Mediterranean chromosome number reports – 18

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

Abstract

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This is the eighteen 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 43 taxa: *Allium*, *Cyclamen*, *Muscari*, *Ornithogalum* from Cyprus, by E. Christou, P. Bareka & G. Kamari (Nos 1645-1649); *Anthriscus* from Israel, *Eryngium* from *Cyprus*, *Daucus*, *Ferula*, *Orlaya*, *Smyrnium* from Crete, *Lagoecia*, *Pimpinella*, *Tordylium* from Israel and Crete, by M. G. Pimenov & Ju. V. Shner (Nos 1650-1663); *Saponaria*, *Dianthus*, *Trigonella*, *Teucrium*, *Inula*, *Taraxacum* from Bulgaria by D. Pavlova (Nos 1664-1669); *Lathyrus* from Bulgaria, by A. Tosheva (Nos 1670-1676); *Pinguicula* from Italy, by K. F. Caparelli, F. Conti & L. Peruzzi (Nos 1677-1678); *Genista* from Spain, Portugal, France, Helvetia, Germany, Rumania, by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & S. Patui (Nos 1681-1682); *Adenocarpus* from Morocco, *Ulex* from Spain, *Genista* from Morocco and Spain, by H. Tahiri, P. Cubas & C. Pardo (Nos 1683-1687).

Addresses of the editors:

Prof. Georgia Kamari, Botanical Institute, Section of Plant Biology, Department of Biology, University of Patras, GR-265 00 Patras, Greece.
E-mail: kamari@upatras.gr
Prof. Cesar Blanché, Laboratori de Botànica, Facultat de Farmàcia, Universitat de Barcelona, Av. Joan XXIII s/n, E-08028 Barcelona, Catalonia, Spain.
E-mail: cesarblanche@ub.edu
Dr. Sonja Siljak-Yakovlev, CNRS, Unité Ecologie, Systématique, Evolution, UMR 8079 UPS-CNRS-AgroParisTech, Département "Biodiversité, Systématique et Evolution, Université Paris-Sud 11, Bat. 360, 91405 ORSAY CEDEX, France.
E-mail: sonia.yakovlev@u-psud.fr

Reports (1645-1649) by Eleni Christou, Pepy Bareka & Georgia Kamari

1645. ***Allium neapolitanum*** Cyr. **—** 2*n* = 28 (Fig. 1a & b).

Cy: Close to Asgata village, on the way to village Kalovasos, open fields, , 34° 46' N, 33° 16' E, alt. ca 150-200 m, 30 Apr 2005, *E. Christou & P. Christou*, E17CY (UPA).

Alliun neapolitanum has a wide distribution in the Mediterranean area.

The chromosome number 2*n* = 4x = 28 found in the population studied here is in accordance with the one given by van Loon & De Jong (1978) in material from Spain and by Karavokyrou & Tzanoudakis (1991) in material from the Aegean islands of Leros, Kos,

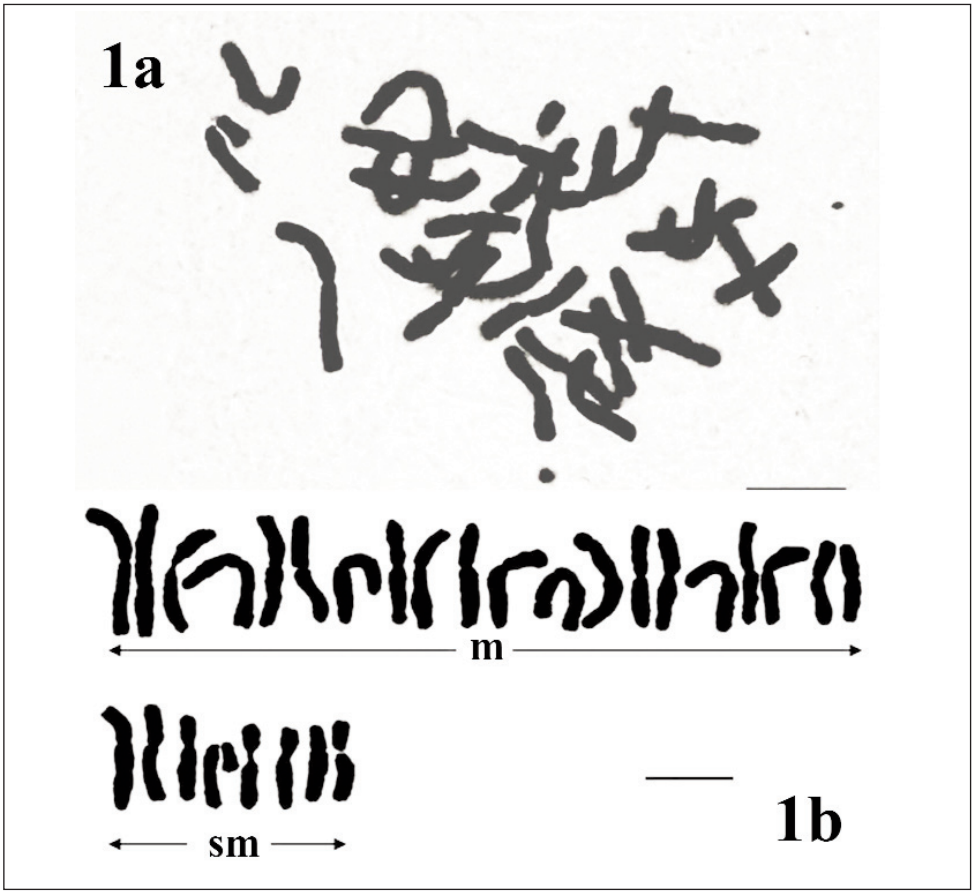


Fig. 1. **a,** Microphotograph of mitotic metaphase plate and **b,** karyogram of *Allium neapolitanum*, 2*n* = 28. – Scale bars = 10 μm.

Rhodos and Lesvos. Moreover, Tzanoudakis (1999) reported in material from Cyprus the chromosome numbers 2*n* = 14, 32, 21, 28, 35.

According to previous studies this species is characterized by several polyploid and aneuploid series (2*n* = 14, 21, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40) with the basic chromosome number x = 7 (Darlington & Wylie 1955, Fedorov 1969, Stearn 1980). Diploid, triploid and tetraploid populations have been reported from Palestine by Kollmann (1973) and by Badr & Elkington (1976). In Greece, triploid, tetraploid and pentaploid populations have been found by Tzanoudakis (1986). Moreover, the pentaploid chromosome number 2*n* = 5x =35 is also given by Puizina & al. (1995) in material from Croatia.

Microphotograph (Fig. 1a) and a karyogram (Fig. 1b) of a different population studied from Cyprus, are presented here. The karyotype is symmetrical, consisting of metacentric and submetacentric chromosomes, ranging in size from 16.79 to 9.29 μm. At least two chromosomes bear satellites, while several secondary constrictions have been observed. The karyotype formula is given as: 2*n* = 4x = 20m+6sm+2sm-SAT = 28 chromosomes.

1646. ***Allium roseum*** L. **—** 2*n* = 32 (Fig. 2).

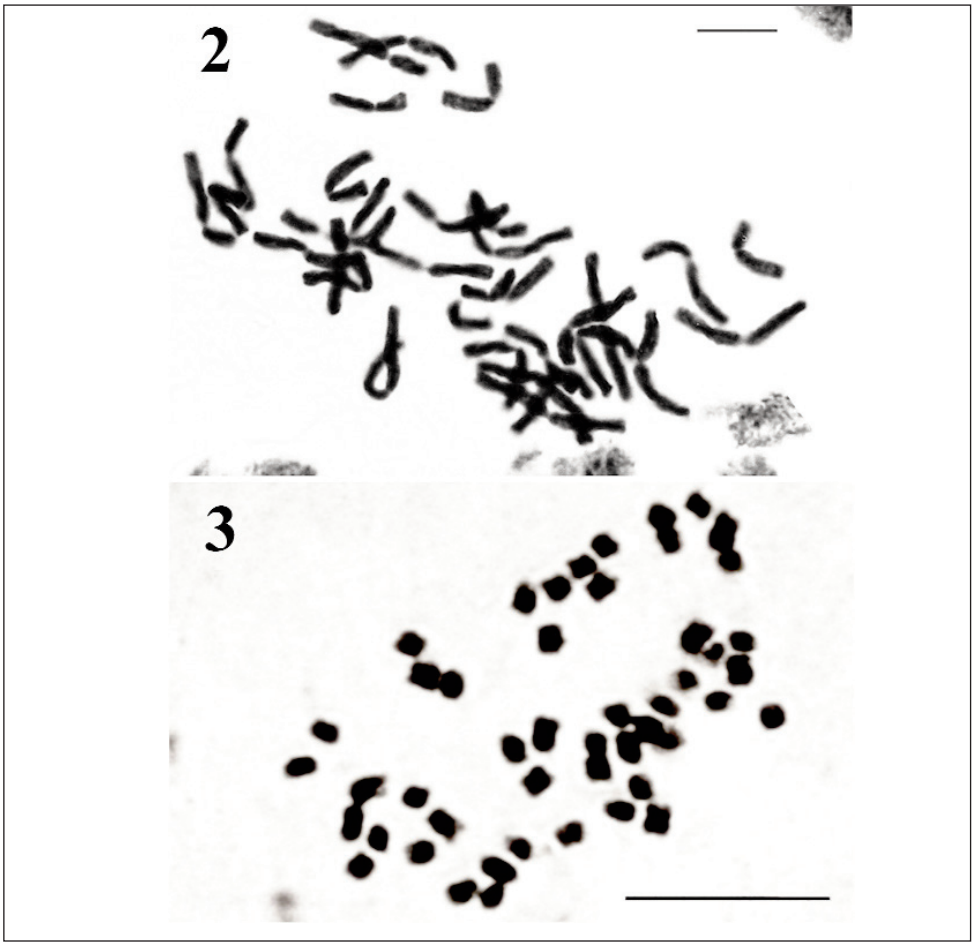
Cy: Close to the village Polemi, at the edges of a vineyard, 34° 52' N, 32° 33' E, alt. ca 300-350 m, 2 Apr 2006, *E. Christou & P. Christou*, E58CY (UPA).

Allium roseum is widely distributed in North Europe and the Mediterranean area. Only two populations have been reported from Cyprus, where the species is reported as Vulnerable at the Red Data Book of the Flora of Cyprus (Papachristophorou 2007).

To our knowledge, the tetraploid chromosome number (2*n* = 4x = 32) reported here to our knowledge for the first time in material from Cyprus, is also given by Levan (1931), Cappelletti (1931), Dietrich (1969), Delay (1970), Dahlgren & al. (1971) and by Pastor (1981) in material from several countries. Several authors have also found a great variation in the chromosome number (2*n* = 16, 24, 32, 40 and 48) for this widely disturbed and widely varied species.

Diploid karyotypes with 2*n* = 16 chromosomes are reported by Delay (1970) in material from France, as well as by Ruiz Rejón (1974) in material from Spain. Eid (1960, 1963 and 1964) count the triploid number 2*n* = 3x = 24, with the presence of telocentric chromosomes in *A. roseum.* Tetraploid (2*n* = 4x = 32) and pentaploid (2*n* = 5x = 40) karyotypes were given by Johnson (1982), in Greek populations, where telocentric chromosomes have also been observed. Additionally, the chromosome number 2*n* = 5x = 40 is also given by Stearn (1978).

The karyotype of *A. roseum* studied here, is symmetrical with mostly metacentric chromosomes, which vary in size between 18.57 and 8.21 μm.



Figs 2-3. Microphotographs of mitotic metaphase plates of: **2,** *Allium roseum*, 2*n* = 32; **3,** *Cyclamen persicum*, 2*n* = 48. – Scale bars = 10 µm.

1647. *Cyclamen persicum* Mill. **—** 2*n* = 48 (Fig. 3).

Cy: Latsi harbour, 35° 02’ N, 32° 23’ E, alt. ca 0-25 m, 2 May 2005, *E. Christou & P. Christou*, E24CY (UPA).

Cyclamen persicum is widespread on Crete, Karpathos and the Eastern Aegean Islands, as well as in Tunisia, south Turkey, Syria, Palestine and Cyprus, where the species is rather common.

The chromosome number 2*n* = 4x = 48 found here is in accordance with previous studies on plants from Cyprus coming from Pafos and from Lemesos (Chrtek & Slavik 1981). Moreover, the same chromosome number 2*n* = 48, has been reported from Cyprus by

Slavik & al. (1993) and by Haan & Doorenbos (1951), Legro (1959) and Lepper (1964) from unknown origin.

The karyotype of this species is symmetrical, consisting mostly of metacentric (m) chromosomes ranging in size from 1.82 to 1.14 μm.

1648. ***Muscari comosum*** (L.) Miller [= *Leopoldia comosa* (L.) Parl.] — 2*n* = 18 (Figs 4-6).

Cy: Agios Nikolaos forest, 35° 05' N, 32° 02' E, alt. ca 800-850 m, 29 Apr 2005, *E. Christou & P. Christou*, E3CY (UPA). – Figs 4a, 4b.

— Troodos Mountains, close to the village Moutoulas, on the way to Prodromos village, 34° 56' N, 32° 50' E, alt. ca 1300-1400 m, 29 Apr 2005, *E. Christou & P. Christou*, *E12CY* (UPA). – Figs 5a, 5b.

— Close to Asgata village, open fields, 34° 46' N, 33° 16' E, alt. ca 150-200 m, 30 Apr 2005, *E. Christou & P. Christou*, E15CY (UPA). – Figs 6a, 6b.

The species is widespread all over the Mediterranean area (Davis & Stuart 1980, Garbari 1973, 1982), and it was also found on the Canary Islands, Northern Russia and Middle East (Bentzer 1973).

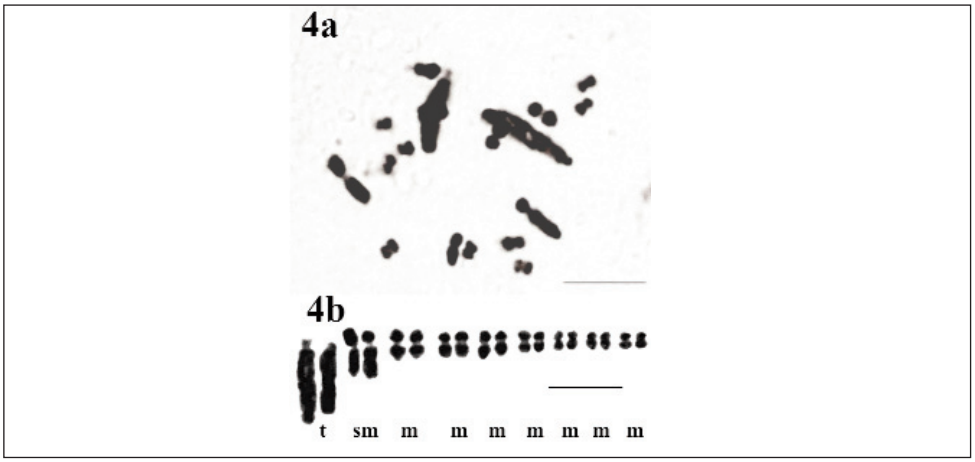
The chromosome number of 2*n* = 2x = 18, found in all populations studied here is reported to our knowledge for the first time from Cyprus and it is in accordance with previous counts from Greece (Bentzer 1972, Bentzer & Ellmer 1975, Bentzer & Landström 1975, Montmollin 1986, Kapasa & al. 2001), and other countries by Wunderlich (1936, 1937), Garbari (1966, 1968, 1969), Dahlgren & al. (1971) Ruiz Rejón (1976), Löve & Löve (1974, 1982), Valdés & al. (1978), Natarajan (1979), van Loon & Snelders (1979), Dalgic (1991), Baldini (1992), Steck-Blaser (1992), Lovka (1995), Corsi & al. (1996), Özhatay & Johnson (1996), Johnson & al. (1996), Johnson & Brandham (1997) and Peruzzi & Cesca (2002).

