

## Mediterranean chromosome number reports – 22

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

### Abstract

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This is the twenty-two 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 15 taxa: *Cakile*, *Chrithmum*, *Dorycnium*, *Inula*, *Reichardia* and *Pancreatium* from Greece by E. Liveri, P. Bareka & G. Kamari (Nos 1753-1758); *Pimpinella* from Turkey by Ç. Kızılarşlan & E. Akalın (Nos 1759-1760); *Anagyris* from Italy, Sardinia, Sicily, Spain, Balearic Islands, Greece, Crete, East Aegean Islands, Asiatic Turkey and Canary Islands by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & L. Pellizzari (Nos 1761-1762); *Chenopodium* and *Suaeda* from Bulgaria by N. Grozeva (Nos 1763-1767).

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**Reports (1753-1758) by Eleni Liveri, Pepy Bareka & Georgia Kamari**

**1753. *Cakile maritima*** Scop. —  $2n = 18$  (Fig. 1□).

**Gr:** Peloponnisos, Nomos Ilias, Palouki beach, 37° 45' N, 21° 18' E, alt. 0-10 m, 30 Aug 2009, *E. Liveri*, cult. no L4 (UPA).

*Cakile maritima* has a wide distribution throughout Europe, occurring in sandy or shingly beaches, rarely in other habitats near open sea from 0-100 m.

The chromosome number  $2n = 18$  found here from continental Greece is in accordance with the reports by Wulff (1937) from Europe, north Africa and southwest Asia, Gjelsås (1970) and Engelskjøn (1979) from Norway, Strid (1971) from Albania, Zeybek & al. (1977) from Turkey, Baltisberger (1988) from Italy, Baltisberger & Charpin (1989) and Diosdado & al. (1993) from Spain, Runermark (2000) from Greece (East Aegean and Cyclades Islands). Gjelsås (l.c.) has also reported the chromosome number  $2n = 36$ , which, according to him, is a result of endopolyploidy.

The diploid karyotype is symmetrical, consisting mainly of metacentric (m) chromosomes. Their size is small, ranging from 0.47 to 1.11  $\mu\text{m}$ .

**1754. *Crithmum maritimum*** L. —  $2n = 20$  (Fig. 1B & 2□).

**Gr:** Peloponnisos, Nomos Ilias, Kourouta beach, 37° 46' N, 21° 17' E, alt. 0-10 m, 29 Jul 2010, *E. Liveri*, cult. no L82 (UPA).

*Crithmum maritimum* is distributed in the Atlantic coast of Europe, in the Mediterranean and Black Sea coasts and Macaronesia, growing in rocky places, such as maritime rocks and rock crevices.

The chromosome numbers given for this taxon are  $2n = 20, 22$  with the first one being the most frequent. The chromosomal number  $2n = 20$  is given by Malheiros Gardé & Gardé (1950, 1951) in material from Portugal, Vazart (1960), Cauwet (1968) and Delay (1969) in material from France, Queirós (1974) from Portugal, Villa (1978) from Italy, Dalgaard (1986) from the Canary Islands, Ruiz de Clavijo (1990) from Spain, Hollingsworth & al. (1992) and Al-Bermani & al. (1993) from the United Kingdom, Vasil'eva & al. (1993) from Georgia and Pimenov & al. (1998) from Tunisia. The number  $2n = 22$  is reported from the Canary Islands by Borgen (1970). Pimenov & al. (1998) suggests that the number  $2n = 20$  could be considered as an aneuploidy.

The chromosome number of  $2n = 20$  presented here is given to the best of our knowledge for the first time from Greece. The karyotype is symmetrical, consisting of  $2n = 10m + 2sm + 4sm/st + 4st = 20$  chromosomes, varying in size from 4.65 to 7.9  $\mu\text{m}$ .

**1755. *Dorycnium hirsutum*** Ser. —  $2n = 14+2B$  (Fig. 1C & 2B).

**Gr:** Peloponnisos, Nomos Ilias, Skafidia beach, 37° 42' N, 21° 19' E, alt. 0-10 m, 5 Aug 2009, *E. Liveri*, cult. no L5 (UPA).

*Dorycnium hirsutum* is a Mediterranean element found in areas with full sun and well drained soil at altitudes of 0-1500 m.

The chromosome number  $2n = 14$  has also been reported from Greece by van Loon & Snelders (1979) in material from W. Macedonia, near Konitsa, Strid & Franzén (1981) in material from Mt. Olympus and Runermark (2006) in material from Kyklades Islands. The same chromosome number has been found in material from elsewhere (Fernandes & Santos 1975 from Portugal, Natarajan 1978 from France, De Leonardis & al. 1981 from Italy and Vioque & Pastor 1991 from Spain). Demiriz & Celebioglu (1980) found the chromosome number of  $2n = 12$  in a population originating from Turkey, although Vioque & Pastor (1991) point out that this different chromosomal number should be treated with caution.

In the population studied here, B-chromosomes are observed to the best of our knowledge for the first time. The karyotype is symmetrical, consisting of metacentric and sub-metacentric chromosomes, ranging in size from 2.06 to 3.53  $\mu\text{m}$ . The karyotype formula is given as  $2n = 2x = 8m + 4m/sm + 2sm = 14+2B$  chromosomes.

**1756. *Inula crithmoides*** L. —  $2n = 18$  (Fig. 1D).

**Gr:** Peloponnisos, Nomos Ilias, Kourouta beach, 37° 46' N, 21° 17' E, alt. 0-10 m, 29 Jul 2010, *E. Liveri*, cult. no L85 (UPA).

The taxon is distributed in the coastal areas of southern and western Europe, extending northwards to Scotland.

The somatic number  $2n = 18$ , found in the hereby studied population, is given for the first time in material from Greece and is in accordance with the one given by Rutland (1941) and Morton (1977) for the British Isles, Castro & Fontes (1946) and Fernandes & Queirós (1971) for Portugal, Delay (1968) and Labadie (1976) for France, Pavone & al. (1981) for Sicily, Gallego Martín & al. (1984) and Luque (1985) for Spain, Dempsey & al. (1994) and Montgomery & al. (1997) for United Kingdom. The karyotype is symmetrical and consists mostly of metacentric (m) and submetacentric chromosomes (sm), varying in size from 2.65 to 4.42  $\mu\text{m}$ .

