2*n* = 18, CHN. Australia, Queensland, Banana, Leichhardt Hwy, 149 m, 24°26′26″S, 150°08′45″E, 16 Sep 2018, *M.J.M. Christenhusz 7362* (EAN) [Fig. 8C].

Passovia pyrifolia (Kunth) Tiegh.

2*n* = 16, CHN. Brazil, Paraíba, Areia, 522 m, 06°58′12″S, 35°42′47″W, 13 Nov 2017, *J.A.L. Neves 31* (EAN) [Fig. 8D].

Psittacanthus cordatus (Hoffmanns.) G.Don

2*n* = 16, CHN. Brazil, Bahia, Morro do Chapéu, 878 m, 11°29′37″S, 41°20′30″W, 12 Apr 2019, *L.P. Felix 18158* (EAN) [Fig. 8E].

Psittacanthus dichroos (Mart.) Mart.

2*n* = 16, CHN. Brazil, Bahia, Itatim, 200 m, 12°40′23″S, 39°39′19″W, 10 Apr 2019, *L.P. Felix 18061* (EAN) [Fig. 8F].

**Struthanthus flexicaulis* (Mart. ex Schult.f.) Mart.

2*n* = 16, CHN. Brazil, Paraíba, Areia, 520 m, 06°55′16″S, 35°43′31″W, 03 Apr 2018, *L.P. Felix 17350* (EAN) [Fig. 9A,B].

**Struthanthus marginatus* (Desr.) G.Don

2*n* = 16, CHN. Brazil, Paraíba, Areia, 533 m, 06°58′12″S, 35°42′54″W, 31 Jan 2018, *J.A.L. Neves 30* (EAN) [Fig. 9C].

Struthanthus podopterus (Cham. & Schltdl.) G.Don

2*n* = 16, CHN. Brazil, Sergipe, Pinhão, 133 m, 10°37′11″S, 37°44′59″W, 09 Apr 2019, *L.P. Felix 18045* (EAN) [Fig. 9D].

*▼*Struthanthus thyrsiflorus* (Cham. & Schltdl.) Kuijt

2*n* = 16, CHN. Brazil, Bahia, Morro do Chapéu, 1078 m, 11°35′36″S, 41°09′48″W, 12 Apr 2019, *L.P. Felix 18140* (EAN) [Fig. 9E].

2*n* = 28, CHN. Brazil, Sergipe, Simão Dias, 344 m, 10°46′05″S, 37°53′41″W, 09 Apr 2019, *L.P. Felix 18049* (EAN) [Fig. 9F].

SANTALACEAE

Phoradendron dipterum Eichler

2*n* = 16, CHN. Brazil, Sergipe, Carira, 297 m, 10°26′16″S, 37°40′39″W, 09 Apr 2019, *L.P. Felix 18035* (EAN) [Fig. 10A].

Phoradendron obtusissimum (Miq.) Eichler

2*n* = 56, CHN. Brazil, Pernambuco, Taquaritinga do Norte, 770 m, 07°54′11″S, 36°22′29″W, 28 Jan 2018, *L.P. Felix 17305* (EAN) [Fig. 10B].

Phoradendron perrottetii (DC.) Eichler

2*n* = 28, CHN. Brazil, Bahia, Ruy Barbosa, 756 m, 12°01′33″S, 41°10′30″W, 12 Apr 2019, *L.P. Felix 18137* (EAN) [Fig. 10C].

Phoradendron pteroneuron Eichler

2*n* = 28, CHN. Brazil, Pernambuco, Maraial, 543 m, 08°47′15″S, 35°58′28″W, 05 Apr 2019, *L.P. Felix 17976* (EAN) [Fig. 10D].

▼*Phoradendron quadrangulare* (Kunth) Griseb.

n = 28, CHN. Brazil, Paraíba, São João do Tigre, 704 m, 08°06′56″S, 36°41′57″W, 30 Nov 2017, *L.P. Felix 17111* (EAN) [Fig. 10E].

**Phoradendron strongyloclados* Eichler

2*n* = 28, CHN. Brazil, Paraíba, Maturéia, 1196 m, 07°15′11″S, 37°23′04″W, 02 Dec 2017, *L.P. Felix 17119* (EAN) [Fig. 10F].

**Phoradendron tunaeforme* (DC.) Eichler

n = 14, CHN. Brazil, Alagoas, Maravilha, 785 m, 09°16′16″S, 37°18′54″W, 07 Apr 2019, *L.P. Felix 18014* (EAN) [Fig. 10G].

**Santalum lanceolatum* R.Br.

2*n* = 28, CHN. Australia, Queensland, Adel's Grove, 131 m, 18° 41′27″S, 138°31′47″E, 25 Sep 2018, *M.J.M. Christenhusz 7366* (PG) [Fig. 10H].

Loranthaceae and Santalaceae are composed of hemiparasitic plants growing on branches of angiosperms and gymnosperms, characterized by the presence of a reduced ovary and undifferentiated eggs, commonly known as mistletoes (Dettke & Waechter, 2014). Loranthaceae is quite diverse, has about 76 genera and 1050 species that occur in the Old and New World, rarely in temperate zones (Kuijt & Hansen, 2015; Christenhusz & Byng, 2016), while Santalaceae exhibit nearly 1000 species distributed in more than 43 genera, occurring in temperate, arid and tropical regions (Der & Nickrent, 2008; Nickrent & al., 2010; Christenhusz & Byng, 2016). Cytologically, these two families are poorly known, which most important contributions in terms of chromosome number records were Barlow (1963), Wiens (1968), Wiens & Barlow (1971), Barlow & Wiens (1971), Barlow & Martin (1984), Andrade & al. (2005) and Moraes & al. (2017) for Australian, North American, African and Brazilian species. The present study aimed to report the numerical chromosome variation in representatives of Loranthaceae and Santalaceae, since cytological studies, for the most part, are based principally on meiotic analyzes.

Immature seeds and inflorescences were pretreated with 8-hydroxyquinoline 0.002 M at 6°C for 24 h, fixed in Carnoy 3 : 1 absolute ethanol/glacial acetic acid (v/v) for 2 h at room temperature and subsequently stored in freezer at −20°C. To prepare the slides, the immature seeds and inflorescences were washed twice in distilled water and digested in an enzymatic solution containing 2% cellulase and 20% pectinase, and kept in a moist chamber at 37°C for 40 min. The slides were aged for three days at room temperature and then stained with 10 μl DAPI (1 μg/ml) for 30 min, mounted in glycerol/McIlvaine buffer (pH 7.0) (1 : 1, v/v) (Guerra & Souza, 2002). The best metaphases were captured in photomicroscope Zeiss with Axio Cam MRC5 using Axio vision v.4.8 software.

The families presented new chromosome counts for almost all the analyzed species, in which 2*n* = 16 for Loranthaceae and 2*n* = 28 for Santalaceae were relatively more constant and conserved among their Neotropical representatives (Table 1). The obtained data in the present study support the basic number *x* = 8 for the Neotropical genera of Loranthaceae, as well as *x* = 14 for Santalaceae, suggesting dysploidy events (Andrade & al., 2005). Nevertheless, in Santalaceae, out of the eight analyzed species, only one was diploid (*Phoradendron dipterum*, with 2*n* = 16), which shows a numerical variability compatible with the incidence of disploidy by increasing a chromosome pair.

