

Supplementary material

Supplementary material Appendix 1, Table A1. Previous studies of chromosome numbers in *Polygonatum*.

Species	Chromosome number	Reference
<i>P. alcutum</i> A. Gray	2n=20	Lee, 1967
<i>P. acuminatifolium</i> Komarov	2n=20	Chen and Tamura, 2000
<i>P. adnatum</i> S. Yun Liang	2n=22	Deng et al., 2009
<i>P. alternicirrhosum</i> Handel-Mazzetti	2n=32	Chen, 1989
<i>P. arisanense</i> Hayata	2n=22,44	Chen and Tamura, 2000
<i>P. biflorum</i> (Walter)Elliott	2n=20,40	Love and Love,1981; Hill, 1995; Dale et al., 2002
<i>P. cathcartii</i> Baker	2n=30+2Bs	Wang et al., 1993
<i>P. cirrhifolium</i> (Wallich) Royle	2n=20,30, 32, 38, 52, 56	Kumar, 1959; Wang et al., 1987; Roy et al., 1988; Chen,1989; Gu et al., 1993; Tamura, 1993; Wang et al., 1993; Gu & Sun, 1996
<i>P. cryptanthum</i> H. Lév.	2n=18	Tamura, 1990; Han et al., 1998; Lattoo et al., 2005
<i>P. curvistylum</i> Hua	2n=28, 30, 38,78	Yang et al., 1988; Wang et al., 1993
<i>P. cyrtonema</i> Hua	2n=18,20,22	Fang et al., 1984; Wang et al., 1987; Chen, 1989; Tamura et al., 1990; Wang et al., 1991; Shao et al., 1993; Wu et al., 2001; Jin et al., 2002; Chen and Zhou., 2005
<i>P. desoulavyi</i> Kom.	2n=18,20	Han et al.1998; Probatova, 2006.
<i>P. desoulayi</i> Kom	2n=22	Shao et al., 1993
<i>P. domonense</i> Satake	2n=19	Tamura, 1990

<i>P. falcatum</i> A. Gray	$2n = 18$	Han et al., 1998
<i>P. filipes</i> Merr. ex C. Jeffrey & McEwan	$2n=14,16,18,22$	Fang et al., 1984; Wang et al., 1987; Fang, 1989; Shao et al., 1993; Jin et al., 2002
<i>P. franchetii</i> Hua	$2n=18,20,22, 26$	Yang et al., 1988; Shao et al., 1994
<i>P. grandicaule</i> Y.S. Kim, B.U. Oh & C. G. Jang	$2n=18$	Han et al., 1998
<i>P. geminiflorum</i> Decne	$2n=30$	Pandita, 1979; Pandita and Mehra. 1982
<i>P. glaberrimum</i> C.Koch.	$2n=20$	Davlianidze, 1985
<i>P. griffithii</i> Baker	$2n=36$	Gu and Sun, 1996,1998
<i>P. hirtellum</i> Handel-Mazzetti	$2n=28,56$	Deng et al., 2009
<i>P. hookeri</i> Baker	$2n=30$	Gu and Sun, 1998
<i>P. humile</i> Fisch. ex Maxim.	$2n=20,30,31$	Lee et al., 1967; Kartashova et al., 1974; Kim and Kim, 1979; Nishikawa, 1985; Wang et al., 1987; Hong and Zhu, 1990; Hong and Sauer. 1990; Tamura, 1990; Malakhova and Markova. 1994; Han et al., 1998
<i>P. inflatum</i> Kom.	$2n=22, 22+1B$	Kim and Kim,1979; Tamura, 1990; Yang et al., 1992; Han et al., 1998
<i>P. infundiflorum</i> Y.S. Kim, B.U. Oh & C. G. Jang	$2n=18$	Han et al., 1998
<i>P. involucratum</i> (Franch. & Sav.) Maxim.	$2n=18,20,22$	Lee, 1967; Kim and Kim,1979; Wang et al., 1987; Tamura, 1990; Han et al.1998
<i>P. kingianum</i> Collett & Hemsl.	$2n=26; 30$	Yang et al., 1988; Chen, 1989; Tamura, 1993; Wang et al., 1993; Deng et al., 2009
<i>P. kiotense</i> N. Yonez.	$2n=18$	Yonezawa, 1998.
<i>P. lasianthum</i> Maxim.	$2n=20$	Tanaka, 1981; Han et al., 1998

<i>P. latifolium</i> (Jacq.) Desf.	$2n=20$	Dale et al., 2002; Weiss-Schneeweiss and Jang, 2003
<i>P. macranthum</i> (Maxim.) Koidz.	$2n=20, 22, 22+1B, 22+3B$	Tamura., 1990
<i>P. macropodium</i> Turcz.	$2n=22$	Wang et al., 1987, 1988
<i>P. maximowiczii</i> F. Schmidt	$2n=20$	Sokolovskaya and Probatova, 1985
<i>P. megaphyllum</i> P.Y. Li	$2n=22$	Yang et al., 1992, Tamura, 1993; Fan et al., 2000
<i>P. miserum</i> Satake	$2n=19$	Tamura, 1990
<i>P. odoratum</i> (Mill.) Druce	$2n=16, 18, 20, 20+2B, 22, 30$	Nowakowska and Zeglicka, 1972. Abramova, 1975; Krogulevich, 1978; Krasnoborov et al., 1980; Li, 1980; Abramova, 1981; Arohonka, 1982; Scrugli, 1982; Krasnikova et al., 1983; Dmitrieva & Parfenov. 1985; Laane and Lie. 1985; Dmitrieva, 1986; Wang et al., 1987, 1988; Chen, 1989; Fang, 1989; Abramova, 1990; Hong and Zhu, 1990; Ma et al., 1990; Wang et al., 1991; Kirschner and tĕpánek. 1992; Malakhova and Fartdinova. 1992; Měsíček, 1992; Shang et al., 1992; Shao et al., 1993; Tamura, 1993; Malakhova and Markova, 1994; Druskovic and Lovka. 1995; Sha et al., 1995; Dobeá and Hahn. 1997; Degtyarev and Punina, 1999; Lökvist and Hultg ård. 1999; Fan et al., 2000; Wu et al., 2001; Baltisberger et al., 2002; Weiss-Schneeweiss and Jang, 2003; Chen and Zhou, 2005; Shatokhina, 2006; Elena Rossell ó et al., 2009
<i>P. omeiense</i> Z. Y. Zhu	$2n=22$	Deng et al., 2009
<i>P. oppositifolium</i> (Wall.) Royle	$2n=24, 30$	Malla et al., 1981; Roy et al., 1988; Tamura, 1993; Gu and Sun, 1996, 1998
<i>P. polyanthemum</i> (M. Bieb.) A. Dietr.	$2n=18, 27$	Gagnidze et al., 1985; Abramova, 1990; Daniela, 1997; Pogosian, 1997;

