Mediterranean chromosome number reports – 17

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Abstract

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This is the seventeen 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 28 taxa: *Allium, Ornithogalum* from Italy and France, by K. F. Caparelli & L. Peruzzi (Nos 1617-1619); *Cytisus* from Italy and Greece, by T. Cusma Velari, L. Feoli Chiapella & V. Kosovel (Nos 1620-1622); *Chenopodium, Atriplex* from Bulgaria, by N. Grozeva (Nos 1623-1630); *Crotalaria, Cytisus, Genista, Hesperolaburnum, Stauracanthus, Ulex* from Morocco and Spain, by H. Tahiri, P. Cubas & C. Pardo (Nos 1631-1639); *Hieracium, Hypochoeris, Jacobaea* from Sicily, by A. Geraci, E. Di Gristina & R. Schicchi (Nos 1640-1644).

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Reports (1617-1619) by Katia Francesca Caparelli & Lorenzo Peruzzi

1617. ***Allium coloratum*** Spreng. (= *A. pulchellum* G. Don *nom. illeg.*) — 2*n* = 16 (Figs 1a-b).

It: Trentino Alto Adige, C-E Alps: Gruppo di Brenta, Molveno (prov. di Trento), along the pathway towards Rifugio Croz dell'Altissimo, ca. 1300 m a.s.l., 46° 09' N, 10° 57' E, 24 Jul 2005, *L. Peruzzi*, *G. Aquaro*, *D. Uzunov* & *K. F. Caparelli* (*cult.* Hort. Bot. Univ. Calabria acc. no 489-m; CLU no 16842).

Allium coloratum Spreng. is widespread in S Europe, from France to Turkey, especially in S Alps (Jauzein & Tison 2005). Our counting, referring to a bulbilliferous form, revealed a diploid 2*n* = 16 chromosome complement. This result agrees with previous data (Ricci 1965, Soliman 1990, Lovka 1995, Vosa 1996), also from other Italian territories such as Tuscany (Cela Renzoni & Garbari 1971, Marchi & al. 1974, Vosa 1976, Löve & Löve 1982) and Lombardia (Tschermak-Woess & Schiman 1960, Wittmann 1984).

According to Levan & al. (1964), karyotype formula can be expressed as follows: 2*n* = 2x = 10m + 1m-SAT + 5m =16. The karyotype structure of our material, showing the sixth pair of chromosomes heteromorphic, does not agrees with that reported from other authors; in fact, Cela Renzoni & Garbari (1971) report two couples of terminally satellited chromosomes, while Ricci (1965) only one couple, moreover with subterminal centromere. A certain degree of heteromorphism in satellited chromosomes is instead reported by Marchi & al. (1974) and Tschermak-Woess & Schiman (1960).

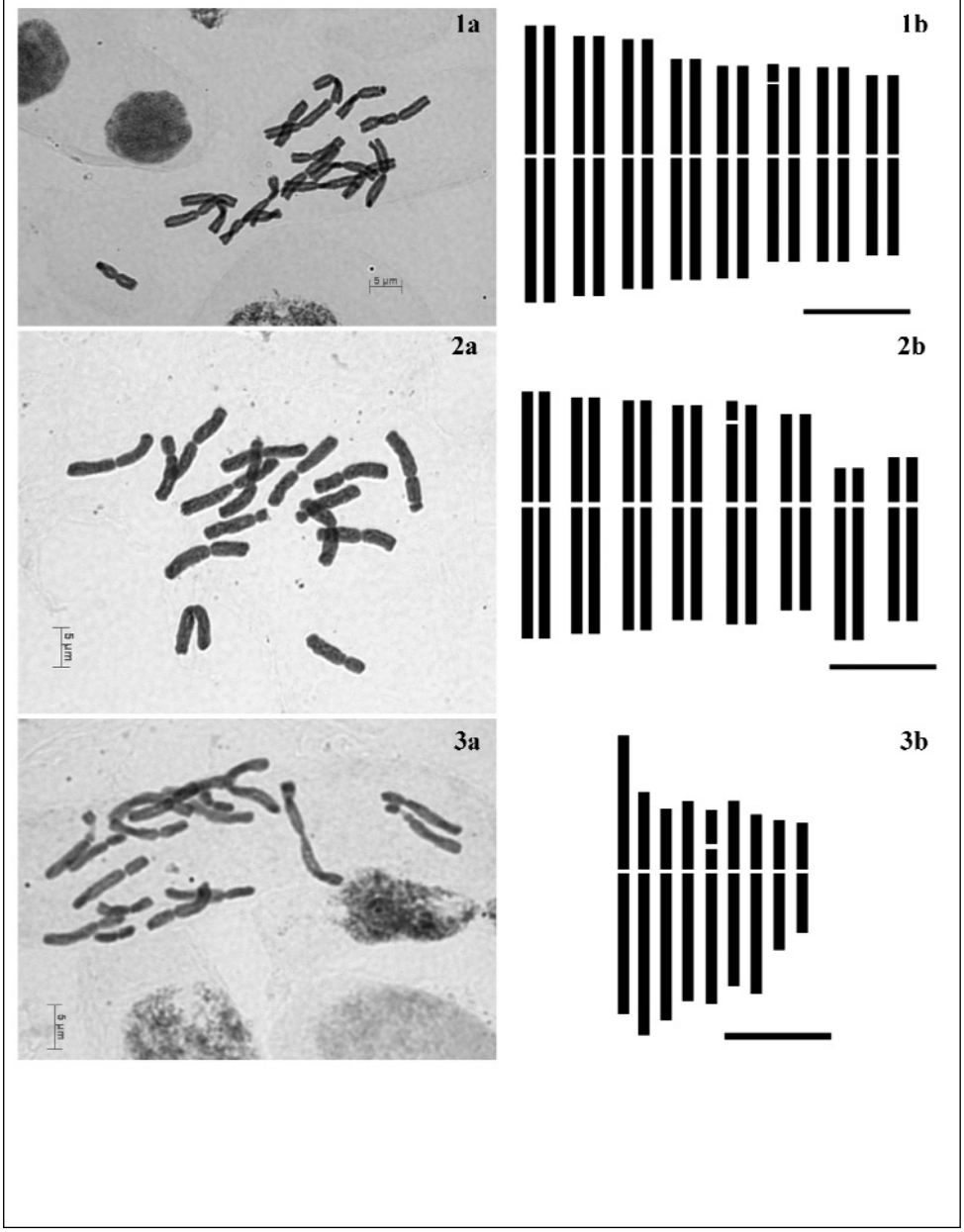
Mean chromosome size (assessed from four metaphase plates) ranges from 8.28 to 12.85 µm; while total haploid genome length is 73.20 µm.

1618. ***Allium parciflorum*** Viv. — 2*n* = 16 (Figs 2a-b).

Fr: SE Corse: L'Ospedale, along the pathway towards the "Piscia di Gallo" cascade, 50-100 m a.s.l., before of the "tottering rock", 41° 40' N, 09° 15' E, 20 Aug 2003, *L. Peruzzi & K. F. Caparelli* (*cult.* Hort. Bot. Univ. Calabria acc. no 703-2; CLU no 16209).

Allium parciflorum Viv. is an interesting species endemic of Sardinia and Corsica, and belongs to *Allium* sect. *Brevispatha* Valsecchi (Valsecchi 1974). Our counting, the second from Corsica, revealed a diploid 2*n* = 16 chromosome complement. This result well agrees with the previous record (Revellata, in NW Corse) from the same region (Contandriopoulos 1962) and with several other data from Sardinia (Martinoli 1955, Garbari & Tornadore 1972, Valsecchi 1974).

According to Levan & al. (1964), karyotype formula can be expressed as follows: 2*n* = 2x = 8m + 1m-SAT + 3m + 2st + 2sm = 16. The karyotype structure of our material, is very similar to that reported by Martinoli (1955) and by Valsecchi



Figs 1-3. Microphotographs (a) and relative idiograms (b) of: 1a-b, *Allium coloratum*, 2*n* = 16; 2a-b, *A. parciflorum*, 2*n* = 16; 3a-b, *Ornithogalum collium*, 2*n* = 18. - Scale bars = 5 µm.

(1974), even if these authors quote a couple of terminally satellited chromosomes, and not a single one.

Mean chromosome size (assessed from five metaphase plates) ranges from 7.41 to 11.35 µm; while total haploid genome length is 66.43 µm.

1619. *Ornithogalum collinum* Guss. — 2*n* = 18 (Figs 3a-b).

It: NE Sicily: Nebrodi, grasslands above Cesarò, 1100 m a.s.l., 37° 51' N, 14° 44' E, 27 Apr 2004, *L. Peruzzi & K. F. Caparelli* (*cult.* Hort. Bot. Univ. Calabria acc. no 620-2; CLU no 12794).

Ornithogalum collinum Guss. is a rare species of central-eastern Mediterranean (Speta 1990). Our counting revealed a diploid 2*n* = 18 chromosome complement. This result well agrees with previous data (Garbari & Giordani 1984, Speta 1990), published also from other two SE (Piazza Armerina and Mazzarino) and one NW (Buonfornello) Sicilian localities (Pavone 1984).