All previous counts using pollen grain stem cells were confirmed, as well as mitotic cell counts for *Psittacanthus dichroos* and *Phoradendron perrottetii* (Andrade & al., 2005). *Struthanthus*

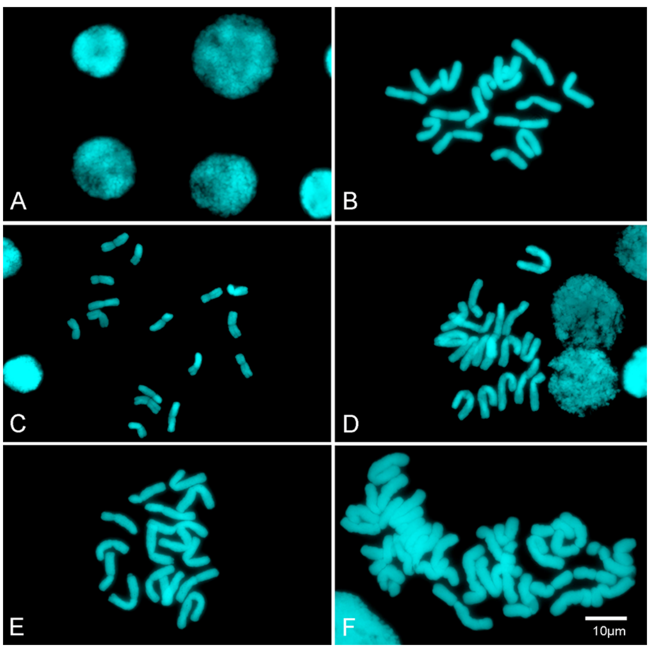

Fig. 9. Loranthaceae species, metaphases stained with DAPI. **A**, *Struthanthus flexicaulis*, interphase nucleus reticulate; **B**, *Struthanthus flexicaulis* (2*n* = 16); **C**, *S. marginatus* (2*n* = 16); **D**, *S. podopterus* (2*n* = 16); **E**, *S. thyrsiflorus* (2*n* = 16); **F**, *S. thyrsiflorus* (2*n* = 28).

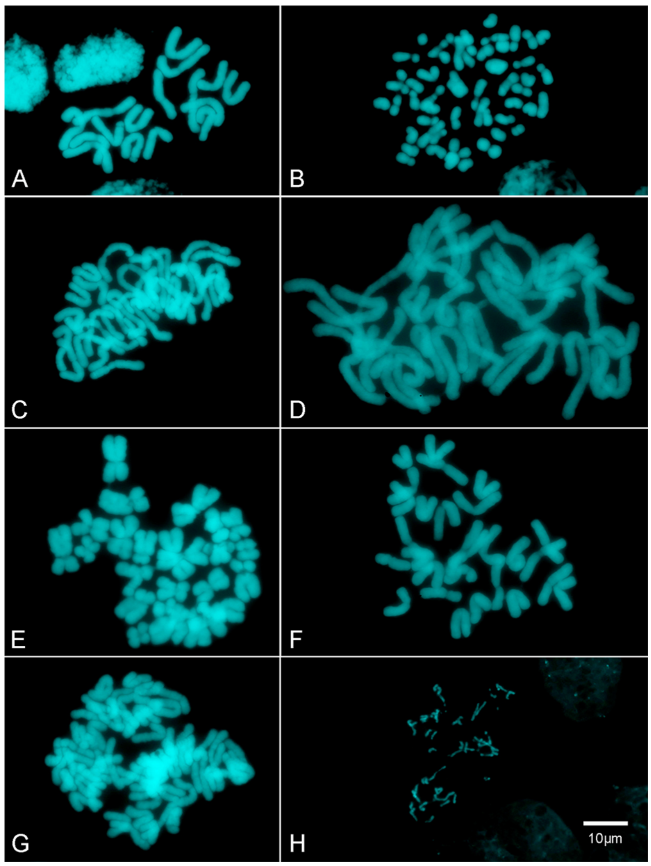

Fig. 10. Santalaceae species, metaphases stained with DAPI. **A**, *Phoradendron dipterum* (2*n* = 16); **B**, *P. obtusissimum* (2*n* = 56); **C**, *P. perrottetii* (2*n* = 28); **D**, *P. pteroneuron* (2*n* = 28); **E**, *P. quadrangulare* (*n* = 28); **F**, *P. strongyloclados* (2*n* = 28); **G**, *P. tunaeforme* (*n* = 14); **H**, *Santalum lanceolatum* (2*n* = 28).

Table 1. Chromosome data of the studied Santalales species.

Taxa	Locality*	*n*	2*n*	Figure	Previous counts**
Loranthaceae Juss.					
Amyema Tiegh.					
A. congener	Bunya Mountains NP – QLD		18	8A	B63 (*n* = 9) / UCN
A. miquelii	Blackall – QLD		18	8B	B63 (*n* = 9) / UCN
Dendrophthoe Mart.					
D. vitellina	Banana – QLD		18	8C	B63 (*n* = 9) / UCN
Passovia Karsten					
P. pyrifolia	Areia – PB		16	8D	UCN
Psittacanthus Mart.					
P. cordatus	Morro do Chapéu – BA		16	8E	UCN
P. dichroos	Areia – PB		16	8F	A05 (2*n* = 16)
Struthanthus Mart.					
S. flexicaulis	Areia – PB		16	9A,B	BW71 (*n* = 8) / A05 (*n* = 8)
S. marginatus	Areia – PB		16	9C	BW71 (*n* = 8) / A05 (*n* = 8)
S. podopterus	Pinhão – SE		16	9D	UCN
S. thyrsiflorus	Morro do Chapéu –BA		16	9E	UCN
S. thyrsiflorus	Simão Dias – SE		28	9F	UCN
Santalaceae R.Br.					
Phoradendron Nutt.					
P. dipterum	Carira – SE		16	10A	UCN
P. obtusissimum	São João do Tigre – PB		56	10B	UCN
P. perrottetii	Ruy Barbosa – BA		28	10C	A05 (2*n* = 28)
P. pteroneuron	Maraial – PE		28	10D	UCN
P. quadrangulare	Taquaritinga do Norte – PE	28		10E	UCN
P. strongyloclados	Maturéia – PB		28	10F	UCN
P. tunaeforme	Maravilha – AL	14		10G	UCN
Santalum L.					
S. lanceolatum	Adel's Grove – QLD		28	10H	UCN

*States of Brazil and Australia: AL = Alagoas; BA = Bahia; PB = Paraíba; PE = Pernambuco; SE = Sergipe; QLD = Queensland.
**Abbreviation of previous counts: A05 = Andrade & al., 2005; B63 = Barlow, 1963; BW71 = Barlow & Wiens, 1971; WB71 = Wiens & Barlow, 1971; UCN = unpublished chromosome numbers.

thyrsiflorus was the only species with two populations analyzed in this study, which presented 2*n* = 16 for the population of Morro do Chapéu – BA and 2*n* = 28 for the population of Simão Dias – SE. This last count is consistent with the incidence of polyploidy followed by descending dysploidy. Structural rearrangements are relatively frequent, being often responsible for the reduction of chromosome numbers and speciation in polyploids (Soltis & al., 2015). For some groups of plants, such as *Arabidopsis thaliana* and related genera, numerical chromosome alterations were followed by deep morphological alterations and speciation (Lysak & al., 2006). However, as in Loranthaceae, numerical chromosome alterations are generally not followed by obvious morphological variations, as observed in different groups of plants, such as the representatives of Cactaceae (Castro & al., 2019) and Fabaceae in the genus *Inga* Mill. (Figueiredo & al., 2014).

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IAPT chromosome data 35/10

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* indicates mixoploidy (only modal numbers are given).

POACEAE

Poa albertii Regel

2*n* = 5*x*? = 32*, 36*, CHN (N = 4). Tajikistan, Gorno-Badakhshan Autonomous Region, Murghob District, Chechekty, alpine grassland, 3815 m, 38.34°N, 74.013°E, 28 Aug 2016, *M. Olonova s.n*. (TK 16-14).

Poa relaxa Ovcz.

