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Mediterranean chromosome number reports – 25

edited by G. Kamari, C. Blanché & S. Siljak-Yakovlev

Abstract

Kamari, G., Blanché, C. & Siljak-Yakovlev, S. (eds): Mediterranean chromosome number reports – 25. — Fl. Medit. 25: 143-167. 2015. — ISSN: 1120-4052 printed, 2240-4538 online.

This is the twenty-fifth of a series of reports of chromosomes numbers from Mediterranean area, peri-Alpine communities and the Atlantic Islands, in English or French language. It comprises contributions on 23 taxa: *Sisymbrium*, *Eremobium*, *Erysimum* and *Schouwia* from Libya and Egypt, by F. Altınordu, K. Abdel Khalik & E. Martin (Nos 1845-1849); *Bellevalia* from Israel and Turkey, by P. Bareka (Nos 1850-1851); *Atriplex*, *Bassia*, *Salicornia*, *Salsola* and *Suaeda* from Bulgaria, by N. Grozeva (Nos 1852-1858); *Centaurea*, *Lunaria* and *Taraxacum* from Greece and Cyprus, by E. Liveri, P. Bareka & G. Kamari (Nos 1859-1862); *Delphinium* from Spain, Canary Islands, Balearic Islands, France, Corsica, Italy and Kriti, by M. R. Orellana, A. Rovira, C. Blanché, J. Simon & M. Bosch (No 1863); *Ajuga*, *Arisarum*, *Muscari* and *Silene* from Greece and Cyprus, by S. Samaropoulou, P. Bareka & G. Kamari (Nos 1864-1867).

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Reports (1845-1849) by F. Altınordu, K. Abdel Khalik & E. Martin

1845. ***Sisymbrium runcinatum*** Lag. ex DC. **—** $2n = 18$ (Fig. 1).

Li: Libya, El Mekhali, *El Naggar* s.n. (SHG).

From the chromosome numbers previously reported for some species of genus *Sisymbrium* L., $2n = 14$ and 28 are the most common reported chromosome numbers in the genus (Lifante & al. 1992; Jeelani & al. 2013).

Our result, $2n = 18$, is a new record of a new population of Libya and is not in accordance to the previous references, with $2n = 14$, 21, 28, 42, 56 chromosomes (Manton 1932; Baez 1933; Khoshoo 1959). The cause of different gametophytic counts might be Robertsonian translocations or detachment of secondary constrictions (SC), which can be counted as extra chromosomes. The karyotype formula of this taxon consists of six median pairs (m) and three submedian pairs (sm). Regarding karyotype asymmetry index, karyotype of this taxon is classified as 2A according to symmetry classes of Stebbins (1971). The other karyotype asymmetry indices are 41%, 59%, 69, 69, 0.19, 0.31 and 0.20 for TF% (Huziwara 1962), AsK% (Arano 1963), Syi (Greilhuber & Speta 1976), Rec (Greilhuber & Speta 1976), A (Watanabe & al. 1999), A_1 and A_2 (Romero Zarco 1986), respectively.

1846. ***Sisymbrium orientale*** L. **—** $2n = 18$ (Fig. 2).

Eg: Egypt, S. Sinai, DeirFeiran, WadiFeiran, *Abdel Khalik* 11 (SHG).

The chromosome number $2n = 14$ was previously reported for the species (Murín 1978; Runemark 2000; Gregor & Hand 2006). The somatic chromosome number $2n = 18$ counted from Egypt is in accordance with that given by Baez (1933), although reported by this author as $2n = 14 + 4$.

The karyotype formula of this taxon consists of eight median pairs (m) and one submedian pair (sm) according to Levan & al. (1964). Regarding karyotype asymmetry index, karyotype of this taxon is classified as 2A according to symmetry classes of Stebbins (1971). The other karyotype asymmetry indices are 44%, 56%, 77, 77, 0.12, 0.20 and 0.21 for TF%, As K%, Syi, Rec, A, A_1 and A_2.

1847. ***Eremobium aegyptiacum*** (Spreng.) Asch. & Schweinf. ex Boiss. subsp. ***aegyptiacum* —** $2n = 18$ (Fig. 3).

Eg: Egypt, N. Sinai, El Arish area beside the Airport, *Abdel Khalik* 29 (SHG).

There are three known chromosome numbers for the taxon $2n = 16$, 20 and $n = 13$ (Reese 1957; Rodman 1978; Khosravi & Maassoumi 1998). The chromosome number $2n = 18$ which was counted from Egypt shows that the karyotype formula of this taxon con-

sists of eight median pairs (m) and one submedian pair (sm). Regarding karyotype asymmetry index, karyotype of this taxon is classified as 2A according to symmetry classes of Stebbins (1971). The other karyotype asymmetry indices are 42%, 58%, 72, 83, 0.17, 0.28 and 0.13 for TF%, As K%, Syi, Rec, A, A_1 and A_2.

1848. ***Erysimum repandum*** L. — $2n = 16$ (Fig. 4).

Eg: Egypt, between Fuka and Matruh, *V. Täckholm* & al. s.n. (CAI).

The somatic chromosome number $2n = 16$ found in the hereby studied population is in accordance with that given by Manton (1932), Murín (1974) and Aryavand (1978) on material from Slovakia and Iran.

Additionally, in the present study the karyotype morphology and an idiogram of the taxon are given. The karyotype formula of this taxon consists of six median pairs (m) and two submedian pairs (sm). Regarding karyotype asymmetry index, karyotype of this taxon is classified as 2A according to symmetry classes of Stebbins (1971). The other karyotype asymmetry indices are 41%, 59%, 69, 84, 0.18, 0.30 and 0.15 for TF%, As K%, Syi, Rec, A, A_1 and A_2.

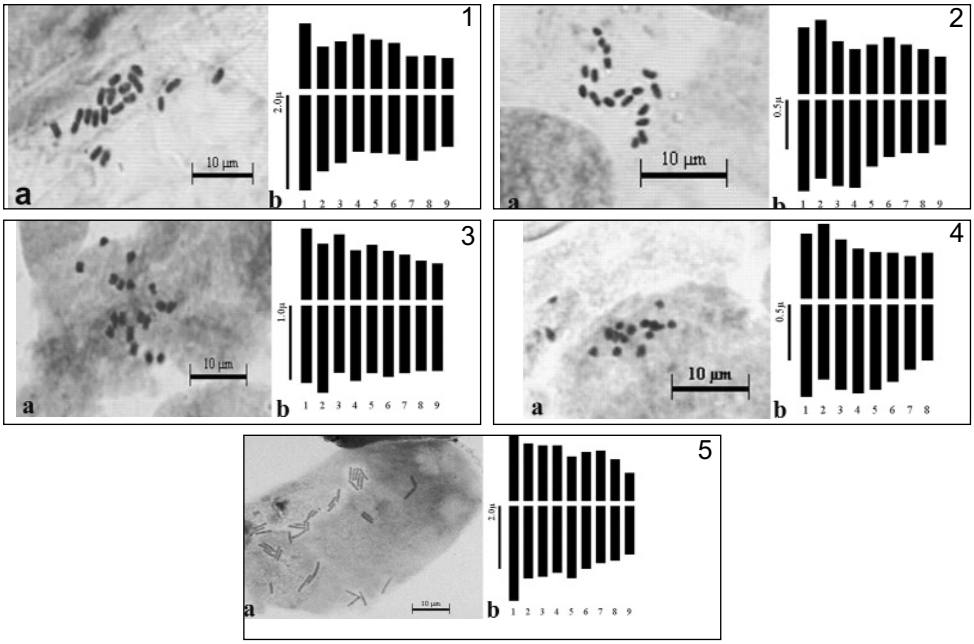

Fig. 1. **a,** Microphotograph of mitotic metaphase plate and **b,** idiogram of *Sisymbrium runcinatum*, $2n = 18$.
Fig. 2. **a,** Microphotograph of mitotic metaphase plate and **b,** idiogram of *Sisymbrium orientale*, $2n = 18$.
Fig. 3. **a,** Microphotograph of mitotic metaphase plate and **b,** idiogram of *Eremobium aegyptiacum* subsp. *aegyptiacum*, $2n = 18$
Fig. 4. **a,** Microphotograph of mitotic metaphase plate and **b,** idiogram of *Erysimum repandum*, $2n = 16$.
Fig. 5. **a,** Microphotograph of mitotic metaphase plate and **b,** idiogram of *Schouwia purpurea*, $2n = 18$.