		Gadnidze et al., 1998
<i>P. prattii</i> Baker	2n=28, 56	Yang et al., 1992; Tamura, 1993
<i>P. pruinosum</i> Boiss.	2n=20	Strid and Franzen. 1981
<i>P. pubescens</i> (Willd.) Pursh	2n=20	Gervais, 1981. Dale et al., 2002
<i>P. punctatum</i> Royle ex Kunth	2n=30, 32, 90	Chen, 1989; Yang et al., 1992; Tamura, 1993
<i>P. robustum</i> (Korsh.) Nakai.	2n=20	Han et al., 1998
<i>P. roseum</i> (Ledebour) Kunth	2n=28	Chen and Tamura, 2000
<i>P. sibiricum</i> Redouté	2n=22, 24	Fang et al., 1984; Wang et al., 1987; Fang, 1989; Han et al., 1998
<i>P. stenophyllum</i> Maxim.	2n=20, 24, 30	Lee, 1967; Yang et al., 1992; Han et al., 1998; Probatova, 2006
<i>P. stewartianum</i> Diels	2n=28,56	Tamura, 1993; Chen and Tamura, 2000
<i>P. tessellatum</i> F.T. Wang & T. Tang	2n=30, 60	Tamura, 1993; Deng et al., 2009
<i>P. trichosantherum</i> Koidz.	2n=18	Tamura, 1990; Han et al., 1998
<i>P. verticillatum</i> (L.) All.	2n=16,18,22,24,28,30,54,56, 56+1B , 58,60,64,66,84,86-91	Kumar, 1959; Pandita and Mehra. 1982; Wang et al., 1987; Chen, 1989; Shao et al., 1993; Tamura, 1993; Deng et al., 2009
<i>P. zanlanscianense</i> Pamp.	2n=22,28,28+1B, 30,32	Fang et al., 1984; Yang et al., 1988; Chen, 1989; Fang, 1989; Shang et al., 1992; Chen and Zhou., 2005; Deng et al., 2009

Supplementary material Appendix 2, Table A2. The karyotypes of 25 Chinese *Polygonatum* species studied in previous research.

Species	Karyotype formula	Reference
<i>P. adnatum</i>	$2n=22=2m+16sm(1sat)+4st$	Deng et al., 2009
	$2n=22=2m+18sm(4sat)+2st$	Deng et al., 2009
	$2n=22=6sm(2sat)+14sm+2st$	Deng et al., 2009
<i>P. alternicirrhosum</i>	$2n=32=18m(2sat)+8sm+6st$	Chen, 1989
<i>P. cathcartii</i>	$2n=30+2Bs=12m+6sm+10st+2t+2Bs$	Wang et al., 1993
<i>P. cirrhifolium</i>	$2n=20=12m(2sc)+8sm$	Wang et al., 1987
	$2n=30=10m+4sm+12st+4t$	Wang et al., 1993
	$2n=56=28m+10sm+18st$	Chen, 1989
<i>P. cyrtoneuma</i>	$2n=18=14m(4sat)+2sm+2st$	Fang et al., 1984
	$2n=18=8m(2sat)+6sm+4st$	Shao et al., 1993
	$2n=20=14m+6sm$	Chen, 1989
	$2n=20=8m+6sm+6st$	Wang et al., 1987
	$2n=22=6m+8sm+4st+4t$	Shao et al., 1993
	$2n=22=2m+18sm+2st$	Chen and Zhou., 2005
	$2n=22=8m+8sm(2sc)+6st(2sc)$	Wang et al., 1987
<i>P. curvistylum</i>	$2n=28=14m+6sm+6st+2t$	Yang et al., 1988
	$2n=30=14m(2sat)+4sm+10st+2t$	Yang et al., 1988
<i>P. desoulavii</i>	$2n=22=10m(2sat)+6sm(1sat)+6st$	Shao et al., 1993
<i>P. filipes</i>	$2n=14=10m+4sm$	Shao et al., 1993
	$2n=16=10m+4sm+2st$	Wang et al., 1987
	$2n=16=8m+4sm+4st$	Shao et al., 1993
	$2n=18=10m(2sat)+8sm(2sat)$	Fang, 1989
	$2n=22=8m+8sm(2sat)+6st$	Shao et al., 1993
<i>P. franchetii</i>	$2n=22=8m+8sm(2sat)+6st$	Shao et al., 1994
	$2n=18=4m+8sm+4st+2T$	Shao et al., 1994
	$2n=20=2m+14sm+4st$	Shao et al., 1994
	$2n=26=10m+4sm+12st$	Yang et al., 1988
<i>P. hirtellum</i>	$2n=28=12m+6sm+8st+2t$	Deng et al., 2009
	$2n=56=16m+28sm+12st$	Deng et al., 2009
<i>P. humile</i>	$2n=20=10m(2sat)+6sm(2sat)+4st$	Hong and Zhu, 1990
	$2n=20=12m(2sat)+4sm+4st$	Unknown