According to Levan & al. (1964), karyotype formula can be expressed as follows: 2*n* = 2x = 2m + 6sm + 2st-SAT + 2m + 2sm + 4m = 18. The karyotype structure of our material, with the fifth couple of chromosomes showing intercalary satellites, is very similar to that reported by the above cited authors, revealing a stable chromosomic arrangement of this species. Mean chromosome size (assessed from two metaphase plates) ranges from 4.96 to 12.91 µm; while total haploid genome length is 71.06 µm.

Moreover, our result confirm the karyological independence of this species respect to the close *O. gussonei* Ten., which has typically 2*n* = 14 chromosomes (Peruzzi & Cesca 2003 and literature cited there). These two species are the only representatives of *Ornithogalum* subgen. *Hypogaeum* Zahar. in C Mediterranean, being this subgenus marked by: hypogeal cotyledons, bulb-scales free, palisade interrupted on the adaxial surface of the leaves (so white-striped), narrow (1-1.5 mm) basal leaves in high number (from 9 to 12) and never glaucous, presence of chromosomes with intercalary satellites. Despite *O. collinum* and *O. gussonei* have different basic chromosome numbers (x = 9 and x =7, respectively), they are morphologically very close. However, according to our personal observations, they can be easily distinguished as follows:

1 Leaves ciliate at margins ..... *O. collinum*
- Leaves glabrous 2
2 dark spot on the back of the anthers present ..... *O. gussonei*
- dark spot on the back of the anthers absent 3
3 Leaves present at flowering, with 7 to 9 vascular bundles (2*n* = 18) ..... *O. collinum*
- Leaves absent at flowering, with 7 vascular bundles (2*n* = 14) ..... *O. gussonei*

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Reports (1620-1622) by Tiziana Cusma Velari, Laura Feoli Chiapella & Vera Kosovel

1620. ***Cytisus spinescens*** Presl — 2*n* = 104 + 0-2B (Fig. 1a).

It: Chieti, Vaduccio, Lama dei Peligni, Majella, 42° 04' N, 14° 19' E, 1600 m a.s.l., 2005, seeds obtained from Botanical Garden, Parco Nazionale della Majella (s.n., s. coll., s.exsicc.).

— L'Aquila, surroundings, 42° 37' N, 13° 39' E, 1989, seeds obtained from Botanical Garden, L'Aquila (s.n., s. coll., s.exsicc).

Cytisus spinescens has a transadriatic distribution; in Italy it occurs in central southern Apennines, from Abruzzo and Marche to Calabria (Pignatti 1982, Greuter & al. 1989).

The chromosome number 2*n* = 104, sometimes with two accessory chromosomes, was counted in both populations. Chromosome size ranges from 0.99 to 1.98 µm and 0.36 µm for B chromosomes. Forissier (1973a), on the contrary, found *n* = 50 in a population of Abruzzo (Ovindoli). The number 2*n* = 104 is by far the highest counted in *Cytisus* s.l.; assuming x= 12 as basic number (Cusma Velari & Feoli Chiapella 1994), the species results hyperaneuploid, with level of ploidy x = 8.

C. spinescens belongs to sect. *Tubocytisus* DC**.,** which presents the highest specific diversity in southern Balkan Peninsula. *C. spinescens* is the only Italian taxon of the series *Spinescentes* Boiss., with circummediterranean distribution, which includes the few spiny species of the genus (Cristofolini 1991).

1621. ***Cytisus pseudoprocumbens*** Markgraf — 2*n* = 48 + 0-2B, 52 + 0-2B (Fig. 1b).

It: Udine, Cividale, arid grassland on the banks of the river Natisone, 46° 09' N, 13° 43' E, 145 m a.s.l., 6 Jul 1991, *L. Feoli Chiapella* (TSB).

— Trieste, Opicina, arid grassland, 45° 65' N, 13° 80' E, 310 m, 3 Jul 1992, *L. Feoli Chiapella* (TSB).

Cytisus pseudoprocumbens is a northern illyric endemic (Frodin & Heywood 1968). In Italy, it occurs on the southern side of the Alps, more frequently in the East, as far as the river Piave, getting gradually rarer towards the West. It was found in Friuli-Venezia Giulia, in Veneto (provinces of Treviso, Belluno, Vicenza and Verona) and, sporadically, in eastern Lombardia (provinces of Brescia and Bergamo) (Feoli Chiapella & Fontana 1990).

No previous karyological data are known for this taxon. The chromosome numbers 2*n* = 48 and, more rarely, 2*n* = 52 (sometimes with two accessory chromosomes) were counted on the basis of 12 metaphase plates. Chromosome size ranges from 0.88 to 2.09 µm and 0.38 µm for B-chromosomes.

The species characterizes the alliance *Satureion subspicatae* (Horvat 62) Horvatić 73. In Venezia Giulia it occurs in Karst on open arid grassland (in the coenosis *Carici humilis-Centaureetum rupestris* Horvat 31); in Friuli it is abundant mostly in the "magredi" (*Centaureo dichroanthae-Globularietum cordifoliae* Pignatti 53 and

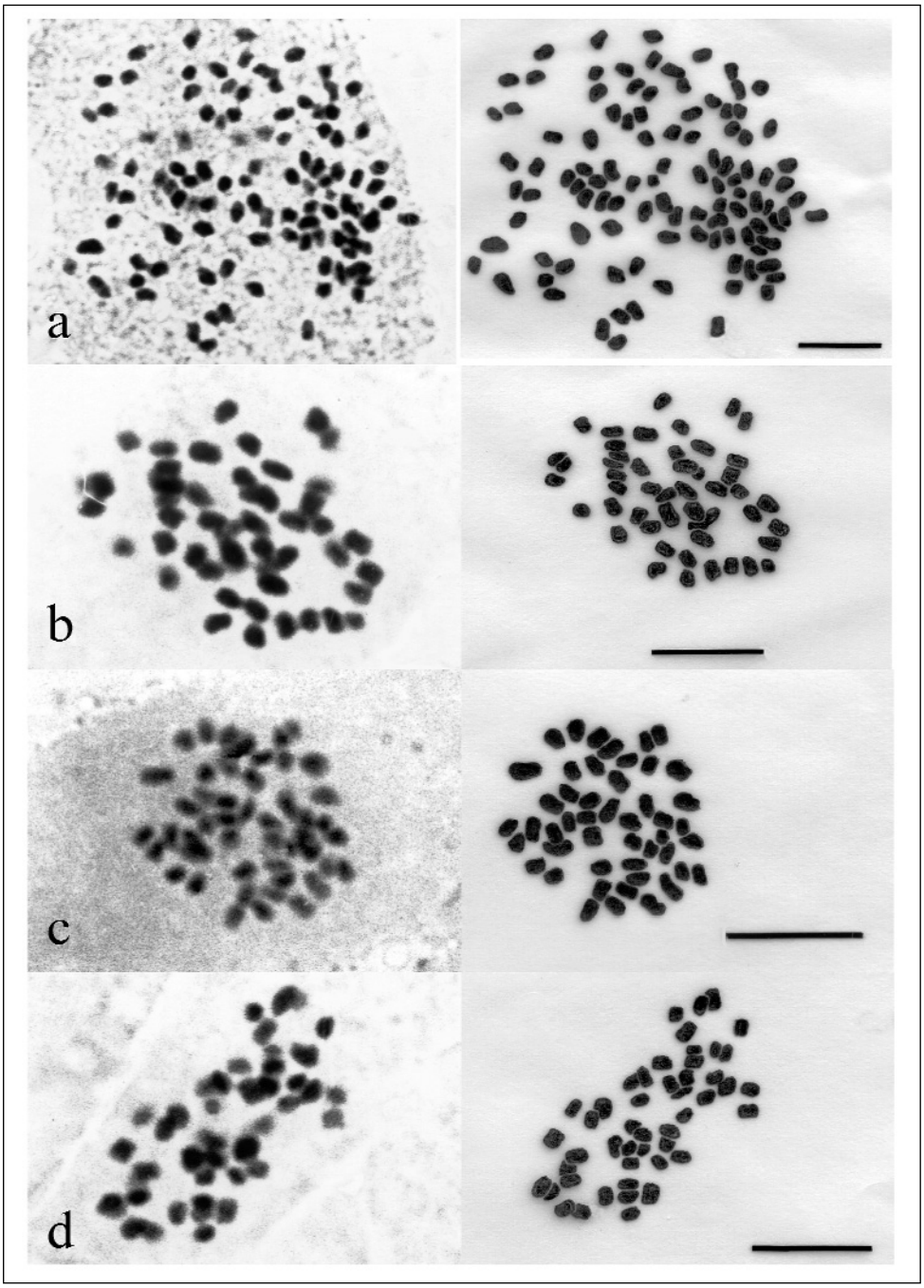

Fig. 1. Photomicrographs and relative drawings of somatic metaphase plates of: **a,** *Cytisus spinescens*, 2*n* = 104; **b,** *C. pseudoprocumbens*, 2*n* = 48; **c,** *C. decumbens* (L' Aquila), 2*n* = 48; **d,** *C. decumbens* (Mt. Olimbos), 2*n* = 48. − Scale bars = 5 µm.

Schoeno nigricantis-Chrysopogonetum grylli Pignatti ex Feoli Chiapella et Poldini 93) (Feoli Chiapella & Poldini 1993).

1622. *Cytisus decumbens* (Durande) Spach — 2*n* = 48 + 0-2B (Figs 1c-d).