1849. ***Schouwia purpurea*** (Forssk.) Schweinf. **—** $2n = 36$ (Fig. 5).

Eg: Egypt, Qena-Safaga desert road, *Abdel Khalik* s.n. (SHG).

Warwick & al. (1993) and El Naggar & Soliman (1999) recorded also the chromosome number $2n = 36$. This report is confirmed by the present study and additionally the karyotype morphology is given to our knowledge for the first time.

The karyotype formula of this taxon consists of eight median pairs (m) and one submedian pair (sm). Regarding karyotype asymmetry index, karyotype of this taxon is classified as 2B according to symmetry classes of Stebbins (1971). The other karyotype asymmetry indices are 43%, 57%, 76, 56, 0.14, 0.24 and 0.25 for TF%, As K%, Syi, Rec, A, A_1 and A_2.

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Reports (1850-1851) by Pepy Bareka

1850. ***Bellevalia flexuosa*** Boiss.— $2n = 2x = 8$ (Fig. 1A).

IJ: Israel: Judean Mts, 1 km W of Mraleh Khamisha, 12 km WNW of Jerusalem, terra rossa, 10 Apr 2004, *Danin Bel.83*(UPA).

Bellevalia flexuosa is an E Mediterranean element found in Egypt, Lebanon, Israel and Syria, in rocky places, desserts, alpine regions and at the edges of cultivated fields. According to Feinbrun (1938-1940), the species is very diverse, due to the different kind of habitats, where it occurs.

The chromosome number $2n = 8$ as well as karyotype morphology, are previously given by Feinbrun (l.c.), which observed a fragment from one of the two acrocentric chromosomes, as well as by Giordani & Peruzzi (2009). Additionaly, Bothmer & Wendelbo (1981) reported an hexaploid chromosome number in material originated from Israel, along with a significant heterozygosity. The hexaploid karyotype is charactrized by the lack of an acrocentric chromosome, while at the same time a extra submetacentric chromosome was obsverved showing chromosomal translocation.

The population studied here is diploid with $2n = 8$ chromosomes,varying in size from 7.82 to 15.13 µm. Chromosome morphology follows the typical *Bellevalia* karyotype and the chromosome formula is given as $2n = 2x = 2m + 2st + 1sm\text{-}SAT + 1sm + 2m/sm = 8$. It is noteworthy that only a small spherical satellite is usually observed at the long arm of one of the longest submetacetric homologues (structural heterozigosity).

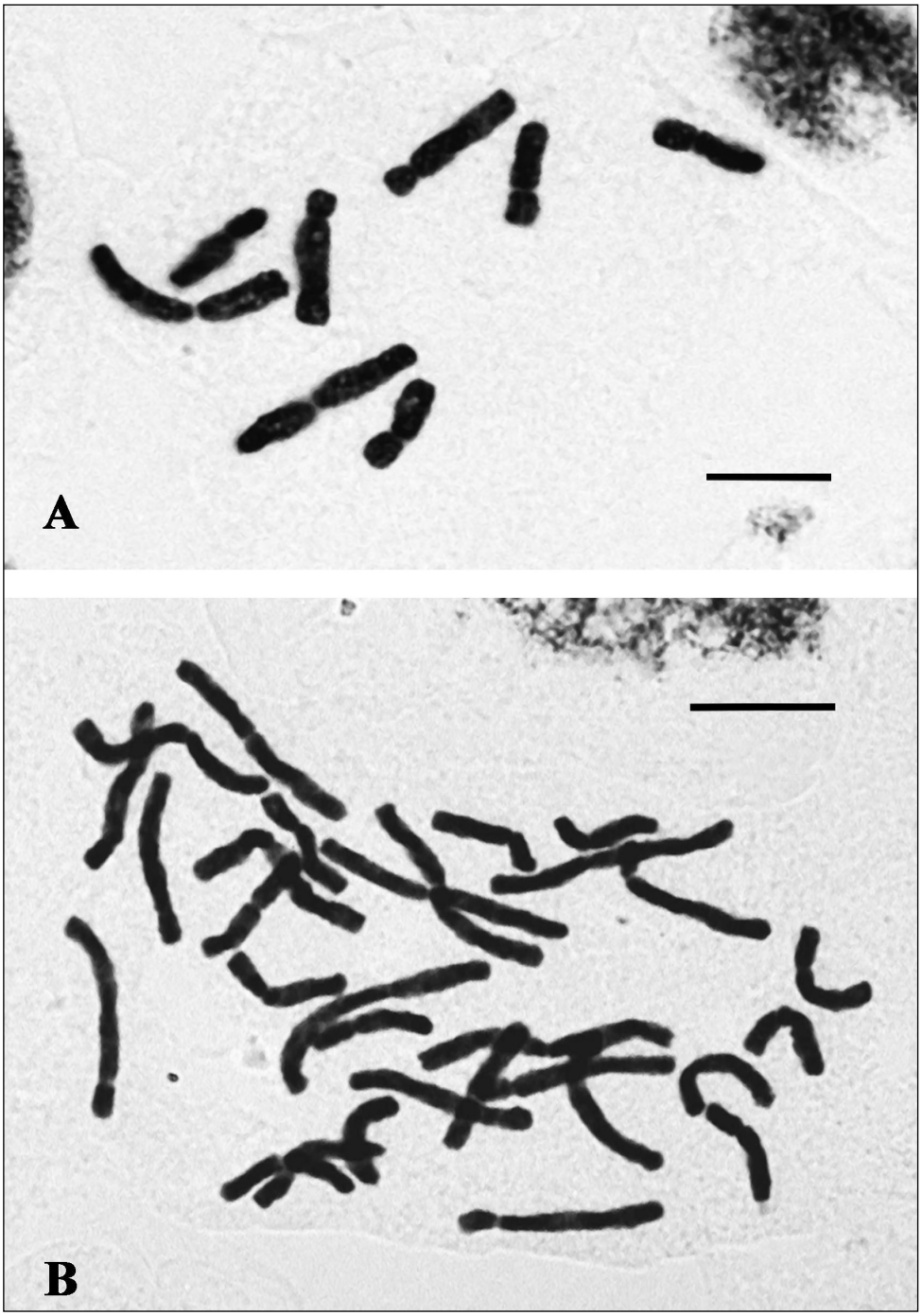

Fig. 1. Microphotographs of somatic metaphase plates of: **A,** *Bellevalia flexuosa*, $2n = 2x = 8$; **B,** *Bellevalia longistyla*, $2n = 8x = 32$. – Scale bars = 10 μm.