**1757. *Reichardia picroides*** (L.) Roth —  $2n = 14$  (Fig. 1E & 2C).

**Gr:** Peloponnisos, Nomos Ilias, Skafidia beach, 37° 42' N, 21° 19' E, alt. 0-10 m, 5 Aug 2009, *E. Liveri*, cult. no L13 (UPA).

*Reichardia picroides* is a Mediterranean element found mostly in S Europe. It grows on dry, stony and rocky places as well as in cultivated fields.

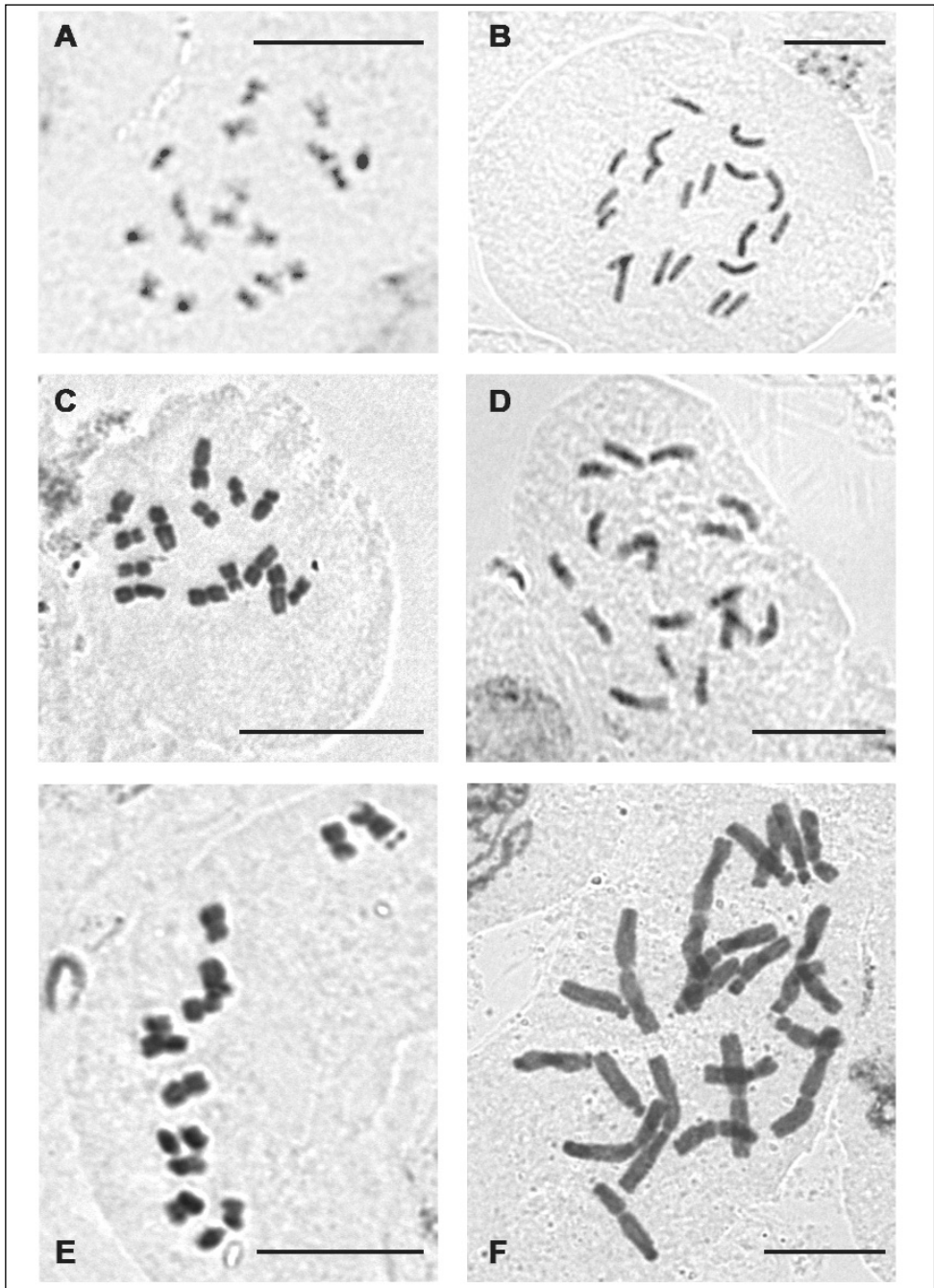


Fig. 1. Microphotographs of mitotic metaphase plates of: **A**, *Cakile maritime*,  $2n = 18$ ; **B**, *Crithmum maritimum*,  $2n = 20$ ; **C**, *Dorycnium hirsutum*,  $2n = 14+2B$ ; **D**, *Inula crithmoides*,  $2n = 18$ ; **E**, *Reichardia picroides*,  $2n = 14$ ; **F**, *Pancratium maritimum*,  $2n = 22$ . – Scale bars = 10  $\mu$ m.