It: L'Aquila, Rocca di Cambio, Terranera, Altopiano delle Rocche, stony pastures on limestone, 42° 24' N, 13° 49' E, 1330 m a.s.l., 7 Jul 2005, *G. Pirone* (TSB). - Fig. 1c.
Gr: Makedonía, Katerini, Mt. Olimbos, 40° 05' N, 22° 21' E, 800 m a.s.l., 24 Jul 1991, *L. Feoli Chiapella* (TSB). - Fig. 1d.

Cytisus decumbens is a central southern European orophyte, distributed from Spain to Greece. In Italy, it is present from Toscana and Abruzzo to Calabria (Skalická 1967; Hess & al. 1970; Pignatti 1982; Greuter & al. 1989).

The chromosome number 2*n* = 48, counted on the basis of 10 metaphase plates, confirms the reference reported by Sañudo (1973, for a Spanish population from Oncala, Soria), whereas Forissier (1973b) found *n* = 23 on cultivated material. Chromosome size ranges between 0.66 and 1.87 μm.

According to Strid (1986), the plants of Mt. Olimbos could represent a variety of *C. decumbens*.

Cytisus pseudoprocumbens and *C. decumbens* belong to sect. *Corothamnus* (Koch) C. Presl, with diversification centre in Balkan Peninsula (Skalická 1967).

Cytisus procumbens (Willd.) Sprengel is the only other species of the section karyologically examined. Dvořák & Dadáková (1976) and Dvořák (1977) releved 2*n* = 48 for a population from Ceská Republika (Boleradice uplands), whereas Hindáková (1974) reported 2*n* = 44 for two populations from Slovenská Republika (Juhoslovenský kras and Jelšava); de Castro (1949) counted 2*n* = 22 on cultivated material.

Most examined populations of the species of sect. *Corothamnus* would result eutetraploid (2*n* = 48) with x = 12, but some cases of aneuploidy were releved in each of the three species so far studied: hyperaneuploid numbers (2*n* = 52) were counted in *Cytisus pseudoprocumbens,* while in *C. decumbens* and *C. procumbens* were noticed hypoaneuploid numbers [*n* = 23, 2*n* = (22), 44].

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Reports (1623-1630) by Neli Grozeva

1623. *Chenopodium chenopodioides* L. — $2n = 18$ (Fig. 1).

Bu: Northern Black See coast, Schabla lake, 43º 35' N, 28º 34' E, 199 m a.s.l., ruderal places, 25 Oct 2004, *Grozeva* NG-165 (SOM).

The chromosome number $2n = 18$ is reported here for the first time on Bulgarian material. It confirms the previous counts of Kawatani & Ohno (1962) and Keener (1970) from elsewhere.

1624. *Chenopodium hybridum* L. — 2*n* = 18 (Figs 2-4).

Bu: Southern Black Sea coast, Burgas town, 42º 30' N, 27º 28' E, 30 m a.s.l., ruderal places, 24 Sept 2004, *Grozeva* NG-80 (SOM).
— Danube plain, Belene town, 43º 39' N, 25º 07' E, 80 m a.s.l., ruderal places, 10 Sept 2003, *Grozeva* NG-156 (SOM).
— Eastern Rhodope Mts, Kurdzhali town, 41º 39' N, 25º 38' E, 275 m a.s.l., ruderal places, 12 Sept 2003, *Grozeva* NG-159 (SOM).

This is the first karyologycal study on Bulgarian material. The chromosome number found by us confirms the results of previous reports (Winge 1917, Kjellmark 1934, Cooper 1935, Löve 1954, Kawatani & Ohno 1956, Gadella & Kliphuis 1963, Schwarzowa 1978).

1625. *Chenopodium glaucum* L. — 2*n* = 18 (Figs 5-6).

Bu: Northern Black Sea coast, Balchik town, 43º 25' N, 28º 10' E, sandy places, 190 m a.s.l., 14 Sept 2004, *Grozeva* NG-161 (SOM).
— Danubian plain, Svistov town, ruderal terrains, 43º 37' N, 25º 20' E, 50 m a.s.l., 18 Aug 2003, *Grozeva* NG-162 (SOM).

This is the first karyological results based on Bulgarian material of *Chenopodium glaucum*. The diploid chromosome number 2*n* = 18, corresponds to the data reported by the other authors (Cooper 1935, Wullf 1937, Polja 1948, Löve 1954, Kawatani & Ohno 1956, Scalinska & al. 1961, Gadella & Kliphuis 1963, Keener 1970, Löve & Löve 1974, Dvořák & al. 1980, Murin & al. 1980, Schwarzova 1980) and by Löve & Löve (1982) for the subspecies *salinum* (Standl.) Aellen in material from Canada.

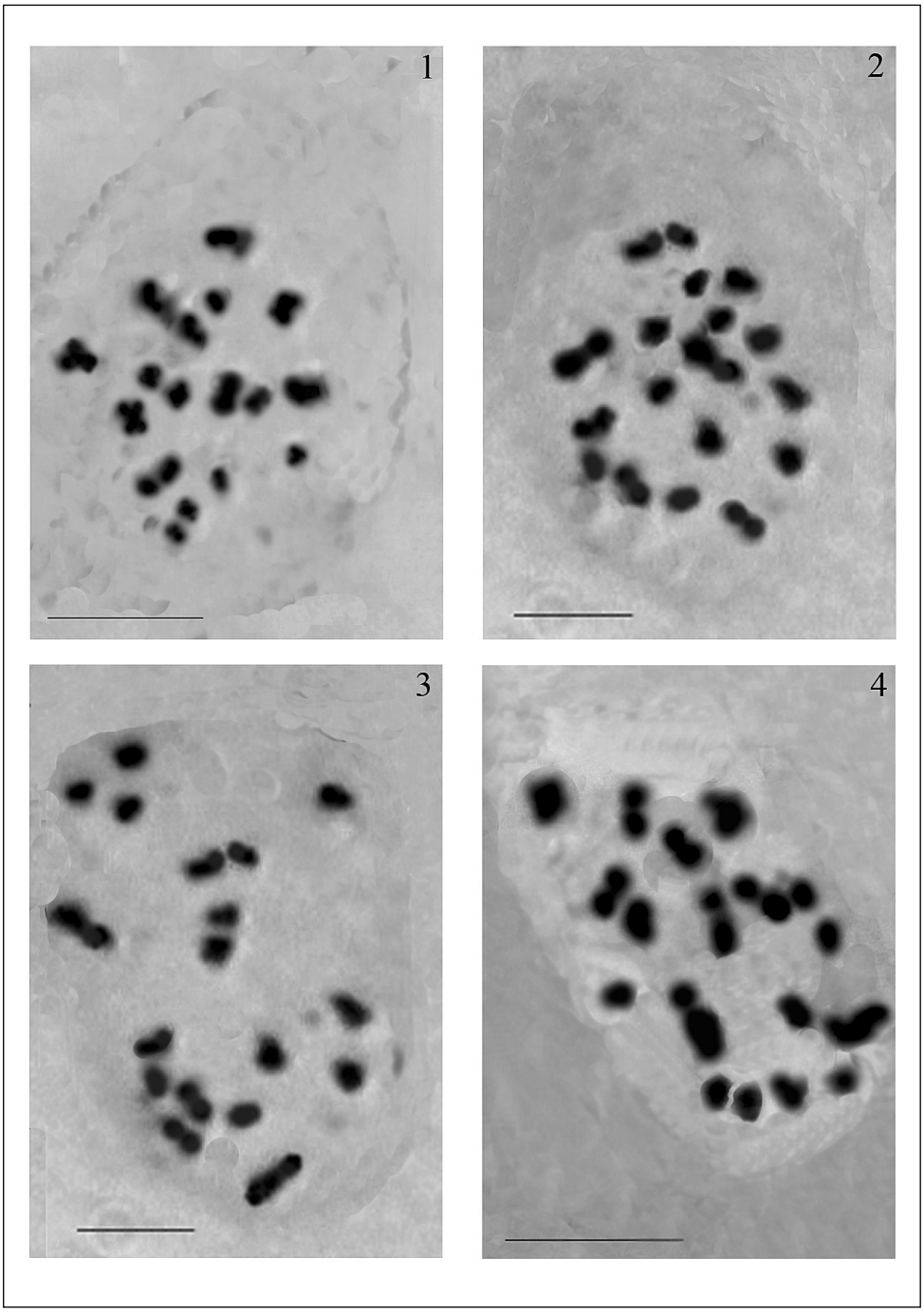
1626. *Chenopodium murale* L. — 2*n* = 18 (Figs 7-8).

Bu: Eastern Balkan Range, Sliven town, 42º 40' N, 26º 19' E, 243 m a.s.l., ruderal places, 28 Aug 2001, *Grozeva* NG-41 (SOM).
— Central Balkan Range, Kotel town, 42º 53' N, 26º 27' E, 643 m a.s.l., ruderal places, 17 Oct 2003, *Grozeva* NG-75 (SOM).