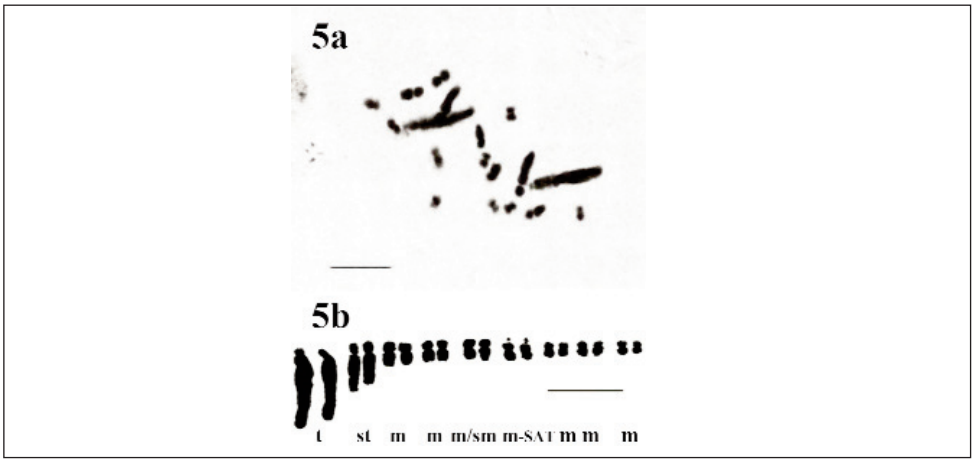
The karyotype of *M. comosum,* according to previous studies, consists of two longer in size chromosome pairs, one telocentric (t) and one submetacentric (sm) or acrocentric (st), three middle sized metacentric (m) or metacentric/submetacentric (m/sm) pairs and four metacentric (m) chromosome pairs, the shortest in size. Small, spherical satellites were reported, which, however, are not always visible.

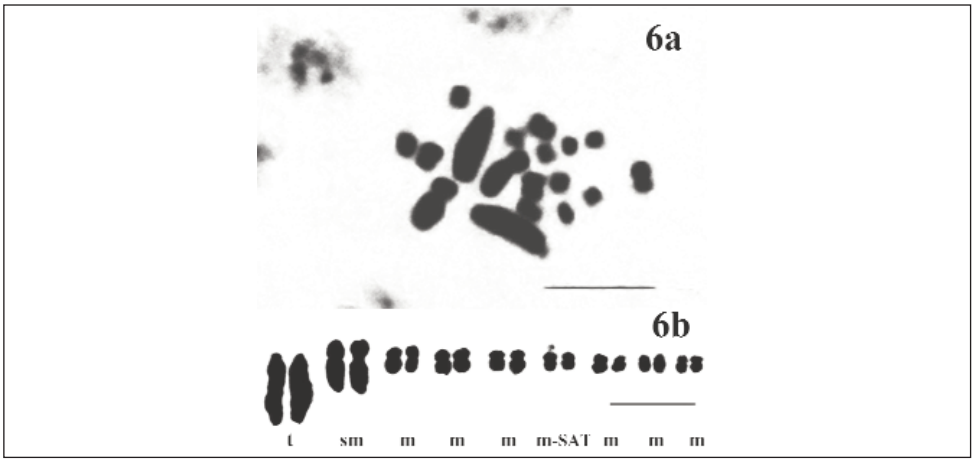
Moreover, Bentzer (1972), Ruiz Rejón & al. (1981) and Ruiz Rejón & al. (1986), report the presence of 1-2 B-chromosomes, a trisomatic karyotype with 2*n* = 18+1 = 19, tripoid and tetraploid populations with 2*n* = 3x = 27 and 2*n* = 4x = 36 chromosomes respectively.

Microphotographs and karyograms of the three studied populations are presented here. The population from Asgata presents structural heterozygosity at the second in size acrocentric chromosome pair. The same heterozygosity has previously been reported in the second chromosome pair by Bentzer & Ellmer (1975), Bentzer & Landström (1975) and Kapasa & al. (2001), in Greek material and by Garbari (1969, 1973) in material from Italy. This phenomenon was explained by Bentzer & Ellmer (1975) as a result of pericentric retroversion or inversion.

The karyotype formula for the populations from the forests of Agios Nicolas and Moutsoula are given as: 2*n* = 2t+2sm+14m = 18 and 2*n* = 2t+2sm+12m+2m-SAT = 18 chromosomes respectively, while for the population of Asgata the karyotype consists of 2*n* = 2t+2st+12m+2m-SAT = 18 chromosomes. Chromosome size varies from 8.57 to 1.78 μm.







Figs 4-6. **a,** Microphotographs of mitotic metaphase plates and **b,** karyogram of *Muscari comosum*, 2*n* = 18, from the populations: **4,** E3CY; **5,** E12CY; **6,** E15CY. – Scale bars = 10 μm.

1649. *Ornithogalum narbonense* L. **—** 2*n* = 54 (Fig. 7a, b).

Cy: Pafos, close to the monastery of Agios Minas, 34° 52' N, 32° 29' E, alt. ca 500-550 m, 30 Apr 2005, *E. Christou & P. Christou*, E63CY (UPA).

Ornithogalum narbonense is widespread in North Europe and the Mediterranean area.

Several authors have reported a great variation in the chromosome number, as well as in number of B-chromosomes, of *O. narbonense* from other countries. Delone (1925, 1926), Heitz (1926), Sprumont (1928) and Geitler (1929) counted the somatic numbers 2*n* = 16 and 2*n* = 24. However, Löve & Kjellqvist (1973) note that these somatic chromosome numbers have been determined on incorrectly classified material. Moreover, Fedorov (1969) reports 2*n* = 14, 16 & 54, Goldblatt (1981) 2*n* = 18+1B, 54, 54+1B and van Loon (1987) 2*n* = 24 chromosomes. Güner & al. (2000) report several chromosome numbers: 2*n* = 14, 14+1B, 14+2B, 24, 36 & 46.

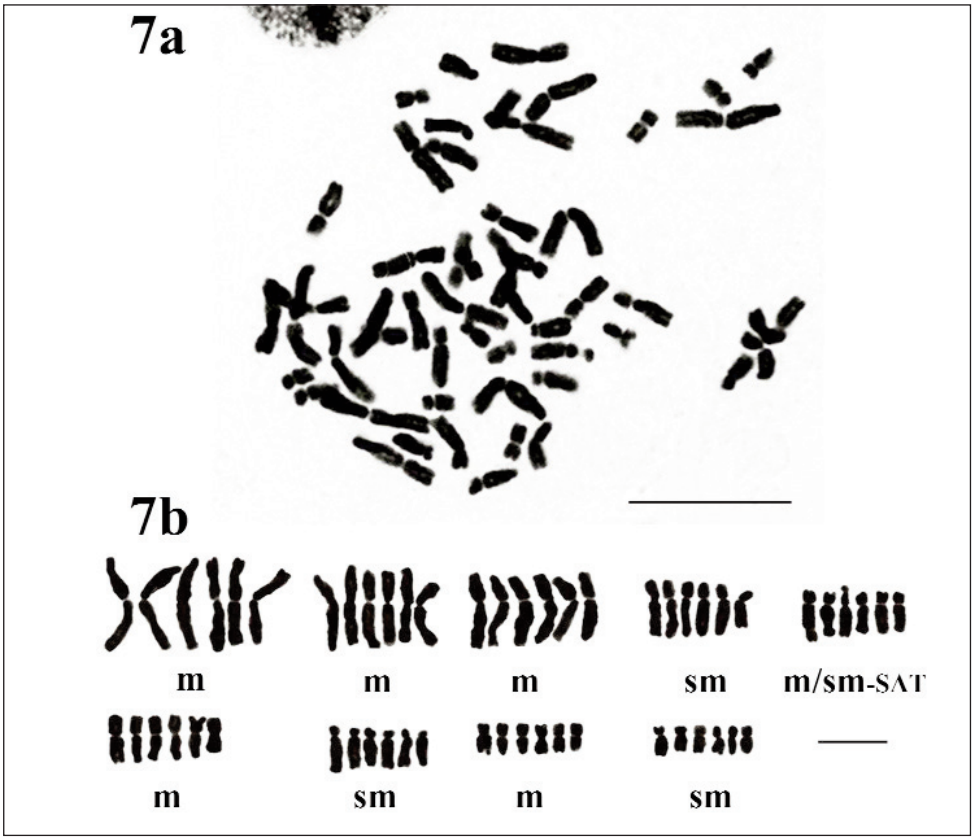


Fig. 7. **a,** Microphotograph of mitotic metaphase plate and **b,** karyogram of *Ornithogalum narbonense*, 2*n* = 54. – Scale bars = 10 μm.

Furthermore, Markova & al. (1974) and Markova (1983) report the chromosome numbers $2n = 18$ & 28, $2n = 24$ respectively in Bulgarian populations, while Ruiz Rejón (1978) reports $2n = 27$ in material from Spain. Capineri & al. (1978) counted $2n = 20$ & 52 in material from Italy.

The chromosome number $2n = 54$ found in the population studied here, was also recorded by Löve & Kjellqvist (1973) in material from Spain. This is the first record for *O. narbonense* from Cyprus. The karyotype formula consists of $2n = 30m+18sm+6st = 54$ chromosomes, ranging in size between 7.95 and 2.05 μm.

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Address of the authors:
E. Christou, P. Bareka & G. Kamari, Botanical Institute, Section of Plant Biology, Department of Biology, University of Patras, 265 00 Patras, Hellas (Greece).
E-mail: elenihristou@upatras.gr; bareka@upatras.gr; kamari@upatras.gr

Reports (1650-1663) by Michael G. Pimenov & Julia V. Shner

1650. ***Anthriscus lamprocarpa*** Boiss. **—** $n = 8$ (Fig. 1a).

IJ: Near Haifa, Mt. Carmel, southern slope, Nahal-Oran, 32º 25' N, 34º 59' E, 19 Mar 2007, *Pimenov* 39 (MW).

This is the first determination of chromosome number for *Anthriscus lamprocarpa*. It corresponds to the numbers of *A. sylvestris* (L.) Hoffm. and *A. glacialis* Lipsky, which are the closest relatives, and of some other species of the genus, whereas the variability in *Anthriscus* includes also $2n = 14$ and $2n = 18$ (Pimenov & al. 2002).

1651. ***Daucus involucratus*** Sm. **—** $n = 11$ (Fig. 1b).

Cr: Central part, northern shore, Prov. of Rethimno, near Platanias, 35º 21' N, 24º 31'E, 07 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden).

This seems to be a forth determination for the species. The two previous ones, on material from Greece (Engstrand 1970) and Cyprus (Vogt & Aparicio 1999) showed $n = 11$ or $2n = 22$, whereas the third, on material from Turkey has $2n = 20$. Our determination corresponds to the two previous reports concerning the more western localities, and the existence of geographical chromosome variability of chromosome number in this species can be supposed.

1652. ***Eryngium maritimum*** L. **—** $2n = 16$ (Fig. 1e).

Cy: Limassol, potamos Germosoya, sandy beech, 34º 41' N, 33º 03' E, 15 Aug 2005, *Shner* s.n.

Numerous (at least 29) previous determinations for *E. maritimum s*howed complete invariability of the species in chromosome number, in all regions of its broad area, always was $2n = 16$. Among these data there are no chromosome number determinations on plants from Cyprus.

1653. ***Ferula communis*** L. — $2n = 22$ (Fig. 1f).

Cr: Central part, southern shore, Prov. of Rethimno, near Preveli, 35º 09' N, 24º 28'E, 14 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden).

There are at least 19 determinations of chromosome numbers for *Ferula communis*, all being identical. One of them was made on Greek material (Engstrand 1970), while the others were from various parts of its distribution. This stability of chromosome number is characteristic for the whole large genus *Ferula*.

1654. ***Lagoecia cuminoides*** L. — $n = 8$ (Fig. 1d), $2n = 16$ (Fig. 1g).

IJ: Judean Desert, Wadi Kelt, near St. George monastery, 31º44' N, 35º19' E, 18 Mar 2007, *Pimenov* s.n. – $n = 8$.
Cr: Central part, northern shore, Prov. of Rethimno, near Platanias, 35º 21' N, 24º 31'E, 07 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden). – $2n = 16$.

There are, at least, 9 previous determinations of chromosome numbers for this species, all showing $n = 8$ or $2n = 16$. Among them, one determination was made on Palestinian material (Tamamschjan 1933) and another on material from Greece (Baltisberger 1991).

1655. ***Orlaya daucoides*** (L.) Greuter — $2n = 16$ (Fig. 1c).

Cr: Central part, Prov. of Rethimno, N slope of Psiloritis Mts, near Arkadi, 35º 18' N, 24º 37'E, 15 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden).

Our determination corresponds to some of previous ones, made for plants from Jordan (Al-Eisawi 1989), Italy (Larsen 1956), Greece (Engstrand 1970), Turkey (Engstrand 1970), Spain (Silvestre 1978) and Portugal (Queirós 1974, 1978). This seems to be an usual chromosome count for the genus. It is needed to note, however, that two times a different number ($2n = 20$) was found in *O. grandiflora*, both for Spanish plants (Lorenzo-Andreu 1951, Le Coq & al. 1978).

1656. ***Pimpinella cretica*** Poir. — $n = 10$ (Fig. 2a), $2n = 18$ (Fig. 2d).

Cr: Central part, northern shore, Prov. of Rethimno, near Platanias, 35º 21' N, 24º 31'E, 07 Jun 2006, *Pimenov* s.n. – $n = 10$.
— Central part, southern shore, Prov. of Rethimno, near Preveli, 35º 09' N, 24º 28'E, 14 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden). – $2n = 18$.