	$2n=20=8m(2sc)+8sm+4st$	Wang et al., 1987
<i>P. inflatum</i>	$2n=22=6m+6sm+10st$	Yang et al., 1992
<i>P. involucreatum</i>	$2n=18=8m+10sm$	Wang et al., 1987
<i>P. kingianum</i>	$2n=26=20sm(2sat)+6st(2sat)$	Deng et al., 2009
	$2n=26=2m+16sm(4sat)+8st(2sat)$	Deng et al., 2009
	$2n=26=4m+14sm+8st$	Chen, 1989
	$2n=26=6m+12sm(2sat)+8st(2sat)$	Yang et al., 1988
	$2n=26=6m+14sm+6st$	Deng et al., 2009
	$2n=30=12m(4SAT)+6sm+10st+2t$	Wang et al., 1993
<i>P. macropodum</i>	$2n=22=14(4sat)+2sm(sat)+6st$	Wang et al., 1987
<i>P. megaphyllum</i>	$2n=22=4m+12sm+6st$	Fan et al., 2000
	$2n=22=4m+12sm+6st$	Yang et al., 1992
	$2n=22=4m+12sm+6st$	Fan et al., 2000
<i>P. odoratum</i>	$2n=16=10m(3sat)+6sm$	Shao et al., 1993
	$2n=18=10m(1sat)+2sm+6st(2sat)$	Shao et al., 1993
	$2n=18=10m+8sm$	Fang, 1989
	$2n=18=8m+10sm$	Fang, 1989
	$2n=18=8m+10sm(3sat)$	Chen and Zhou, 2005
	$2n=20=10m+10sm(3sat)$	Hong and Zhu, 1990
	$2n=20=10m+6sm+4st$	Chen, 1989
	$2n=20=12m(2sat)+8sm$	Fan et al., 2000
	$2n=20=12m(4sat)+8sm$	Hong and Zhu, 1990
	$2n=20=12m+8sm$	Wang et al., 1987
	$2n=20=14m+6sm$	Fang, 1989
	$2n=20=12m+8sm$	Shang et al., 1992
	$2n=20=14m+6sm$	Hong and Zhu, 1990
	$2n=20=12m(4sat)+8sm$	Hong and Zhu, 1990
	$2n=22=10m+8sm+4st$	Fang, 1989
	$2n=22=10m+8sm+4st$	Fang, 1989
	$2n=22=8m+8sm+6st$	Li, 1980
	$2n=22=10m+8sm+4st$	Fang, 1989
<i>P. omeiense</i>	$2n=22=8m+12sm+2st$	Deng et al., 2009
<i>P. prattii</i>	$2n=28=6m+8sm+14st$	Yang et al., 1992
<i>P. punctatum</i>	$2n=32=20m+2sm+8st+2t$	Chen, 1989

<i>P. sibiricum</i>	$2n=24=2m+12sm+8st+2t$	Fang, 1989; Chen, 1989
<i>P. stenophyllum</i>	$2n=30=12m+12sm+6st$	Yang et al., 1992
<i>P. tessellatum</i>	$2n=30=10m+6sm(1sat)+14st(2sat)$	Deng et al., 2009
<i>P. verticillatum</i>	$2n=24=6m+4sm+12st+2T$	Shao et al., 1993
	$2n=30=18m(2sat)+2sm(2sat)+8st+2t$	Deng et al., 2009
	$2n=30=18m+2sm+10st(1sat)$	Deng et al., 2009
	$2n=30=8m+14sm(2sat)+8st(2sat)$	Deng et al., 2009
	$2n=24=2m+6sm+14st(2sat)+2t$	Chen, 1989
	$2n=24=4m+8sm(2sc)+12st(2sc)$	Wang et al., 1987
	$2n=30+1B=14m(1sat)+6sm+10st+1B$	Deng et al., 2009
	$2n=30=18m(2sat)+2sm+10st$	Deng et al., 2009
<i>P. zanzlanescianense</i>	$2n=30=16m+6sm+8st$	Deng et al., 2009
	$2n=30+1B=12m(1sat)+8sm+10st+1B$	Deng et al., 2009
	$2n=30=16m(2sat)+6sm+6st+2t$	Chen, 1989
	$2n=30=12m+8sm+10st$	Yang et al., 1988
	$2n=28=16m+6sm+6st$	Fang, 1989
	$2n=30=18m(2sat)+4sm+6st+2t$	Shang et al., 1992
	$2n=28=10m+8sm+10st$	Chen and Zhou., 2005

Supplementary material Appendix 3, Table A3. List of the taxa included in this study and their sampling locality and voucher information.

Species	Voucher	Locality
<i>Polygonatum involucratum</i> (Franchet & Savatier) Maximowicz	zhao10071804, SZ	Xiaowutaishan, Hebei
<i>P. megaphyllum</i> P. Y. Li	zhao09072401, SZ	Xinglongshan, Gansu
	zhao10081501, SZ	Huashan, Shaanxi
<i>P. odoratum</i> (Miller) Druce	zhao09195, SZ	Jinfoshan, Chongqing
	zhao09072506, SZ	Xinglongshan, Gansu
	zhao10070701, SZ	Jigongshan, Henan
	zhao10070703, SZ	Jigongshan, Henan
	zhao10071107, SZ	Langyashan, Anhui
	zhao10071902, SZ	Xiaowutaishan, Hebei
	zhao10072101, SZ	Zanhuang, Hebei, CN.
	zhao10081504, SZ	Huashan, Shaanxi
	zhao10081506, SZ	Huashan, Shaanxi
<i>P. adnatum</i> S. Yun Liang,	zhao10060101, SZ	Leibo, Sichuan
<i>P. macropodum</i> Turczaninow	zhao10071405, SZ	Songshan, Beijing
<i>P. filipes</i> Merrill ex C. Jeffrey & McEwan	zhao20100731, SZ	Tianmushan, Zhejiang
<i>P. punctatum</i> Rayle ex Kunth	zhao10070907, SZ	Tiantangzhai, Anhui
<i>P. cyrtoneura</i> Hua	zhao10071101, SZ	Langyashan, Anhui
	zhao10071103, SZ	Langyashan, Anhui
	zhao10071105, SZ	Langyashan, Anhui
<i>P. jinzhaiense</i> D. C. Zhang & J. Z. Shao	zhao10070905, SZ	Tiantangzhai, Anhui
	zhao10070906, SZ	Tiantangzhai, Anhui
<i>P. nodosum</i> Hua	zhao09060803, SZ	Lixian, Sichuan
	zhao09060807, SZ	Lixian, Sichuan
<i>P. hookeri</i> Baker	zhao11062405, SZ	Jiuzhaigou, Sichuan
<i>P. alternicirrhosum</i> Handel-Mazzetti	zhao09062503, SZ	Kangding, Sichuan
	zhao09062510, SZ	Kangding, Sichuan
<i>P. verticillatum</i> (Linnaeus) Allioni	zhao10082905, SZ	Emei Mountain, Sichuan
<i>P. gracile</i> P. Y. Li	zhao09072504, SZ	Xinglongshan, Gansu
<i>P. sibiricum</i> Redoute	zhao10071102, SZ	Langyashan, Anhui