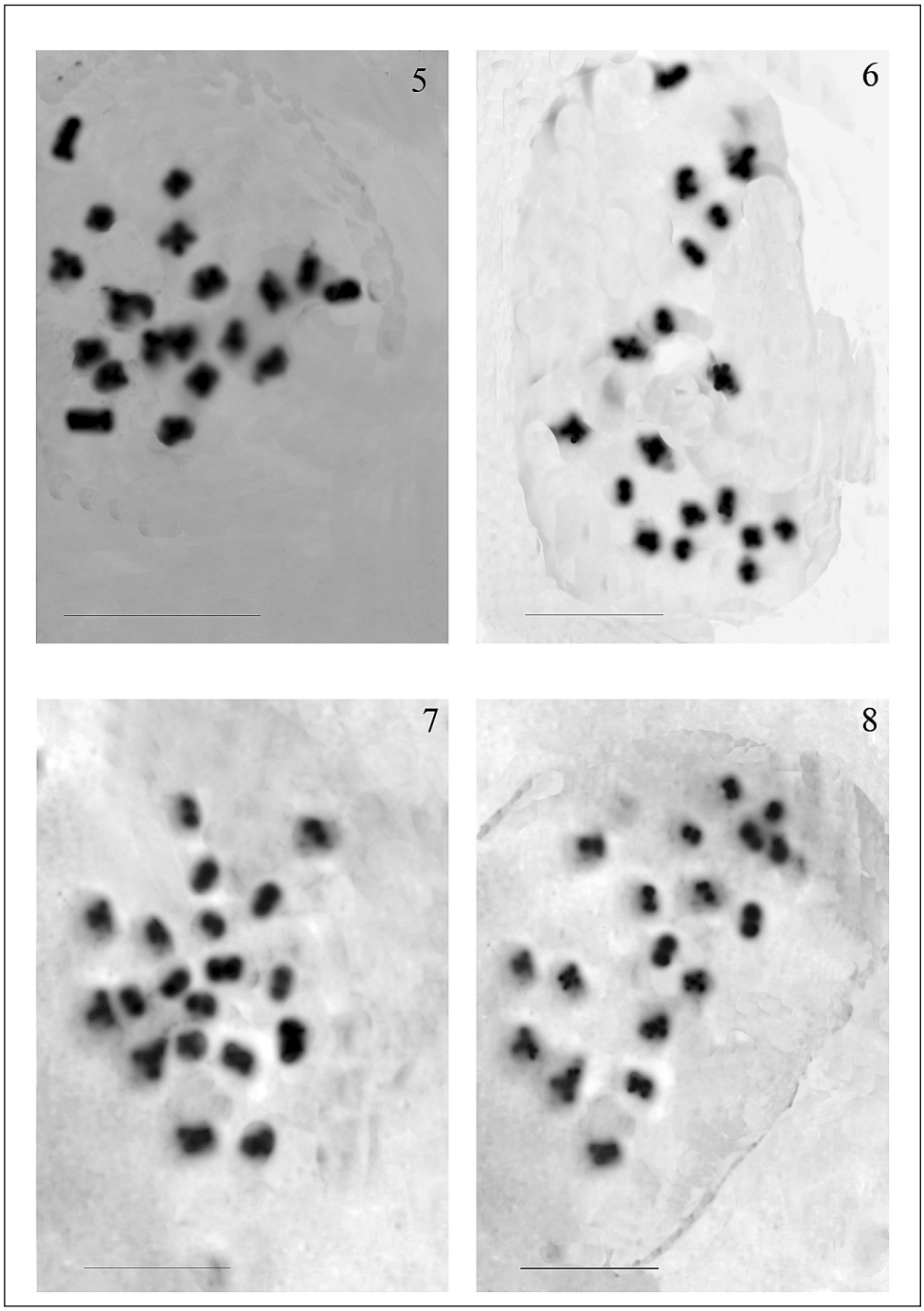
The chromosome number reported here is the first record for *C. murale* from Bulgaria and agrees with reports of Winge (1917), Rohweder (1937), Heiser & Whitaker (1948), Kawatani & Ohno (1956), Mehra & Malik (1963), Uotila (1973), Dvorak & al. (1980), Dvorak & Dadakova (1984), D'Ovidio (1987).

1627. *Chenopodium rubrum* L. — 2*n* = 18 (Fig. 9).

Bu: North-Eastern Bulgaria, Tutrakan town, 44º 03' N, 26º 37' E, 107 m a.s.l., ruderal places, 5 Sept 2002, *Grozeva* NG-43 (SOM).



Figs 1-4. Microphotographs of root tip mitosis of: **1,** *Chenopodium chenopodioides*, 2*n* = 18; **2-4,** *C. hybridum*, 2*n* = 18. − Scale bars = 10 μm.



Figs 5-8. Microphotographs of root tip mitosis of: **5-6,** *Chenopodium glaucum*, 2*n* = 18; **7-8,** *C. murale*, 2*n* = 18. − Scale bars = 10 µm.

The species was studied for the first time in Bulgaria. The result obtained 2*n* = 18 is in agreement with most previous reports (Kjellmark 1934, Kawatani & Ohno 1962, Zosimovič 1965, Keener 1970, Kliphuis & Wieffering 1972, Uotila 1973, Dvorak & al. 1980, Dvorak & Dadakova 1984). Additionally, the chromosome number 2*n* = 36 was reported by Löve & Löve (1982) in material from Canada and also see Májovský & al. (1970) from elsewhere.

1628. *Chenopodium polyspermum* L. — 2*n* = 18 (Figs 10-12).

Bu: Eastern Sredna Gora Mt., Gorno Novo Selo village, 42º 27' N, 25º 14' E, 597 m a.s.l., ruderal places, 25 Jul 2003,, *Grozeva* NG-149 (SOM).
— Thracian Lowland, Stara Zagora town, 42º 25' N, 25º 38' E, 196 m a.s.l., ruderal places, 26 Sept 2003, *Grozeva* NG-145 (SOM).
— Strandža mt., Malko Tarnovo town, 41º 59' N, 27º 32' E, 350 m a.s.l., ruderal places, 25 Sept 2002, *Grozeva* NG-146 (SOM).

Our count is the first record from Bulgarian populations, and confirms data that many authors published from elsewhere (Kjellmark 1934, Rohweder 1937, Kawatani & Ohno 1956, Cole 1962, Gadella & Kliphuis 1963, Uotila 1973, Schwarzowa 1978, Dvorak & al. 1980, Dvorak & Dadakova 1984).

1629. *Chenopodium ficifolium* Sm. — 2*n* = 18 (Figs 13-15).

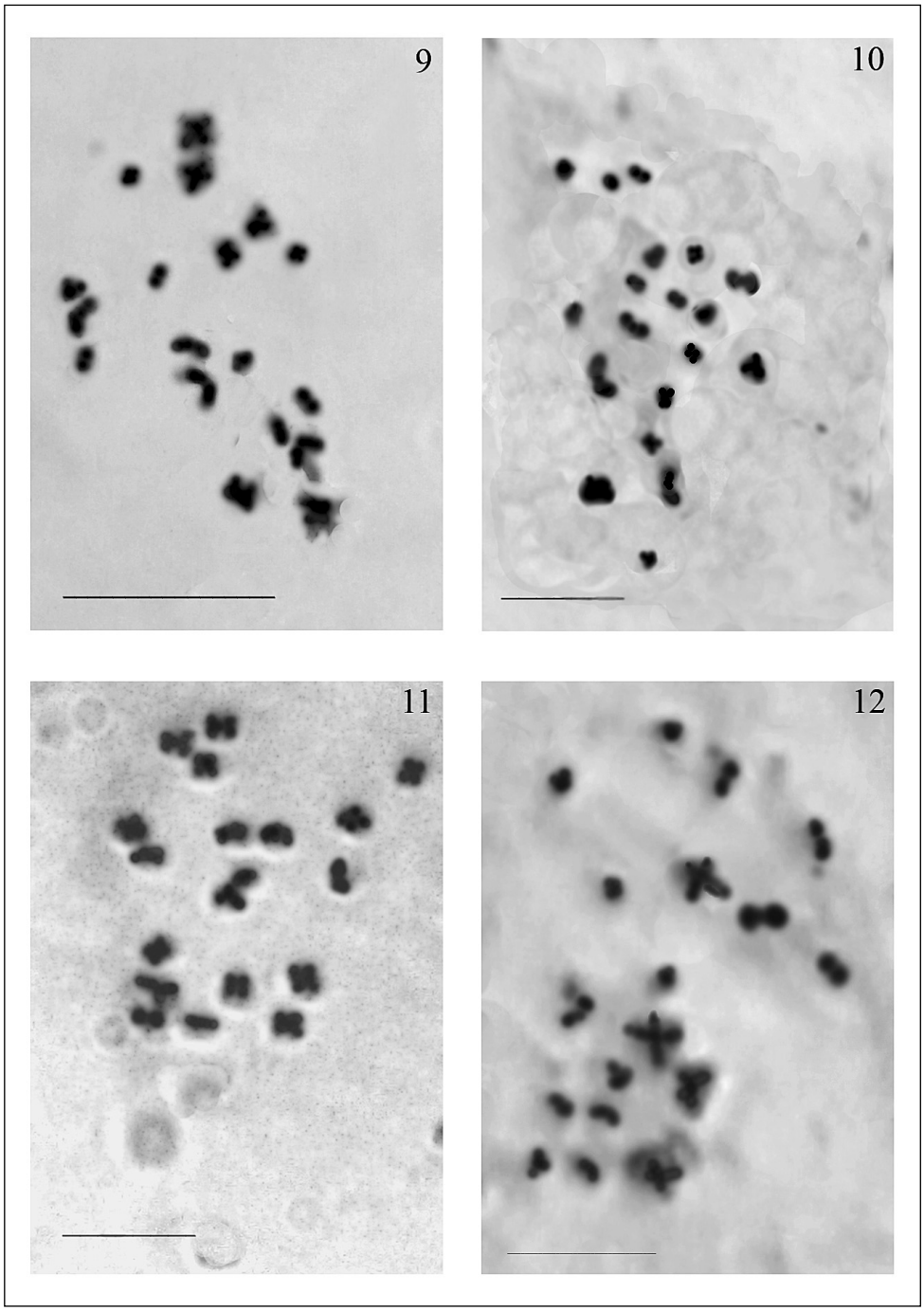
Bu: Northern Black See coast, Obzor town, 42º 49' N, 27º 53' E, 0 m, ruderal places, 25 Aug 2001, *Grozeva* NG-31 (SOM).
— North-Eastern Bulgaria, Dobrich town, 42º 11' N, 26º 40' E, 225 m a.s.l., ruderal places, 3 Sept 2002, *Grozeva* NG-25 (SOM).
— Thracian Lowland, Yambol town, 42º 29' N, 26º 30' E, 114 m a.s.l., ruderal places, 3 Sept 2002, *Grozeva* NG-54 (SOM).