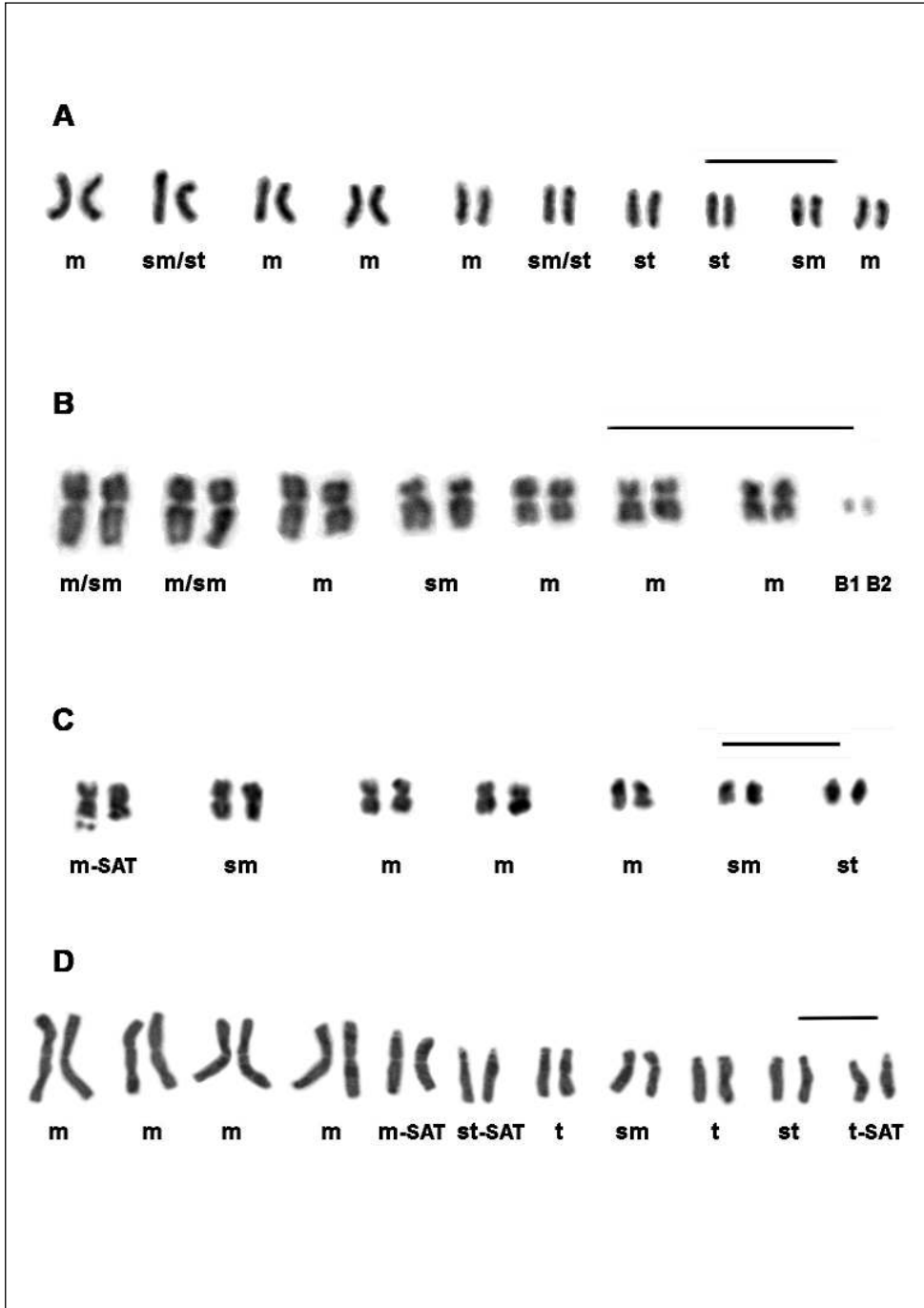


Fig. 2. Karyograms of: **A**, *Crithmum maritimum*,  $2n = 20$ ; **B**, *Dorycnium hirsutum*,  $2n = 14+2B$ ; **C**, *Reichardia picroides*,  $2n = 14$ ; **D**, *Pancratium maritimum*,  $2n = 22$ . – Scale bars = 10  $\mu$ m.

The population studied in the present study from the west coasts of continental Greece showed the somatic number  $2n = 14$  and the same karyotype morphology with previous reports from several Aegean islands (Snogerup 1980, Kapasa & al. 2001), as well as from other countries (Larsen 1955, Dolcher & Pignatti 1960, Dalgreen & al. 1971, Nilson & Lassen 1971, Fernandes & Queirós 1971, Strid 1971, Queirós 1973, Cardona 1973 & 1974, Šiljak 1977, Brullo & Pavone 1978, Šiljak-Yakovlev 1981, 1982, 1986, 1996, Natarajan 1978, Gallego 1980, Talavera & al. 1984, Aparicio 1989, Brullo & al. 1990 and Mejías 1998). Romano & al. 1991 reported  $2n = 16$  for *R. picroides* var. *intermedia* (Sch.-Bip.) Fiori while Kamel (2004) also reports  $2n = 16$  in material from Egypt.

The karyotype formula is given as  $2n = 10m + 2m\text{-SAT} + 2m/sm = 14$  chromosomes, ranging in size from 1.67 to 2.96  $\mu\text{m}$ .

**1758. *Pancratium maritimum* L.** —  $2n = 22$  (Fig. 1F & 2D).

**Gr:** Peloponnisos, Nomos Ilias, Palouki beach, 37° 45' N, 21° 18' E, alt. 0-10 m, 21 Apr 2009, *E. Liveri*, cult. no L3 (UPA).

*Pancratium maritimum* is a bulbous perennial geophyte, growing in maritime sands and dunes of the Mediterranean area.

The chromosome number  $2n = 22$  has been previously reported from Greece by Constantinidis & Kamari (1995), as well as from several countries (Fernandes 1933, Martinoli 1939, 1949, Contandriopoulos 1962, Bhattacharya & al. 1971, Bartolo & al. 1978, Oliva 1978, Valdés-Bermejo 1980, Badr 1980, Bartolo & al. 1980, Pastor & Valdés 1986, Zakharjeva 1990, Kuzmanov 1993, Oberprieler & Vogt 1994, Dalgıç & Basak 1996, d'Amato & de Dominicis 1996, Zemska & Sveshnikova 1999, Fernández & al. 2001, Şenel & al. 2002 and Christou 2010).

The karyotype formula of the population studied here is symmetrical consisting of  $2n = 2x = 8m + 2m\text{-SAT} + 2sm + 2st + 2st\text{-SAT} + 4t + 2t\text{-SAT} = 22$  chromosomes, varying in size from 6.12 to 19.59  $\mu\text{m}$ . The karyotype morphology of the population studied here is different from the karyotype morphology given by Constantinidis & Kamari (1995) with  $2n = 8m + 4sm + 2st + 8t = 22$  chromosomes, Şenel & al. (2002) with  $2n = 10m + 2sm + 10st = 22$  chromosomes in material from Turkey and Christou (2010) with  $2n = 8m + 4sm + 6st + 4t = 22$  in material from Cyprus. It should be noted that until today, no satellite chromosomes had been reported in the karyotype of this taxon.