	zhao10071106, SZ	Langyashan, Anhui
	zhao10071304, SZ	Songshan, Beijing
	zhao10071404, SZ	Songshan, Beijing
	zhao10071406, SZ	Songshan, Beijing
	zhao10071502, SZ	Songshan, Beijing
	zhao10071801, SZ	Xiaowutaishan, Hebei
	zhao10072201, SZ	Zanhuang, Hebei
<i>P. cirrhifolium</i> (Wallich) Royle	zhao09062702, SZ	Kangding, Sichuan
	zhao09072509, SZ	Xinglongshan, Gansu
	zhao10081503, SZ	Huashan, Shaanxi
	zhao10081601, SZ	Huayang, Shaanxi
	zhao10082903, SZ	Emei Mountain, Sichuan
	zhao10091301, SZ	Rangtang, Sichuan
<i>P. cirrhifliodes</i> D. M. Liu & W. Z. Zeng	zhao09062506, SZ	Kangding, Sichuan
<i>P. stewartianum</i> Diels	zhao10091201, SZ	Rangtang, Sichuan
<i>P. zanlanscianense</i> Pampanini	zhao09062101, SZ	Baoxing, Sichuan
	zhao0918, SZ	Lixian, Sichuan
	zhao10051212, SZ	Jiangyou, Sichuan
	zhao10060102, SZ	Leibo, Sichuan
	zhao10070705, SZ	Jigongshan, Henan
	zhao10070903, SZ	Tiantangzhai, Anhui
	zhao10081602, SZ	Huayang, Shaanxi

Supplementary material Appendix 4, Figure A1- A9.

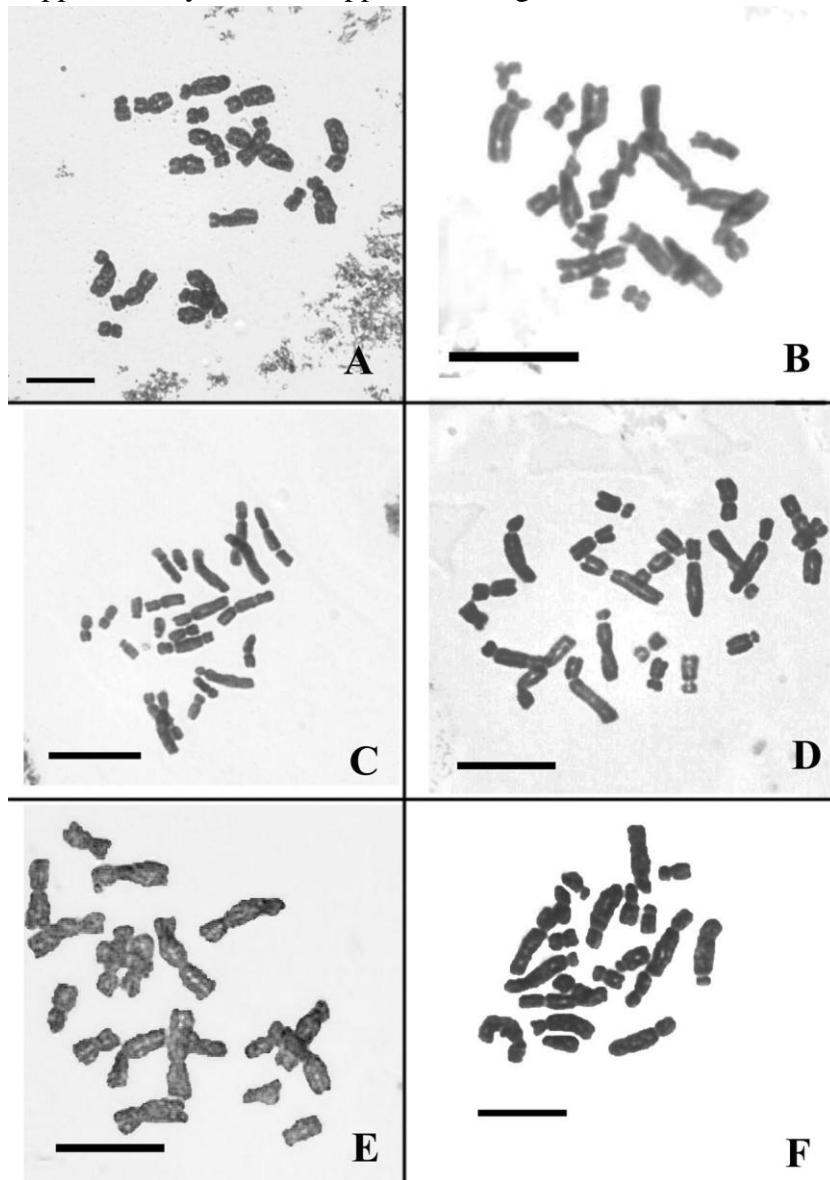


Figure. A1. Mitotic metaphase plates of species in *Polygonatum*. A. *P. involucratum* (zhao10071804). B. *P. megaphyllum* (zhao09072401). C. *P. megaphyllum* (zhao10081501). D. *P. odoratum* (zhao09195). E. *P. odoratum* (zhao09072506). F. *P. odoratum* (zhao10070701). Scale bars=10 μ m