2*n* = 3*x*? = 22*, 2*n* = 6*x*? = 44*, CHN (N = 13). Tajikistan, Gorno-Badakhshan Autonomous Region, Ishkoshim District, gorge Garm-Chashma, stony slope, 2607 m, 37.293°N, 71.516°E, 09 Aug 2017, *M. Olonova s.n*. (TK 17-10).

2*n* = 3*x*? = 24, 2*n* = 4–5*x*? = 32, 34, 36, CHN (N = 11). Tajikistan, Gorno-Badakhshan Autonomous Region, Rushan ridge, Bartang basin, gorge Rovmed-dora, stony slope, 3027 m, 37.978°N, 71.992°E, 19 Aug 2017, *M. Olonova s.n*. (TK 17-50).

2*n* = 4–5*x*? = 32, CHN (N = 4). Tajikistan, Gorno-Badakhshan Autonomous Region, Rushan ridge, Bartang basin, gorge Rovmed-dora, gravel slope, 3027 m, 37.978°N, 71.992°E, 19 Aug 2017, *M. Olonova s.n*. (TK 17-56).

2*n* = 5*x*? = 35*, 2*n* = 6*x* = 42*, CHN (N = 10). Tajikistan, Gorno-Badakhshan Autonomous Region, Ishkoshim District, gorge Garm-Chashma, stony slope, 2607 m, 37.293°N, 71.516°E, 09 Aug 2017, *M. Olonova s.n*. (TK 17-23).

2*n* = 5*x* = 35*, 2*n* = 6*x* = 42*, CHN (N = 11). Tajikistan, Gorno-Badakhshan Autonomous Region, Shughnon District, Khorog vicinity, bank of Shakhdora River, gravel slopes, 2520 m, 37.453°N, 71.598°E, 28 Aug 2017, *M. Olonova s.n*. (TK 17-53).

2*n* = 5*x*? = 36*, 2*n* = 6*x* = 42*, CHN (N = 5). Tajikistan, Gorno-Badakhshan Autonomous Region, Shughnon District, bank of Gunt River, gravel slopes, 4001 m, 37.491°N, 72.731°E, 28 Aug 2016, *M. Olonova s.n*. (TK 16-28).

2*n* = 6*x* = 42, CHN (N = 5). Tajikistan, Gorno-Badakhshan Autonomous Region, Ishkoshim District, vicinity of the settlement Ratm, gravel slope, 3860 m, 37.092°N, 72.784°E, 10 Aug 2017, *M. Olonova s.n*. (TK 17-27).

2*n* = 6*x* = 42, 2*n* = 8*x* = 56, CHN (N = 21). Tajikistan, Gorno-Badakhshan Autonomous Region, Ishkoshim District, vicinity of the settlement Ratm, shrubby slope, 3860 m, 37.092°N, 72.784°E, 10 Aug 2017, *M. Olonova s.n*. (TK 17-36).

2*n* = 8*x* = 56, CHN (N = 3). Tajikistan, Gorno-Badakhshan Autonomous Region, Ishkoshim District, gorge Bizhon-dora, stony slope, 2580 m, 37.296°N, 71.5114°E, 09 Aug 2017, *M. Olonova s.n*. (TK 17-46).

The territory of Badakhshan on the both sides of the border river Pyanj is one of the most elevated mountain systems of Middle Asia. Mountain territories have a wide range of ecological conditions due to the heterogeneity of the environment, such as high diversity of terrain, soil, and climate (Orme & al., 2005). The mountainous territories of Central Asia are generally known as hotspots of global importance (Myers & al., 2000). The position of Badakhshan at the junction of the Western-Asian and Sahara-Gobi floristic regions of the Ancient Mediterranean subkingdom and in the immediate vicinity of the Sino-Himalayan region of the East Asian subkingdom (Kamelin, 2017) caused its special floristic richness. Indeed, the high level of phytodiversity of this territory has been pointed out by many researchers (e.g., Agakhanyants, 1958; Ikonnikov, 1963, 1979; Saboiev, 2002). Geographical and ecological conditions of Badakhshan and the life history of its plant lineages resulted in a wide range of species showing also high intraspecific variability. The isolation of plant populations, caused by mountains, orography and the impact of the Quaternary glaciations facilitated the preservation of their karyological and genetic diversities.

The chromosome numbers of two species of *Poa* sect. *Stenopoa* Dumort. bluegrasses (*P. relaxa* Ovcz., *P. albertii* Regel) were studied, focusing on the most common species, *P. relaxa*. This Middle Asian species is classified within the large Eurasian *P. versicolor* aggregate and sometimes is treated as subspecies of the polytypic *P. versicolor* (Tzvelev, 1976). Like other species of this aggregate, it shows high morphological variability, in particular in the territory of the Republic of Tajikistan (Ovchinnikov, 1933; Ovchinnikov & Chukavina, 1957). A preliminary morphological research on *P. relaxa* populations in Tajikistan has confirmed their high variability (Olonova & al., 2012; Olonova & Khisoriev, 2013). This high phenotypic diversity could be associated with high karyological variability. Overall, the chromosome data available for *P. relaxa* are still limited, the most frequent chromosome number being $2n = 6x = 42$ (Tzvelev, 1976; Astanova, 2007). Recently, a chromosomal study of this species in W Tajikistan confirmed $2n = 6x = 42$ as the most common chromosome number though some individuals also showed mixoploidy with hexaploid and pentaploid cells and one individual with pentaploid cells (Olonova & al., 2017a).

Poa albertii is a Central-Asian dwarf alpine species. It belongs to one of the most taxonomically intricated and problematic groups of the section; this species is supposed to have derived from hybridization between *P. attenuata* Trin. and a member of the *P. glauca* aggregate (Olonova & al., 2017b). There is no available information on chromosome numbers of this species. Our chromosome counts from Badakhshan indicate that the individuals of *P. albertii* are pentaploids but also show mixoploidy.

Chromosomal studies were performed following Pukhalskiy & al. (2007). Chromosome counting was done on root-tip meristematic metaphase cells. Chromosomes were stained with acetic hematoxylin and visualized using an Axiostar plus microscope (Carl Zeiss) at 15× 100 magnification. Image capture was performed with the software AxioVision LE v.4.8.2. N indicates the number of individual seeds analyzed from each population.

Our study has corroborated the high karyological diversity present among populations of *Poa relaxa* and *P. albertii* in the Pamir mountains. The existence of mixoploidy was detected in 5 samplings of *P. relaxa* (TK 16-28, TK 17-10, TK 17-23, TK 17-36, TK 17-53) and in single sampling of *P. albertii*. Pentaploidy was found within samplings TK 17-23 and TK 17-53, and hexaploidy was revealed within TK 17-23, and 17-36.

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IAPT chromosome data 35/11

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* First chromosome count for the genus and species.

APOCYNACEAE
Subfamily Apocynoideae
Tribe Rhabdadenieae

**Rhabdadenia biflora* (Jacq.) Müll.Arg.
$2n = 30$, CHN. Brasil, Pará, Salvaterra, 24 Jul 2011, *S.S. Viana 9* (IAN 193015) [Fig. 11A,E].

**Rhabdadenia madida* (Vell.) Miers
$2n = 10$, CHN. Brasil, Mato Grosso do Sul, Porto Murtinho, road towards the river Amonguijá, 21°41′23.00″S, 57°52′21.00″W, 02 Jun 2014, *A.P. de Souza 33* (CGMS) [Fig. 11B,F].

**Rhabdadenia ragonesei* Woodson
$2n = 30$, CHN. Argentina, Corrientes Dpto. Ituzaingó, national road 12, 27°33′59.2″S, 56°35′10.2″W, 27 Sep 2014, *H.A. Keller & G. Morillo 12298* (CTES) [Fig. 11C,G].