1851. ***Bellevalia longistyla*** (Miscz.) Grossh. **—** 2*n* = 8x = 32 (Fig. 1B).

Tu: Turkey, 5.5 km S of Van, edges of cultivated fields and steppe, alt. 1840 m, 38º 27′ N, 43º 25′ E, 15 Apr 2002, *Bareka & Constantinidis Bel.46* (UPA).

The species has a wide distribution at the Irano-Touranian region (E Turkey, Iran, Caucasus) on open places, cultivated fields and steppe.

Bellevalia longistyla is an octoploid species with 2*n* = 8x = 32 chromosomes. Both diploid and polyploid populations within certain species, as well as exclusively polyploid taxa, have been observed in the genus *Bellevalia*. Only *Bellevalia longistyla* (Misez.) Grossh and *B. olivieri* (Baker) Wendelbo are exclusively octoploid, with 2*n* = 8x = 32 chromosomes (Özhatay & al. 1991; Özhatay & Johnson 1996; Johnson 2003). Additionally, octoploid populations are referred for *B. glauca* Kunth by Zakhariyeva & Makushenko (1969) and Bothmer & Wendelbo (1981), as well as for *B. sarmatica* by Johnson & Brandham (1997). Besides the euploid chromosome number of 2*n* = 8x = 32, the phenomenon of aneuploidy has been reported for the species with 2*n* = 30, 31, 33, 35 chromosomes in populations from Turkey (Özhatay & al. 1991; Johnson & Brandham 1997; Johnson 2003). Moreover, Johnson (2003) report telocentric fragments and a B-chromosome in two of populations studied.

The population studied here is also octoploid, characterized by the presence of small spherical satelites, on the long arms of four of the smallest in size submetacentric chromosomes, with 2*n* = 8x = 8m + 8st + 12sm + 4sm-SAT = 32 chromosomes, ranging in size from 9.79 to 17.70 μm. The same chromosome number, as well as the karyotype have previously been given by Özhatay & al. (1991), Johnson & Brandham (1997) and Johnson (2003) in material from Turkey. Additionally, Nersesian (2001) and Pogosyan (1975) report the same chromosome number (2*n* = 8x = 32) from Armenia and former Soviet Union respectively.

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Reports (1852-1858) by Neli Grozeva

1852. ***Atriplex heterosperma*** Bunge — 2*n* = 36 (Fig 1).

Bu: Southern Black Sea coast, Nessebar old town, 42° 39’ 21’’ N, 27° 44’ 08’’ E, sandy terrains, alt. 0 m, 27 Sept 2014, *Grozeva NG*-707 (SOM).

The species is studied for the first time on Bulgarian material. The tetraploid number 2*n* = 36 coincides with the data obtained by Mulligan (1965), Frankton & Basset (1968) and Nobs (1975).

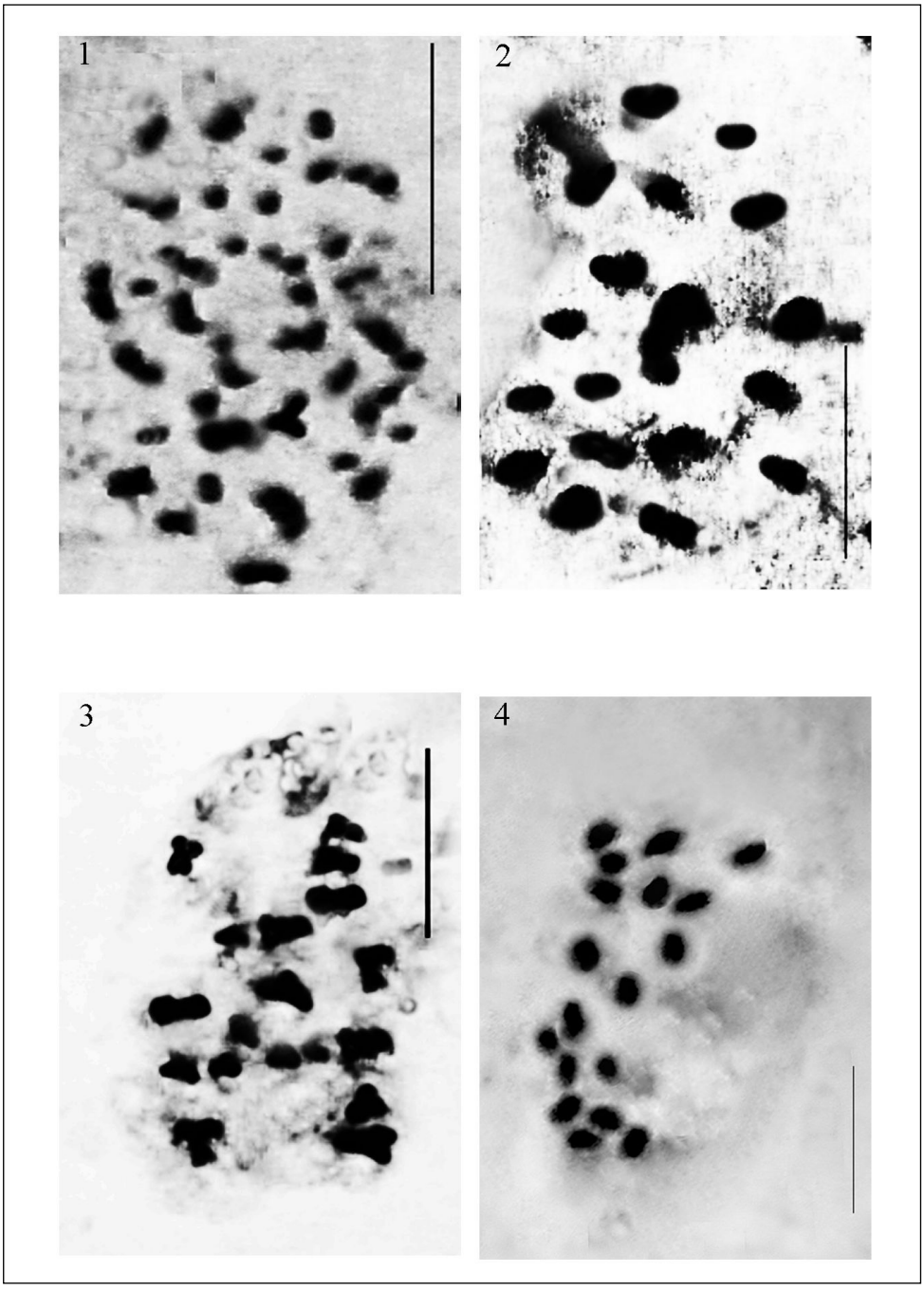
1853. ***Bassia prostrata*** (L.) Beck. — 2*n* = 18 (Fig 2).

Bu: Thracian Lowland, Rakitnitsa village, 42º 20’ 36’’ N, 25º 31’ 15’’ E, ruderal places, alt. 184 m, 18 Sept 2014, *Grozeva NG*-708 (SOM).

The diploid chromosome number 2*n* = 18 reported here is the first record for *B. prostrata* from Bulgaria and agrees with reports of Pope & McArthur (1977), Javůrková-Jarolímová (1992), Lomonosova & Krasnikov (1993), Stepanov (1994), Zakirova (1999), Krasnikov (2004). Some other chromosome numbers were also reported for the same species: *n* = 8 (Kaliagin 1970), 2*n* = 36 (Lidzhieva & Erendzhenova 2014; Zakirova 1999; Lomonosova & al. 2014) and 2*n* = 54 (Lidzhieva & Erendzhenova 2014).