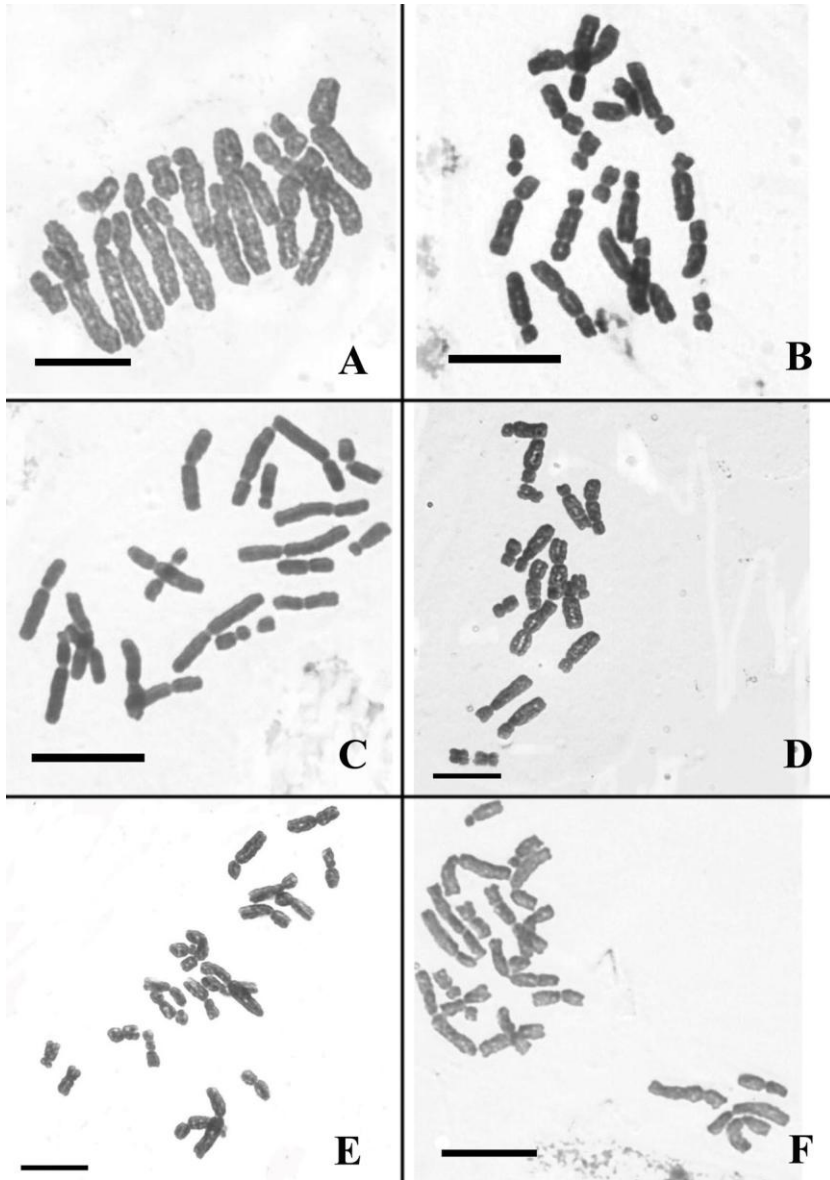


Fig. A2. Mitotic metaphase plates of species in *Polygonatum*. A. *P. odoratum* (zhao10070703). B. *P. odoratum* (zhao10071107). C. *P. odoratum* (zhao10071902). D. *P. odoratum* (zhao10072101). E. *P. odoratum* (zhao10081504). F. *P. odoratum* (zhao10081506). Scale bars=10 μ m

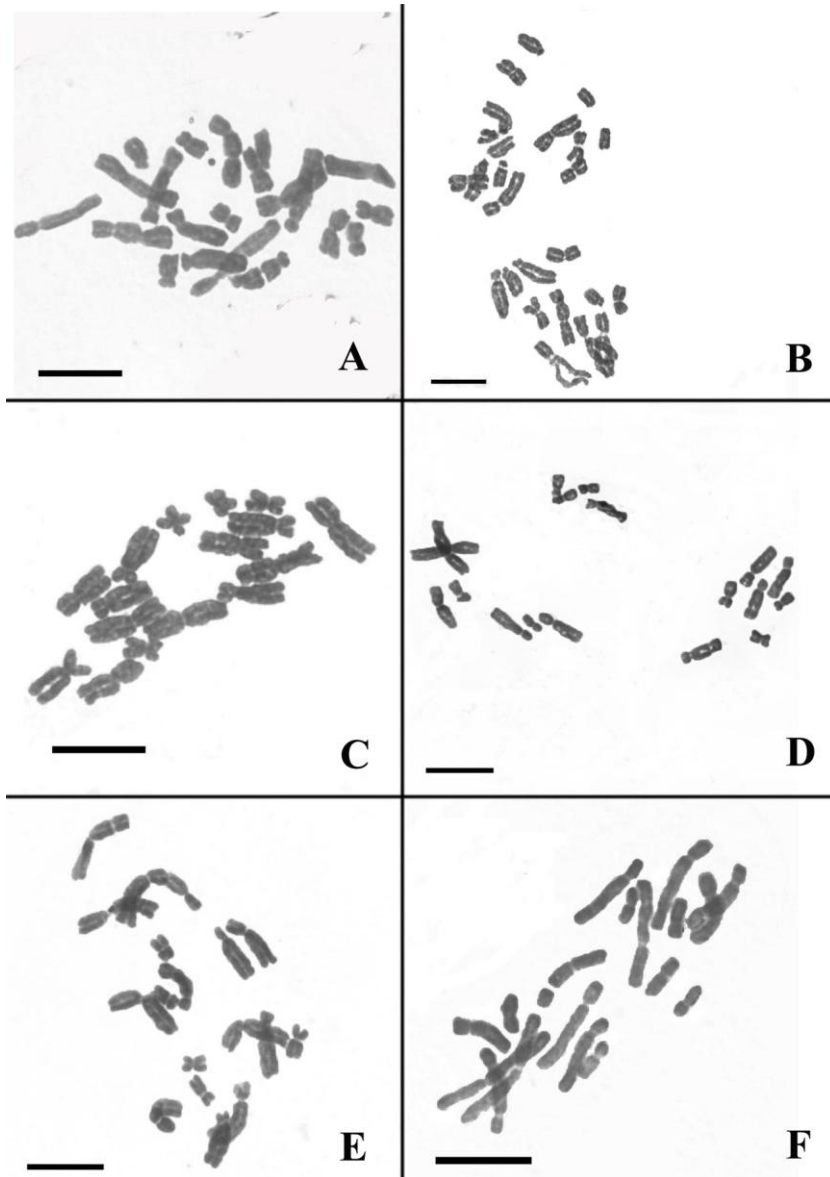


Fig. A3. Mitotic metaphase plates of species in *Polygonatum*. A. *P. adnatum* (zhao10060101). B. *P. macropodum* (zhao10071405). C. *P. filipes* (zhao20100731).D. *P. punctatum* (zhao10070907).E. *P. cyrtonema* (zhao10071101).F. *P. cyrtonema* (zhao10071103). Scale bars=10 μ m