The species is studied for the first time in Bulgarian material. The result obtained 2*n* = 18 is in agreement with most reports (Kjellmark 1934, Cole 1962, Kawatani & Ohno 1962, Uotila 1973, Löve & Löve 1974, Dvorak & al. 1980, Schwarzova 1980, Dvorak & Dadakova 1984). The chromosome number 2*n* = 36 was also reported by Kawatani & Ohno (1962) and Dvorak (1989).

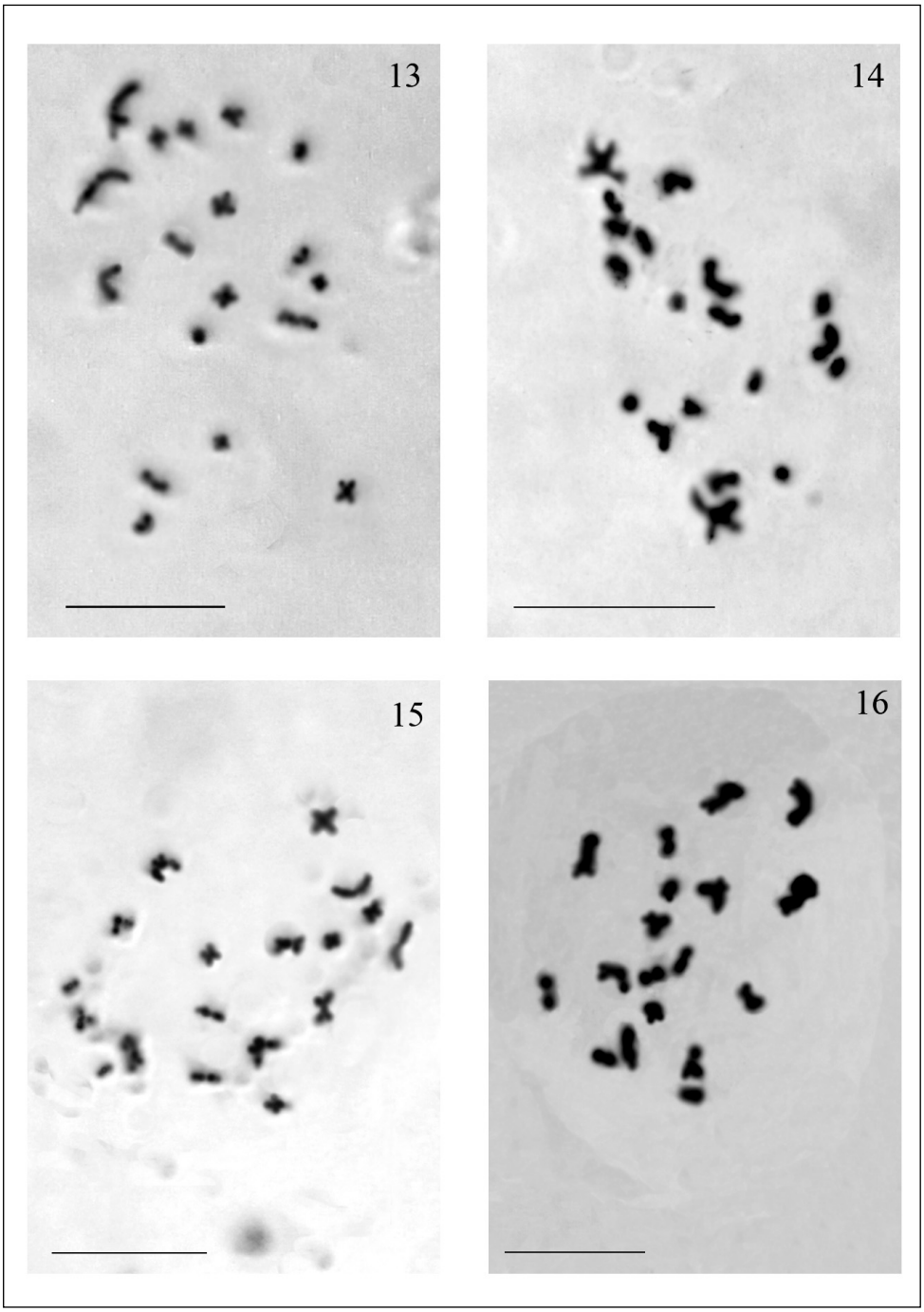
1630. *Atriplex tatarica* L. — 2*n* = 18 (Fig. 16).

Bu: Southern Black Sea coast, Pomoriysko lake, sandy terrains, 42º 35' N, 27º 37' E, 10 m a.s.l., 15 Sept 2005, *Grozeva* NG-295 (SOM).

Our report is the first chromosome count for the species on Bulgarian material. It confirms the previous reports (see Fedorov 1969, Májovský & Murin 1987, for references).



Figs 9-12. Microphotographs of root tip mitosis of: **9,** *Chenopodium rubrum*, 2*n* = 18; **10-12**, *C. polyspermum*, 2*n* = 18. − Scale bars = 10μm.



Figs 13-16. Microphotographs of root tip mitosis of: **13-15,** *Chenopodium ficifolium,* 2*n* = 18; **16**, *Atriplex tatarica,* 2*n* = 18. − Scale bars = 10 μm.

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Reports (1631-1639) by Hikmat Tahiri, Paloma Cubas & Cristina Pardo

1631. ***Crotalaria saharae*** Coss. **—** 2*n* = 16.

Ma: Maroc saharien, Graara, Aouchfegt, c 140 km W of Aousserd, 23° 05' N, 15° 50' W, 5 May 2000, *Fennane & Rejdali* (RAB62341).

This species is distributed in the Sahara regional transition zone (Roskov & al. 2005) of Mauritania, Morocco, Mali, Niger, Algeria and Libya. *Crotalaria* is considered a dibasic genus with x = 7 and x = 8, the latter being the most frequent and widespread basic number (Almada & al. 2006). Our report, 2*n* = 16 chromosomes in root mitosis, is the first chromosome data for this species and indicates that *C. saharae* is a diploid species.

1632. ***Cytisus arboreus*** (Desf.) DC. subsp. ***baeticus*** (Webb) Maire **—** 2*n* = 50 (Figs 1, 7).

Hs: Málaga, Ronda to San Pedro de Alcántara, km 162-161, 36º 33' N, 5º 03' W, 530 m a.s.l., sepentinites, 25 Jun 1996, *Cubas & Pardo*, (MAF 158231).

This number (2*n* = 50) has been previously found in Moroccan populations (Tahiri & Cubas 2000, Cubas & al. 2001) but only 2*n* = 48 had been reported for Spanish populations (Sañudo 1973a). Thus, the Spanish populations show variability in the chromosome number as do the Moroccan ones. No morphological variation has been detected associated with chromosome number changes.

1633. ***Cytisus oromediterraneus*** Rivas Mart. & al. **—** 2*n* = 46.

Hs: Madrid, Puerto de Navacerrada, 44º 46' N, 4º 00' W, 1858 m a.s.l., 3 Sep 2005, *Tahiri* (RAB65897).

Cytisus oromediterraneus extends from the Iberian Peninsula to France growing on the Massif Central and Cévennes (central and southern France), Pyrenees (Andorra, Spain, and France), the Cantabrian Mountains and the Iberian Ranges of northern Spain and the Central System (central Spain and Portugal). We counted $2n = 46$ chromosomes in root mitosis, a result that agrees with the chromosome number reported for samples from France (Forissier 1975) and Central Spain (Sañudo 1973a, Cubas & al. 2001). A different chromosome number ($2n = 48$) were found in other Spanish samples that showed meiosis irregularities (Cubas & al. 2001).

C. oromediterraneus was segregated from *C. purgans* s.l. together with *C. galianoi* Talavera & P. E. Gibbs (Betics, Spain) and *C. valdesii* Talavera & P. E. Gibbs (Morocco) and *C. balansae* (Boiss.) Ball (Morocco and Algeria) (Talavera & Gibbs 1997). However, molecular phylogenetic analysis indicates that *C. purgans* s.l. consists of two evolutionary units: *C. balansae* (Boiss.) Ball, which groups the Moroccan, Algerian and Betics (Spain) populations, and *C. oromediterraneus* where the rest of the European populations are included (Cubas & al. 2006). More data from *C. balansae* are needed to confirm the stability of the chromosome number found in the only Moroccan population studied (sub *C. valdesii*; $2n = 46$; Cubas & al. 2001).