1854. ***Bassia scoparia*** (L.) A. J. Scott. — 2*n* = 18 (Fig 3).

Bu: Thracian Lowland, Tselina village, 42° 07’ 14’’ N, 25° 27’ 06’’ E, ruderal terrains, 193 m, 27 Aug 2014, *Grozeva NG*-711 (SOM).



Figs 1-4. Microphotographs of root tip mitosis of: **1,** *Atriplex heterosperma*, 2*n* = 36; **2,** *Bassia prostrata*, 2*n* = 18; **3,** *Bassia scoparia*, 2*n* = 18; **4,** *Salicornia perennans*, 2*n* = 18. – Scale bars = 10 μm.

The chromosome number 2*n* = 18 confirms the previous result from Plovdiv Botanical Garden, Thracian Lowland, Bulgaria (Popova & Ceschmedjiev 1978). It confirms the earlier counts published from elsewhere (Uhrikova 1974; Pogan & al. 1982; Ge & al. 1989; Murín & Svobodová 1992; Lomonosova & Krasnikov 1993; Kiehn & al. 2000; Probatova 2000; Krasnikov 2004; Lomonosova 2006; Lomonosova & al. 2014).

1855. *Salicornia perennans* Willd. **—** 2*n* = 18 (Figs 4-5).

Bu: The Black Sea Coast (*Southern*), Protected area Pomoriysko lake, 42° 34’ 26’’ N, 27° 37’ 39’’ E, halophytic community, 1 m, 29 Sept 2014, *Grozeva NG*-712 (SOM).

— The Black Sea Coast (*Southern*), Atanasovsko lake Managed Reserve, 42° 33’ 11’’ N, 29° 29’ 02’’E, halophytic community, alt. 1.5 m, 28 Sept 2014, *Grozeva NG*-710 (SOM).

The diploid chromosome number 2*n* = 18 reported here for *S. perennans* is the first record from Bulgarian populations. It agrees with several previous counts (see Kőnig 1939; Hambler 1954; Ball & Tutin 1959; Dalby 1962; Loidi & al. 1999; Lomonosova 2005, 2006; Chepinoga & al. 2010). The tetraploid chromosome number 2*n* = 36 was also reported by Kőnig (1939).

1856. *Salsola soda* L. **—** 2*n* = 18 (Fig 6).

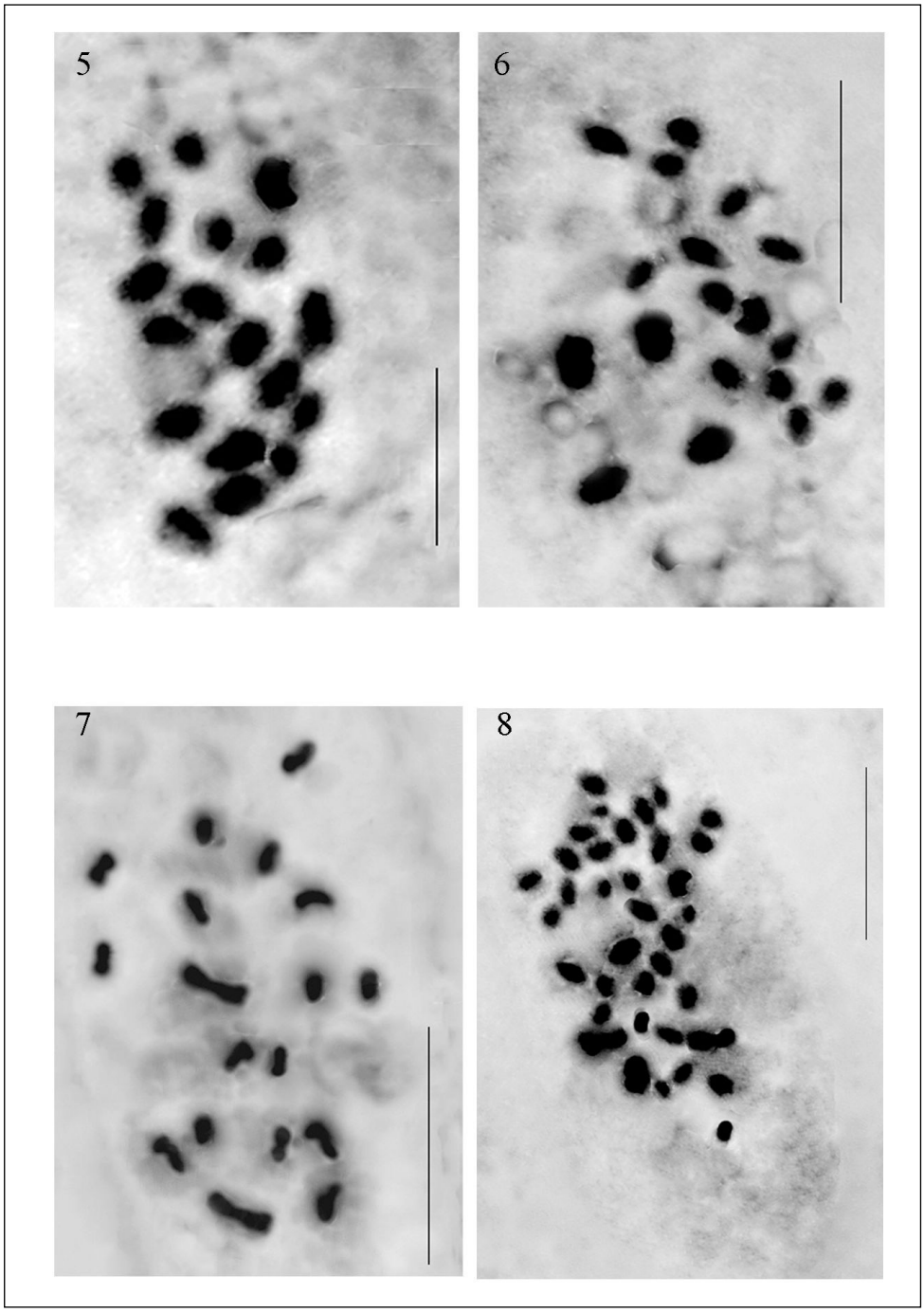
Bu: The Black Sea Coast (*Southern*), protected area Pomoriysko lake, 42° 34’ 25’’ N, 27° 37’ 41’’ E, halophytic community, alt. 1 m, 29 Sept 2014, *Grozeva NG*-716 (SOM).

The chromosome number is reported for the first time for a population from Bulgaria. The result obtained 2*n* = 18 is in agreement with most reports (Wulff 1937; Polya 1948; Zosimovič 1965; Labadie 1976; Scrugli & Bocchieri 1977; Tarnavschi & Lungeanu 1982; Zakharyeva 1985). Additionally, Queiros (1975) reported for the same species 2*n* = 36.

1857. *Suaeda heterophylla* Bunge **—** 2*n* = 18 (Fig. 7).

Bu: The Black Sea Coast (*Southern*), protected area Pomoriysko lake, 42° 34’ 25’’ N, 27° 37’ 39’’ E, halophytic community, alt. 1 m, 29 Sept 2014, *Grozeva NG*-714 (SOM).

The diploid chromosome number 2*n* = 18 confirms previous results from Atanasovsko lake Managed Reserve, Southern Black Sea Coast, Bulgaria (Grozeva 2012), as well as reports from other countries (Lomonosova & al. 2003, 2005, 2014; Lomonosova 2005, 2005a, 2011).