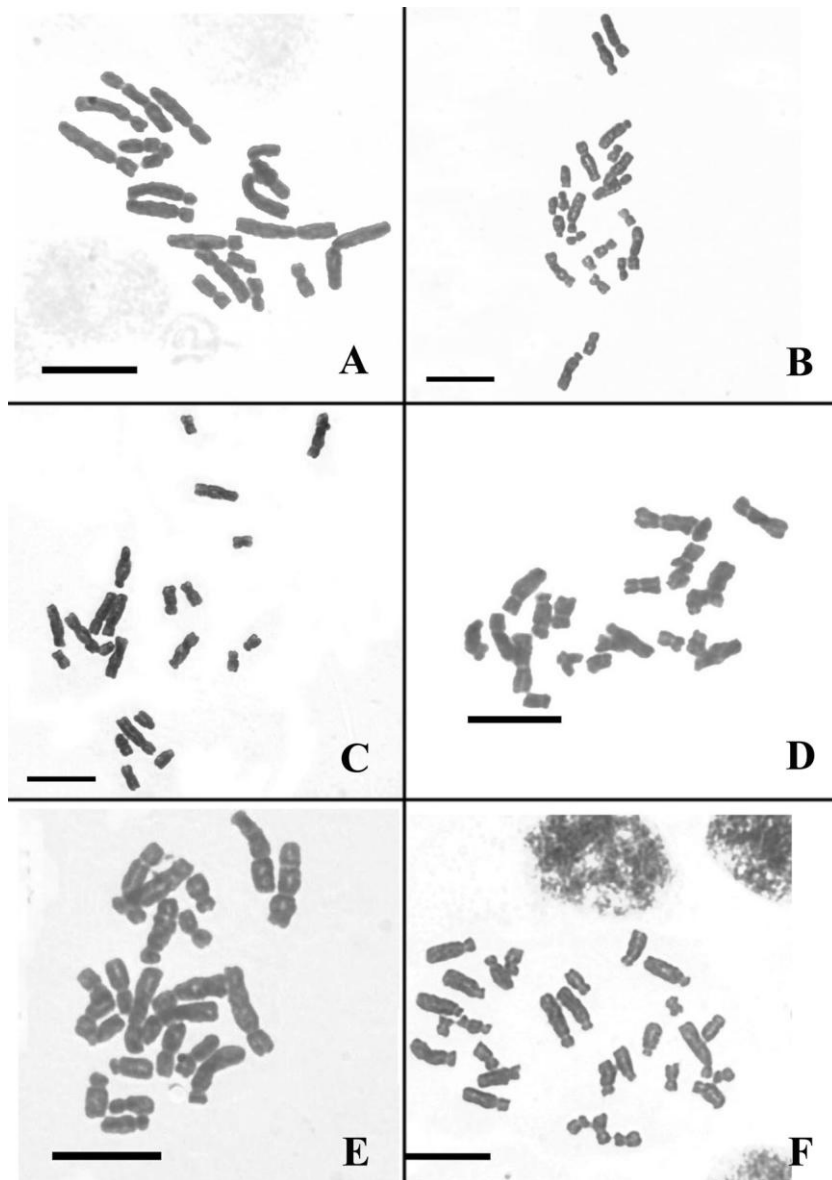


Fig. A4. Mitotic metaphase plates of species in *Polygonatum*. A. *P. cyrtonea* (zhao10071105). B. *P. jinzhaiense* (zhao10070905). C. *P. jinzhaiense* (zhao10070906). D. *P. nodosum* (zhao09060803). E. *P. nodosum* (zhao09060807). F. *P. hookeri* (zhao11062405). Scale bars=10 μ m

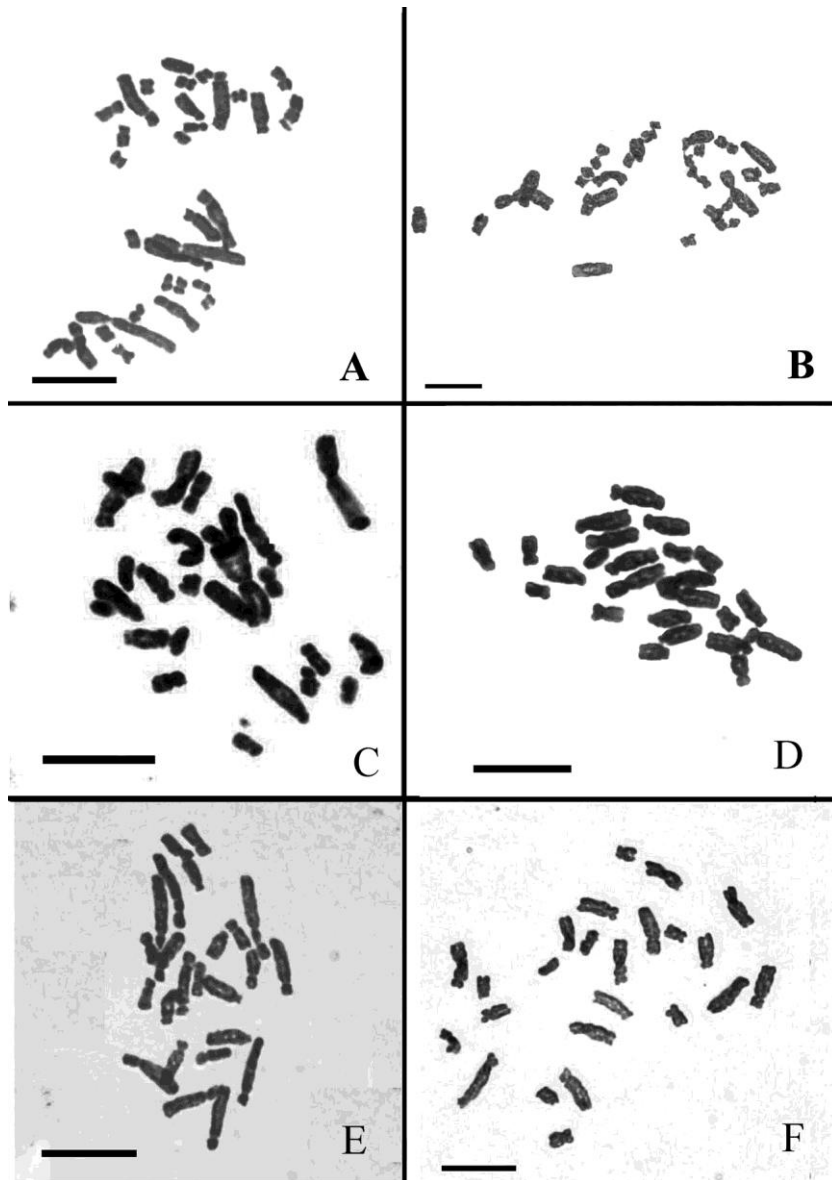


Fig. A5. Mitotic metaphase plates of species in *Polygonatum*. A. *P. alternicirrhosum* (zhao09062503). B. *P. alternicirrhosum* (zhao09062510). C. *P. gracile* (zhao09072504). D. *P. sibiricum* (zhao10071102). E. *P. sibiricum* (zhao10071106). F. *P. sibiricum* (zhao10071304). Scale bars=10 μ m