1634. *Cytisus scoparius* (L.) Link subsp. ***scoparius*** **—** $2n = 46$.

Hs: Madrid, Collado Mediano, 40º 38’ N, 4º 00’ W, 1020 m a.s.l., 1 Aug 2005, *Tahiri* (RAB65898).

In the typical subspecies of *Cytisus scoparius* we counted $2n = 46$ chromosomes in root mitosis. Two chromosome numbers have been reported for this species, $2n = 46$ and $2n = 48$ (Castro 1949, Bocher & Larsen 1958, Gilot 1965, Gill & Walker 1971, Sañudo 1973a, Horjales 1974, 1975, Fernandes & Santos 1975, Fernandes & al. 1977, Fernandes & Queirós 1978, González Zapatero & al. 1988, Cubas & al. 2001, among others). The chromosome variations are not associated with geographical or morphological patterns such as growth-form (erect or prostrate forms; Gill & Walker 1971).

1635. *Genista scorpius* (L.) DC.**—** $2n = 40$ (Figs 2, 8).

Hs: Jaén, Siles to Orcera, 38º 22’ N, 2º 39’ W, 700 m a.s.l., 6 Jun 1995, *Cubas*, *Pardo & Sánchez Mata*, PC 9556 (MAF 148148).

We counted $2n = 40$ chromosomes in regular root mitosis. This result agrees with most of the records (Lorenzo Andreu & García-Sanz 1950, Sañudo 1971, Gallego Martín & al. 1986, Verlaque & al. 1987, Cusma Velari & al. 2005) although plants with $2n = 36$ to 44 and showing mitotic and meiotic irregularities have been detected in France, as well as an eupolyploid population with $2n = 84$ (Seidenbinder & Verlaque 1985, Verlaque & Contandriopoulos 1990, Verlaque 1992).

1636. *Genista umbellata* (L'Hér.) Poir. subsp. ***equisetiformis*** (Spach) Rivas Goday & Rivas Mart. — *2n* = 48 (Figs 3, 9).

Hs: Málaga, Barriada del Chorro, near the dam, slates, 36º 44' N, 4º 25' W, 24 Jun 1996, *Cubas & Pardo*, PC 9623 (MAF 153710).

Genista umbellata subsp. *equisetiformis* is an endemism restricted to south-western Spain. Morphologically it is characterised by a calyx, standard petal and fruit covered with hairs more than 1mm long, inflorescences more than 24 mm wide, and bracteoles narrow linear to linear (Talavera 1999). Two different chromosome numbers have been reported for this subspecies: 2*n* = 46 and *2n* = 48 (Santos 1945, Sañudo 1973b, Talavera & Arista 1995, Cusma Velari & al. 1998). Our result (2*n* = 48 chromosomes in root mitosis) confirms the highest number found in this subspecies.

This taxon is closely related to *G. umbellata* subsp. *umbellata* that grows in south-eastern Spain and northern Africa (Morocco and Algeria) and can be differentiated by the presence of shorter hairs, inflorescences less than 24 mm wide, and bracteoles ovate to elliptical (Talavera 1999). Only 2*n* = 46 chromosomes have been reported for this subspecies (Sañudo 1973b). Molecular studies support the relationship of *G. umbellata* to *G. clavata* Poir., another species of Sectio *Cephalospartum* Spach that has also 2*n* = 48 chromosomes (Pardo & al. 2004, Tahiri & al. 2005).

1637. *Hesperolaburnum platycarpum* (Maire) Maire — 2*n* = 50 (Figs 4, 10).

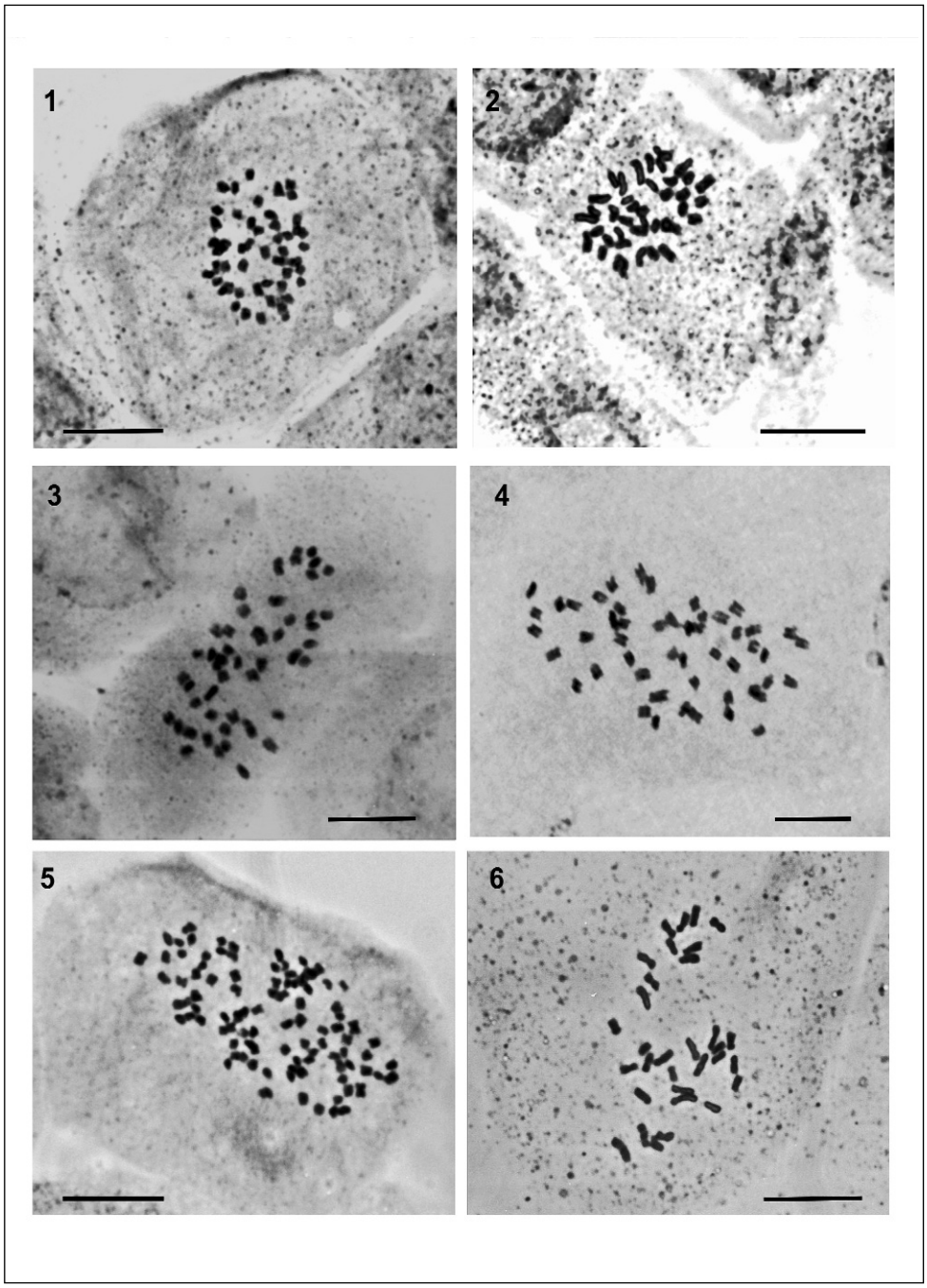
Ma: Anti Atlas, road cross to Tidi, 10 km before Imi Mquorn, 30º 00' N, 9º 02' W, 300 m a.s.l., 17 Jun 2005, *Tahiri* (MAF 164848).

Our result confirms the only previous record (Tahiri & al. 2006) of the chromosome number of this endemic species of southern Morocco. The chromosomes are small and show conspicuous differences in size.