It was rather surprising that chromosome number of this species, widely distributed in Eastern Mediterranean, was determined only once (Al-Eisawi 1989); the number for plants

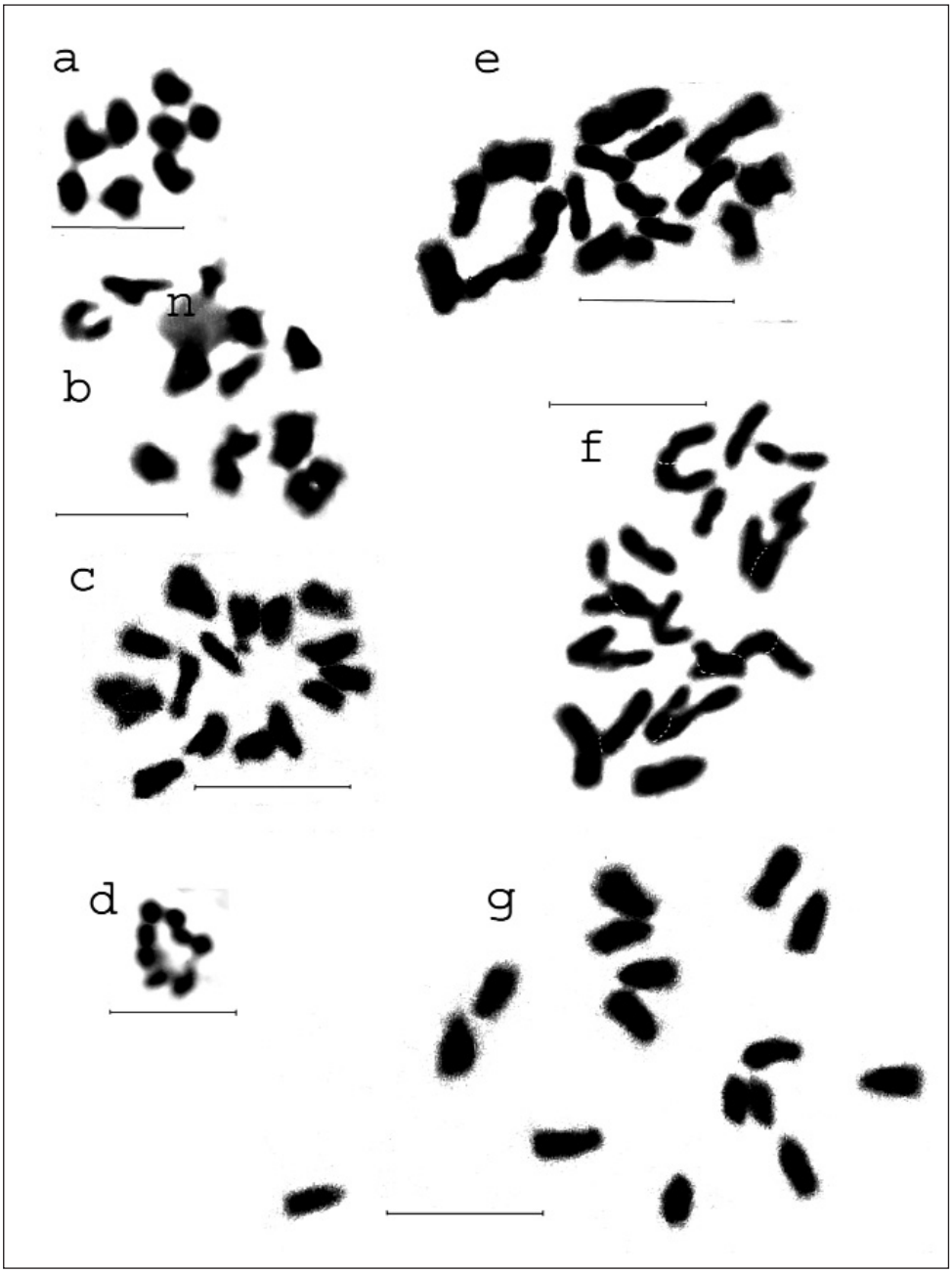

Fig. 1. Contrasted microphotographs of chromosomes of: **a,** *Anthriscus lamprocarpa*, $n = 8$ (meiosis, metaphase II); **b,** *Daucus involucratus*, $n = 11$ (meiosis, diakinesis); **c,** *Orlaya daucoides*, $2n = 16$ (mitosis); **d,** *Lagoecia cuminoides*, $n = 8$ (meiosis, metaphase II); **e,** *Eryngium maritimum* $2n = 16$ (mitosis); **f,** *Ferula communis*, $2n = 22$ (mitosis); **g,** *Lagoecia cuminoides*, $2n = 16$ (mitosis). – n, indicate nucleolus. Scale bars = 10μm.

from Jordan (four different provenances) appeared to be n =10 ($2n$ = 20), what is one of common chromosome numbers in *Pimpinella* and corresponds to one of our determinations (from Platanias). The second count ($2n$ = 18) is new for the species, but is known in 32 other species of the genus (Pimenov & al. 2002).

1657. *Pimpinella nana* Pimenov **sp. nov. —** n = 8 (Fig. 2b).

IJ: Judean Desert, Wadi Kelt, near St. George monastery, 31º 44' N, 35º 19' E, 18 Mar 2007, *Pimenov* 31 (MW).

This collection belongs to a new undescribed species. According to the monographic revision by H. Wolff (1927) it belongs to sect. *Tragium* (Spreng.) DC. emend. H. Wolff, subsect. [*Eu*]*tragium* H. Wolff, ser. *Anisum* DC. emend H. Wolff and subser. *Simplicifoliae* H. Wolff. Among the members of this terminal taxon no species corresponds in leaf dissection and other characters to our N. 31. In "*Flora Palaestina*" (Zohary 1972) there are also no annual species of the genus, corresponding in all characters to our gathering. The picture of *P. eriocarpa* Banks & Sol. is the most similar, but it does not corresponds to the description of species and type sheet, seen in BM (from Aleppo, Syria). The main differences are the structure of middle and upper stem leaves (deeply bipinnatisect and rather rigid in true *P. eriocarpa*, entire or almost entire in our plant), and stylopodium form (elongated conical in *P. eriocarpa* and low conical or almost flat in our plant). Only the lowest leaves of *P. eriocarpa* are entire with round or subround blades, whereas all other leaves are dissected.

A similar small plant of the genus *Pimpinella* was collected by Messerli & Dan (1994) near Eilat (Negev desert); it remains unidentified. The colleagues compared their plant with *P. cretica* Poir., *P. petraea* Nab. and *P. puberula* (DC.) Boiss. and concluded with hesitation that the most probable identification could be *P. puberula*, previously not known in Palestina flora (Zohary 1972). It seems more probable that their plant was closer to *P. eriocarpa* (20-30 cm tall, *"tige ramifiée dès la base", "feuilles caulinaires tripartites-triséquées"*). At least, our material (N. 31) differs clearly in some characters (short stem, almost without branches, indumentum, entire leaves) from *P. puberula*, which we collected many times in Middle Asia and Iran.

Another probable related annual species is *P. ethbaica* from Nubian Coast (NE Africa), but this species is almost glabrous and clearly differs in dissected leaves.

Some interesting data can be extracted from chromosome number information. In *P. puberula* two different numbers were determined, both on the basis of Turkmenian material: $2n$ = 20 (Vasilieva & al. 1981) and $2n$ = 18 (Jurtzeva 1988). *P. eriocarpa* is also variable: two determinations for Iraq (Constance & al. 1976) and Iran (Leute & Speta 1972) of n = 9 or $2n$ = 18; and one determination is different. This last determination is especially interesting in the context of present analysis. Al-Eisawi (1989) reported for Jordan plants (Wadi Mojeb, collector and date unknown) the number n = 8, and this is the only count of this number in the whole large genus *Pimpinella.* Our determination coincides with Al-Eisawi's data. It is possible to suppose that his plant could be identical to our new species, as it is distributed also in adjacent Jordan. Unfortunately, the Al-Eisawi collection was not seen, as its voucher was not indicated.

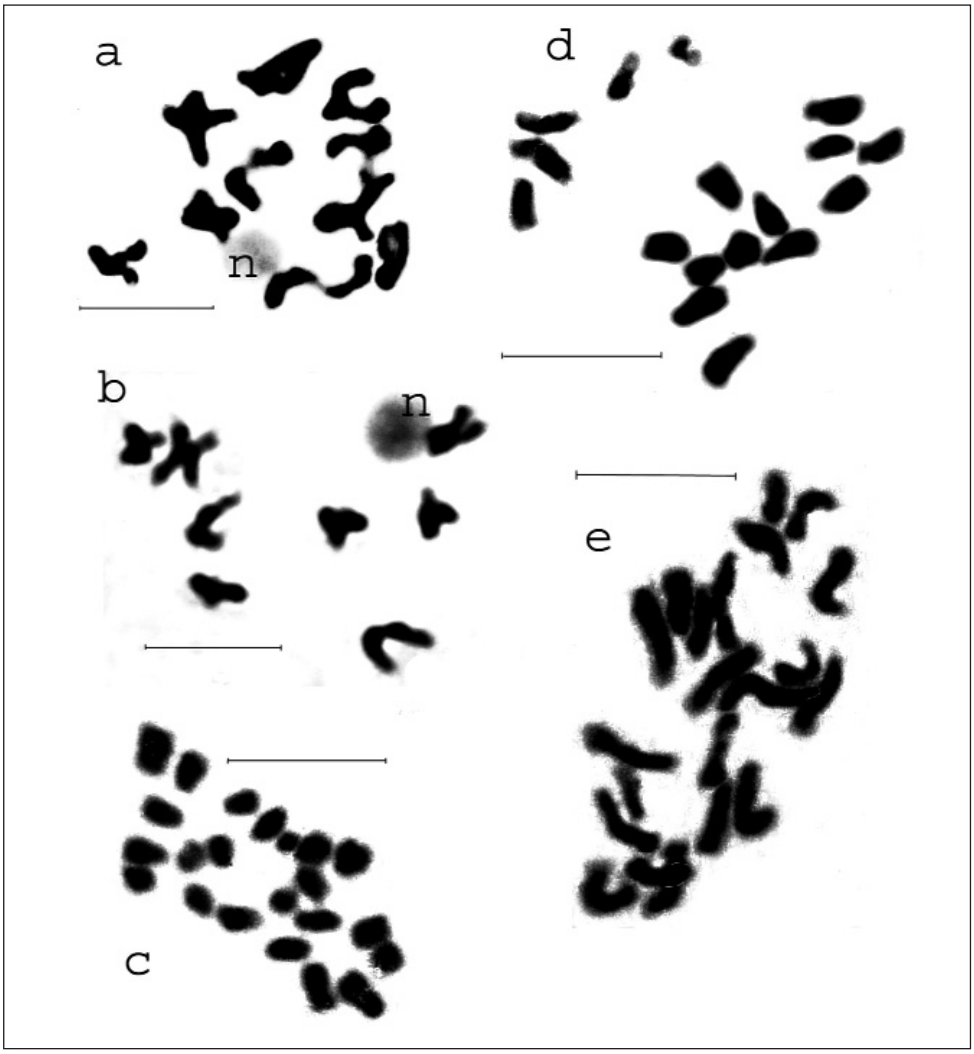

Fig. 2. Contrasted microphotographs of chromosomes of: **a,** *Pimpinella cretica*, $n = 10$ (meiosis, diakinesis); **b,** *P. exigua*, $n = 8$ (meiosis, diakinesis); **c,** *Smyrnium rotundifolium*, $2n = 22$ (mitosis); **d,** *P. cretica*, $2n = 18$ (mitosis); **e,** *S. creticum*, $2n = 22$ (mitosis). – n, indicate nucleolus. Scale bars = 10 μm.

It was surprising that among unidentified gatherings of annual *Umbelliferae* from S Yemen (vicinity of Aden), kindly presented to us for identification by Dr. Peter Hein (Botanischer Garten und Botanisches Garten, FU, Berlin-Dahlem), there are plants (N. 969), indistinguishable from our material N. 31, in spite of long-distant disjunction. Therefore, the area of the new species ranges probably from Israel (Judean desert) and Jordan (Wadi Mojeb) to S Yemen at extreme south of Arabian Peninsula.

Pimpinella nana Pimenov, **sp. nov.**

Plantae annuae, pumilae (3-9 cm alt.), pilosae, radicibus tenuibus, filiformibus, caulibus solitariis, erectis, tenuibus, solidis, pauciramosis, pilis rariusculis albis, mollibus, crispatisque tectis. Folia radicalia cito marcescentia, caulina pauca, simplicia, vaginis angustis, petiolis tenuibus, solidis, pilosiusculis, laminis mollibus pilosis, ambitu orbicularis vel cordato-orbicularis, vel raro trilobatis, margine dentatis, superiora trisecta, basi cuneata. Umbellae paucae, terminales lateralesque, 1.3-2.5 cm in diam., radicis 4-5, tenuibus, pilosis, bracteis nullis. Umbellulae radiolis 10-16, bracteolis nullis. Dentes calycini nulli. Petala alba, dorso vix virescentia, nervo pilis anbis leviter tecta, obovata, emarginata, apice lobis inflexis. Stylopodium plano-conicum, stylodia longa, divaricata. Fructus (juveniles) ovati, pilis albis tenuibus, longis, apice uncinatis dense tecti, costis indistinctis. — $n = 8$.

Holotypus: Palaestina, Israel, desertum Judaicum, in angustiis (wadi) Kelt, prope St. Georgii coenobium, 31º 44' N, 35º 19' E, 18 Mar 2007, *Pimenov* 31 (MW). – Fig. 3.

Affinities: *Species haec P. eriocarpae* Banks & Sol.*, P. creticae* Poir., *P. ethbaicae* Schweinf. *et P. puberulae* (DC.) Boiss. *proxima est, sed foliis superioribus indivisis (non dissectis vel pinnatisectis) ad omnibus speciebus affinibus bene diagnostitur. Ad P. eriocarpae foliis mediis indivisis, caulibus pauciramosis (non at basin ramosis) et stylopodiis forma (plano or breviter conicis, non elongato-conicis), ad P. cretica et P. ethbaicae – caulibus, foliis, umbellis, petalisque pilosis, ad P. puberulae caulibus humilioribus, pauciranosis etiam differt.*

1658. ***Smyrnium creticum*** Mill. — $2n = 22$ (Fig. 2e).

Cr: Prov. of Xania, W part of Lefka Ori, Samaria gorge, 35º 21' N, 23º 57' E. *Pimenov* s.n. (MW).

This is the first report for the species, showing the same chromosome number as that found in all three previously studied species of the genus (see, Pimenov & al. 2002).

1659. ***Smyrnium rotundifolium*** Mill. — $2n = 22$ (Fig. 2c).

Cr: Central part, Prov. of Rethimno, N slope of Psiloritis Mts, near Arkadi, 35º 18' N, 24º 37'E, 15 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden).

Our determination corresponds to three previous ones (Engstrand 1970, Strid 1983, Baltisberger 1991) for the species, all on material from Greece.

Fig. 3. The "Holotypus" of *Pimpinella nana* Pimenov, sp. nov.

1660. ***Tordylium apulum*** L. — $2n = 20$ (Fig. 4a).

Cr: Central part, Prov. of Rethimno, N slope of Psiloritis Mts, near Arkadi, 35º 18' N, 24º 37'E, 15 Jun 2006, *Pimenov* s.n. (seed collection of MSU Botanical garden).

The same chromosome number ($2n = 20$) of *Tordylium apulum* has been determined earlier three times (Runemark 1968, Strid 1971, Capineri & al. 1978); the first of them on Greek material.

1661. ***Tordylium carmelii*** (Labill.) Al-Eisawi & Jury — $n = 10$ (Fig. 4c), $n = 10+1\text{-}2$ B (Fig. 4d).

IJ: Galilee, W bank of Kineret lake near Tveria, 32º 47' N, 35º 12' E, 13 Mar 2007, *Pimenov* 5 (MW).

We confirm $n = 10$ for the species, known previously by the works of Constance & al. 1971) from unclear origin and by Al-Eisawi (1989) and Al-Eisawi & Jury (1988) from Jordan.

1662. ***Tordylium cordatum*** (Jacq.) Poir. — $n = 10$ (Fig. 4b).

IJ: Judean Desert, Wadi Kelt, near St. George monastery, 31º 44' N, 35º 19' E, 18 Mar 2007, *Pimenov* 24 (MW).

They are known only two determinations of chromosome number (both identical with our one), made by Gardé & Malheiros-Gardé (1954: without indication of origin) and by Shner & Ostroumova (2004) from Syria.

1663. ***Tordylium trachycarpum*** (Boiss.) Al-Eisawi & Jury — $n = 9$ & $n = 9+1$ B (Fig. 4e).