Figs 5-8. Microphotographs of root tip mitosis of: **5,** *Salicornia perennans*, 2*n* = 18; **6,** *Salsola soda*, 2*n* = 18; **7,** *Suaeda heterophylla*, 2*n* = 18; **8,** *Suaeda maritima*, 2*n* = 36. – Scale bars = 10 μm.

1858. ***Suaeda maritima*** (L.) Dumort. **—** 2*n* = 36 (Fig. 8).

Bu: The Black Sea Coast (*Southern*), Burgas saltpans, 42° 33' 12'' N, 29° 29' 27'' E, halophytic community, 1 m, 30 Sept 2014, *Grozeva NG*-716 (SOM).

The chromosome number 2*n* = 36 is in accordance with the previous count from Southern Black Sea Coast, Bulgaria (Grozeva 2010) and confirms data that many authors published from elsewhere (Mesquita 1953; Queirós 1975; Bassett & Crompton 1978; Pedrol & Castroviejo 1988; Canzobre 1989; Krahulcová & Tomaovic 1997; Lövkvist & Hultgård 1999; Lomonosova & Freitag 2009). A chromosome number of 2*n* = 18 is given by Sharma & Delay (1967), Fedorov (1969), Tanaka & Taniguchi (1975), Subramanian (1988).

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Reports (1859-1862) by E. Liveri, P. Bareka & G. Kamari

1859. ***Centaurea litochorea*** T. Georgiadis & Phitos — 2*n* = 18 (Fig. 1A).

Gr: Nomos Larissis, Mt. Kato Olimpos, close to the village Kallipefki, alt. c. 1050 m, 11 Aug 2011, *I. Kofinas* s.n. (UPA).

Centaurea litochorea is an endemic species of Greece, which is distributed only at the mountains Olimpos and Kato Olimpos. It is included in the Red Data Book of Rare and Threatened Plants of Greece (Constantinidis 2009) as Vulnerable (VU).

The chromosome number 2*n* = 18 has been given by Georgiadis & Phitos (1978) from Mt. Olimpos. Additionally, the chromosome number 2*n* = 16 has been referred by Strid & Franzén (1981), from the same area, but needs further confirmation.

The karyotype of *C. litochorea* is symmetrical, mostly with metacentric (m) chromosomes and a pair of submetacentric (sm) satellited chromosomes (sm-SAT), varying in size from 1.65 to 2.68 μm.

1860. *Centaurea pumilio* L. — 2*n* = 22 (Fig. 1B).

Gr: Peloponnisos, Nomos Lakonias, island Elafonisos: in arenosis maritimis ad occidentem insulae spectantibus, alt. 0-5 m, 8 Aug 2015, *D. Phitos & G. Kamari no 29028* (UPA).

Centaurea pumilio occurs along the sandy coasts of Egypt, Libya, Syria, Israel, Greece (Kamari & al. 2009) and Italy (Puglia region). Its taxonomic status was complicated until recently (e.g. Mele & al. 2008) and is the reason to be mentioned as *Aegialophila pumilio* (L.) Boiss. In the Red Data Book of Rare and Threatened Plants of Greece (Phitos & al. 2009) *C. pumilio* is included and is characterized by Kamari & al. (2009) according to IUCN (2001) criteria as Vulnerable (VU).

The chromosome number, 2*n* = 22, counted here from Elafonisos island, is in accordance to that given previously from other Greek populations, from Elafonisi, W Crete (Kamari & Matthäs 1986) and Kefalonia, Ionian Islands (Phitos & al. 2003). Moreover, the same chromosome number was counted from Libya (Brullo & al. 1990) and Italy (Tornadore & al. 1998).

The karyotype of *C. pumilio* is diploid, symmetrical, consisting of mostly metacentric and some submetacentric chromosomes. The chromosomes are small varying in size from 1.47 to 2.86 μm. It is noteworthy that usually we observed 2 pairs of satellited chromosomes; the bigger satellite is on a submetacentric pair, while the smaller ones on a ± metacentric pair. Two satellite chromosome pairs were also referred by Kamari & Matthäs (1986) and Tornadore & al. (1998).

1861. *Lunaria annua* L. subsp. ***pachyrhiza*** (Borbás) Hayek — 2*n* = 30 (Fig. 1C).

Gr: Ionian Islands, Kefalonia, at the roadsides, close to the village Poros, alt. 20-50, 25 Oct 2015, *D. Phitos & G. Kamari no 29027* (UPA).

Lunaria annua subsp. *pachyrhiza* is distributed in S & C Italy and the Balkan Peninsula. It is known from all regions of Greece except Kiklades and probably E Aegean Islands (Tan 2002).

The somatic chromosome number 2*n* = 30 found in the hereby studied population is in accordance with that given by Baltisberger & al. (1993) and Runemark (2000), on material from Albania and Kefalonia, respectively. Although Runemark (2000) gives only the chromosome number from the same island, the population is from a different locality (close to