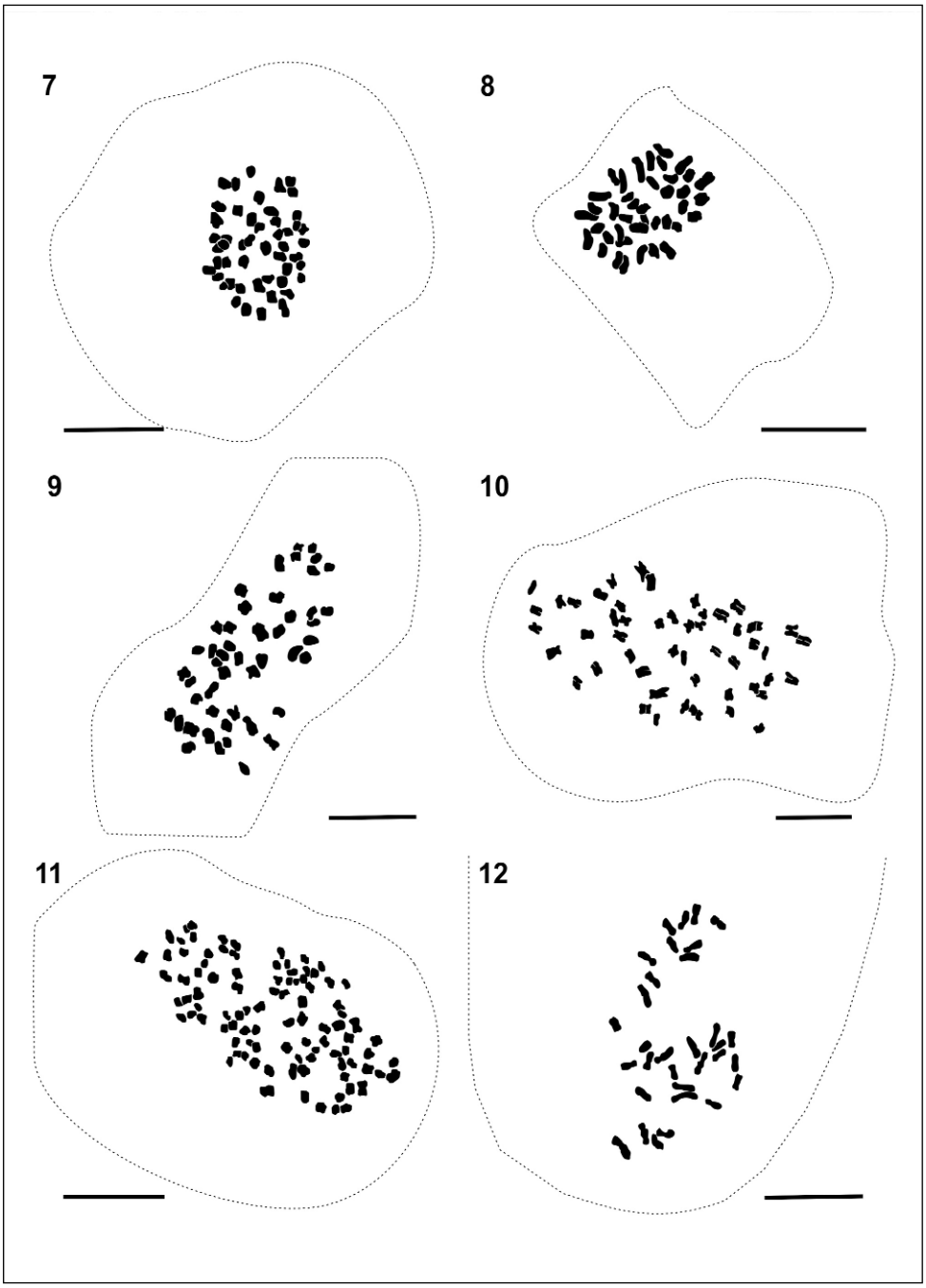
1638. *Stauracanthus boivinii* (Webb) Samp. — 2*n* = 96 (Figs 5, 11).

Ma: Tanger, Cap Spartel, 35º 47' N, 5º 55' W, 100 m a.s.l., *Pardo & Tahiri* (MAF 164618).

Our count confirms previous reports (Tahiri & al. 2005, 2006) of the presence in northern Morocco of *S. boivinii* plants with 2*n* = 96 chromosomes. Only diploid and tetraploid plants (2*n* = 48 and 96) have been found in Morocco with a northward pattern: diploids have been reported from the Middle Atlas and Western Rif, while tetraploid plants were found in the Tanger-Tetouan area in northern Morocco (Talavera & Arista 1995, Tahiri & al. 2005). On the contrary, in southern Iberia plants with 2*n* = 96, ±128 and 144 chromosomes have been reported (Castro 1943, Cubas 1986).



Figs 1-6. Mitotic metaphase plates of: **1**, *Cytisus baeticus*, 2*n* = 50; **2**, *Genista scorpius*, 2*n* = 40; **3**, *G. umbellata* subsp. *equisetiformis*, 2*n* = 48; **4**, *Hesperolaburnum platicarpum*, 2*n* = 50; **5**, *Stauracanthus boivinii*, 2*n* = 96; **6**, *Ulex africanus*, 2*n* = 32. − Scale bars = 10 µm.



Figs 7-12. Explanatory diagrams of Figs 1-6: **7**, *Cytisus baeticus*, 2*n* = 50; **8**, *Genista scorpius*, 2*n* = 40; **9**, *G. umbellata* subsp. *equisetiformis*, 2*n* = 48; **10**, *Hesperolaburnum platicarpum*, 2*n* = 50; **11**, *Stauracanthus boivinii*, 2*n* = 96; **12**, *Ulex africanus*, 2*n* = 32. − Scale bars = 10 μm.

1639. *Ulex africanus* Webb [*U. parviflorus* subsp. *africanus* (Webb) Greuter] — $2n = 32$ (Figs 6, 12).

Ma: Rif, Tetouan, jbel Dersa, 35º 33' N, 5º 21' W, 500 m a.s.l., 25 May 2005, *Pardo & Tahiri* (MAF 166456).

Ulex africanus is an endemism restricted to northern Morocco and Algeria (Oran). In Morocco it grows in the Tetouan area, the Central Rif Mountains (around Targuist), in the coastal band eastern to Melilla and Nador, and penetrates inland up to the mountains of Beni Snassen (near Berkane). We counted $2n = 32$ chromosomes in root mitosis from plants collected in one of the westernmost populations of this taxon. This count confirms previous results (Castro 1943, Tahiri & al. 2005, 2006).

Only tetraploid populations of *Ulex* have been detected till now in the area (Tahiri & al. 2005). These tetraploid plants were ascribed to *Ulex congestus* (Webb) Pau [= *U. scaber* f. *congestus* (Webb) Maire], a taxon closely related to the Spanish tetraploid *U. borgiae* Rivas Mart. Molecular studies have shown the genetic relationships of the diploid (*U. baeticus* Boiss., *U. scaber* Kunze, and *U. africanus*) and the tetraploid populations of *Ulex* (*U. borgiae* and *U. congestus*) that grow in South Spain and North Africa (Cubas & al. 2005).

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Reports (1640-1644) by Anna Geraci, Emilio Di Gristina & Rosario Schicchi

1640. ***Hieracium murorum*** subsp. ***atrovirens*** (Froel.) Raimondo & Di Gristina – 2*n* = 27 (Figs.1, 2).

Si: Palermo, Monti Madonie, Acqua del Canale, on calcareous rocks, 1420 m a.s.l., 37°51'N, 14°03'E, 29 Jun 2005, *E. Di Gristina* (PAL).

Hieracium murorum subsp. *atrovirens* is a hemicryptophyite scapose flowering from early June to the first decade of July; it occurs in Spain, Southern-France, Corse and Italy (Campania, Calabria and Sicily) (Zahn 1921, Fiori 1928). In Sicily it is known only from a unique locality on the Madonie Mountains and it is very controversial from the taxonomical point of view. It was originally described as an indipendent taxon at specific level (Froelich 1838), but it was subsequently considered as a synonym of *H. murorum* L. (Fries 1862, Belli 1904) or of *H. praecox* Sch. Bip. subsp. *glaucinum* Jord. (*H. pallidum* × *murorum*) (Zahn 1921, Fiori 1928). Recently, the Sicilian population has been considered distinct from *H. murorum* and so treated at subspecific rank (Raimondo & Di Gristina 2007).

The chromosome number $2n = 3x = 27$, found here for the first time on material from Madonie Mounts (NC-Siciliy) is included in the variability reported for *H.* ×*glaucinum* and *H. murorum* by Sell & West (1976). The karyotype (Levan & al. 1964) is: z = $2n = 3x$ = 27: 12m + 15sm (Fig. 2).

1641. *Hieracium crinitum* Sibth. & Sm. – $2n = 27$ (Fig. 3, 4)

Si: Messina, Isole Eolie, Salina, Monte Rivi, on volcanic rocky soil, 350 m a.s.l., 38°34'N, 14°51'E, 5 Nov 2003, *E. Di Gristina & G. Domina* (PAL).

Hieracium crinitum is a hemicryptophyite scapose which flowers from the late summer to autumn; it is an European-Caucasian species, occurring in several areas within the Sicilian floristic District (Fiori 1928, Sell & West 1976, Pignatti 1982). It is differentiated in several populations growing in open woods on the highest mountains of the North-Eastern Sicily and in the Eolian Islands (Lojacono 1903).