Subfamily Asclepiadoideae
Tribe Asclepiadeae

**Schubertia grandiflora* Mart.
$2n = 22$, CHN. Brasil, Mato Grosso do Sul, Corumbá, Passo do Lontra, MS-325, Carandazal road, 26 June 2012, *M.A. Farinaccio & al. 928* (CGMS) [Fig. 11D,H].

Apocynaceae species occur in tropical and subtropical regions; there are 378 genera and more than 5350 species in this family worldwide (Endress & al., 2018). In Brazil, Apocynaceae is represented by 94 genera and 974 species (Flora do Brasil, 2020). Chromosome data are scarce in the family, but the species studied so far have a great diversity in chromosome numbers due to the occurrence of polyploidy and dysploidy events (Santos & al., 2018). The base chromosome number $x = 11$ is predominant in the family (Van der Laan & Arends, 1985; Albers & Meve, 2001).

Rhabdadenia Müll.Arg. (subfamily Apocynoideae Burnett) is a small tropical genus, with three species occurring predominantly in seasonally flooded environments and with one of the broadest geographical distributions among the Apocynoideae (Morales, 2009). It is distributed in almost all tropical and subtropical areas of the American continents, occurring from northern Argentina to the southern United States and the Antilles (Morales, 2009). *Rhabdadenia* species are characterized by perennial twining vines with opposite leaves that contain white latex, and large showy flowers [(1–)2(–5) flowers per inflorescence], each flower varying in color from white to a shade of pink, and each having dextrorse contortion, infundibuliform corolla, absence of calycine colleters, truncated and lignified anthers, five free or basally united nectaries, an apocarpous gynoecium with a filiform style, and pilose style heads with a large membranous basal collar (Morales, 2009; Endress & al., 2014).

Schubertia Mart. (subfamily Asclepiadoideae Burnett) is a small tropical genus with five species, mainly in Central America and Mexico. It belongs to tribe Asclepiadeae Duby, subtribe Gonolobinae Liede (Krings & al., 2008). *Schubertia grandiflora* Mart. occurs in northeastern Argentina, Bolivia, Brazil, Paraguay, and Peru, especially in the cerrado (savanna), scrub and dry forests, frequent on roadside. This species is easily recognized by large flowers (more than 3 cm long) and equinate follicle. The corolla is white, greenish on base, urceolate, the tube is longer than the corolla lobes, with long trichomes on the throat area.

We present chromosome numbers for *Schubertia grandiflora* and for the three species of *Rhabdadenia*. The chromosome numbers here presented are the first generic counts for *Schubertia* and

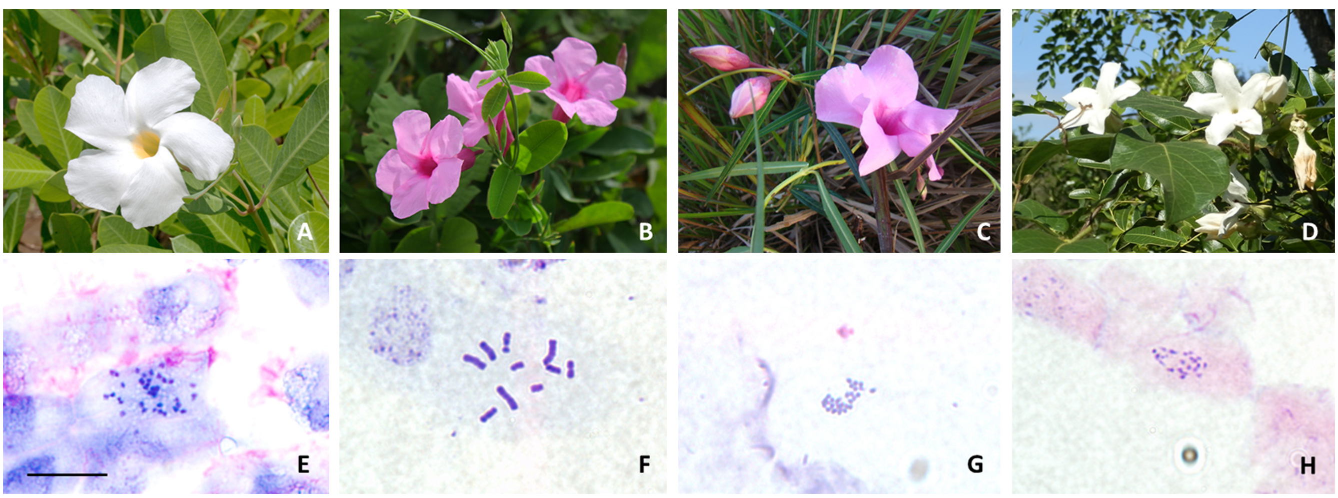

Fig. 11. Flowers and mitotic metaphases of Apocynaceae species. **A** & **E**, *R. biflora* ($2n = 30$); **B** & **F**, *Rhabdadenia madida* ($2n = 10$); **C** & **G**, *R. ragonesei* ($2n = 30$); **D** & **H**, *Schubertia grandiflora* ($2n = 22$). — Scale bar (for E–H) = 10 µm. Photos: A by Pedro Vianna; B by Thales Panfiglio; C by Héctor Keller; D by Maria Ana Farinaccio.

Rhabdadenia, although our unpublished data for *R. madida* (Vell.) Miers was mentioned previously by Santos & al. (2018). Roots obtained from recently germinated seeds were pretreated with 8-hydroxyquinoline (8 Hq) 0.002 M at 4°C for 24 hours and fixed in ethanol : acetic acid (3 : 1, v/v). Chromosome preparations followed Guerra & Souza (2002).

For *Rhabdadenia* we obtained two chromosome numbers: 2*n* = 10 for *R. madida* and 2*n* = 30 for *R. biflora* and *R. ragonesei* (Fig. 11). So, *Rhabdadenia* presents infrageneric polyploidy, with chromosome numbers a multiple of 10. Van der Laan & Arends (1985) also associated eight genera of Apocynaceae with infrageneric polyploidy, such as *Allamanda* L. (2*n* = 18, 36), *Rauvolfia* L. (2*n* = 22, 44, 66, 88) and *Tabernaemontana* L. (2*n* = 22, 66). The count for *R. madida* (2*n* = 10) seems to be the smallest known chromosome number in Apocynaceae (Santos & al., 2018).

Although *x* = 11 is the base chromosome number considered as primitive in Apocynaceae (Van der Laan & Arends, 1985), there are genera, belonging to different tribes, with *x* = 10. So, this distinct base chromosome number is not a phylogenetic signal. Endress & al. (2014) have suggested the monotypic tribe Rhabdadenieae Pichon ex M.E.Endress to include *Rhabdadenia*, but its position was doubtful since Rhabdadenieae was part of a polytomy (Livshultz & al., 2007). Recently, Rhabdadenieae emerged as sister to Apocyneae Rchb. in the Apocynoid grade (Fishbein & al., 2018). According to our revision of chromosome numbers (in Rice & al., 2015) in tribe Apocyneae, 2*n* = 20 was exclusively cited for *Chonemorpha* G.Don and *Trachelospermum* Lem. (both of subtribe Chonemorphinae Pichon ex. M.E.Endress), *Ichnocarpus* R.Br. (subtribe Ichnocarpinae Benth. & Hook.f.) and *Urceola* Roxb. (subtribe Urceolinae Pichon ex M.E.Endress). Species with 2*n* = 20 and distinct chromosome numbers have been reported in *Apocynum* L. of subtribe Apocyneae (2*n* = 16, 20, 22) and in *Vallaris* Burm.f. of subtribe Beaumontiinae Pichon ex M.E.Endress (2*n* = 20, 22). The taxonomy of tribes and subtribes follows Endress & al. (2014).