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### Reports (1759-1760) by Çağla Kızılarslan & Emine Akalın

**1759.** *Pimpinella aromatica* Bieb. —  $2n = 20$  (Fig. 1).

**Tu:** Erzincan, Spikor Mountain, Kolçekmez Gateway, downward slopes, 2360 m, 13 Aug 2010, s.coll. (ISTE 94 692).

*Pimpinella* L., with about 150 species distributed throughout much of the Old World (Pimenov & Leonov 1993), is one of the largest genera of the family Apiaceae. This genus is represented with 25 species in Turkey.

These are the karyological results based on the Turkish material of *Pimpinella aromatica*. The diploid chromosome number as  $2n = 20$  is in accordance with previous report given by Fedorov (1974).

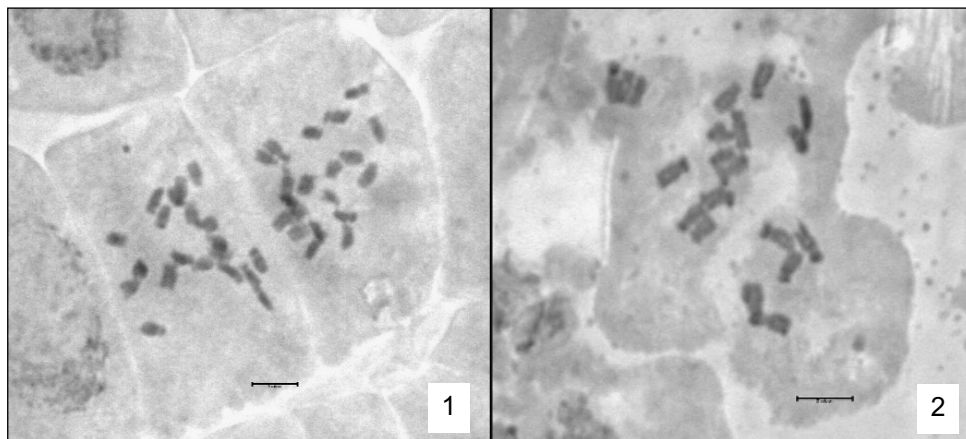
**1760.** *Pimpinella corymbosa* Boiss. —  $2n = 20$  (Fig. 2).

**Tu:** Erzincan, Spikor Mountain, Erzincan entrance, beginning of the military zone, 1530 m, 18 Aug 2010, s.coll. (ISTE 94 697).

The diploid chromosome number  $2n = 20$  was counted for *Pimpinella corymbosa*. This result confirms the previous report by Al-Eisawi (1989) from Jordan. Also the haploid chromosome number  $n = 10$  was found by Pimenov & al. (1996).

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Figs 1-2. Microphotographs of root tip mitosis of: **1**, *Pimpinella aromatica*,  $2n = 20$ ; **2**, *P. corymbosa*,  $2n = 20$ . – Scale bars = 5  $\mu\text{m}$ .

Pimenov, M. G., Daushkevich, J. V., Vasil'eva, M. G. & Kljuykov, E. V. 1996: Reports (716-748). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports - 6]. – Fl. Medit. **6**: 288-307. –

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### Reports (1761-1762) by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & L. Pellizzari

**1761.** *Anagyris foetida* L. —  $2n = 18+0-4B$  (Fig. 1a, 1b).

**It:** Savona, Varigotti, 44° 10' N, 8° 24' E, seeds obtained from Botanical Garden, Genova (s.n., s.coll., s.exsicc.).

**Sa:** Cagliari, Capoterra, Canale de Is Tintionis, 39° 10' N, 8° 58' E, *G. Bacchetta* (CAG).  
— Sassari, Villanova Monteleone, Necropoli M. Codinu, 40° 30' N, 8° 28' E, *G. Bacchetta* (CAG).

**Si:** Palermo, Piana degli Albanesi, 38° 00' N, 13° 16' E, seeds obtained from Botanical Garden, Palermo (s.n., s.coll., s.exsicc.).

- Hs:** Córdoba, Sierra de Córdoba, 37° 54' N, 4° 51' W, seeds obtained from Botanical Garden, Córdoba, (s.n., s.coll., s.exsicc.).
- Córdoba, Pantano la Breña, 37° 49' N, 4° 58' W, seeds obtained from Botanical Garden, Córdoba (s.n., s.coll., s.exsicc.).
- Cádiz, Ubrique, 36° 40' N, 5° 27' W, seeds obtained from Botanical Garden, Córdoba (s.n., s.coll., s.exsicc.).
- Málaga, 36° 47' N, 4° 26' W, seeds obtained from Botanical Garden La Concepción, Málaga (s.n., s.coll., s.exsicc.).
- Bl:** Mallorca, Sierra del Norte, 39° 43' N, 2° 37' E, seeds obtained from Botanical Garden, Sòller (s.n., s.coll., s.exsicc.). – (Fig. 1a).
- Mallorca, Bini Araix, Mirador de l'Ofre, 39° 32' N, 2° 25' E, seeds obtained from Botanical Garden, Berlin-Dahlem (s.n., s.coll., s.exsicc.).
- Gr:** Ipiros, Eparchia Dodonis, Nomos Ioanninon, Farangi Vikou, Monodendri, 39° 56' N, 20° 41' E, seeds obtained from Botanical Garden, Berlin-Dahlem (s.n., s.coll., s.exsicc.).
- Fokis, Chrisso, 38° 28' N, 22° 28' E, seeds obtained from Botanical Garden, Nice (s.n., s.coll., s.exsicc.).
- Cr:** Anopoli, Lefka Ori, 35° 14' N, 24° 07' E, seeds obtained from Botanical Garden, Berlin-Dahlem (s.n., s.coll., s.exsicc.).
- AE:** Lesbos, 38° 58' N, 26° 26' E, seeds obtained from Botanical Garden, København (s.n., s.coll., s.exsicc.). – (Fig. 1b).
- An:** Mugla, Bafa Gölü, 37° 28' N, 27° 25' E, seeds obtained from Botanical Garden, Berlin-Dahlem (s.n., s.coll., s.exsicc.).