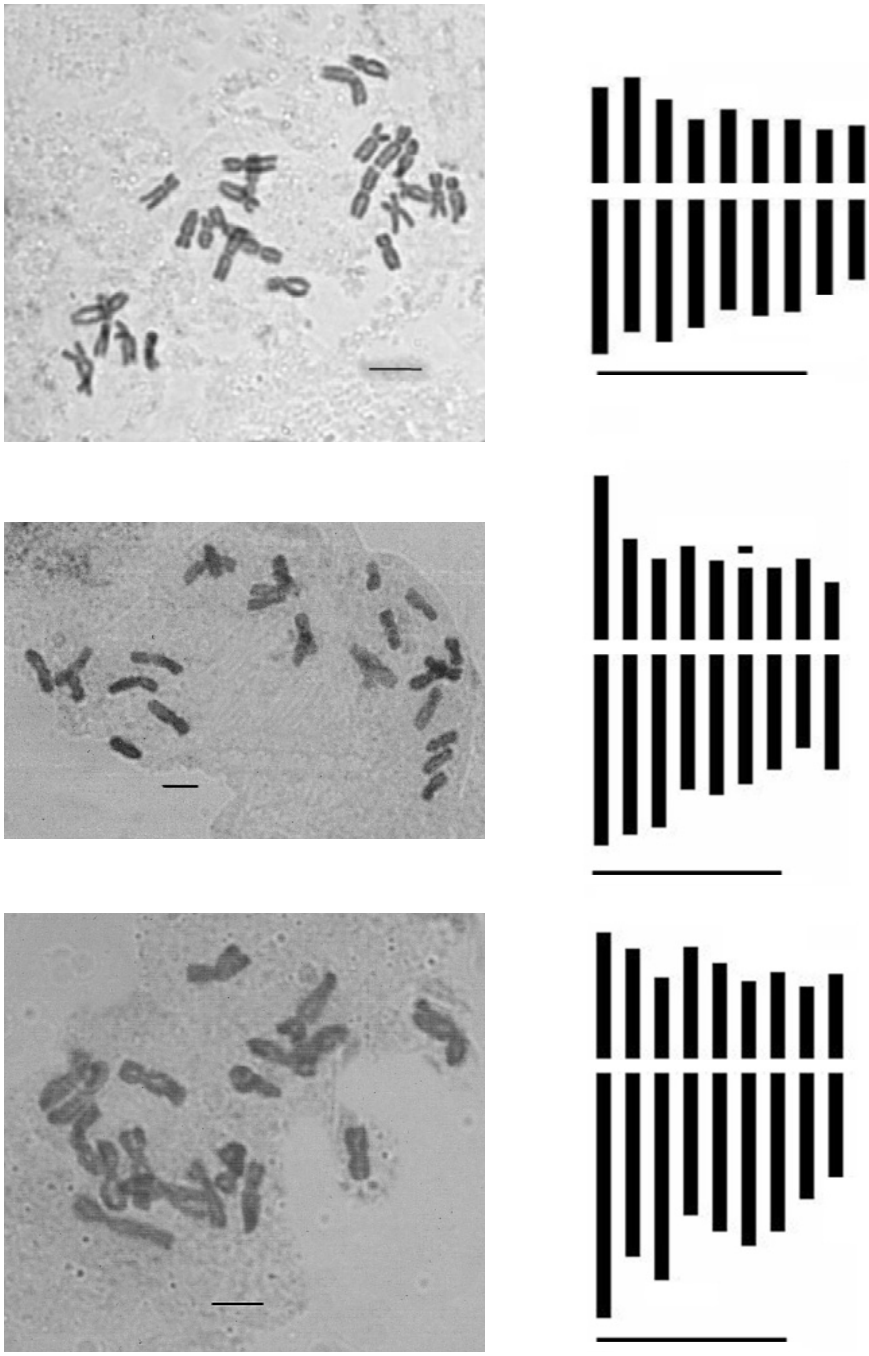
The chromosome number $2n = 3x = 27$ found on material from the Salina Island (NE-Sicilia) confirms the reports from Sella Croce (Peloritani Mounts) (Brullo & al. 1977), Mirto (Nebrodi Mounts) (Brullo & al. 2005) and Emmaus (Etna) (Brullo & al. 2005), but does not agree with the number reported for the same species ($2n = 36$) by Sell & West (1976). The chromosome formula (Levan & al. 1964) is: z = $2n = 3x$ = 27: 12m + 12sm + 3sm-SAT (Fig. 4). This karyotype is similar to that obtained by Brullo & al. (2005), except for a unique satellited group of homologous.

1642. *Hieracium lucidum* subsp. ***cophanense*** (Lojac.) Greuter – $2n = 18$ (Figs 5, 6)

Si: Trapani, Riserva Naturale dello Zingaro, Monte Passo del Lupo, calcareous cliffs, 750 m a.s.l., 38°07'N, 12°45'E, 20 Nov 2002, *E. Di Gristina & V. Ilardi* (PAL).

Hieracium lucidum subsp. *cophanense* is a chasmophyte, exclusive to Monte Cofano and Monte Passo del Lupo, carbonate promontories West of the Palermo Gulf and to the Natural Riserve of Zingaro (NW-Sicily).

The chromosome number $2n = 18$ on material from Monte Passo del Lupo confirms the report by Brullo & al. (2005) for the Monte Cofano population. The karyotype (Levan & al. 1964) is: z = $2n = 2x = 18$: 10m + 8sm (Fig.6). This chromosome formula does not agree with that obtained by Brullo & al. (2005) because of the lack of a pair of satellited chromosomes. This taxon, like *H. lucidum* Guss., probably belongs to the very small number of diploid amphimictic species of the genus *Hieracium* that are sexed.



Figs 1-6. Microphotographs and relative haploid idiograms of: **1-2,** *Hieracium murorum* subsp. *atrovirens*, 2*n* = 27. **3-4,** *H. crinitum*, 2*n* = 27. **5-6,** *H. lucidum* subsp. *cophanense*, 2*n*=18. – Scale bars = 5 μm.

1643. *Hypochoeris laevigata* (L.) Cesati, Passer. & Gibelli – 2*n* = 12 (Figs 7, 8)

Si: Palermo, Monte Pellegrino, calcareous cliffs, 280 m a.s.l., 38°11'N, 13°20'E, 18 May 2006, *E. Di Gristina* (PAL).

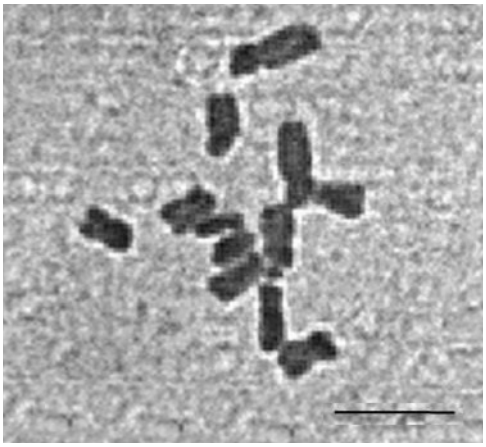
Hypochoeris levigata, a hemicryptophyite scapose flowering in spring (March-June), occurs in Morocco, Algeria, Tunisia, S-Italy (Calabria and Basilicata) and in Sicily (Fiori 1928, De Filipps 1976, Pignatti 1982). In Sicily it is quite common, very polymorphic and differentiated.

The chromosome number, identified on material from Monte Pellegrino near Palermo (NW-Sicily), is 2*n* = 12. This datum confirms the reports from Monte Soro (Nebrodi Mounts) (Brullo & al. 1977), and from Quacella (Madonie Mounts) (Barghi & al. (1989). The chromosome formula (Levan & al. 1964) is: z = 2*n* = 12: 8m + 2sm-SAT + 2sm (Fig. 8). The karyotype differs from those described by Brullo & al. (1977) and by Barghi & al. (1989) owing to only one pair of satellited chromosomes.

1644. *Jacobaea lycopifolia* (Poir.) Greuter & E. Nard – 2*n* = 80 (Fig. 9)

Si: Agrigento, near Lago Arancio, Sambuca di Sicilia, 37° 37' N, 13° 03' E, 250 m a.s.l., 10 oct 2006 V. Ilardi (PAL).

Jacobaea lycopifolia is endemic to Sicily and few other localities in Southern Italy (Pignatti 1982). The chromosome number 2*n* = 8*x* = 80 obtained on material from SW-Sicily confirms the report by Rossitto & al. (1983) on material from Piazza Armerina



Figs 7-8. Microphotograph and relative haploid idiogram of *Hypochoeris laevigata* 2*n* = 12. – Scale bars = 5 μm.

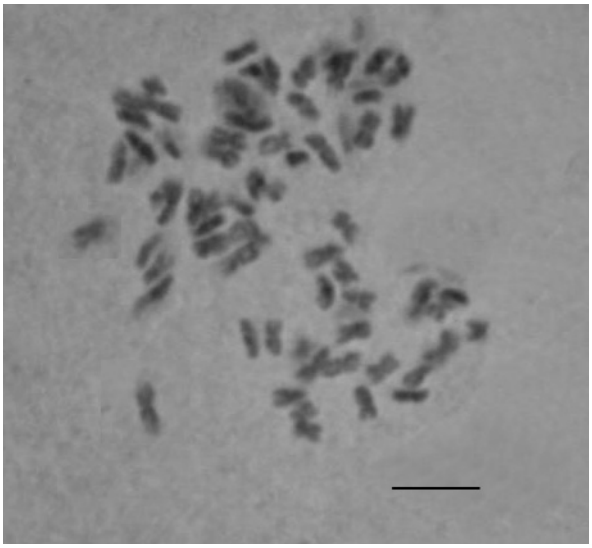


Fig. 9. Microphotograph of somatic metaphase plate of *Jacobaea lycopifolia* 2*n* = 80. – Scale bar = 5 μm.

(Enna province, C-Sicily). For this taxon the number 2*n* = 40 has also been reported for a population from Milena (Caltanissetta province - C-Sicily) (Colombo & Marcenò 1990).

The chromosome number of *J. lycopifolia*, belongs to the series basic number *x* = 10 also found in the *S. cineraria* group and in *J. erucifolia* (L.) G. Gaertn., B. May & Scherb., strictly close species with number 2*n* = 40 (Lindauerova & Malarikova 1972, Váchová & Májovsky 1978).

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