IJ: Near Haifa, Mt. Carmel, southern slope, Nahal-Oran, 32º 25' N, 34º 59' E, 19 March 2007, *Pimenov* 40 (MW).

Previous determinations showed infraspecific variability of chromosome numbers within *Tordylium trachycarpum* (= *Ainsworthia trachycarpa* Boiss.) – $n = 7, 8, 9, 10$. The number $2n = 16$ is also reported (Constance & al. 1971, 1976, Al-Eisawi & Jury 1988, Al-Eisawi 1989, Vogt & Aparicio 1999). In particular the numbers $n = 7$ and $n = 9$ were determined for plants from Israel.

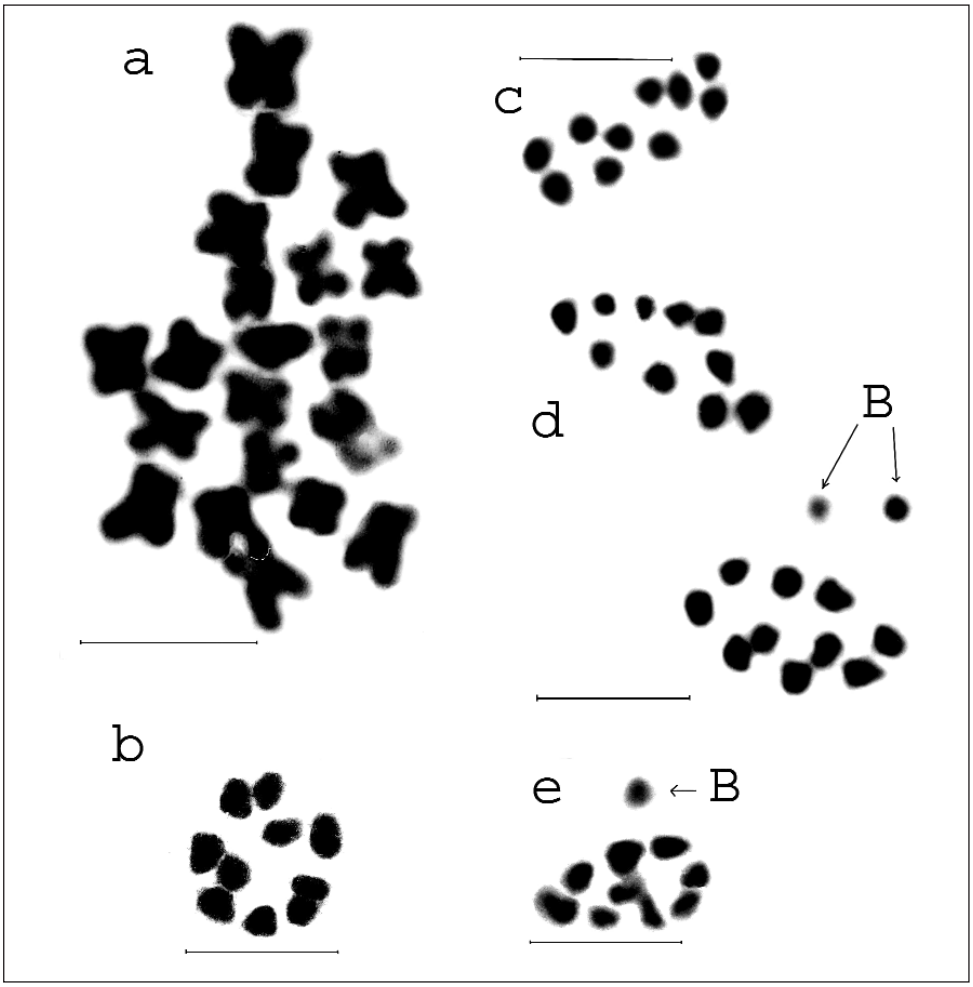

Fig. 4. Contrasted microphotographs of chromosomes of: **a,** *Tordylium apulum*, 2*n* = 20 (mitosis); **b,** *T. cordatum*, *n* = 10 (meiosis, metaphase II); **c,** *T. carmelii*, *n* = 10 (meiosis, metaphase II); **d,** *T. carmelii*, *n* = 10+1-2 B (meiosis, metaphase II); **e,** *T. trachycarpum*, *n* = 9+1 B (meiosis, metaphase II). – B, indicate B-chromosomes. Scale bars = 10 μm.

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Address of the authors:
M. G. Pimenov & Ju. V. Shner, Botanical Garden, Moscow State University, Moscow 119992, Russia. E-mail: mgpimenov@mail.ru

Reports (1664-1669) by Dolja Pavlova

CARYOPHYLLACEAE

1664. ***Saponaria stranjensis*** D. Jordanov **—** 2*n* = 28 (Fig. 1).

Bu: East Rhodope Mts, on serpentine rocky places south-westward from Fotinovo village, above an oxbow of the river Varbica, 425±20 m, 41˚ 21.800' N, 25˚ 18.628' E, with fruits, 6 Oct 2007, *D. Pavlova* (SO 104603).

This is a Balkan endemic species distributed in the Bulgarian mountains Strandza and Eastern Rhodope Mts (Petrova 1992) and European part of Turkey. According to Chater (1993) the taxon is closely related to the mediterranean species *Saponaria sicula* Rafin. The populations of *Saponaria stranjensis* are distributed mainly on stony and rocky fissures, from 300 to 500 m on calcareous substrate. In the Eastern Rhodopes Mts they appear on serpentines. The species is protected by the Law of Biodiversity (2002) and included in the Red Data Book of Bulgaria (Velchev 1984) as "Rare" category.

The chromosome number 2*n* = 28 is in accordance with those already known number for species from genus *Saponaria*. The karyotype morphology is investigated for the first time for this species. The centromeric index, Ic = S/L+S (Grif & Agapova 1986) gives reasons to consider the chromosomes being to metacentric and submetacentric types. The chromosome formula 2*n* = 10m+4m-SAT+6sm+8sm-SAT = 28 shows a symmetrical karyotype. The ratio X^{max}:X^{min} is 3.75:1.

1665. ***Dianthus armeria*** L. **—** 2*n* = 30 (Fig. 2).

Bu: East Rhodopes Mts, on serpentine rocky places south-westward from Fotinovo village, above an oxbow of the river Varbica, 425±20 m, 41˚ 21.800' N, 25˚ 18.628' E, with flowers and fruits, 6 Oct 2007, *D. Pavlova* (SO 104602).

This widely European plant is widespread in Bulgaria in meadows, and shrubby places up to 1800 m (Petrova 1992).

The chromosome number 2*n* = 30 confirms previous counts (see Fedorov 1969, Goldblatt & Johnson 1991, 1994, 1998, 2000 for references) from elsewhere. The same number was published by Petrova (1975, 1995) and van Loon & van Setten (1982) for the populations from Bulgaria.

The karyotype consists of small chromosomes with unclear morphology. A chromosomes pair has small ball-shaped satellites. Most probably, the SAT-pair is of m-type. The ratio X^{max}:X^{min} is 1.2:1.

The population of this species growing on serpentines is investigated for the first time.

FABACEAE

1666. ***Trigonella monspeliaca*** L. — $2n = 16$ (Fig. 3).

Bu: East Rhodope Mts, on serpentine rocky places south-westward from Fotinovo village, 41° 23' N, 25 13' E, with fruits, 6 Jun 2005, *D. Pavlova* (SO 104593).

This species is widespread in Europe (Chater 1968). In Bulgaria it is common up to 800 m a.s.l. on dry sandy places (Kozuharov 1992). This plant is rarely distributed on serpentines in the Eastern Rhodope Mts (Pavlova & al. 2003).

The chromosome number $2n = 16$ confirms previous counts (see Fedorov 1969, Goldblatt 1981, 1984, Goldblatt & Johnson 1994, 1998, 2000 for references) from elsewhere.

The centromere index, Ic = S/L+S gives reasons to consider the chromosomes being to metacentric and submetacentric types. The chromosome formula $2n$ = 8m+2m-SAT+6sm = 16 shows a symmetrical karyotype. The SAT-pair is of m-type, the satellites are small and ball-shaped. The ratio X^{max}:X^{min} is 1.38:1. The difference with a previously published report (Pavlova 1996) for this species in Bulgaria is one more pair of chromosomes of m-type instead of a sm-type pair.

This species is karyologically investigated for the first time from a population distributed on serpentines in the Eastern Rhodope Mts.

LAMIACEAE

1667. ***Teucrium chamaedrys*** L. — $2n = 56$ (Fig. 4).

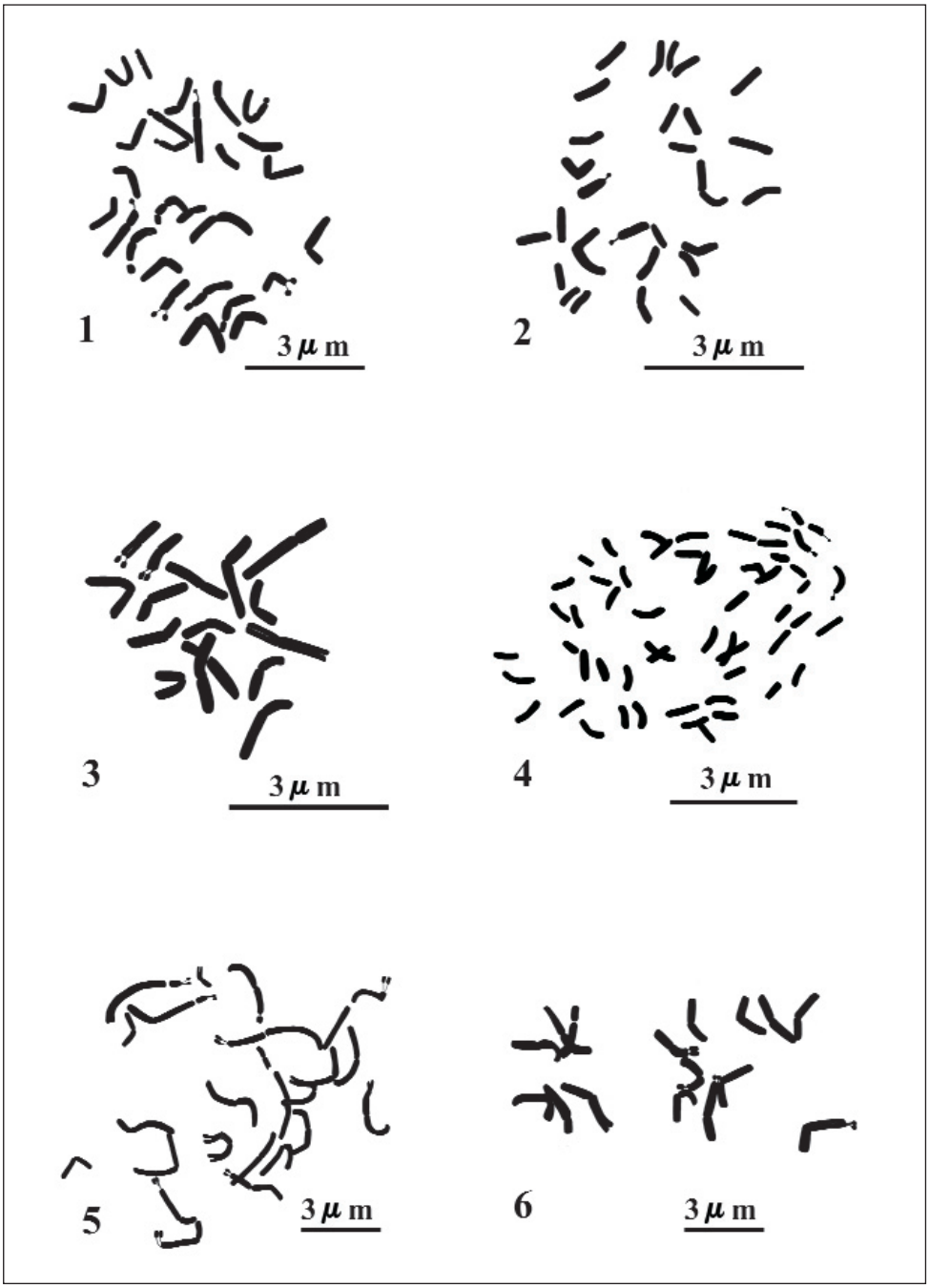
Bu: East Rhodopes Mts, on serpentine rocky places south-westward from Dobromitrtzi village, 320 m, 41° 23' N, 25° 12' E, with flowers and fruits, 6 Jun 2007, *D. Pavlova* (SO 104607).

This species is widely distributed in the country up to 1500 m (Markova 1992) and also in Europe northwards to the Netherlands, South Poland and South Central Russia (Tutin & Wood 1972).

Teucrium chamaedrys is a variable taxon divided into several infraspecific taxa, which mostly are not recognized. The chromosome numbers reported from different parts of the area of the species are $2n$ = 32, 58, 60, 62, 64, 65, 72, 80, 82, 96, 104 (see Fedorov 1969, Goldblatt & Johnson 1990, 1991, 1994, 1996, 1998, 2000, Kuzmanov 1993, for references)

There are also some previous reports for Bulgarian populations (see Kuzmanov 1993, Baltisberger 2006). The chromosome numbers reported for Bulgaria are $2n$ = 58, 60, 62, 64, 65, 96 and all the investigated populations originate from calcareous and siliceous bedrocks, collected from different altitudes.

The chromosome number $2n = 56$ is a new count for the species. The chromosomes have unclear morphology, but two of them are with visible small satellites.



Figs. 1-6. Karyotypes of: **1**, *Saponaria stranjensis*, 2*n* = 28; **2,** *Dianthus armeria*, 2*n* = 30; **3,** *Trigonella monspeliaca*, 2*n* = 16; **4,** *Teucrium chamaedrys*, 2*n* = 56; **5,** *Inula ensifolia*, 2*n* = 24; **6,** *Taraxacum serotinum,* 2*n* = 16.

ASTERACEAE

1668. ***Inula ensifolia*** L. — $2n = 24$ (Fig. 5).

Bu: East Rhodopes Mts, on serpentine rocky places south-westward from Dobromitrtzi village, 360 m; 41˚ 23' N, 25˚ 12' E, with fruits, 6 Oct 2007, *D. Pavlova* (SO 104817).

This is a common plant found in all floristic regions in Bulgaria (Peev 1992). The distribution in Europe according to Ball & Tutin (1976) covers Eastern, East-central Europe, extending westwards to Northen Italy and includes Gotland to the north.

The chromosome number previously given for this species is $2n = 16$ (see Fedorov 1969, Goldblatt & Johnson 2000, Kuzmanov 1993 for references).

The chromosome formula $2n = 3x = 16m+4m\text{-}SAT+2sm\text{-}SAT+2I\text{-}SAT = 24$ shows an asymmetrical karyotype. The ratio $X^{max}:X^{min}$ is 6:1. This is a new count for the species.

1669. ***Taraxacum serotinum*** (Waldst. & Kit.) Poir. — $2n = 16$ (Fig. 6).

Bu: Central Rhodopes Mts, on serpentine rocky places south-westward from Parvenetz village, 360 m; 42˚ 03' N, 24˚ 39' E., with flowers and fruits, 28 Aug 2007, *D. Pavlova* (SO 104816).

This autumn-flowering plant is widely distributed in Bulgaria (Peev 1992) and in many dry places in South, Central and East Europe (Richards & Sell 1976).

The chromosome number $2n = 16$ confirms previous counts (see Fedorov 1969, Goldblatt & Johnson 1998, 2000, Kuzmanov 1993 for references). The chromosome formula $2n = 2x = 6m+2m\text{-}SAT+4sm+2sm\text{-}SAT+2I = 16$ shows an asymmetrical karyotype. The ratio $X^{max}:X^{min}$ is 1.5:1.