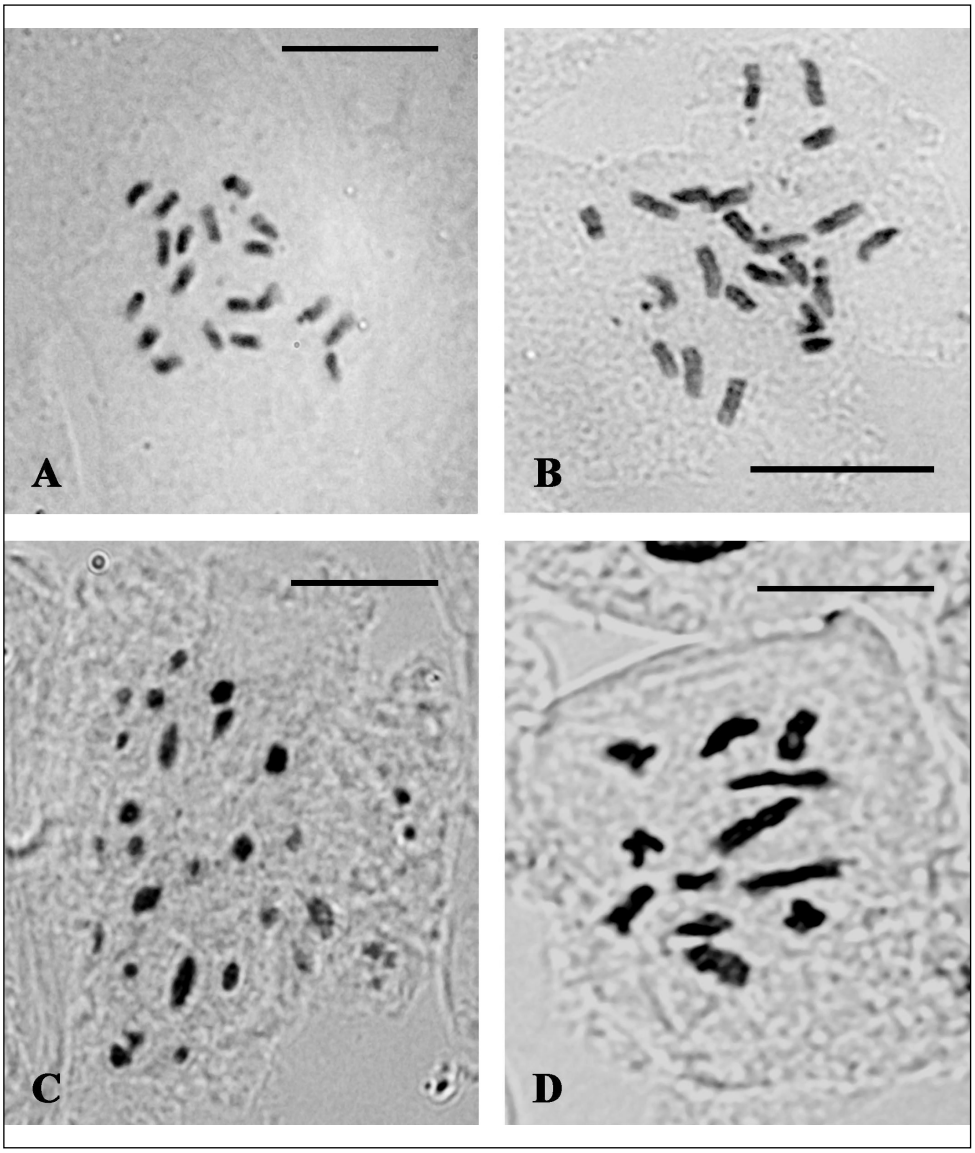

Fig. 1. Microphotographs of somatic metaphase plates of: **A,** *Centaurea litochorea*, 2*n* = 18; **B,** *Centaurea pumilio*, 2*n* = 22; **C,** *Lunaria annua* subsp. *pachyrhiza*, 2*n* = 30; **D,** *Taraxacum holmboei*, 2*n* = 12. – Scale bars = 10 µm.

Sami). The same chromosome number has been also given for the species *L. annua* s.l. (Sharma 1970; Uhrikova 1976; Harriman 1978). Additionally, Dvořak & Dadáková (1984) and Manton (1932) have referred to 2*n* = 28 and 2*n* = 28 + 2B, respectively.

The chromosomes are small varying in size from 0.9 to 2.56 µm.

1862. *Taraxacum holmboei* H. Lindb. — 2*n* = 12 (Fig. 1D).

Cy: Troodos Mountains, at the summit area, 28 Apr 2008, *E. Christou & M. Andreou K40Cy* (UPA).

Taraxacum holmboei is an endemic species of Cyprus. It is included in the Red Data Book of the Flora of Cyprus (Tsintides & al. 2007) and is characterized as Vulnerable (VU).

The chromosome number 2*n* = 12 and the karyotype morphology of *Taraxacum holmboei* are presented here for the first time. The basic chromosome numbers for the genus *Taraxacum* are x = 6, 8 (Loon van 1987).

The karyotype is diploid, consisting of mostly metacentric chromosomes, while is asymmetrical in size (two pairs are almost two times longer than the others) and varying in size from 2.39 to 5.35 μm.

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Report (1863) by M. R. Orellana, A. M. Rovira, C. Blanché, J. Simon & M. Bosch

1863. ***Delphinium staphisagria*** L. – 2*n* = 18 (Fig. 1A-F).

Hs: Alacant, Serra de Bèrnia, near Benissa, abandoned house, 38° 42’ 4.63’’ N, 0° 0’ 53.98’’ E, alt. 600 m, 7 May 2003, *J. Soler, M. R. Orellana & M. Bosch* s.n. (BCF).

– Cádiz, Grazalema, nitrophilous areas near orchards, 36° 45’ 34.85’’ N, 5° 21’ 56.05’’ W, alt. 812 m, 27 Apr 2005, *M. R. Orellana, J. López, A. Rovira & M. Bosch* s.n. (BCF).

– Cádiz, Jimena de la Frontera, near the castle, rocky places, 36° 26’ 0.02” N, 5° 27’ 19.15” W, alt. 200 m, 27 Apr 2005, *M. R. Orellana, J. López, A. Rovira & M. Bosch* s.n. (BCF).

– Ciudad Real, Piedrabuena, near Miraflores castle, rocky places, 39° 3’ 12.82’’ N, 4° 12’ 7.22’’ W, alt. 741 m, 28 Apr 2005, *M. R. Orellana, J. López, A. Rovira & M. Bosch* s.n. (BCF). – Fig. 1A.

– Jaén, La Cerradura, nitrophilous areas under spiny *Rosa canina* and *Crataegus monogyna* bushes, 37° 42’ 18.68’’ N, 3° 39’ 8.04’’ W, alt. 800 m, 28 Apr 2005, *M. R. Orellana, J. López, A. Rovira & M. Bosch* s.n. (BCF). – Fig. 1B.

Ca: Tenerife, Teno, foot of Pico del Fraile, road margin, 28° 21' 48.24" N, 16° 52' 36.18" W, alt. 75 m, 11 Jul 1997, *J. Molero & A. Rovira* s.n. (BCF). – Fig. 1C.

Bl: Eivissa, path to s'Estanyol beach, near Jesús, nitrophilous area, 38° 55' 34.49" N, 1° 28' 33.11" E, alt. 150 m, Jun 2004, *C. Blanché & R. Ferrer* s.n. (BCF). – Fig. 1D.

– Mallorca, road to Sa Calobra, from Nus de sa Corbata, road margins, 39° 49' 50.68" N, 2° 48' 18.51" E, alt. 150 m, 14 Apr 2004, *M. R. Orellana, A. Rovira & M. Bosch* s.n. (BCF).

– Mallorca, Torrent de Pareis, nitrophilous rocky areas, 39° 51' 0.1" N, 2° 48' 36.16" E, alt. 5 m, 14 Apr 2004, *M. R. Orellana, A. Rovira & M. Bosch* s.n. (BCF).

Ga: Gard, Vic, near Nimes, ruderal places, 43° 56' 22.578" N, 4° 21' 3.49" E, alt. 60 m, 5 May 2004, *J. Molina, M. R. Orellana & M. Bosch* s.n. (BCF). – Fig. 1E.

– Var, Bòrmas [Bormes-les-Mimoses], confluence of Bormes and Batailler creeks, river bed, 1 Jul 1995, 43º 8' 0.4" N, 6º 20' 18" E, alt. 50 m, seeds sent by *M. Virevaire*, Conservatoire Botanique Méditerranéen, Jun 2004.

Co: Bunifaziu [Bonifacio], Vallon St. Julien, near Sant'amanza beach, nitrophilous places inside a cattle fence, 41° 24' 5.44" N 9° 12' 11.98" E, 20 m, 9 May 2005, *M . R. Orellana & M. Bosch* s.n. (BCF). – Fig. 1F.

It: Tuscany, Grosseto, Orbetello, Ansedonia, Ruins of the ancient roman town of Cosa, among calcareous stones under olive groves, 42° 24' 42.6" N, 11° 17' 20.8" E, 110 m, 26 Feb 2005, *F. Selvi, M. R. Orellana & M. Bosch* s.n. (BCF).

Cr: Chanion, Aradena, near Anapolis, nitrophilous places under olive groves, 530 m, 35° 13' 24.21" N, 24° 3' 40.75" E, 13 Apr 2005, *C. Blanché & M. Bosch* s.n. (BCN 44780).

Delphinium staphisagria L. (= *Staphisagria macrosperma* Spach) is an annual or biennial herb from the Mediterranean Basin, widely distributed (from Turkey to Morocco and Portugal, also found in the Canary Islands) in isolated populations of variable size, showing low levels of genetic variability, with a suspected human-mediated distribution due to its historical medicinal uses (Orellana & al. 2009a).