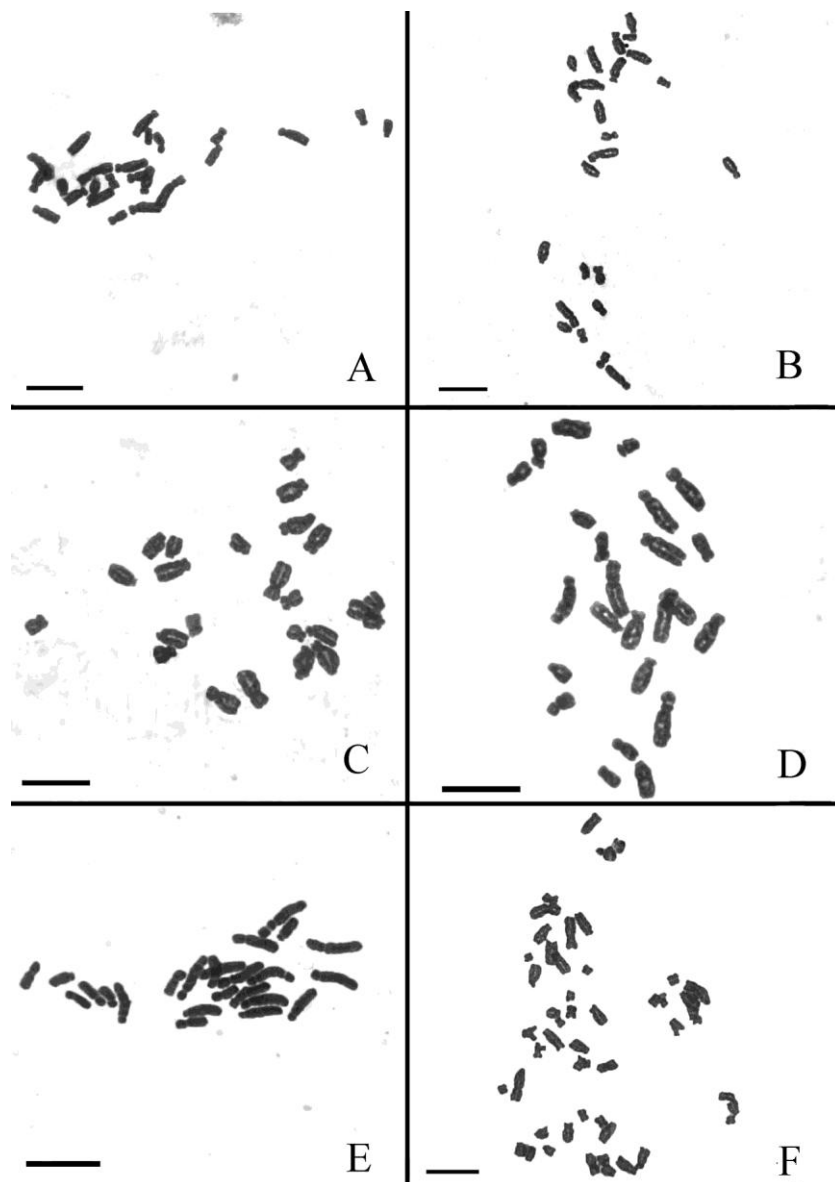


Fig. A6. Mitotic metaphase plates of species in *Polygonatum*. A. *P. sibiricum* (zhao10071404). B. *P. sibiricum* (zhao10071406). C. *P. sibiricum* (zhao10071502). D. *P. sibiricum* (zhao10071801). E. *P. sibiricum* (zhao10072201). F. *P. cirrhifolium* (zhao09062702). Scale bars=10 μ m