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Address of the authors:
Dr. D. Pavlova, University of Sofia "St. Kliment Ohridski", Faculty of Biology, Department of Botany, blvd. Dragan Tzankov 8, 1164 Sofia, Bulgaria. E-mail: pavlova@biofac.uni-sofia.bg

Reports (1670-1676) by Anita Tosheva

1670. ***Lathyrus filiformis*** (Lam.) Gay — 2*n* = 14 (Fig. 1).

Bu: Central Rhodopes Mts, Lakes Chairski, 1750 m a.s.l, KG 80, 41˚ 35' N 24˚ 27' E, 09 Jul 2003, *B. Assiov*, Det. *A. Tosheva* (SO-103050).

Lathyrus filiformis, a characteristic species for the Western Mediterranean region (Central North Spain, Eastern Spain, Southern France, Northern Italy, Morocco, Algeria and the Azores (Bässler 1981, Greuter & al. 1989, Gallego 1999), is recently reported from the Bulgaria (Tosheva 2005). In Bulgaria it is currently known from few localities in only one floristic region - Central Rhodopes Mts.

The karyological data are reported for the first time. The centromereric index, Ic = S/L+S (Grif & Agapova 1986) gives reasons to consider the chromosomes being to metacentric and submetacentric types. The karyotype is rather symmetrical: 2*n* = 2x = 8m+4sm+2m-SAT = 14. One of the metacentric pairs (the first in length) bears ball-shaped satellites. The chromosome size ranged from 5.8 to 9.6 m. The ratio X^{max}:X^{min} is 1.59:1. The shortest chromosome pair, as well as the longest one, are metacentric. The total length of the karyotype is s+l = 104.3 µm.

1671. ***Lathyrus pallescens*** (M. Bieb.) K. Koch — 2*n* = 14 (Fig. 2).

Bu: Western Sredna Gora Mts, Lozenska Mts, FN 91, 42˚ 35' N, 23˚ 25' E, 31 Jul 2004, Leg./Det. *A. Tosheva* (SO-103950).

The distribution range of this species covers Central and Eastern Europe, the Caucasus Mts, Southwest Asia and Siberia. This species is rarely distributed in Bulgaria up to 1100 m a.s.l. (Kozuharov 1976, 1992).

The number is reported for a new population of the species. The karyotype is comparatively symmetrical and consists of metacentric and submetacentric types: 2*n* = 2x = 6m+6sm+2m-SAT = 14. A pair of metacentric chromosomes (the shortest) carries satel-

lites. The chromosome size varies between 6.0 and 8.4 m. The ratio $X^{max}:X^{min}$ is 1.40:1. The shortest chromosome pair is the metacentric with satellites while the longest one is submetacentric. The total length of the karyotype is s+l = 98.0 m.

1672. ***Lathyrus pancicii*** (Jurišić) Adamović — 2*n* = 14 (Fig. 3).

Bu: Znepole region, Lubash Mts, near Rebro village, FN 43, 42˚ 46' N, 22˚ 46' E, 17 Sept 2004, Leg./Det. *B. Assiov* & *A. Tosheva* (SO-103625).

This species is endemic for the Balkan peninsula, distributed in Bulgaria and Serbia. The species is rarely distributed in Bulgaria in one floristic region - Znepole (Kozuharov 1976, 1992), and it is included in the Europe (Lucas 1983) and World (Walters & Gillet 1998) Red Lists of plants and the Red Data Book of Bulgaria (Velchev 1984).

The number 2*n* = 14 is reported for the first time.

The karyotype is symmetrical and consists of metacentric and submetacentric chromosomes: 2*n* = 2x = 10m+2sm+2sm-SAT = 14. The shortest pair of the chromosomes of submetacentric type possesses satellites. This is the shortest pair in the karyotype and the longest one is submetacentric. The chromosome size ranged from 4.8 to 7.2 m. The ratio $X^{max}:X^{min}$ is 1.50:1 and the total length of the karyotype is s+l = 81.6 μm.

1673. ***Lathyrus grandiflorus*** Sm. — 2*n* = 14 (Fig. 4).

Bu: Rila Mts, near Pastra village, in forest of *Fagus sylvatica* L. along the road to artificial lake "Kalin", 1600 m a.s.l, FM 86, 42˚ 07' N, 23˚ 13' E, 14 Jul 2003, Leg. / Det. *A. Tosheva, L. Evstatieva* (SO-103622).

The distribution range of this species covers the southeastern Europe, East Mediterranean and southwest Asia. This species is rarely distributed in Bulgaria up to 1600 m and is included in the Red Data Book of Bulgaria with category "rare" (Kozuharov 1976, 1992, Velchev 1984).

The number 2*n* = 14 was established and confirms previous investigations (see Fedorov 1969: 302, Goldblatt 1984: 186, Goldblatt & Johnson 1991: 104, Šopova & al. 1993 for references). This is the first report for a population from Bulgaria.

The centromere index shows presence of metacentric, submetacentric and telocentric chromosomes: 2*n* = 2x = 8m+2sm+2I+2m-SAT = 14. The karyotype is slightly asymmetrical. One pair of metacentric chromosomes (the shortest) carries satellites. The size of the chromosomes in this karyotype ranged from 5.6 to 8.8 m. The shortest and the longest chromosome pairs are of metacentric type.The ratio $X^{max}:X^{min}$ is 1.57:1. The total length of the karyotype is s+l = 97.2 m.

The karyotype of a population of this taxon from Greece, presented by Šopova & al. (1993) showed the higher degree of asymmetry than the investigated Bulgarian materials.

1674. ***Lathyrus sylvestris*** L. — 2*n* = 14 (Fig. 5).

Bu: Rila Mts, Samokov town, "Mechka" locality, near the Palakaria river, GM 19, 42˚ 20' N, 23˚ 39' E, 02 Sept 2004, Leg./Det. *A. Tosheva* (sub *L. sylvestris* var. *platyphyllos* (Retz.) Asch.) (SO-103958).

The distribution range of this species covers Europe, Mediterranean, the Caucasus Mts., southwestern Asia. This species is widely distributed in Bulgaria up to 1000 m (Kozuharov 1976, 1992).

Our data confirm and supplement previous investigations (see Fedorov 1969: 303, Fernandes & Santos 1975, Fernandes & Queiros 1978, Magulaev 1980, van Loon 1980, Goldblatt 1981: 243, 1984: 186, 1988: 108, Goldblatt & Johnson 1990: 89, 1991: 104, 1994: 98, 1996: 115, 2000: 71, Chugunkova & al. 1992 for references). This chromosome number is reported for the first time for a population from Bulgaria.

The karyotype is symmetrical and consists of metacentric and submetacentric chromosomes: 2*n* = 2x = 8m+6sm = 14. The shortest and the longest chromosomes are metacentric. The ratio $X^{max}:X^{min}$ is 1.56:1. The chromosome size varies between 6.8 and 10.6 m. The total length of the karyotype is s+l = 126.8 m.

The karyotype presented by Fernandes & Santos (1975) showed rather homogenous set of metacentric and submetacentric chromosomes and one pair whit satellites. Chugunkova & al. (1992) reported two B-chromosomes (2*n* = 14+2B) in the karyotype of a population from Slovakia.

1675. ***Lathyrus nissolia*** L. — 2*n* = 14 (Fig. 6).

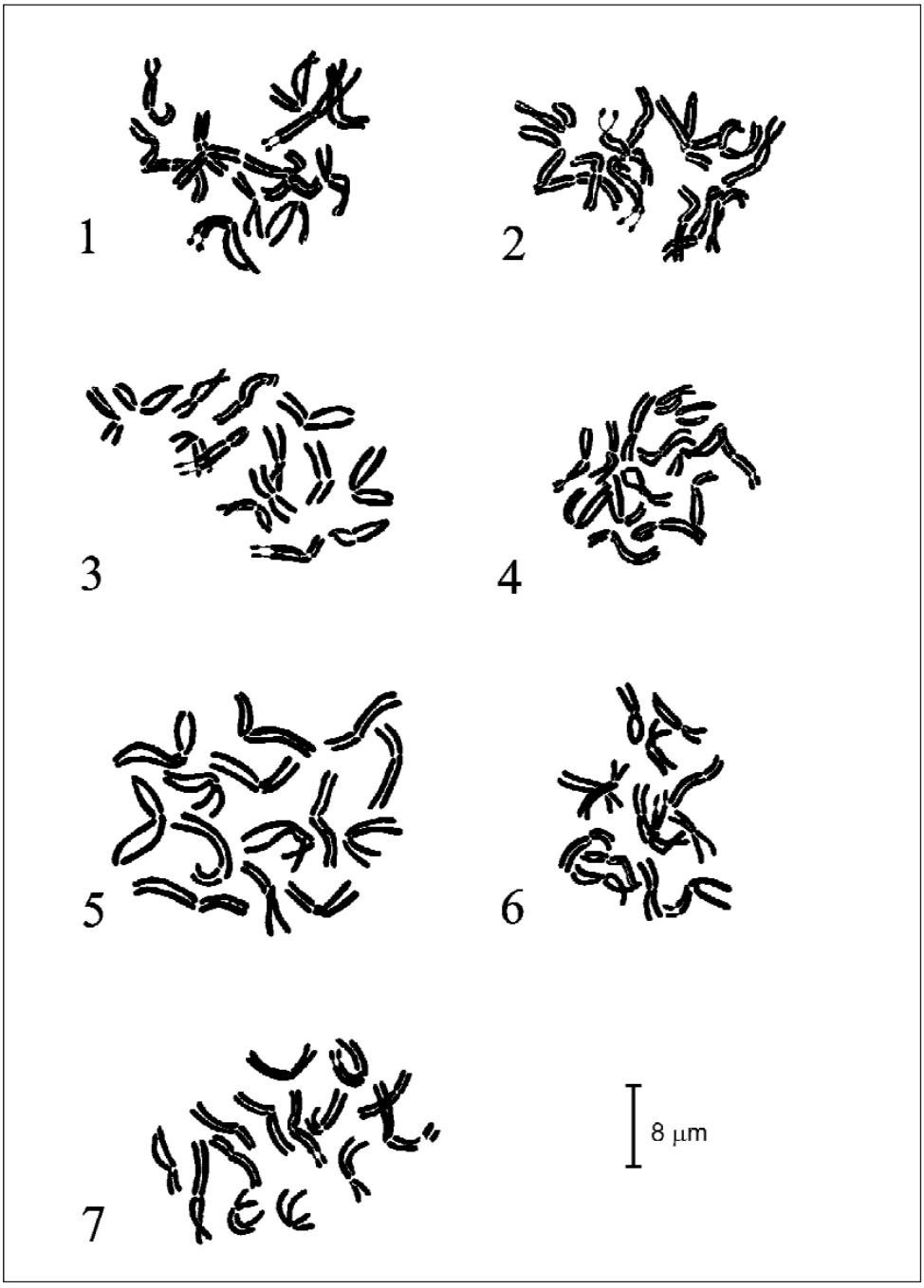
Bu: Tundza hilly region, Kenana park the town of Haskovo, LG 84, 41˚ 58' N, 25˚ 39' E, 20 Jul 2007, Leg./Det. *A. Tosheva* (SO-104591).

The distribution range of this species covers Europe, the Caucasus Mts, South-western Asia, Siberia and northern Africa. It is widely distributed in Bulgaria up to 1000 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number 2*n* = 14 confirms previous data from Bulgaria (Kozuharov & al. 1973, 1975, Krusheva 1975) and from other countries (see in Fedorov 1969: 302, Fernandes & Queiros 1978, Magulaev 1980, Goldblatt & Johnson 1990: 89, 1996: 115, Šopova & al. 1990 for references).

The karyotype consists of 2*n* = 2x = 6m+4sm+2I+2sm-SAT = 14. The investigated karyotype is slightly asymmetrical. A pair of metacentric chromosomes carries satellites. The shortest chromosomes are metacentric and the longest ones are telocentric. The size of the chromosomes in this karyotype varies very slowly from 4.8 to 5.8 μm and the ratio $X^{max}:X^{min}$ is 1.21:1. The total length of the karyotype is s+l = 75.2 μm.

The karyotype of this population is more similar to that reported by Kozuharov & al. (1975) but differs by the lower number of metacentric chromosomes. The results of Fernandes & Santos (1975) pointed out the predominantly submetacentric chromosomes and a pair with satellites in the karyotype. Šopova & al. 1990 reported a rather homogenous set of submetacentric chromosomes without satellites.



Figs 1-7. Karyotypes of some *Lathyrus* species: **1,** *L. filiformis*, 2*n* = 14; **2,** *L. pallescens*, 2*n* = 14; **3,** *L. pancicii*, 2*n* = 14; **4,** *L. grandiflorus*, 2*n* = 14; **5,** *L. sylvestris*, 2*n* = 14; **6,** *L. nissolia*, 2*n* = 14; **7,** *L. aphaca*, 2*n* = 14.

1676. ***Lathyrus aphaca*** L. 2*n* = 14 (Fig. 7)

Bu: Tundza hilly region, Kenana park the town of Haskovo, LG 84, 41˚ 58' N, 25˚ 39' E, 20 Jul 2007, Leg./Det. *A. Tosheva* (SO 104592).

The distribution range of this species covers Europe, the Caucasus Mts, southwestern Asia and northern Africa. This species is widespread distributed in Bulgaria up to 1000 m (Kozuharov 1976, 1992).

The chromosome number 2*n* = 14 confirms previous investigations (see Fedorov 1969: 301, Kozuharov & al. 1973, 1975, Fernandes & Queiros 1978, Magulaev 1980, Goldblatt & Johnson 1990: 89, 1991: 104, 1994: 98, 1998: 85, 2000: 70 for references).

The karyotype is symmetrical and consists of metacentric and submetacentric chromosomes: 2*n* = 2x = 4m+8sm+2m-SAT = 14. One of the metacentric pairs (the shortest) bears satellites. The shortest chromosomes are submetacentric and the longest are of metacentric type. The chromosome size ranged from 5.2 to 8.0 m, and the ratio X^{max}:X^{min} = 1.54:1. The total length of the karyotype is s+l = 86.8 m.

The karyotype presented by Kozuharov & al. (1975): 2*n* = 8sm+4a+2m-SAT = 14 shows presence of metacentric and submetacentric chromosomes and a metacentric pair with satellite, but also one pair of acrocentric type.

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Address of the authors:
Dr. Anita Tosheva, University of Sofia “St. Kliment Ohridski”, Faculty of Biology, Department of Botany, blvd. Dragan Tzankov 8, 1164 Sofia, Bulgaria.
E-mail: atosheva@biofac.uni-sofia.bg

Reports (1677-1678) by Katia Francesca Caparelli, Fabio Conti & Lorenzo Peruzzi

1677. *Pinguicula vulgaris* subsp. ***vestina*** F. Conti & Peruzzi — 2*n* = 64 (Fig. 1A).

It: Abruzzo: Altopiano delle Rocche, loc. Campo di Rovere (L'Aquila), rive di un ruscello, ca. 1250 m a.s.l., 42° 12' N, 13° 32' E, 24 Mar 2007, *L. Peruzzi*, *F. Bartolucci*, *K. F. Caparelli & J.-M. Tison* (temporarily cult. Hort. Bot. Univ. Pisa, APP).