The chromosomes of *Rhabdadenia madida* were much larger than those of the other two species of *Rhabdadenia*. In *R. madida*, the chromosome length ranged from 1.5 to 3.6 µm, and in *R. biflora*, the biggest chromosomes reached 0.9 µm. The chromosomes of *R. ragonesei* seem to be smaller, but they were very condensed in our preparations. Tapadar (1964) studied 27 species and varieties of Apocynaceae s.str. and classified the chromosomes according to their length: long (3.1 to 4.8 µm), medium-sized (2.1 to 3.0 µm) and short (0.7 to 2.0 µm). He concluded that the majority of the chromosomes in the family were short or medium-sized. Most of the 43 species of Apocynaceae s.str. analyzed by Van der Laan & Arends (1985) had a chromosome size ranging from 0.5 to 3.5 µm, most of them falling in a range of 1 to 2 µm. Sanso & Xifreda (2000) have reported chromosome lengths ranging from 1.21 to 282 µm in *Mandevilla petraea* (A.St.-Hil.) Pichon and *M. virescens* (A.St.-Hil.) Pichon. Future studies in *Rhabdadenia*, applying techniques of chromosome banding and in situ hybridization, could explain karyotype evolution (polyploidy, possible chromosome rearrangements and DNA amplification) in this small genus.

Schubertia grandiflora had 2*n* = 22 (Fig. 11). This chromosome number reinforces the suggestion of *x* = 11 as the base chromosome number for the subfamily Asclepiadoideae. Deviant base numbers are known in some genera, *x* = 10 being the most frequent one, followed by *x* = 9, and the sporadic *x* = 12, 13 and 14 (Albers & Meve, 2001). The chromosomes of *S. grandiflora* are small, reaching 0.8 µm. This chromosome size agrees with reports of Albers & Meve (2001) for three subfamilies of Apocynaceae (0.6 to 1.7 µm). The smallest chromosomes were seen in tribe Asclepiadeae, usually less than 1 µm long, where *Schubertia* is included (Krings & al., 2008).

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IAPT chromosome data 35/12

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Herbarium specimens and seeds are deposited in the Vavilov Institute of General Genetics of the Russian Academy of Sciences (hereafter VIGG), Laboratory of Population Genetics, Moscow.

* First chromosome count for the species.

ROSACEAE

Spiraea betulifolia Pall.

2*n* = 18, CHN. Russian Federation, Irkutskaya Oblasť, Taishetskii Raion, near Berezovka village, along the R-255 highway, 55°53′19″N, 98°00′04″E, 05 Aug 2013, *T.A. Poliakova 10713* (VIGG).

The diploid chromosome number of 2*n* = 18, which was previously determined for *S. betulifolia*, collected in Primorskii Krai (Polyakova & Muratova, 2015), is confirmed here. For closely related species, the diploid number of chromosomes (2*n* = 18) was reported for *S. beauverdiana* C.K.Schneid., collected in Sakhalin (Probatova & al., 2007), and for *S. stevenii* (C.K.Schneid.) Rydb. from Chukotka (Goldblatt & Johnson, 1979–). The aneuploid chromosome number of 2*n* = 14 was reported for *S. stevenii* from Magadan (Zhukova & al., 1973).

Spiraea chamaedryfolia L.

2*n* = 36, CHN. Russian Federation, Novosibirsk, Academgorodok, near Berdskoe highway, 54°52′50″N, 83°04′54″E, 02 Nov 2015, *E.V. Banaev 30915* (VIGG); Russian Federation, Krasnoyarskii Krai, Berezovskii Raion, northwestern spurs of the Eastern Sayan Mountains, near Stolby National Park, 55°55′01″N, 92°31′27″E, larch-birch forest, 02 Jul 2016, *T.A. Poliakova 10916* (VIGG).

For this species, which is widespread in Siberia, two cytotypes were reported (2*n* = 18, 2*n* = 36; Fedorov, 1969; Goldblatt & Johnson, 1979–). The tetraploid chromosome number (2*n* = 36) was reported for *S. chamaedryfolia* var. *chamaedryfolia*, collected in the Botanical Garden of Moscow State University (of unknown wild origin) (Oginuma & al., 2004). For the closely related *S. chamaedryfolia* var. *ulmifolia* (Scop.) Maxim. (= *S. elegans* Pojark.), common in Eastern Siberia, two cytotypes are also known from samples of unknown origin, i.e., 2*n* = 36 (Matskevich & Lutkov, 1966) and 2*n* = 18 (Sun & al., 1997). In addition to the common basic number of *x* = 9 for *Spiraea* species, another basic number of *x* = 8 is known (Rani & al., 2014). Obviously, this explains the unusual chromosome number of *S. chamaedryfolia* (2*n* = 32) (Goldblatt & Johnson, 1979–).

Spiraea crenata L.

2*n* = 18, CHN. Russian Federation, Karachay-Cherkess Republic, vicinity of Karachaevsk city, shrubby thickets near Shoaninskii church, 43°48′15″N, 41°53′23″E, on rocky slopes, 23 Aug 2018, *T.A. Poliakova 11018* (VIGG); Russian Federation, Karachay-Cherkess Republic, vicinity of Karachaevsk city, shrubby thickets near the waterfalls of Medovye, 43°53′04″N, 42°35′22″E, on rocky slopes, 24 Aug 2018, *T.A. Poliakova 21018* (VIGG); Russian Federation, Volgogradskaya Oblasť, Kamyshinskii Raion, near Kamyshin city, 50°07′58″N, 45°19′01″E, 160 m a.s.l., rocky slope near the Kamyshinskie ushi ("ears") mountains, 09 Jul 2019, *T.A. Poliakova 11019* (VIGG); Russian Federation, Republic of Dagestan, Kazbekovskii Raion, near Dubki village, 43°01′12″N, 46°49′57″E, shrubby thickets, 21 Jul 2019, *T.A. Poliakova 21019* (VIGG).

Only the diploid chromosome number (2*n* = 18) is known from samples of this species of unknown wild origin (Dickson & al., 1992).

**Spiraea dahurica* (Rupr.) Maxim.

2*n* = 18, CHN. Russian Federation, Republic of Sakha (Yakutia), near Yakutsk city, near the museum Kingdom of Permafrost, 62°02′41″N, 129°37′08″E, rare-coniferous pine-larch forest, 12 Jul 2015, *T.A. Poliakova & A.P. Efimova 11215* (VIGG); Russian Federation, Republic of Sakha (Yakutia), Neryungrinskii Raion, mouth of Khani River, about 7 km from the railway station Olekma, about 60 km east of Khani village, 57°03′14″N, 120°59′37″E, 400–415 m, kurumnik ("stone sea"), dry southern slope, 17 Jul 2015, *T.A. Poliakova & A.P. Efimova 21215* (VIGG); Russian Federation, Republic of Sakha (Yakutia), Neryungrinskii Raion, 4 km west of Khani village, 56°54′36″N, 119°52′38″E, 736 m, along the road at the foot of blockfield ("kurumniki"), 18 Jul 2015, *T.A. Poliakova & A.P. Efimova 31215* (VIGG); Russian Federation, Republic of Sakha (Yakutia), Aldanskii Raion, vicinity of Tommot village, Ukulan River, 70 km from Aldan city, 58°58′57″N, 126°16′02″E, 366 m, rocky-gravelly northeastern slope, 22 Jul 2015, *T.A. Poliakova & A.P. Efimova 41215* (VIGG).

Spiraea hypericifolia L.

2*n* = 18, CHN. Russian Federation, Republic of Dagestan, Botlikhskii Raion, near Botlikh village, near the lake, 42°40′58″N, 46°13′17″E, on a slope overgrown with bushes, 19 Jul 2019, *T.A. Poliakova 11719* (VIGG).