The species is distributed in the Mediterranean area, both in the western and the eastern part (Pignatti 1982, Greuter & al. 1989).

The chromosome number  $2n = 18+0-4B$  was counted on the basis of 62 metaphase plates. Chromosome size ranges from 1.65 to 2.90  $\mu\text{m}$  and from 0.63 to 0.86  $\mu\text{m}$  for B-chromosomes. Our counting confirms the references reported by Van Loon & al. (1971) and Fernandes & al. (1977) from cultivated material; Ottonello & al. (1985) and Colombo & al. (1987) for two Sicilian populations (M. Pellegrino, Palermo and Favignana, Isole Egadi, respectively); Runemark (2006) for a Greek population from Oros Zeus, Naxos (Kiklades).

The species grows in degraded stages of alliance *Oleo-Ceratonion*.

**1762. *Anagyris latifolia*** Brouss. ex Willd. —  $2n = 18+0-2B$  (Fig. 1c).

- Ca:** La Palma, Mazo, 28° 31' N, 17° 45' W, *A. Santos Guerra* (s.n., s.exsicc.). – (Fig. 1c).
- Gran Canaria, 27° N, 15° W, seeds obtained from Botanical Garden Canario “Viera y Clavijo” (s.n., s.coll., s.exsicc.).

The species is endemic to Canary Islands (Gran Canaria, Tenerife, La Palma) (Lems 1960, Santos Guerra 1983, Bramwell & Bramwell 1990).

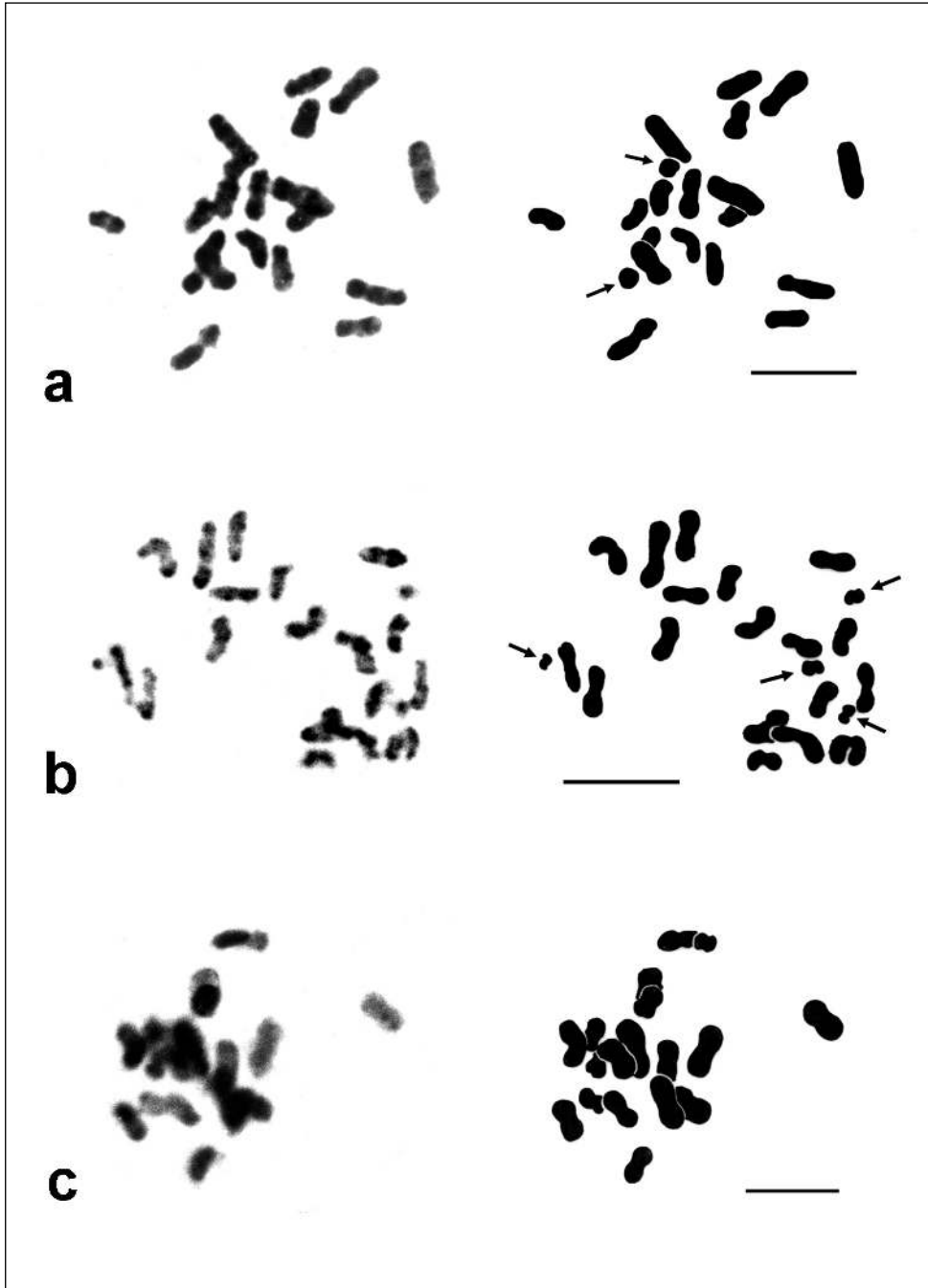


Fig. 1. Photomicrographs and relative drawings of somatic metaphase plates of *Anagyris*: **a**, *A. foetida* (Mallorca, Sierra del Norte),  $2n = 18+2B$ ; **b**, *A. foetida* (Lesbos),  $2n = 18+4B$ ; **c**, *A. latifolia* (La Palma, Mazo),  $2n = 18$ . – Arrows indicate B-chromosomes. Scale bars = 5  $\mu\text{m}$ .