Pinguicula vulgaris subsp. *vestina* is a recently described taxon, endemic to Gran Sasso and Altopiano delle Rocche (Abruzzo, C Italy; cfr. Conti & Peruzzi 2006). Our counting is the first for this unit and agrees with most of data reported for *P. vulgaris sensu lato* from elsewhere (Peruzzi 2004 and literature cited therein, Casper & Stimper 2006). Mean chromosome size is extremely small, ranging from 0.35 to 0.96 µm.

1678. *Pinguicula vulgaris* subsp. ***ernica*** Peruzzi & F. Conti — 2*n* = 64 (Fig. 1B).

It: Abruzzo: Ernici, sottogruppo dei M.ti Cantari, Riserva Naturale Zompo Lo Schioppo, Morino (L'Aquila), rupi stillicidiose ai piedi della cascata, 730 m a.s.l., 41° 50' N 13° 24' E, 28 Jul 2007, *F. Conti* (temporarily cult. Hort. Bot. Univ. Pisa, APP).

Pinguicula vulgaris subsp. *ernica* is an endangered narrow endemic unit, exclusive of a single locality in Abruzzo (Conti & Peruzzi 2006). Our counting is the first for this taxon and agrees with most of data reported for *P. vulgaris sensu lato* from elsewhere (Peruzzi 2004 and literature cited therein, Casper & Stimper 2006). Mean chromosome size is extremely small, ranging from 0.27 to 1.15 µm.

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Addresses of the authors:
K. F. Caparelli & L. Peruzzi, Dipartimento di Biologia, Unità di Botanica generale e sistematica, Università di Pisa, Italy.
E-mail: katiacaparelli@hotmail.com; lperuzzi@biologia.unipi.it
F. Conti, Dipartimento di Scienze Ambientali, Università degli Studi di Camerino – Centro Ricerche Floristiche dell'Appennino, P.N. del Gran Sasso e Monti della Laga, 67021 Barisciano (AQ), Italy. E-mail: fabio.conti@unicam.it

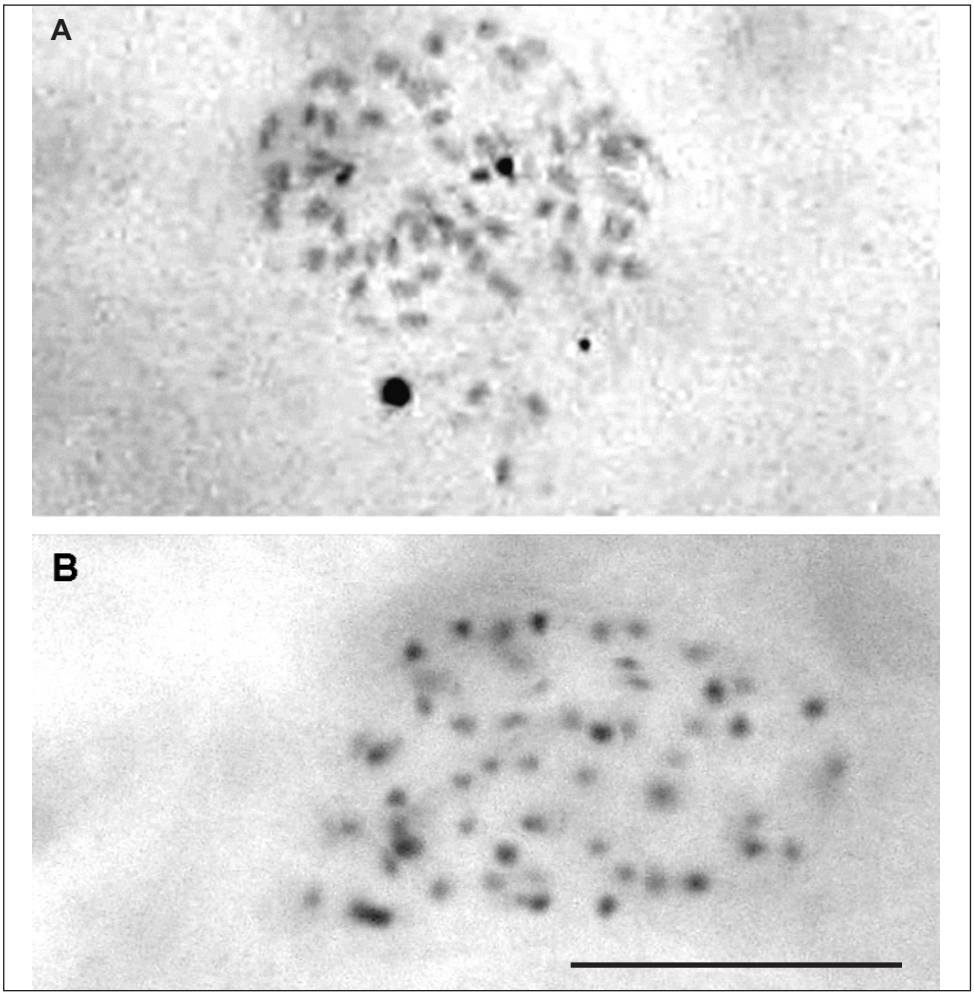

Fig. 1. Microphotographs of metaphasic plates of: **A,** *Pinguicula vulgaris* subsp. *vestina*, 2*n* = 64; **B,** *P. vulgaris* subsp. *ernica*, 2*n* = 64. – Scale bar = 10 µm.

Reports (1679-1680) by Graziana Fiorini, Claudia Quercioli & Bruno Foggi

1679. *Bellardiochloa variegata* subsp. ***aetnensis*** (C. Presl) Giardina & Raimondo — 2*n* = 14 (Fig. 1A).

It: Sicilia, Mt. Etna (CT) southern slope, near the station of Etna's cable-railway (Funivia dell'Etna), 2358 m, UTM East 500006, UTM North 4174434, time zone 33s, 09 Jul 2005, *C. Quercioli* & *L. Cartei* (FI).

The population lives on scree of lavic soil with *Rumex aetnensis* C. Presl, *Cerastium tomentosum* L., *Anthemis aetnensis* Schouw, *Senecio squalidus* L. subsp. *aetnensis* (Poir.) Greuter. The record is new to Italy and confirms the number $2n = 14$ given for the taxon by Mizianty & al. (1973) from southeastern Poland and by Duckert-Henriod & Favarger (1987) from Suisse, both sub *Poa violacea* Bellardi.

1680. ***Festuca circumediterranea*** Patzke — $2n = 14$ (Figs 1-2).

It: Sicilia, Mt. Pizzuta (Sicilia, PA), 20 Dec 1995, *M. Clause*r, *B. Foggi* & *P. Luzzi* (*Cult*. pot n° 10155, Botanical Garden of the Florence University, Italy). – Figs 1B, 2C.

— Sicilia, Mt. Etna (CT) southern slope, near Grande Albergo dell'Etna, 1725 m, 8 Jul 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10163, Botanical Garden of the Florence University, Italy). – Fig. 1C.

— Sicilia, Mt. Etna (CT) eastern slope, from Milo to Rifugio Citelli, 1675 m, UTM East 505237; UTM North 4180067; time zone 33s, 10 Jul 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10154, Botanical Garden of the Florence University, Italy). – Fig. 1D.

— Sicilia, Mt. Peloritani (ME), near Sella Mandrazzi, 1129 m, UTM East 512283; UTM North 4202846; time zone 33s, 12 Jul 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10195, Botanical Garden of the Florence University, Italy). – Figs 1E, 2D.

— Sicilia, Novara Sicula (ME), 899 m, UTM East 511298, UTM North 4206417, time zone 33s, 12 Jul 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10204, Botanical Garden of the Florence University, Italy). – Fig. 1F.

— Campania Mt. Faito (NA), 720 m, UTM East 454294, UTM North 4502081, time zone 33t, 20 Jun 2005, *C. Quercioli* & *L. Cartei*. (FI). (*Cult*. pot n° 10152, Botanical Garden of the Florence University, Italy). – Figs 2A, 2E.

— Campania, Lago Laceno (AV) Parco Regionale dei Monti Picentini, 1079 m, UTM East 508295, UTM North 4517604, 33t, 22 Jun 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10158, Botanical Garden of the Florence University, Italy). – Fig. 2B.

— Basilicata: Dolomiti Lucane, Pietrapertosa (PZ) Piccole Dolomiti Lucane, 743 m, UTM East 589894, UTM North 4487259, 33t, 23 Jun 2005, *C. Quercioli* & *L. Cartei* (FI). (*Cult*. pot n° 10153, Botanical Garden of the Florence University, Italy). For this population we have made only the count.

The *Festuca circumediterranea* populations were sampled on grasslands growing on different type of soils (limestone, sandstone, volcanic) and at an altitude ranged from 200 to 2000 m.

Our counts confirm the literature data: Bidault (1966 sub. *Festuca ovina* subsp. *laevis* Hack. var. *eu-laevis* St.-Yves subvar. *typica* Hack.) found $2n = 14$ for two populations growing in the Maritimes Alps: Vallone di Rio Freddo (Imperia) e Col di Nava ["Navo" sic] (Cuneo), both in the Italian territory.

The investigated karyotypes are all slightly asymmetrical, but similar, and the different grade of centromere index may be due to the isolation of the populations.

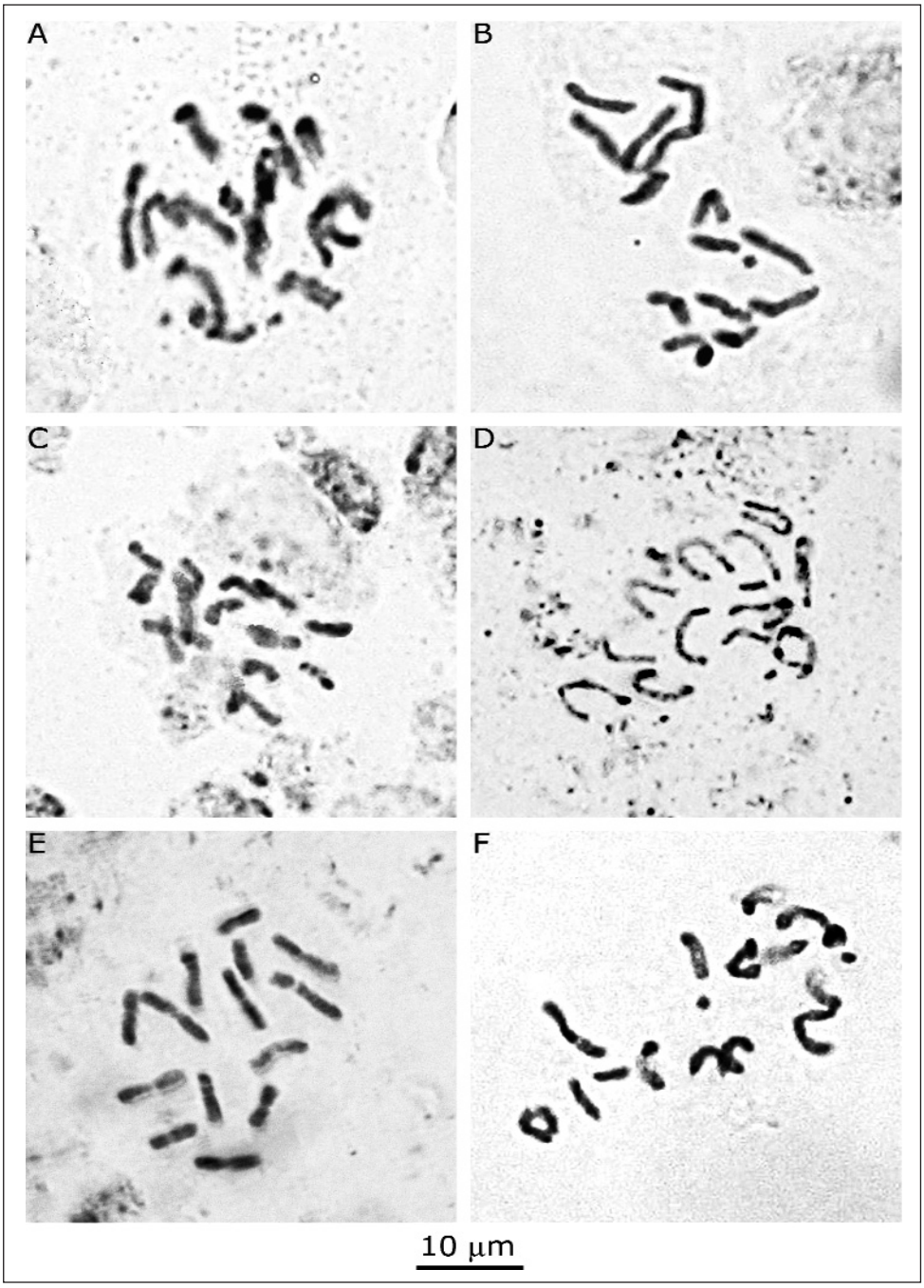

Fig. 1. Microphotographs of mitotic metaphase plates: **A,** *Bellardiochloa variegata* subsp. *aetnensis*, 2*n* = 14; **B-F:** *Festuca circumediterranea*, 2*n* = 14: **B,** Mt. Pizzuta; **C,** Grande Albergo dell'Etna; **D,** Mt. Etna from Milo to Rif. Citelli; **E,** Mt. Peloritani; **F,** Novara Sicula.

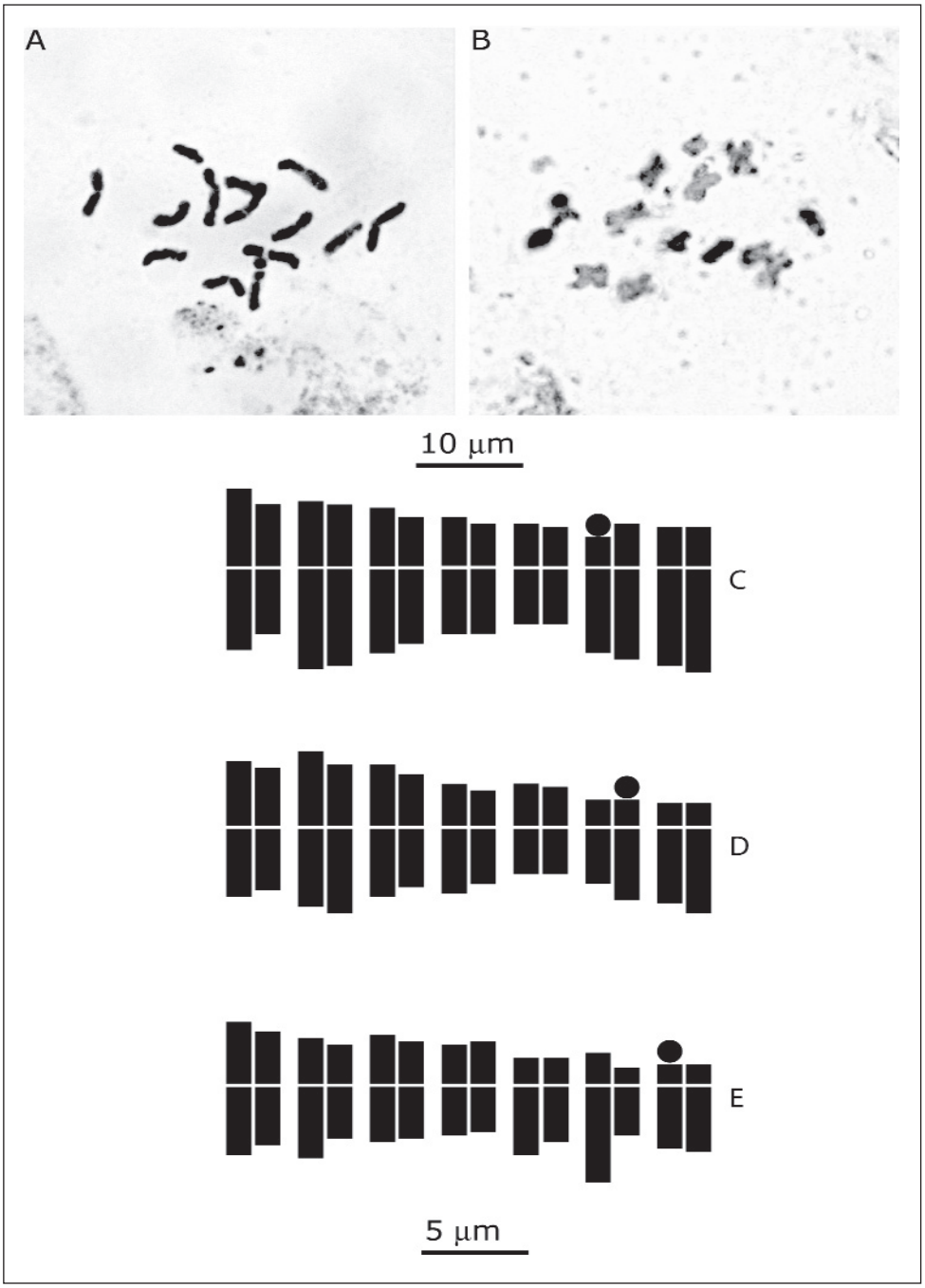

Fig. 2. Microphotographs of mitotic metaphase plates of *Festuca circumediterranea*, 2*n* = 14: **A,** Mt. Faito; **B,** Lago Laceno. Idiograms of three different populations: **C,** Mt. Pizzuta; **D,** Mt. Peloritani; **E,** Mt. Faito.