Only one chromosome number report (diploid, 2*n* = 18) is known for this species, namely from Kazakhstan (Karatau ridge) (Fedorov, 1969).

Spiraea media Schmidt

2*n* = 18, CHN. Russian Federation, Amurskaya Oblasť, Selemdzhinskii Raion, 24 km from Ekimchan village towards Zlatoustovsk city, 52°59′21″N, 133°03′28″E, birch-larch forest, 14 Aug 2002, *T.A. Poliakova 71902* (VIGG); Russian Federation, Primorskii Krai, Olginskii Raion, vicinity of Permskoye village, 43°45′49″N, 135°11′18″E, 101 m, rocky slope, 10 Sep 2009, *T.A. Poliakova 11909* (VIGG); Russian Federation, Amurskaya Oblasť, Blagoveshchenskii Raion, vicinity of Mukhinka village, 50°32′31″N, 127°39′06″E, pine forest, 29 Jul 2013, *T.A. Poliakova 11913* (VIGG); Russian Federation, Irkutskaya Oblasť, Taishetskii Raion, near Berezovka village, along R-255 highway, 55°53′19″N, 98°00′04″E, 05 Aug 2013, *T.A. Poliakova 21913* (VIGG); Russian Federation, Republic of Sakha (Yakutia), near Yakutsk city, near the museum "Kingdom of Permafrost", 62°02′41″N, 129°37′08″E, rare-coniferous pine-larch forest, 12 Jul 2015, *T.A. Poliakova & A.P. Efimova 11915* (VIGG); Russian Federation, Krasnoyarskii Krai, Berezovskii District, northwestern spurs of Eastern Sayan Mountains, near Stolby National Park, 55°55′01″N, 92°31′27″E, larch-birch forest, 02 Jul 2016, *T.A. Poliakova 11916* (VIGG).

This species is very polymorphic, which is also expressed in the degree of its karyological studies (Probatova & al., 2007; Polyakova & Muratova, 2015). The diploid cytotype (2*n* = 18) was reported for samples from Siberia (Goldblatt & Johnson, 1979–; Stepanov, 2018), Sakhalin (Moneron Island) (Probatova & al., 2006), Irkutskaya Oblasť (Probatova & al., 2009; Polyakova & Muratova, 2015) and Amurskaya Oblasť (Polyakova & Muratova, 2015). The tetraploid cytotype (2*n* = 36) of this species is also known from Siberia (Goldblatt & Johnson, 1979–; Krogulevich & Rostovtseva, 1984). The triploid chromosome number (2*n* = 27) was also reported (pers. comm. of A.V. Shatokhina; Probatova & al., 2007). In addition, aneuploid chromosome numbers are known for this species: 2*n* = 10 (Fedorov, 1969), 2*n* = 20 (samples from the Republic of Tuva; Goldblatt & Johnson, 1979–). The diploid cytotype (2*n* = 18) was reported for the closely related species *S. sericea* Turcz.; this sample was collected in East Siberia, Zabaikaľskii Krai (Probatova & al., 2015). Some taxonomists consider *S. sericea* to be synonymous with *S. media*.

Spiraea ussuriensis Pojark.

2*n* = 18, CHN. Russian Federation, Irkutskaya Oblasť, Taishetskii Raion, near Berezovka village, along R-255 highway, 55°53′19″N, 98°00′04″E, 05 Aug 2013, *T.A. Poliakova 12813* (VIGG); Russian Federation, Primorskii Krai, Sovetskii Raion, near Vladivostok City, near Mt. Sedanka, 43°11′36″N, 131°57′28″E, rocky slope, 07 Sep 2009, *T.A. Poliakova 12809* (VIGG).

The diploid chromosome number of 2*n* = 18, which was previously determined for the first time for *S. ussuriensis* collected in Primorskii Krai (Polyakova & Muratova, 2015), is confirmed here.

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IAPT chromosome data 35/13

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* First chromosome count for the species.

CONVOLVULACEAE

**Ipomoea acanthocarpa* (Choisy) Hochst. ex Schweinf. & Asch.

2*n* = 30, CHN. Brazil, Alagoas, Ilha do Ferro, 09°44′16.33″S, 37°31′56.06″W, 05 May 2016, *J.A.A.M. Lourenço 60* (PEUFR) [Fig. 12A].

**Ipomoea bonsai* D.Santos & Alencar
2*n* = 30, CHN. Brazil, Ceará, Cratéus, 05°12′52.2″S, 40°56′42.04″W, 01 Jul 2019, *S.L. Costa 88* (PEUFR) [Fig. 12B].

**Ipomoea queirozii* J.R.I.Wood & L.V.Vasconc.
2*n* = 30, CHN. Brazil, Bahia, Juazeiro, 19°37′34″S, 40°25′51″W, 14 Apr 2019, *L.P. Felix 18198* (EAN) [Fig. 12C].

**Jacquemontia corymbulosa* Benth.
2*n* = 18, CHN. Brazil, Paraíba, Algodão de Jandaíra, 06°55′17″S, 35°58′57″W, 10 Aug 2018, *L.P. Felix 17657* (EAN) [Fig. 12D].

**Jacquemontia evolvuloides* (Moric.) Meisn.
2*n* = 18, CHN. Brazil, Bahia, Palmeiras, 12°26′11″S, 41°29′15″W, 21 May 2015, *R. Staples 1690* (PEUFR) [Fig. 12E].

**Jacquemontia mucronifera* (Choisy) Hallier f.
2*n* = 36, CHN. Brazil, Pernambuco, Igarassu, 07°34′54.3″S, 34°50′15.839″W, 10 May 2015, *R. Staples 1718* (PEUFR) [Fig. 13A].

**Jacquemontia nodiflora* (Desr.) G.Don
2*n* = 20, CHN. Brazil, Bahia, Palmeiras, 12°27′15.001″S, 41°28′43″W, 19 May 2015, *R. Staples 1661* (PEUFR) [Fig. 13B].

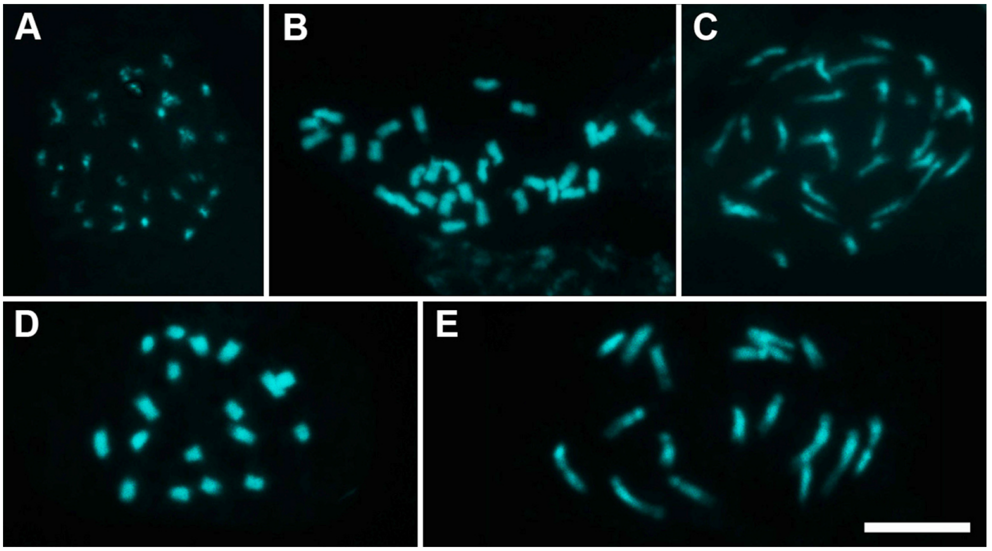

Fig. 12. **A**, *Ipomoea acanthocarpa*, 2*n* = 30; **B**, *I. bonsai*, 2*n* = 30; **C**, *I. queirozzi*, 2*n* = 30; **D**, *Jacquemontia corymbulosa*, 2*n* = 18; **E**, *J. evolvuloides*, 2*n* = 18. — Scale bar = 10 µm.