The chromosome number  $2n = 18+0-2B$  was counted on the basis of 13 metaphase plates. Chromosome size ranges from 1.58 to 3.10  $\mu\text{m}$ . Our counting confirms the references reported by Larsen (1958, 1960) from cultivated material and Bramwell & al. (1972) for a population from Guia de Isora (Tenerife).

The species grows in scrub vegetation with *Juniperus phoenicea* (Santos Guerra 1983).

The genus *Anagyris* L. belongs to the tribe Thermopsidae Yakovlev. Thermopsidae comprise six genera (*Anagyris* L., *Piptanthus* Sweet, *Ammopiptanthus* Cheng, *Thermopsis* R. Br., *Baptisia* Vent., *Pickeringia* Nutt. ex Torrey & A. Gray) of trees, shrubs and perennial herbs, distributed in the temperate regions of the Northern Hemisphere, from the Mediterranean area through Asia to North America (Turner 1981). Polhill (1981, 1994) includes the tribe in the “genistoid alliance” together with Genisteeae and related tribes.

*Piptanthus* has two species distributed in Bhutan, China, Kashmir, Nepal (Zhi & Lock 2010); the only karyologically examined, *P. nepalensis* (Hook.) D. Don in Sweet, shows  $2n = 18$  (see Manandhar & Sakya 2003), number confirmed in our study.

*Ammopiptanthus* has two species [*A. mongolicus* (Maxim. ex Kom.) S.H. Cheng and *A. nanus* (Popov) S.H. Cheng] distributed in China, Kazakhstan, Kyrgyzstan, Mongolia (Zhi & Lock 2010). The chromosome number  $2n = 18$  (only once 20) was counted for both species by various authors (among others, Goldblatt 1981, Pan & Huang 1993).

*Baptisia* has about 20 species confined to the Eastern U.S.A. (Turner 1981). The numbers  $n = 9$  and/or  $2n = 18$  were observed for all the species karyologically examined [*B. australis* (L.) R. Br., *B. tinctoria* (L.) R. Br., *B. laevicaulis* (Gray) Small, *B. leucantha* Torr. & A. Gray, *B. viridis* Larisey, *B. nuttalliana* Small, *B. sphaerocarpa* Nutt., *B. calycosa* Engelm., *B. perfoliata* (L.) R. Br., *B. simplicifolia* Croom] from several authors (among others, Turner 1956, 1963, Turner & Fearing 1960).

The only species of *Pickeringia* (*P. montana* Nutt. ex Torr. & A. Gray), endemic to Western North America (from Oregon to Baja California), presents  $2n = 14, 28$  (Raven & al. 1965, Goldblatt 1981).

The genus *Thermopsis* comprises about 25 species, distributed in Central and Eastern Asia (with the highest diversity in China) and Northern America, especially in the western part (from southern Canada to New Mexico, with the highest diversity in California), but with some species in the Eastern States (from Maine to Georgia) (Zhi & Lock 2010, Chen & al. 1994).

All the examined Asian species [*T. lanceolata* R. Br., *T. mongolica* Czefran., *T. alterniflora* Regel & Schmalh., *T. barbata* Benth., *T. lupinoides* (L.) Link, *T. chinensis* Benth. ex S. Moore, *T. przewalskii* Czefran., *T. licentiana* E. Peter] show the chromosome number  $2n = 18$  (only the last species once  $2n = 14$ ) (among others, Mesicek & Sojak 1969, Chen & al. 1992).

The examined American species [*T. rhombifolia* (Nutt. ex Pursh) Richardson ex A. Gray, *T. montana* Nutt. ex Torr. & A. Gray, *T. villosa* (Walter) Fernald & B.G. Schub., *T. californica* S. Watson var. *argentata* (Greene) C.J. Chen & B.L. Turner, *T. macrophylla* Hook. & Arn.] present all the chromosome number  $2n = 18$ . In the present study this number was observed for the first time for *T. mollis* (Michx.) M.A. Curtis. Only for *T. gracilis* Howell and *T. divaricarpa* Nelson  $2n = 36$  was reported (Ledingham 1957, Chen & al. 1994).

The genera *Anagyris*, *Piptanthus*, *Ammopiptanthus*, *Thermopsis* and *Baptisia* have the

chromosome basic number  $x = 9$ ; all the examined taxa result diploid, except for *T. gracilis* and *T. divaricarpa*, which are tetraploid.

The only species of *Pickeringia* presents the basic number  $x = 7$ , with both diploid and tetraploid numbers. This genus results different, besides karyologically, also on the basis of phytochemical and molecular characters; recently, it has been found to be most closely related to some taxa of tribe Sophoreae Sprengel (see Turner 1981, Wang & al. 2006).

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## Reports (1763-1758) by Neli Grozeva

**1763.** *Chenopodium album* L. —  $2n = 54$  (Figs 1-3).

- Bu:** Black Sea Coast (*Northern*): village of Shkorpilovtsi, 42° 57' 37.27" N, 27° 52' 41.20" E, along the road to Varna, 15 m, 28 Aug 2010, *Grozeva NG* - 401 (SOM).
- Rhodopi Mts (*Eastern*): town of Kardzhali, 41° 38' 10.27" N, 25° 23' 37.10" E, ruderal terrains near bus station, 275 m, 12 Sept 2010, *Grozeva NG* - 404 (SOM).
- Thracian Lowland: town of Stara Zagora, 42° 25' 7.78" N, 25° 36' 11.52" E, between blocks of flats in Trite chuchura area, 253 m, 12 Sept 2010, *Grozeva NG* - 407 (SOM).

The species is widespread in Bulgaria on weedy cultivated and barren areas, along roads and as a weed in cultural communities. For the three studied populations of the species chromosome number  $2n = 54$  has been established. This chromosome number is in accordance with previous studies on plants from Bulgaria (Grozeva & Cvetanova 2008) and corresponds to the data reported by many authors (Kjellmark 1934, Löve & Löve 1961, Cole 1962, Mehra & Malik 1963, Giusti 1964, Uotila 1972, 1973, Dvořák



& Grull 1978, Queiros 1975; Schwarzova 1978, 1986a, b, Basset & Crompton 1982, Al-Turki & al. 2000, Lomonosova & al. 2001, Lomonosova & Krasnikov 2003, Krasnikov 2004, Rahiminejad & Gornal 2004, Lomonosova & al. 2005, Rahiminejad 2006). Uotila (1974) also reported  $n = 27$ .