Idiograms, karyotype formula (Levan & al. 1965), chromosome size and centromere index (Arano & Saito 1980) of three different populations are also reported:

Mt. Pizzuta: 2*n* = 2x = 10m+3sm+1sm-SAT = 14; total chromosome size ranged from 8.2 to 4.6 μm; index Ask = 0,61 (Fig. 2C).

Mt. Peloritani: 2*n* = 2x = 10m+1sm+1sm-SAT+2st = 14; chromosome size varies between 7.8 and 4.5 μm; index Ask = 0,59 (Fig. 2D).

Mt. Faito: 2*n* = 2x = 8m+2sm+3st+1st-SAT = 14; chromosome size ranged from 7.8 to 4.2 μm; index Ask = 0,62 (Fig. 2E).

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Address of the authors:
Graziana Fiorini, Claudia Quercioli & Bruno Foggi,
Dipartimento di Biologia Vegetale dell'Università, via G. La Pira, 4 - 50121 Firenze Italy.
E-mail: graziana.fioriniunifi.it

Reports (1681-1682) by Tiziana Cusma Velari, Laura Feoli Chiapella, Vera Kosovel & Sonia Patui

1681. *Genista tridentata* L. [= *Chamaespartium tridentatum* (L.) P. E. Gibbs; *Pterospartum tridentatum* (L.) Willk. in Willk. & Lange] – 2*n* = 28, 56+0-2B (Fig. 1a).

Hs: León, Montes de León, Puerto del Manzanal, 42° 27' N, 6° 3' W, 1100 m a.s.l., 8 Jul 1989, *L. Feoli Chiapella* (TSB).

Lu: Sintra, Lagoa Azul, 38° 47' N, 9° 25' W, seeds obtained from Botanical Garden, Lisboa (s.n., s.coll., s.exsicc.).

— Beira Litoral, Coimbra, seeds obtained from Botanical Garden, Coimbra (s.n., s.coll., s.exsicc.).

This species is distributed in the Iberian Peninsula and northern Morocco (Maire 1987, Greuter & al. 1989, Talavera 1999).

The chromosome numbers $2n = 28$ (Sintra) and $2n = 56$ (Puerto del Manzanal and Coimbra), sometimes with two accessory chromosomes, were counted on the basis of 12 metaphase plates. Chromosome size ranges from 0.94 to 2.65 μm and 0.60 μm for B chromosomes. The populations of Sintra and Coimbra belong to subsp. *tridentata*, while the plants of Puerto del Manzanal correspond to subsp. *cantabrica* (Spach) Nyman.

Fernandes & Santos (1971) reported $2n = 56$ for a Portuguese population from Pampilhosa do Botão, Valdoeiro. Gallego Martín & al. [1984, 1985, sub *Genistella tridentata* (L.) Samp.] releved $n = 28$, $2n = 56$ for a Spanish population from Puebla de Sanabria, Zamora. Sañudo (1974) counted $n = 14$ for var. *lasianthum* (Barrios, Cádiz), $n = 28$ for var. *tridentatum* (Frío de Riaza, Segovia and Cervera de Pisuerga, Palencia) and var. c*antabricum* (Corconte, Burgos), all from Spain.

These numbers may be traced back to the primary basic number x = 14 (Fernandes & Santos 1971, Sañudo 1974, 1979, Talavera 1999).

1682. *Genista sagittalis* subsp. ***sagittalis*** [= *Chamaespartium sagittale* (L.) P. E. Gibbs; *Genistella sagittalis* (L.) Gams] **—** $2n = 44+0\text{-}2B$ (Fig. 1b).

Ga: Haute-Savoie, 1440 m a.s.l., 1992, seeds obtained from Botanical Garden, Genève (s.n., s.coll., s.exsicc.).
— Côte-d'Or, Arcenant, 47° 8' N, 4° 51' E, 1992, seeds obtained from Botanical Garden, Dijon (s.n., s.coll., s.exsicc.).
— Vosges, La Bresse, 48° 0' N, 6° 53' E, 1080 m a.s.l., seeds obtained from Botanical Garden, Nancy (s.n., s.coll., s.exsicc.).
— Vosges, Vogelstein, 1989, seeds obtained from Botanical Garden, Strasbourg (s.n., s.coll., s.exsicc.).
— Bas-Rhin, Camp du Feu, 48° 23' N, 7° 16' E, 1090 m a.s.l, 1998, seeds obtained from Botanical Garden, Strasbourg (s.n., s.coll., s.exsicc.).
— Cantal, 45° 7' N, 2° 45' E, 5 Aug 1993, seeds obtained from Botanical Garden, Gent (s.n., s.coll., s.exsicc.).
— Isère, Massif du Taillefer, 45° 02' N, 5° 55' E, 2000, seeds obtained from Botanical Garden, Strasbourg (s.n., s.coll., s.exsicc.).
He: Crêtes du Jura central, 900-1700 m a.s.l., 1989, seeds obtained from Botanical Garden, Neuchâtel (s.n., s.coll., s.exsicc.).
— Valais, 46° 10' N, 7° 30' E, 1450 m a.s.l., seeds obtained from Botanical Garden, Genève (s.n., s.coll., s.exsicc.).
— Waadt, Pays d'Enhout, Rossinière, 46° 28' N, 7° 4' E, seeds obtained from Botanical Garden, Bern (s.n., s.coll., s.exsicc.).
Ge: Baden-Württemberg, Villingen-Schwenningen, 48° 4' N, 8° 28' E, 1998, *Dürbye,* seeds obtained from Botanical Garden, Berlin-Dahlem (s.n., s.exsicc.).
— Baden-Württemberg, Lenzkirch, 47° 52' N, 8° 12' E, 23 Sept 1998, *B. Bouillon*, seeds obtained from Botanical Garden, Bonn (s.n., s.exsicc.).

— Schwarzwald, 48° 0' N, 8° 15' E, 1989, seeds obtained from Botanical Garden, Oldenburg (s.n., s.coll., s.exsicc.).

Rm: Mehadia, 44° 55' N, 22° 22' E, 1998, seeds obtained from Botanical Garden, Brno (s.n., s.coll., s.exsicc.).

Genista sagittalis subsp. *sagittalis* is widely spread in central Europe, particularly in the West and in the Balkan Peninsula; it is sporadic in the Italian Peninsula and in Greece (Gibbs 1968, Pignatti 1982, Greuter & al. 1989).

The chromosome number $2n = 44$, often with one or two accessory chromosomes, was counted for all the studied populations, on the basis of 52 metaphase plates. The number $2n = 48$ was found once, only in the population from Vosges, La Bresse. Chromosome size ranges from 1.15 to 1.98 μm and 0.56 μm for B-chromosomes.

Forissier (1973a, sub *Chamaespartium sagittale*) releved $n = 22$ in four Swiss populations (Cantons de Berne and de Neuchâtel); Tschechow (1931) counted $2n = 44$ (42-45) in cultivated material; Gadella & Kliphuis (1972, sub *C. sagittale*) $2n = 44$ (rarely 43 and 46) in a population from Montenegro; Murín & Májovský (1976, sub *C. sagittale*) $2n = 44$ in a Slovakian population. Forissier (1975, sub *C. sagittale*) reported $n = 44$ for a French population from Pyrénées-Orientales; Verlaque & al. (1983) found $n = 22$, $2n = 44$ in several populations from Var, Alpes-de-Haute-Provence, Lozère, Gard, Hautes-Alpes, Pyrénées-Orientales; Sañudo (1974, sub *C. sagittale*) revealed $n = 22$ and $n = 44$ in various populations from northern Spain (Burgos and Palencia). Kuzmanov & Markova (1973, sub *C. sagittale*), Krusheva (1975), Kuzmanov (1978, sub *C. sagittale*) all counted $2n = 48$ in various populations of Bulgaria; Nilsson & Lassen (1971, sub *C. sagittale*) and Verlaque & al. (1983) reported the same number respectively for populations from Slovenia and Italy, Calabria. Santos (1944/45) found both numbers $2n = \pm 46$ and $2n = 48$ in cultivated material.

Forissier (1973b, sub *Genista delphinensis*) counted $n = 22$ in a French population from Pyrénées-Orientales (Conat près de Prades) of *G. sagittalis* subsp. *delphinensis* (Verl.) Nyman [= *Chamaespartium delphinense* (Verl.) Soják], a taxon distributed in southern France and northern Iberian Peninsula (Talavera 1999).

In the southern Iberian Peninsula (Sierra Nevada) grows an endemic taxon: *Genista sagittalis* subsp. *undulata* (Ern) Greuter, with a distributional area remarkably disjoint from the main range of the species, which reaches the northern provinces of the Iberic Peninsula. Esteve Chueca & Varo Alcalá (1972, sub *Chamaespartium nevadense* Esteve Chueca & Varo Alcalá) reported $n = \sim 42$, $2n = \sim 84$ for a population from Cerro Trevenque, Granada, number subsequently established from the authors as $n = 44$ (after Sañudo, 1974: 172). Sañudo (1974, sub *C. sagittale*) releved both numbers $n = 24$ and $n = 44$ in two populations of this taxon from Sierra Nevada. According to Sañudo (1974) two chromosomal races, respectively with $n = 24$ and $n = 44$, would thus coexist in the small area of Sierra Nevada.

The populations of *Genista sagittalis* from the southeastern and southern zones of the range (Slovenia, Bulgaria and Calabria) apparently tend to present the euploid number $2n = 48$ (except for the populations from Montenegro and Romania), while populations from central and western zones (Slovakia, Germany, Switzerland, France, northern Spain) present the aneuploid number $2n = 44$, as already observed by Verlaque (1988). In some populations from the south western part of the main range (Pyrénées-Orientales, Burgos) a polyploid race with $2n = 88$ would presumably have originated.

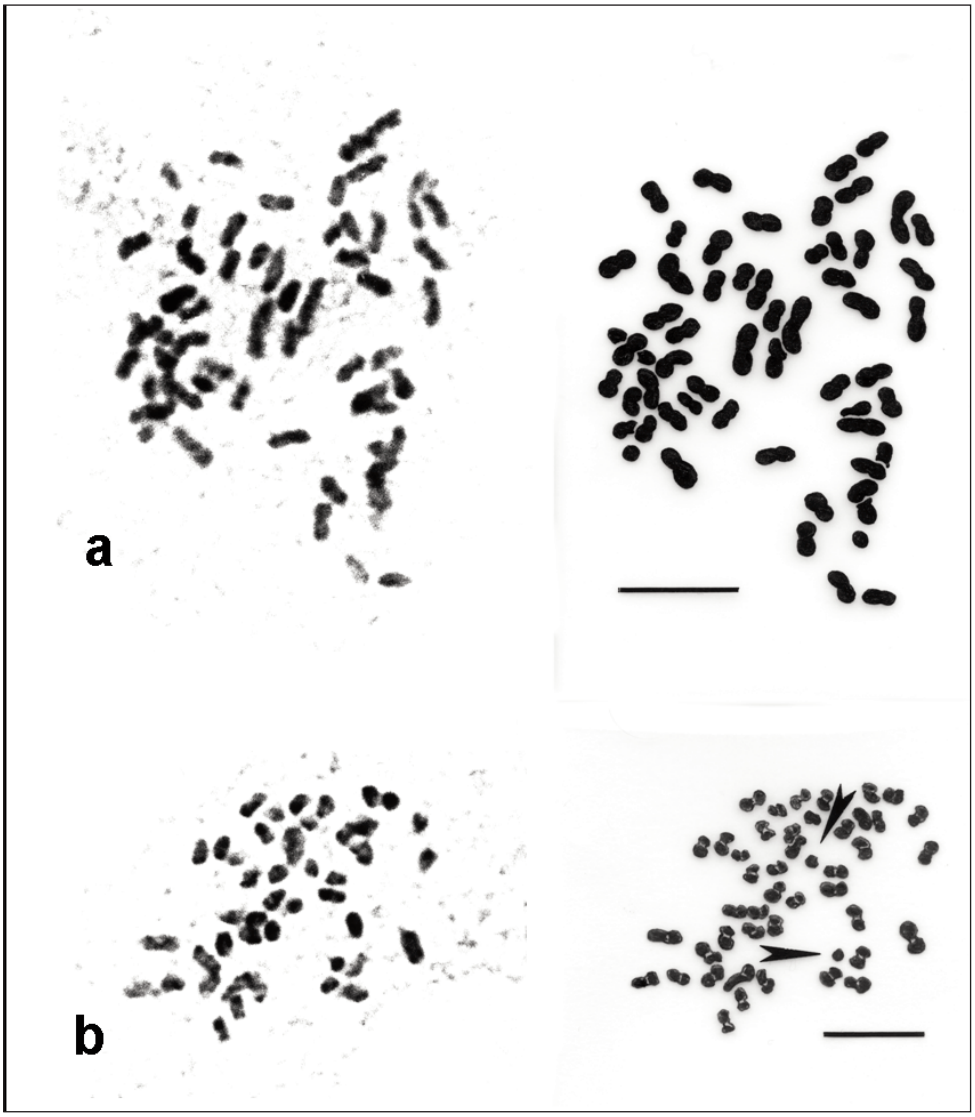

Fig. 1. Photomicrographs and relative drawings of somatic metaphase plates of: **a,** *Genista tridentata*, 2*n* = 56; **b,** *Genista sagittalis*, 2*n* = 44+2B. – Arrows indicate B-chromosomes. Scale bars = 5 µm.

According to Sañudo (1974, 1979) these numbers may be traced back to the primary basic number x = 12; both euploid and hypoaneuploid (more frequent) populations are present.