Early chromosome counts reported $2n = 16$ or $2n = 32$ for this species (see references in Simon & al. 1995), although Constantinidis & Kamari (1995) and Simon & al. (1995) definitively established $2n = 18$ as chromosome number (considering previous counts as misinterpretations of the architecture of the second chromosome pair). Further karyotype analysis show a large chromosome pair (m) and eight smaller and progressively decreasing ones (st-t) , and verified $x = 9$ and $2n = 18$ in 4 populations from Greece (Constantinidis & Kamari 1995; Bareka & al. 2000; Runemark 2000), Spain (Simon & al. 1995), Balearic Islands (Eivissa), Canary Islands (La Gomera) and Morocco (Bosch & al. 2002).

As a consequence of large scale collection trips (Project REN2003-01815/GLO, see Orellana & al. 2009a, b), additional localities were scored for chromosome number. Here we can confirm $2n = 18$ for 14 new populations, coming from several Mediterranean countries, being the first chromosome reports for this species from Italy, Crete or France (departments of Gard and Var), from southern Spain (provinces of Cádiz, Jaén and Ciudad

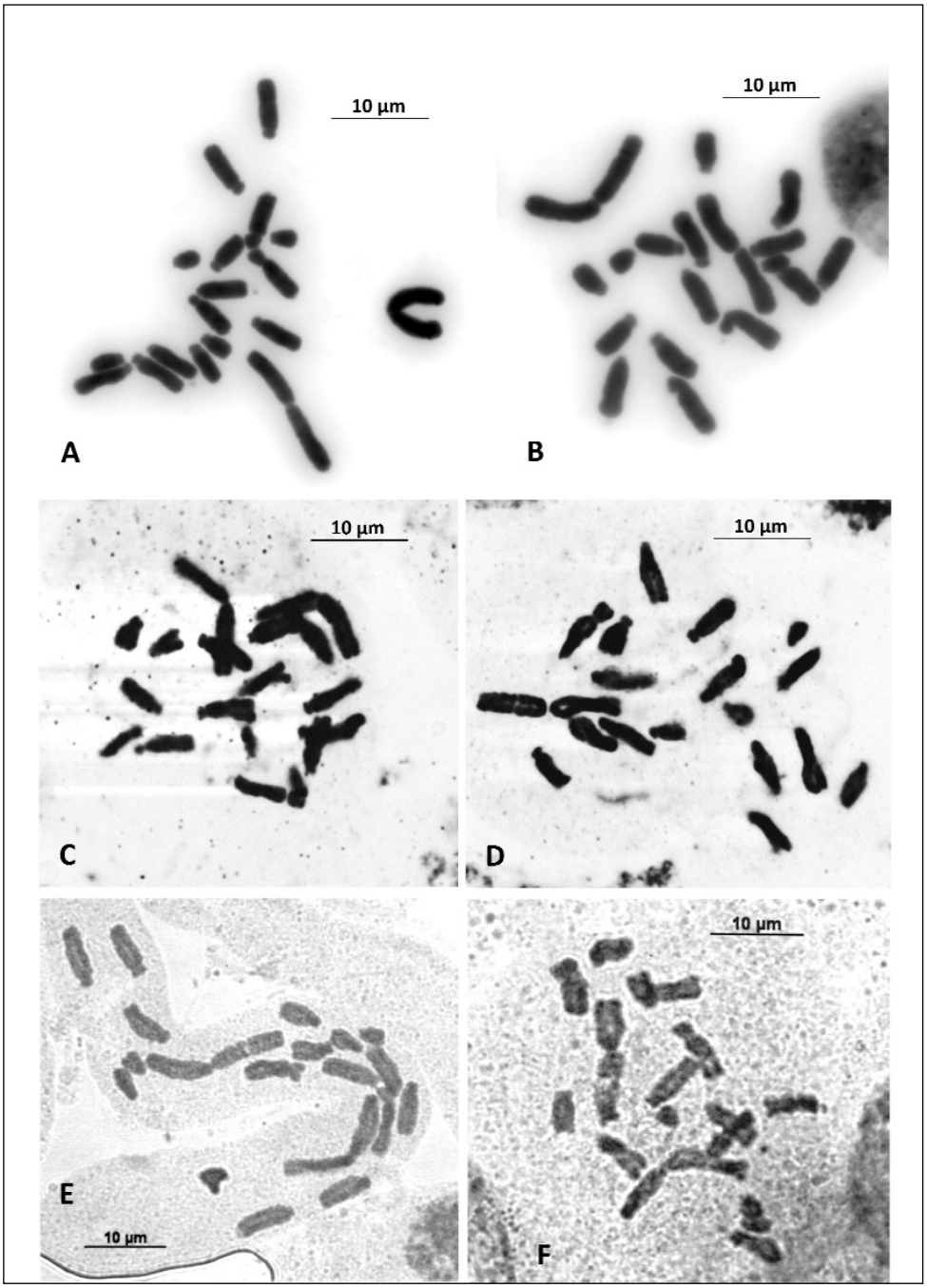

Fig. 1. Microphotographs of somatic metaphase plates of *Delphinium staphisagria*, 2*n* = 18. **A**, Piedrabuena (Hs, Ciudad Real); **B**, La Cerradura (Hs, Jaén); **C**, Teno (Ca,Tenerife); **D**, Estanyol (Bl, Eivissa); **E**, Vic (Ga, Gard); **F**, Bonifacio (Co, Corsica).

Real) and from the islands of Mallorca (2 populations, Balearic Islands), Tenerife (Canary Islands) and Southern Corsica.

The speciation process in this species implied a change in the basic chromosome number from x = 8 to x = 9 (Orellana & al. 2009a) and karyotype characteristics are considered key in evolution within the group (Jabbour & Jenner 2011). When taken together with other exclusive morphological and reproductive traits, this clearly differentiates the species from others in the genus, including its close relatives of the Section *Staphisagria* (Orellana & al. 2009b). Contrasting hypotheses about the position of the taxon in the evolutionary history of the group have been proposed regarding some of these traits (see Bosch & al. 2001 or Verlaque & Aboucaya 2001). Finally, Jabbour & Jenner (2011), from molecular sequence data show that the three species of *Delphinium* subg. *Staphisagria* (J. Hill) Peterm. form a sister clade to *Aconitum* L., *Aconitella* Spach, *Consolida* (DC.) S.F. Gray, and all remaining species of *Delphinium* L.; they resurrect the genus *Staphisagria* J. Hill (1756) and named the studied species as *Staphisagria macrosperma* Spach.

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Reports (1864-1867) by S. Samaropoulou, P. Bareka & G. Kamari

1864. ***Ajuga orientalis*** subsp. ***aenesia*** (Heldr.) **Phitos** & **Damboldt** **—** $2n = 4x = 32 +$ 0-4B (Fig. 1A).

Gr: Ionian Islands, Isl. Kefalonia, Mt. Ainos, in Abietis saxosis calcareous, alt. 1150, 16 Jul 2015, *G. Lisitsa, S. Moschopoulou & K. Volteras 29012* (UPA).

Ajuga orientalis's distribution includes Italy, Sardinia, Greece, Albania, Turkey, Crimea, Anatolia, Cyprus, Lebanon, Syria, Israel and Jordan (Ball 1972; Greuter & al. 1986). The typical subspecies is found throughout the species' distribution range, while subsp. *aenesia* is a Kefalonian endemic taxon, restricted on Mt. Ainos (Phitos & Damboldt 1985).