**1764. *Chenopodium album* subsp. *pedunculare* (Bertol.) Arcang. —  $2n = 54$  (Fig. 4).**

**Bu:** Black Sea Coast (*Northern*): town of Shabla, 43° 32' 46,34" N, 28° 31' 58,57" E, ruderal terrains in the park, 37 m, 15 Oct 2004, *Grozeva NG* - 331 (SOM).

The species is rare in ruderal saline locations along the Black Sea Coast and in Thracian Lowland (around Belozem village). The established chromosome number  $2n = 54$  is the first count on Bulgarian material and confirms this reported by Dvořák (1984a) from the Czech Republic.

**1765. *Chenopodium striatiforme* Murr —  $2n = 36$  (Fig. 5).**

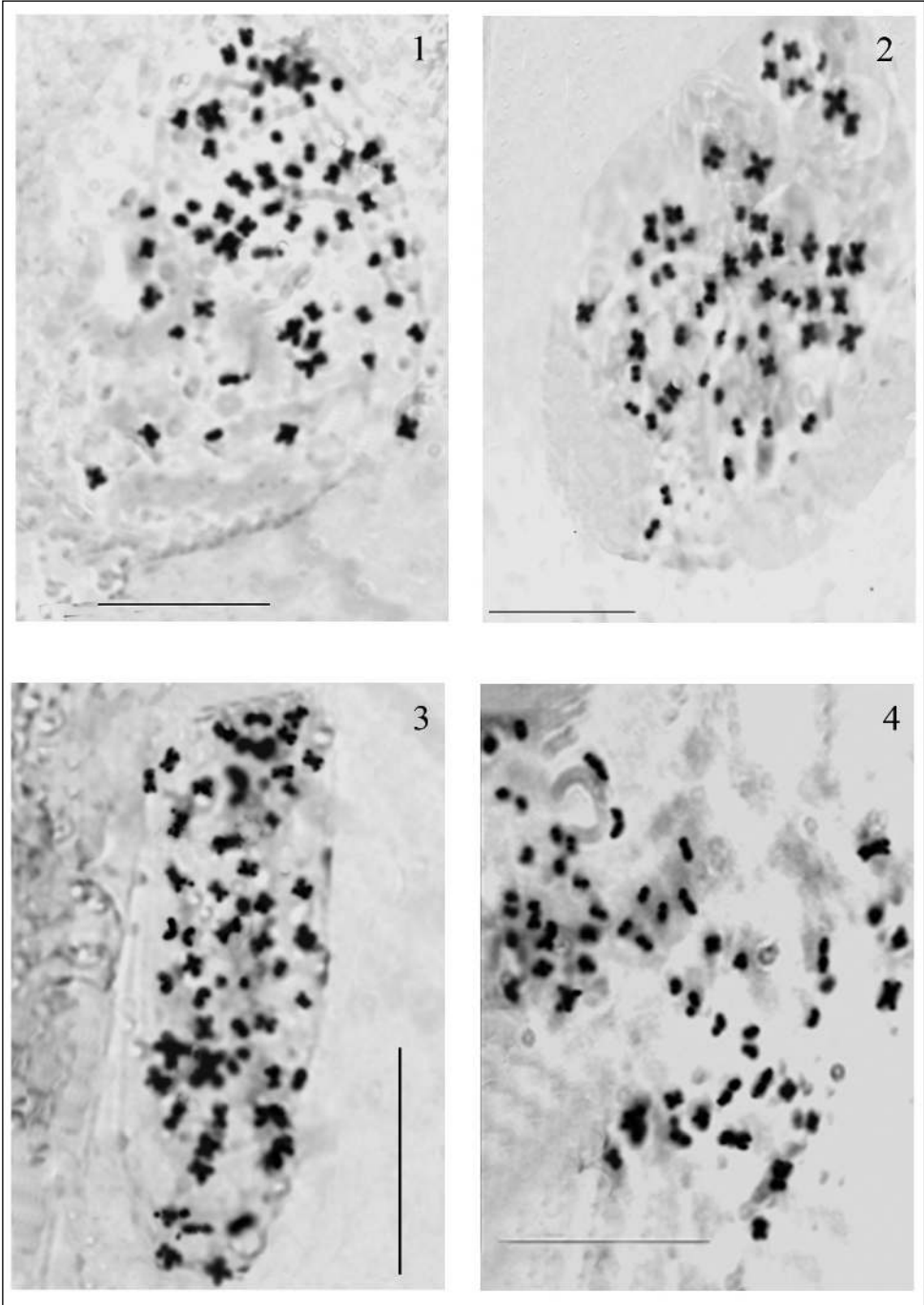
**Bu:** Black Sea Coast (*Southern*): Tended Nature Reserve “Atanasovsko Lake”, 42° 35' 54, 39" N, 27° 27' 24,49" E, along ruderal terrains, 30 m, 11 Sept 2009, *Grozeva NG* - 140 (SOM).

The species has limited occurrence in Bulgarian flora. It forms scarce populations on more shadowy terrains and moderately moist soils along the Black Sea Coast and in Thracian Lowland and Tundzha Hilly Country up to 230 m a.s.l. The chromosome number  $2n = 36$  is reported here for the first time from Bulgaria and agrees with reports of Dvořák (1984b, 1989) from the Czech Republic.