Genista tridentata and *G. sagittalis* were included by some authors in the genus *Chamaespartium* Adanson (e.g. Gibbs 1968). However, the two species differ morphologically (e.g. seeds strophiolate in *G. tridentata,* estrophiolate in *G. sagittalis*, see Gibbs 1966) and serologically (Cristofolini & Feoli Chiapella 1984); recent molecular analyses

based on nucleotide sequences of nrDNA and cpDNA (Pardo & al. 2004) show that the two species do not form a monophyletic group. *G. sagittalis* shows a high similarity to the species of subgen. *Genista*, while *G. tridentata* to taxa of other subgenera of *Genista*, to *Ulex* and *Stauracanthus*. The two species differ also karyologically for the basic number (x = 12 and x = 14). *Chamaespartium* results an artificial genus; the two species share only a conspicuously winged stem. It appears thus convenient to include the two taxa in *Genista*, as proposed by Polhill (1976), Bisby (1981), Cristofolini & Feoli Chiapella (1984), Greuter & al. (1989). *G. tridentata* could fall within the monospecific subgenus *Pterospartum* Spach, as suggested by Cristofolini & Feoli Chiapella (1984).

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Address of the authors:
Tiziana Cusma Velari, Laura Feoli Chiapella, Vera Kosovel & Sonia Patui, Dipartimento di Scienze della Vita, Università degli Studi di Trieste, Via Licio Giorgieri 10, I-34127 Trieste, Italy. E-mail: cusma@univ.trieste.it

Reports (1683-1687) by Hikmat Tahiri, Paloma Cubas & Cristina Pardo

1683. ***Adenocarpus nainii*** (Maire) P. Gibbs — $2n = 52$ (Figs 1, 7).

Ma: Moyen Atlas, El Harcha, 928 m, 33° 29' 25" N, 6° 08' 25" W, 27 Jun 2007, *Pardo & Tahiri* (MAF167269).

Adenocarpus nainii is an endemism from the central Rif Mountains and the Middle Atlas of Morocco. This taxon has been considered as a subspecies of *Adenocarpus com-*

plicatus [*A. complicatus* subsp. *nainii* (Maire) P. Gibbs]. However, molecular data based on the ITS region indicate that *A. nainii* is not related to the latter but to *A. boudyi* Battand. & Maire and *A. telonensis* (Loisel.) DC in Lam. & DC. Thus, we consider the specific rank to be more appropriate for *Adenocarpus nainii*.

We counted 2*n* = 52 chromosomes in root mitosis, which is the first record for this species. The number 2*n* = 52 is the most frequently reported for *Adenocarpus* (Sañudo 1973a, Cubas & al. 1998, Gallego Martín & al. 1986, Castroviejo & al. 2003), although lower numbers were reported in *A. manii* (Hook f.) Hook f. (2*n* = 48, Frahm-Leliveld 1969) and *A. bacquei* Batt. & Pitard (2*n* = 48, Humphries & al. 1978). Aneuploid variations were also detected in several species. Examples of this variation are: *A. anagyrifolius* Coss. & Bal. with 2*n* = 48 (Humphries & al. 1978), 2*n* = 52 (Parra & al. 1999) and 2*n* = 54 (Tahiri & al. 2006); *A. argyrophyllus* (Rivas Goday) Caball. with 2*n* = 52 and 54 (Horjales 1972, Castroviejo & al. 2003); *A. complicatus* (L.) J. Gay s.l. with 2*n* = 52 and 54 (Horjales 1972); and *A. viscosus* (Willd.) Webb & Berthel. where *n* = ca. 24 (Larsen 1960) and 2*n* = 52 (Cubas & al. 1998) were reported.

1684. *Genista ifniensis* A. Caballero **—** 2*n* = 48 (Figs 2, 8).

Ma: Maroc atlantique moyen, Aïn Lahjar, 130 m, 31° 39’ 25” N, 9° 35’ 29” W, 16 Jun 2007, *Tahiri & El-Rhzaoui* (MAF 1627267).

This plant is a shrub endemic to southern Morocco. Our results confirm the chromosome number of 2*n* = 48 provided by Cusma Velari & al. (1999, 2004).

1685. *Genista tricuspidata* Desf. **—** 2*n* = 50 (Figs 3-4 & 9-10).

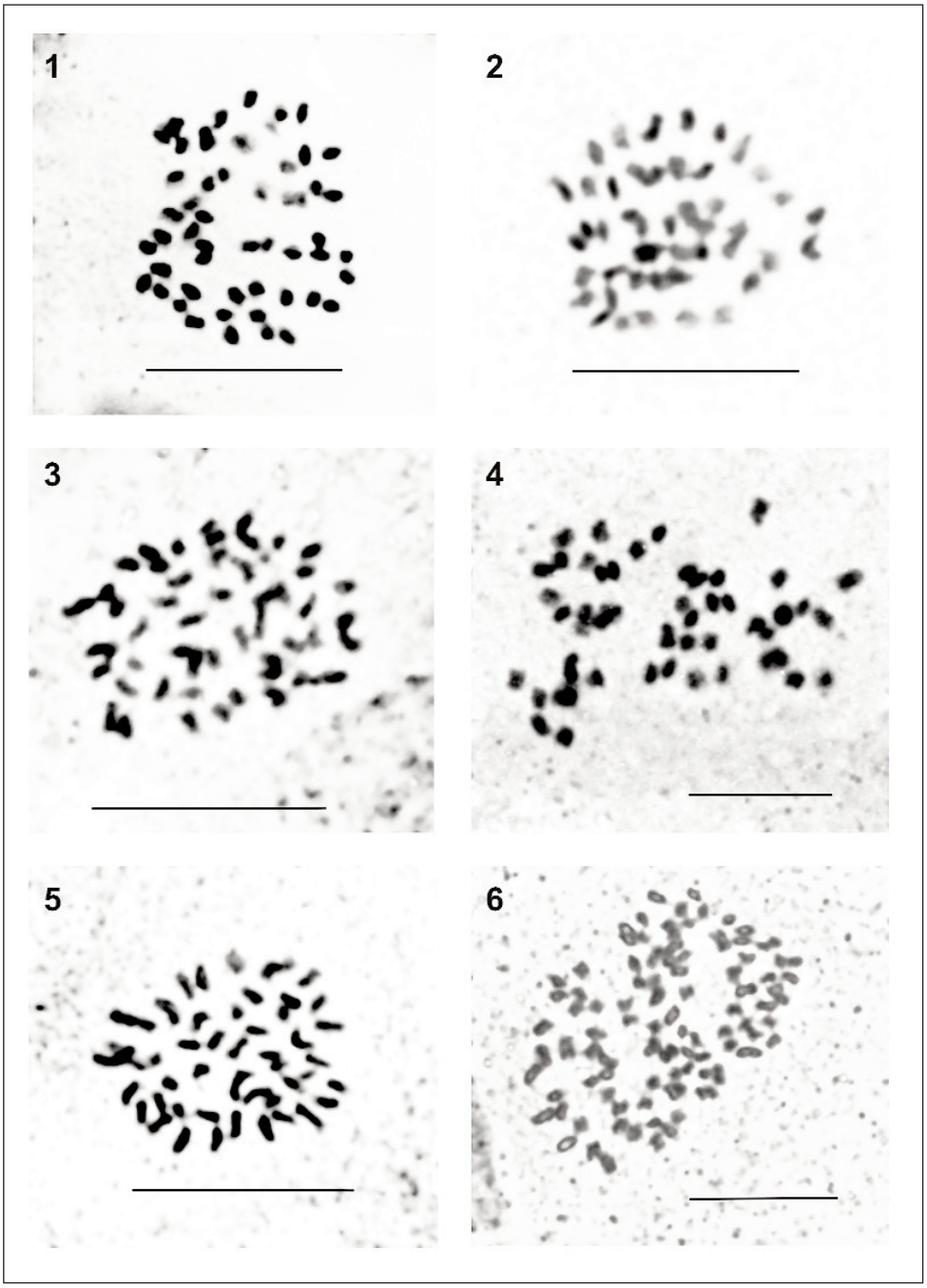
Ma: Maroc atlantique moyen, Aïn Lahjar, 130 m, 31° 39’ 25” N, 9° 35’ 29” W, 16 Jun 2007, *Tahiri & El-Rhzaoui* (MAF 1627268).

Genista tricuspidata is an endemism restricted to northern Africa (Morocco, Algeria and Tunisia). Two chromosome numbers were reported from the northern and High Atlas populations of Morocco (2*n* = 48, Cusma Velari & al. 1999; 2*n* = 50, Tahiri & al. 2004, 2006). Our data confirm the highest number (2*n* = 50) for the southernmost populations.

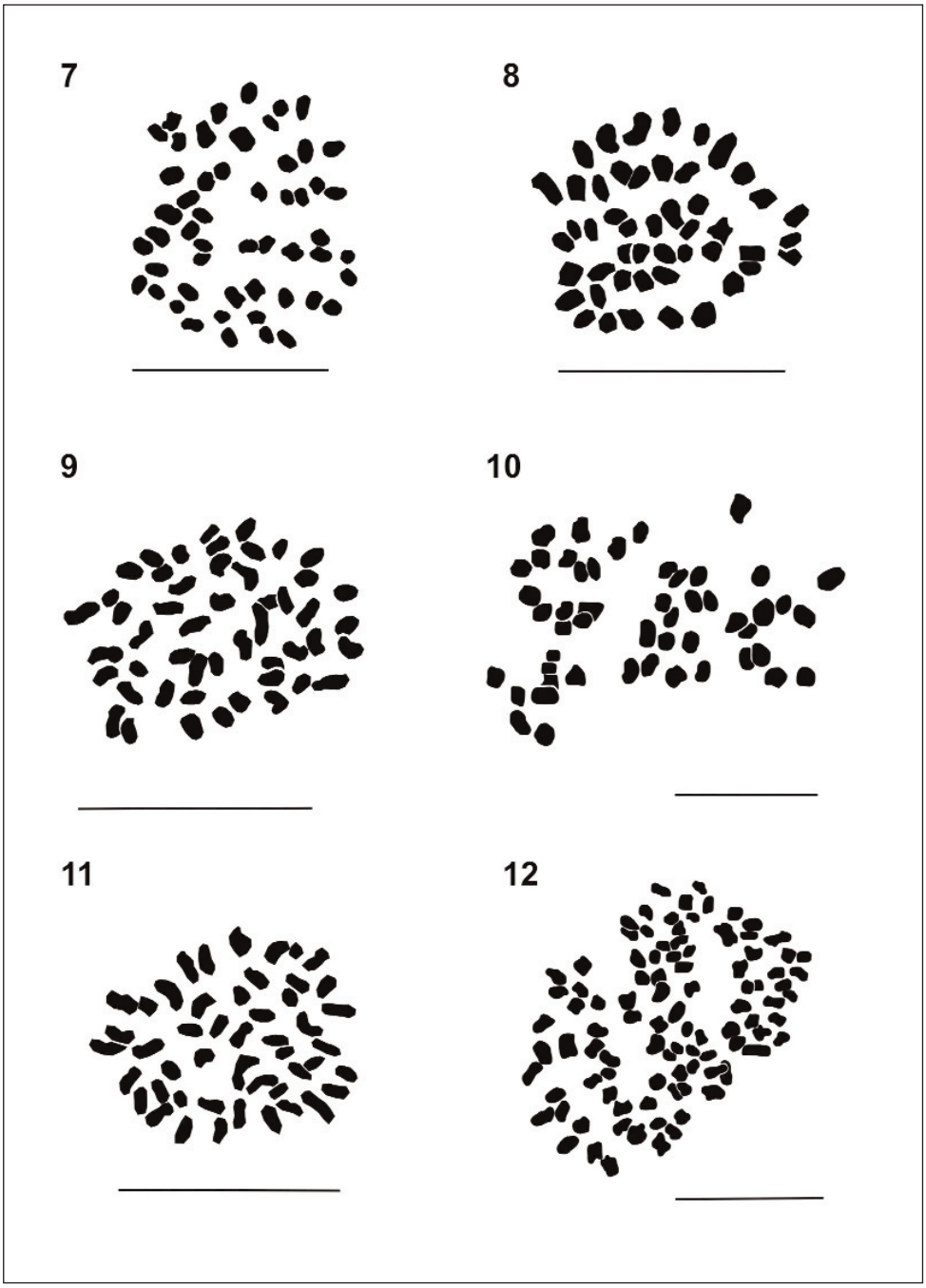
1686. *Genista umbellata* subsp. ***equisetiformis*** (Spach) Rivas Goday & Rivas Mart. **—** 2*n* = 48 (Figs 5, 11).

Hs: Málaga, Valtocado, Coín-Mijas, 460 m, 36º 36’ 18” N, 4º 40’ 48” W, 26 Jun 1996, *Cubas & Pardo* (MAF 153712).

Genista umbellata grows in southern Spain and it has also scattered populations in northern Morocco and Algeria. The studied plants correspond to subsp. *equisetiformis*,



Figs 1-6. Mitotic metaphase plates of: **1,** *Adenocarpus nainii*, 2*n* = 52; **2,** *Genista ifniensis*, 2*n* = 48; **3,** *G. umbellata* subsp. *equisetiformis*, 2*n* = 48; **4-5,** *G. tricuspidata*, 2*n* = 50; **6,** *Ulex gallii* subsp. *gallii*, 2*n* = 96. – Scale bars = 10 μm.



Figs 7-12. Explanatory diagrams of Figs 1-6: **7,** *Adenocarpus nainii*, 2*n* = 52; **8,** *Genista ifniensis*, 2*n* = 48; **9,** *G. umbellata* subsp. *equisetiformis*, 2*n* = 48; **10-11,** *G. tricuspidata*, 2*n* = 50; **12,** *Ulex gallii* subsp. *gallii*, 2*n* = 96. – Scale bars = 10 µm.

which is restricted to the western part of the Spanish area. These plants are characterised by larger inflorescences and longer hairs over flowers and fruits than subsp. *umbellata*.

Two different chromosome numbers have been reported at meiosis for this subspecies: $n = 23$ (Sañudo 1973b) and $n = 24$ (Talavera & Arista 1995). We confirm the number 2n = 48 found in root mitosis by Tahiri & al. (2007).

1687. *Ulex gallii* subsp. ***gallii*** Planchon. **—** $2n = 96$ (Figs 6, 12).

Hs: León, Puerto de Tarna, subida desde La Uña, 1490 m, 43º 05' 3" N, 5º 13' 5" W, 11 Jun 2003, *Cubas* & *Pardo* (MAF 166447).

Ulex gallii subsp. *gallii* is a western European species that grows from Great Britain to northern Spain in areas subjected to the climatic influence of the ocean. Our data agree with numerous reports indicating $2n = 96$ chromosomes for this taxon (Frahm-Leliveld 1960, Gilot 1965, Valdés Bermejo & Castroviejo 1979, Castroviejo & Valdés-Bermejo 1983, Cubas 1987, Alvarez Martínez 1988, Misset 1990, Kirchner & Bullock 1999, Stokes & al. 2003, among others). Another cytotype from northwestern Spain (Castroviejo & Valdés-Bermejo 1983, Alvarez Martínez & al. 1988) has $2n = 64$ chromosomes and smaller flowers [*U. gallii* subsp. *breoganii* (Castrov. & Valdés Berm.) Rivas Mart. & al.]. The reports on diploid plants of this species (Fernández Prieto & al. 1993) have not been confirmed.

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Addresses of the authors:
Hikmat Tahiri, Département de Biologie, Faculté des Sciences, Université Mohammed V, BP1014, Rabat, Morocco.
Paloma Cubas*, Cristina Pardo, Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense, 28040 Madrid, Spain.
*E-mail: cubas@farm.ucm.es