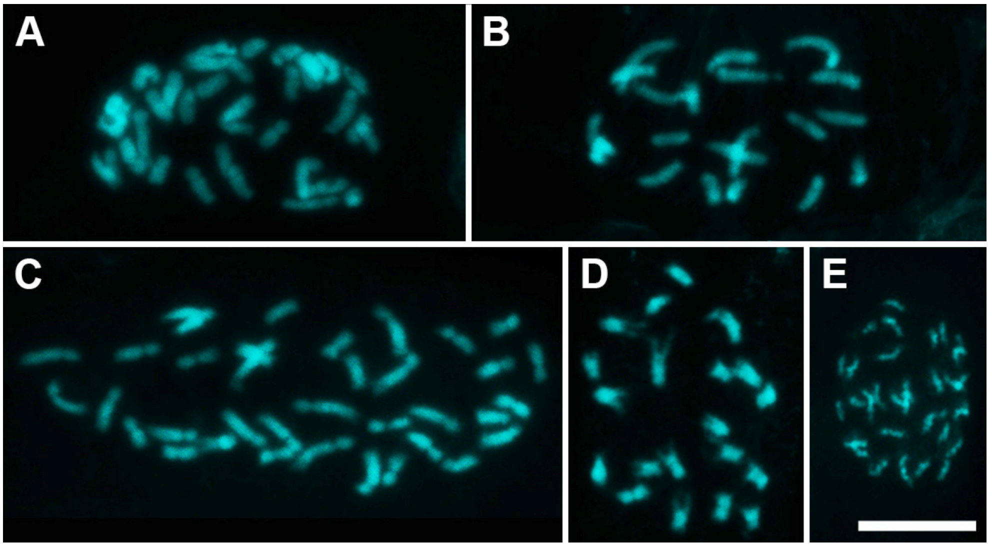

Fig. 13. **A**, *Jacquemontia mucronifera*, 2*n* = 36; **B**, *J. nodiflora*, 2*n* = 20; **C**, *J. pentanthos*, 2*n* = 36; **D**, *J. sphaerostigma*, 2*n* = 20; **E**, *Operculina hamiltonii*, 2*n* = 30. — Scale bar = 10 µm.

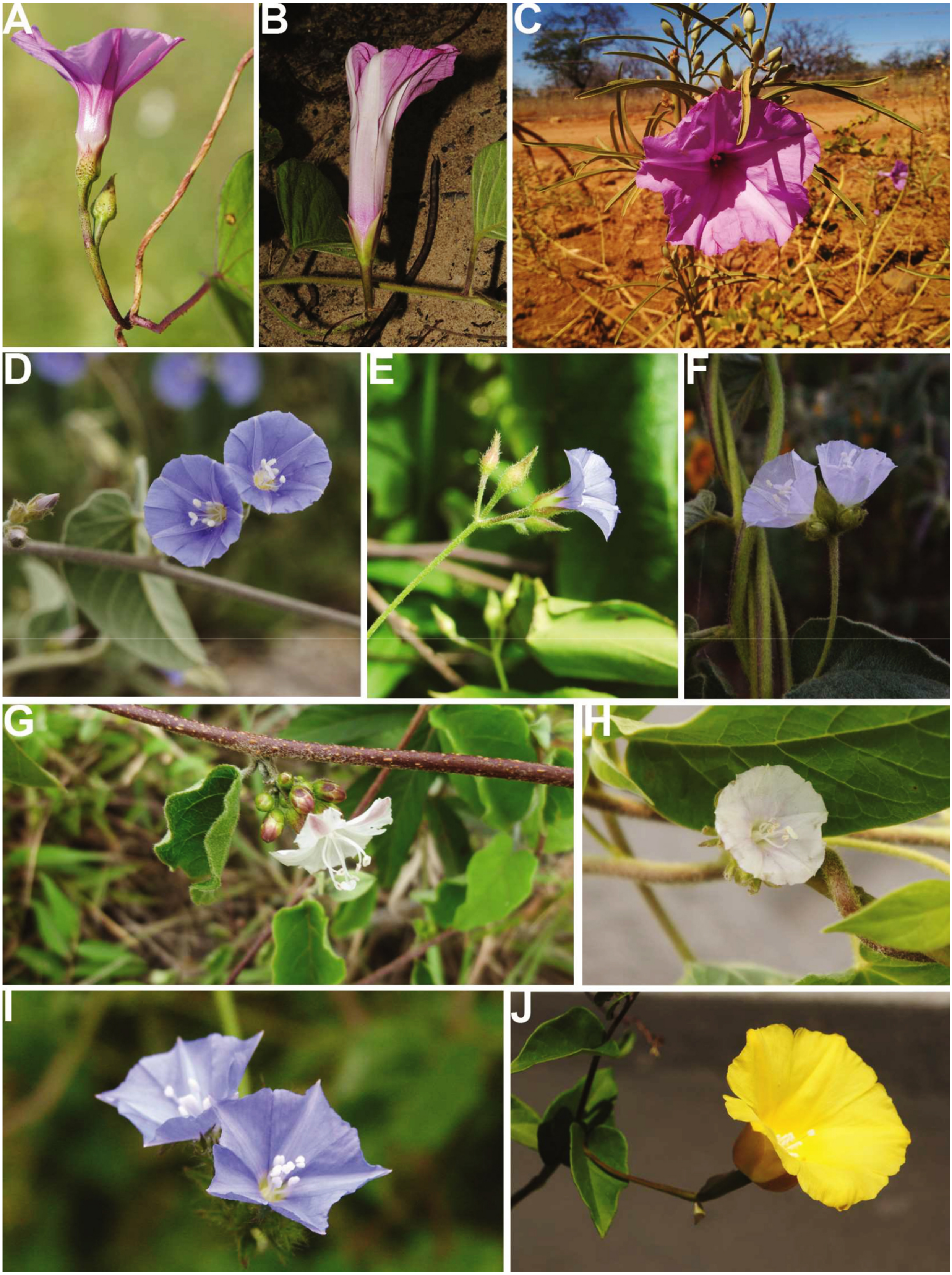

Fig. 14. Inflorescences. **A**, *Ipomoea acanthocarpa*; **B**, *I. bonsai*; **C**, *I. queirozzi*; **D**, *J. corymbulosa*; **E**, *J. evolvuloides*; **F**, *J. mucronifera*; **G**, *J. nodiflora*; **H**, *J. pentanthos*; **I**, *J. sphaerostigma*; **J**, *Operculina hamiltonii*. — Photos: Juliana Alencar, Leonardo Pessoa Felix, Deibson Pereira Belo and Carlos Pinheiro.

**Jacquemontia pentanthos* (Jacq.) G.Don
2*n* = 36, CHN. Brazil, Paraíba, Esperança, Lagoa de Pedra, 06°00′42″S, 35°52′07″W, 10 Aug 2018, *L.P. Felix 17648* (EAN) [Fig. 13C].

**Jacquemontia sphaerostigma* (Cav.) Rusby
2*n* = 20, CHN. Brazil, Bahia, Palmeiras, 12°36′47.99″S, 41°30′20.002″W, 21 May 2015, *R. Staples 1703* (PEUFR) [Fig. 13D].

**Operculina hamiltonii* (G.Don) D.F.Austin & Staples
2*n* = 30, CHN. Brazil, Paraíba, Araçagi, Fazenda Santos Rios, 06°08′09.57″S, 35°31′18″W, 07 Nov 2019, *A.M. Santos 29* (EAN) [Fig. 13E].