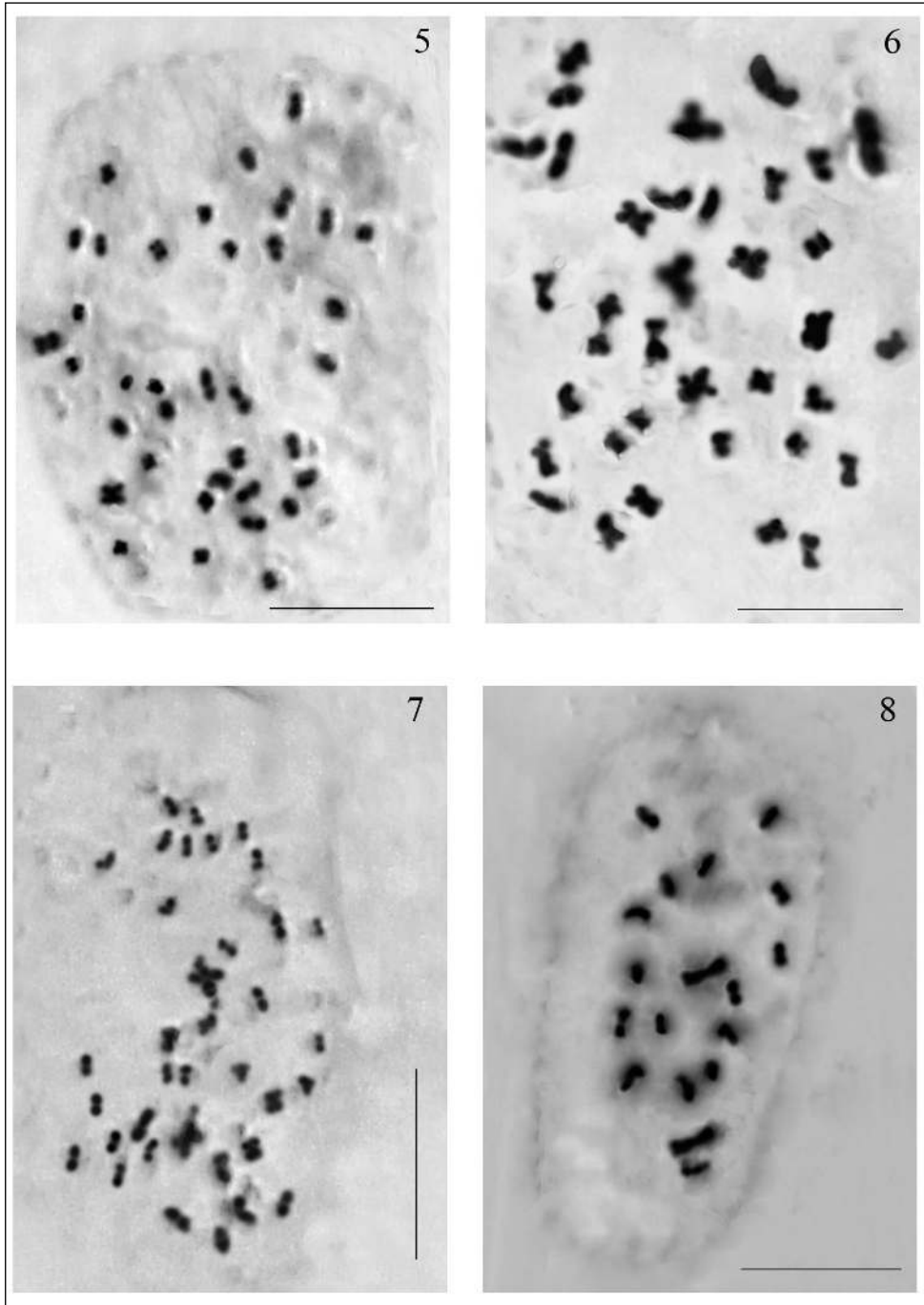
**1766. *Chenopodium strictum* Roth —  $2n = 36$  (Figs 6-7).**

**Bu:** Danubian plain: Levski town, 43° 21' 01,74" N, 25° 08' 12,71" E, ruderal terrains along the railway station, 72 m, 21 Oct 2008, *Grozeva NG* - 134 (SOM).  
— Rhodopi Mts (*Eastern*): town of Kardzhali, 41° 38' 10,28" N, 25° 23' 37,11" E, ruderal terrains in the Industrial part, 275 m, 14 Oct 2009, *Grozeva NG* - 137 (SOM).

The species is rare on open, dry and sunny terrains along the Black Sea Coast and in Sofia region; Danube plain, Eastern Rhodopes Mts, Thracian Lowland and Tundzha Hilly Country up to 250 m a.s.l. The chromosome number  $2n = 36$  established for the two populations is the first report from Bulgaria and confirms the results reported by different authors (Homsher 1963, Löve & Löve 1974, Schwarzova 1978, Gervais 1979, Murin & al. 1980, Dvořák 1989, Lomonosova & Krasnikov 2003, Lomonosova & al. 2003b, Rahiminejad & Gornal 2004, Lomonosova 2006, Rahiminejad 2006) from elsewhere. Lomonosova & al. (2005) reported  $2n = 18$ .



Figs 1-4. Microphotographs of root tip mitosis of: 1-3, *Chenopodium album*,  $2n = 54$ ; 4, *Ch. album* subsp. *pedunculare*,  $2n = 54$ . – Scale bars = 10  $\mu\text{m}$ .



Figs 5-8. Microphotographs of root tip mitosis of: **5**, *Chenopodium striatiforme*,  $2n = 36$ ; **6-7**, *Ch. strictum*,  $2n = 36$ ; **8**, *Suaeda heterophylla*,  $2n = 18$ . – Scale bars = 10  $\mu$ m.

**1767. *Suaeda heterophylla* Bunge** —  $2n = 18$  (Fig. 8).

**Bu:** Black Sea Coast (*Southern*): Tended Nature Reserve “Atanasovsko Lake”, 42° 35' 54,31" N, 27° 27' 24,42" E, on saline locations around the lake, 30 m, 12 Sept 2010, *Grozeva NG* - 501 (SOM).

The species has extremely limited occurrence in Bulgarian flora and is protected by Biological Diversity Act (2002). It is included in Red Data Book of Republic of Bulgaria (Stoeva 2011) in category CR. Its populations have been registered along the saline sands and clays of the Black Sea Coast near Pomoriysko and Atanasovsko Lakes. The localities are within sites of the European ecological network Natura 2000 in Bulgaria.

The established chromosome number  $2n = 18$  is the first karyological record of *S. heterophylla* from Bulgaria and corresponds to the data reported by the other authors (Lomonosova & al. 2003a, 2005, Lomonosova 2011).

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