According to our study, the chromosome number $2n = 32$ agrees with previous reports for *A. orientalis* s.l. from the Aegean islands of Ikaria and Naxos (Strid 1965). Additionally, an octoploid population with $2n = 64$ chromosomes has been published for *A. orientalis* s.l. in material originated from Italy (Rossito & al. 1983). The karyotype examined here is tetraploid and symmetrical, consisting of metacentric and submetacentric chromosomes, varying in size between 1.48 µm and 2.96 µm. Additionally, 0-4 small metacentric B-chromosomes usually were observed.

1865. ***Arisarum vulgare*** Targ. Tozz. subsp. ***vulgare*** **—** $2n = 8x = 56$ (Fig. 1B).

Cy: Lefkosia, Orkontas, alt. ca. 600 m, 1 May 2005, *E. Christou & P. Christou*, cult. *no E53CY* (UPA).

According to Prime (1980), *Arisarum vulgare* is divided in two subspecies. The typical one, *Arisarum vulgare* subsp. *vulgare*, is widespread around Mediterranean area, the Canary Islands and the Azores, while *Arisarum vulgare* subsp. *simorrhinum* (Durand) Maire & Weiller is distributed in S and E Spain and NW Africa.

The chromosome number $2n = 56$ found here, agrees with previous reports for the taxon from a different population of Cyprus (Christou & al. 2008). The octoploid karyotype has also been reported from Croatia (Bedalov 1973; Bedalov & al. 2002), Italy (Capineri & al. 1976) and Spain (Valdés & al. 1978). Moreover, a case of aneuploidy, with

$2n = 52$ chromosomes has also been reported by Fedorov (1969) and Dahlgren & al. (1971) in material from Balearic Islands.

The karyotype of the typical subspecies studied here is octoploid and symmetrical. The chromosomes are mostly metacentric and submetacentric and their size ranges from 3.16 μm to 7.37 μm.

1866. ***Muscari parviflorum*** Desf.— $2n = 4x = 36$ (Fig. 1C).

Gr: Ionian Islands, Isl. Zakynthos, Tsilivi, 37° 48' N, 20° 52' E, alt. 40 m, 14 Oct 2013, *Kamari & Samaropoulou 27934 (Samaropoulou* cult. Z1) (UPA).

Muscari parviflorum is the only autumn-flowering representative of the genus, with a Mediterranean distribution. Its habitat includes sandy areas and cultivated fields.

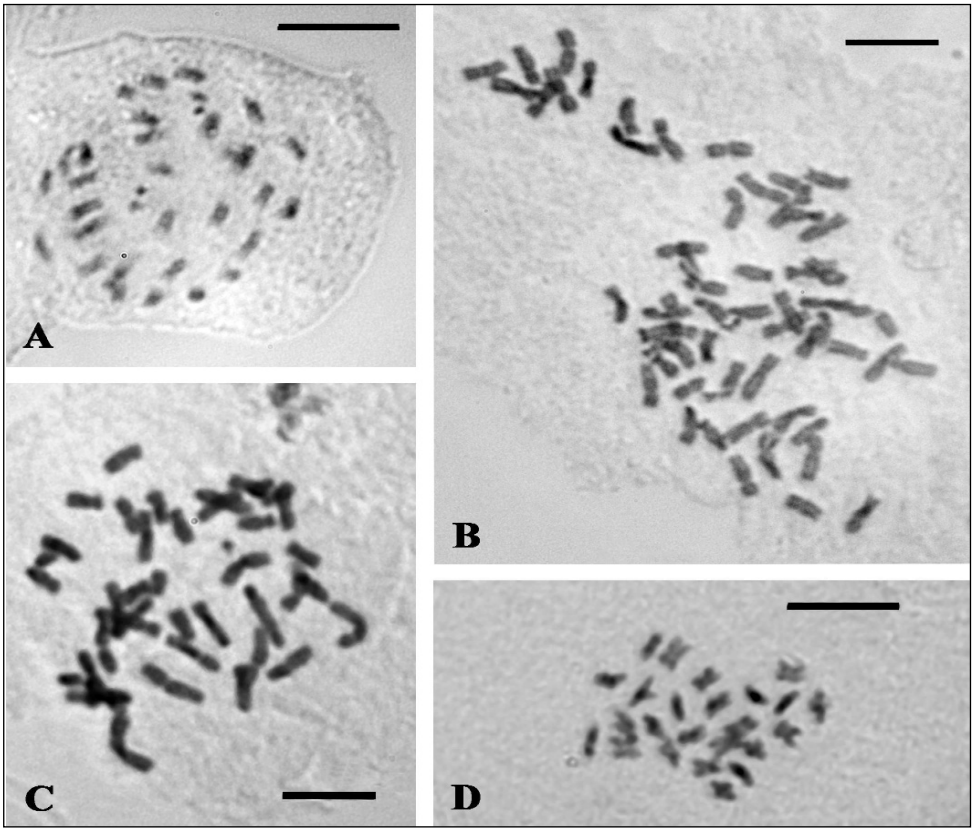

Fig. 1. Microphotographs of somatic metaphase plates of: **A,** *Ajuga orientalis* subsp. *aenesia*, $2n = 4x = 32 + 0\text{-}4B$; **B,** *Arisarum vulgare* subsp. *vulgare*, $2n = 8x = 56$; **C,** *Muscari parviflorum,* $2n = 4x = 36$ and **D,** *Silene ionica*, $2n = 2x = 24$. – Scale bars = 10 μm.

To our knowledge, this is the first chromosome count from the Ionian Islands. The karyotype is symmetrical and tetraploid, with $2n = 4x = 36$, metacentric and submetacentric chromosomes. The size of the chromosomes varies from 3.78 µm to 11.11 µm. The chromosome number found here is in accordance with previous studies from Italy (Garbari 1966, 1969; Rossi & Capineri 1982; Matteucci & al. 2008). Moreover, the chromosome number $2n = 45$ has been reported from Italy (Rossi & Capineri 1982; Garbari 1984; Avincini & al. 2005; Matteucci 2008) and Rhodos island, Greece (Davis & al. 1988). Finally, Garbari (1984) mentioned a rare case of aneuploidy with $2n = 48$ chromosomes.

1867. *Silene ionica* Halácsy **—** $2n = 2x = 24$ (Fig. 1D).

Gr: Ionian Islands, Isl. Kefalonia, NW slopes of Mt. Ainos, locality called "Nerofagoma", alt. ca. 499 m, 08 Jun 2013, *G. Kamari, N. Katsouni, S. Samaropoulou & D. Spanou* [*Samaropoulou* cult. SK45] (UPA).

Silene ionica is a Greek endemic species which is located at Sterea Hellas and Kefalonia Island (Phitos & Damboldt 1985; Greuter 1997). By now, two subpopulations were known from Kefalonia at Mt. Ainos and Omala region (above the church of Ag. Gerasimos). Recently, a third one was found at the locality Nerofagoma, SW slopes of Mt. Ainos. The species generally prefers bare, gravelly slopes and altitudes between 300 and 1200 m.

With basic chromosome numbers x = 10, 12 for the genus (Sheidai & al. 2008), the studied karyotype was found diploid and symmetrical, with $2n = 24$ chromosomes. The results are in accordance with previous counts by Damboldt & Phitos (1970) and Chater & al. (1993). The karyotype feature is given here for the first time. The karyotype consists of mostly metacentric chromosomes, ranging in size between 1.8 and 2.7 µm.

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