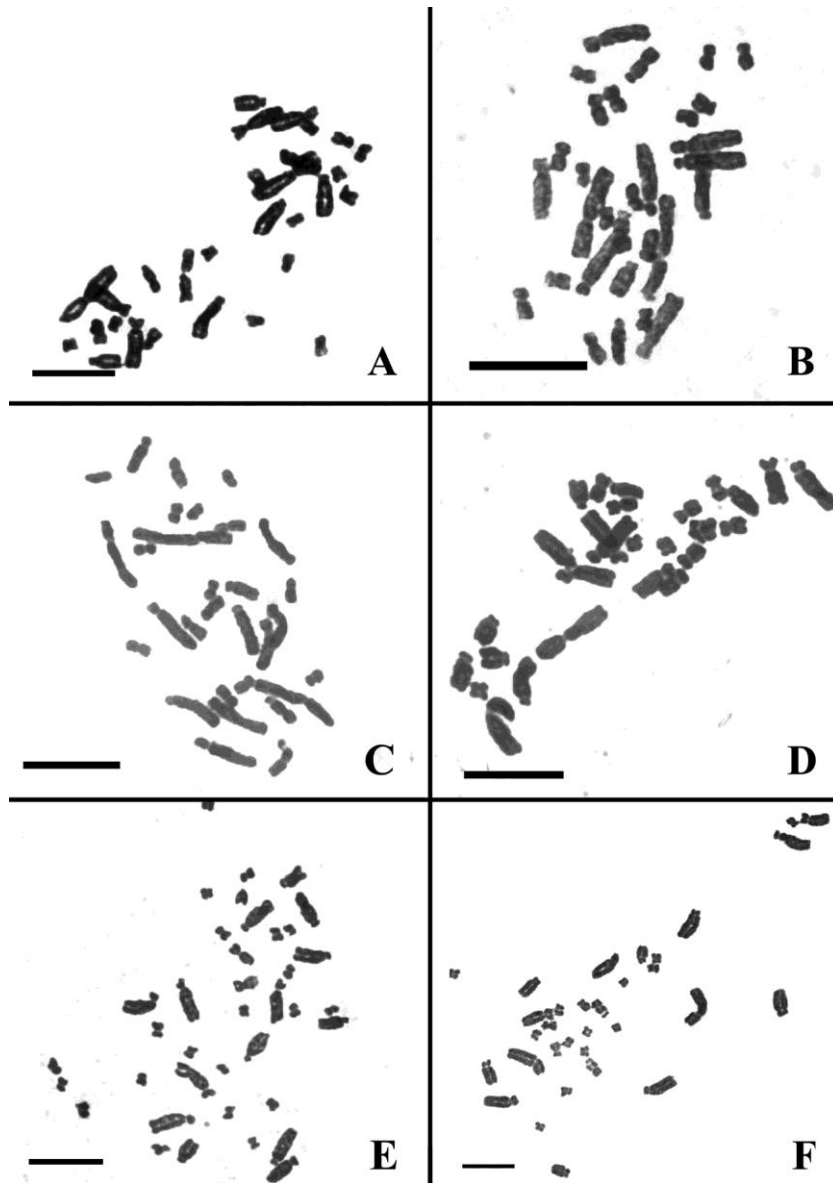


Fig. A7. Mitotic metaphase plates of species in *Polygonatum*. A. *P. cirrhifolium* (zhao09072509). B. *P. cirrhifolium* (zhao10081503). C. *P. cirrhifolium* (zhao10081601). D. *P. cirrhifolium* (zhao10082903). E. *P. cirrhifolium* (zhao10091301). F. *P. alternicirrhosum* (zhao09062506). Scale bars=10 μ m

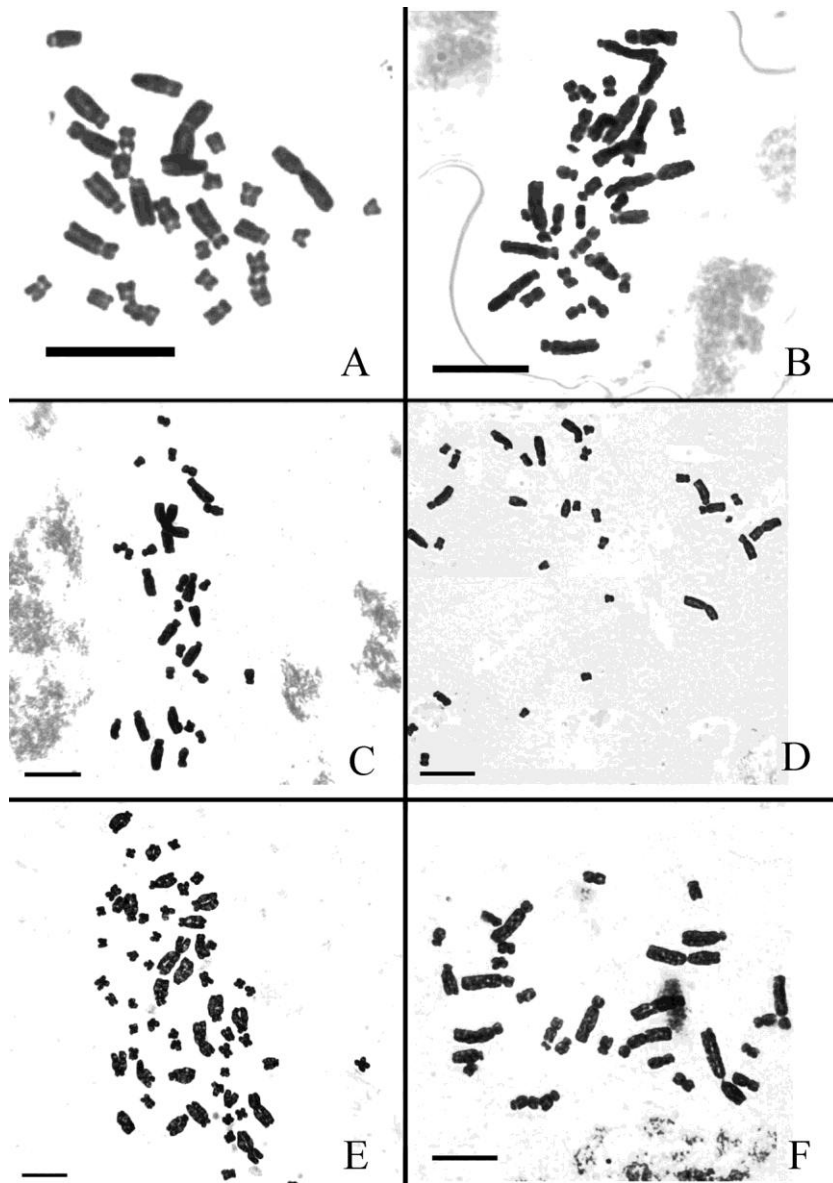


Fig. A8. Mitotic metaphase plates of species in *Polygonatum*. A. *P. zanlanscianense* (zhao09062101). B. *P. zanlanscianense* (zhao0918). C. *P. zanlanscianense* (zhao10051212). D. *P. zanlanscianense* (zhao10060102). E. *P. zanlanscianense* (zhao10070705). F. *P. zanlanscianense* (zhao10070903). Scale bars=10 μ m

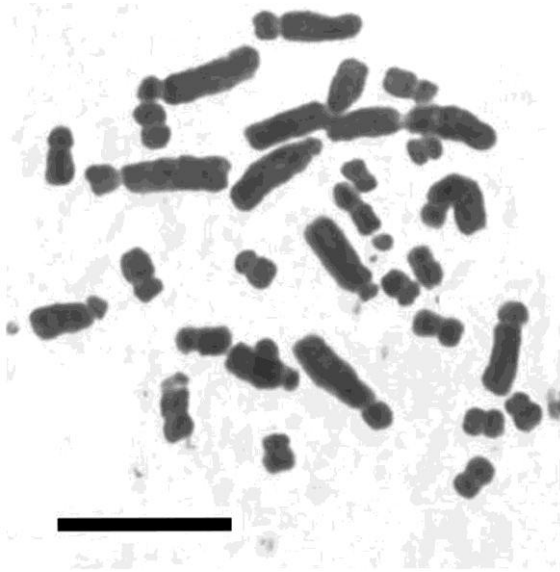


Fig. A9. Mitotic metaphase plates of *Polygonatum zanlanscianense* (zhao10081602). Scale bars=10 μ m