The family Convolvulaceae Juss. is cosmopolitan, comprising 57 genera and approximately 1660 species (Govaerts & al., 2021). Its monophyly is supported by the occurrence of evident synapomorphies, including the deletion of the intron from the plastid gene *rpl2* in all Convolvulaceae, the main characteristic that defines it as a distinct lineage from other families in angiosperms (Stefanović & al., 2002, 2003). The family can be recognized by its usually simple, alternating leaves, without stipules, calyx dialisepalous, corolla gamopetalous and plicated, dehiscent fruits of capsule type (Staples & Brummitt, 2007). Worldwide, Convolvulaceae are especially used for food, such as *Ipomoea batatas* (L.) Lam. (sweet potatoes) (Srivastava & al., 2018) and *I. aquatica* Forssk. (Malalavidhane & al., 2000), while others grow as ornamental plants, such as *I. quamoclit* L. (Austin, 2013) and *Jacquemontia* Choisy (Buril, 2013).

Cytologically, Convolvulaceae is a poorly known family, with chromosome numbers reported for 223 species, which corresponds only to 12% of the entire family (Dornelas & al., in prep.). Besides that, a large number of chromosome records refer to few genera, in particular *Ipomoea* L. (85 species), *Convolvulus* L. (40 species) and *Cuscuta* L. (36 species), i.e., 72% of the records are restricted to three genera (Dornelas & al., in prep.). Therefore, several genera have few records of chromosome numbers, sometimes just a single one, while 31 genera have no record at all (Dornelas & al., in prep.). Despite the scarcity of data, the group has an extensive variation in chromosome numbers already reported, ranging from 2*n* = 10 in *Cuscuta pedicellata* Ledeb. (Pazy & Plitmann, 1991) to 2*n* = 120 in *Ipomoea batatas* (Sampathkumar, 1968).

From the chromosome number variation records, polyploidy and dysploidy are the karyotype evolution events most clearly related to the diversification of the family. Some genera have high variation, especially *Cuscuta*, whose diversification has been attributed to polyploidy, dysploidy, and especially agmatoploidy, a common phenomenon in species that present holokinetic chromosomes (Garcia, 2001). Other genera have relatively stable chromosome numbers, such as *Ipomoea*, with 2*n* = 30 in 60% of the species with known chromosome numbers, and the polyploidy occurring in the 40% (Dornelas & al., in prep.).

According to the records of chromosome numbers for the genera in Convolvulaceae, it is possible to state with certainty that the family presents different patterns of chromosome number variation in different lineages. However, due to the lack of chromosome number records for several genera and species, it is difficult to understand the chromosome evolution of the family. The present study aimed to document chromosome numbers in species belonging to different genera of the family Convolvulaceae for which there are no records in the literature.

New chromosome counts were recorded for species belonging to three genera in Convolvulaceae. *Ipomoea acanthocarpa* (Fig. 12A) as well as the recently described *I. bonsai* (Fig. 12B) and *I. queirozii* (Fig. 12C) possess 2*n* = 30, which is in line with previous records for the diploid species in *Ipomoea*. The chromosome numbers of 2*n* = 18 for *J. corymbulosa* (Fig. 12D) and *J. evolvuloides* (Fig. 12E), and 2*n* = 20 for *J. nodiflora* (Fig. 13B) and *J. sphaerostigma* (Fig. 13D), confirm the occurrence of these numbers already reported for the genus, while 2*n* = 36 for *J. mucronifera* (Fig. 13A) and *J. pentanthos* (Fig. 13C) represents the first record of polyploidy for the genus. *Operculina hamiltonii* possesses 2*n* = 30 (Fig. 13E) and represents the second chromosome count for the genus, confirming the previous record of this number for *Operculina*. The inflorescences of the 10 species analyzed here are shown in Fig. 14.

Based exclusively on the chromosome number records, a marked difference in the patterns of chromosome number variation can be observed between some genera of Convolvulaceae. *Ipomoea* and *Jacquemontia* illustrate two different pathways of chromosome evolution that partially explain the high karyotype variation in the family. With a reasonable number of cytologically known species, it is notable that *Ipomoea* maintains 2*n* = 30 in most of its species, occasionally breaking karyotype stability by polyploidy events. Some species have both diploid and polyploid cytotypes, as in *I. cairica* (L.) Sweet, *I. cordatotriloba* Dennst., *I. gracilis* R.Br., and *I. trifida* (Kunth) G.Don (Darlington & Wylie, 1956; Jones, 1970; Yen & al., 1992; Ozias-Akins & Jarret, 1994; Chiarini, 2000), while others are possibly only polyploids, as *I. batatas*, *I. biflora* (L.) Pers., *I. lonchophylla* J.M.Black., *I. racemigera* F.Muell. and *I. saintronanensis* R.W.Johnson (Sampathkumar, 1968; Yen & al., 1992; Ozias-Akins & Jarret, 1994).

Jacquemontia stands out for its taxonomic complexity, related to the overlapping of morphological characteristics (Buril & Alves, 2011; Buril & Staples, 2018). With only 6% of the species cytologically known, chromosome numbers range from 2*n* = 18 (Lewis & al., 1962; Jones, 1968; Sampathkumar, 1979; Coleman, 1982; Yeh & Tsai, 1995; Pitrez & al., 2014) to 2*n* = 20 (Robertson, 1970; Sampathkumar, 1979), showing that dysploidy is related to chromosome variation in *Jacquemontia*. Our data, in addition to confirming the dysploid variation of previous records, also show that polyploidy occurs in the genus. Both polyploids presented here belong to the taxonomically problematic group designated by Buril (2013) as the *J. pentanthos* complex. The combination of different mechanisms of karyotype evolution in the same lineage can be observed in other genera of Convolvulaceae, such as in *Convolvulus* (Sa'ad, 1967; Ward, 1984; Luque & Lifante, 1994; Rizzotto, 2003), and also in other plant families, for example in the genus *Epidendrum* L. (Orchidaceae, see Assis & al., 2013), *Nothoscordum* Kunth (Alliaceae, see Souza & al., 2012) and *Nicotiana* L. (Solanaceae, see Chase & al., 2003).

Although relatively common in Convolvulaceae, the effects of polyploidy and/or dysploidy on the diversification of its species are poorly understood. We are well informed that chromosome changes are important forces in the evolution of plant species (Dodsworth & al., 2016; Carta & al., 2018), but whether they present a direct effect or are randomly associated with speciation events remains unclear. Especially in Convolvulaceae, the lack of well-supported phylogenies clarifying the infrageneric relationships and the lack of chromosome data make it difficult to address important questions about its basic number and the roles of chromosome changes in speciation. Despite all these problems, it is already clearly demonstrated the diversity of scenarios reflecting different chromosome changes strategies seems to be not random in Convolvulaceae, making the family an interesting group of plants to study chromosome evolution.

METHODS

For mitotic analyzes, root tips were pretreated with 0.002 M 8-hydroxyquinoline at 10°C for 24 h, fixed in Carnoy 3 : 1 absolute ethanol/glacial acetic acid (v/v) for 3 h at room temperature. To prepare the slides, the root tips were digested in an enzymatic solution containing 2% cellulase and 20% pectinase, and kept in a humid chamber at 37°C for 2 h. The slides were stained with 10 µl of DAPI (2 mg/ml) for 30 min, mounted in glycerol/McIlvaine buffer (pH 7.0) (1 : 1, v/v) (Guerra & Souza, 2002). The best metaphases/pro-metaphases were captured in a Zeiss photomicroscope with Axio Cam MRC5 using the software Axiovision v.4.8.

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