

Mediterranean chromosome number reports – 24

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

Abstract

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This is the twenty-four 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 21 taxa: *Hymenonema* from Greece by E. Liveri, P. Bareka & G. Kamari (Nos 1824-1825); *Fritillaria* from Turkey by Mine Koçyiğit, N. Özhatay, U. Rastgeldi & E. Kaya (Nos 1826-1836); *Hieracium* from Sicily by E. Di Gristina, G. Domina & A. Geraci (No 1837); *Bellevia* and *Leopoldia* from Tunisia by A. Troia, G. Domina & V. Spadaro (Nos 1838-1839); *Bubon*, *Centaurea*, *Crepis*, *Rindera* and *Scaligeria* from Greece by Ch. Kyriakopoulos, P. Bareka & G. Kamari (Nos 1840-1844).

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, IRBio-GReB, 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 "Evolution des Angiospermes", Université Paris-Sud, Bat. 360, 91405 ORSAY CEDEX, France. E-mail: sonia.yakovlev@u-psud.fr

Reports (1824-1825) by E. Liveri, P. Bareka & G. Kamari

1824. *Hymenonema graecum* (L.) DC. — $2n = 20$ (Figs 1a & 1b).

Gr: Kiklades, Kithnos island, Merihas bay (SW side), 37° 23' N, 24° 23' E, alt. 20-40 m, 12 Jul 2013, E. Liveri & V. Ketsilis-Rinis s.n., cult. no *H1b* (UPA).

Hymenonema Cass., a representative of Compositae family, is an endemic genus to Greece, which comprises two species, *H. graecum* (L.) DC. and *H. laconicum* Boiss. & Heldr. They are perennial herbs which differ in leaves, flowers and achenes. It is worth mentioning that *Hymenonema* is one of the 8 endemic genera in Greece and is the only one with two species.

Hymenonema graecum is distributed in many islands and islets of Kiklades as well as in Crete, occurring in margins of coastal saline ground, margins of roadsides and stony places, growing with phrygana and garigue. In Crete, the most recent record of this species

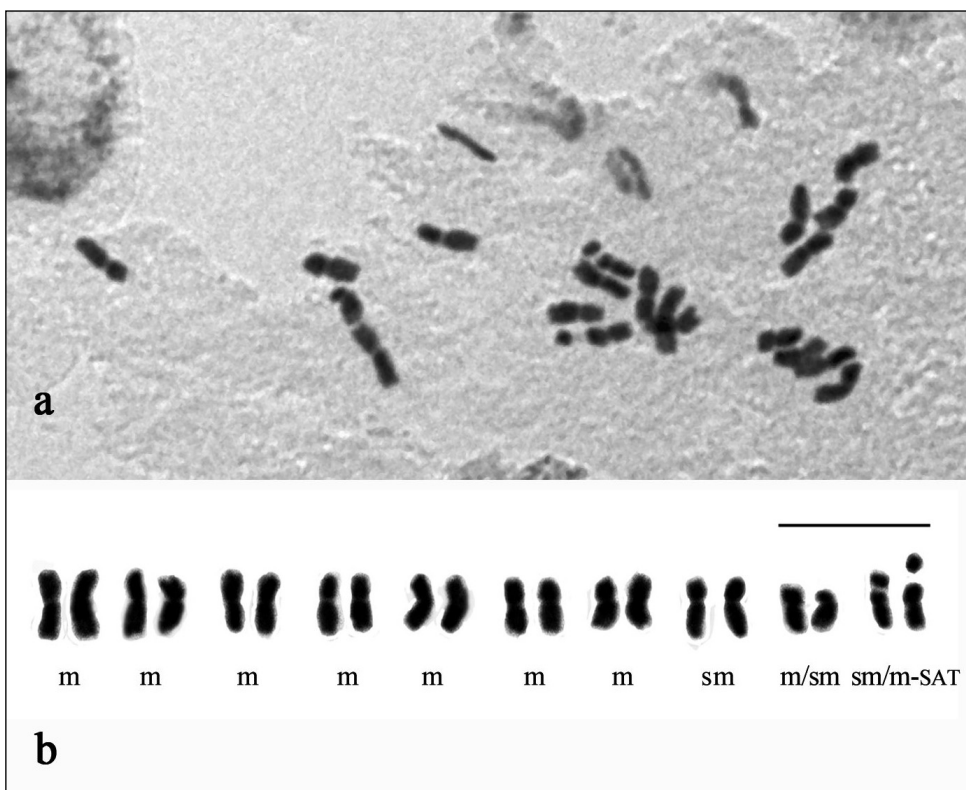


Fig. 1. Microphotograph of mitotic metaphase plate and corresponding karyogram of *Hymenonema graecum*, $2n = 20$. – Scale bar = 10 μ m.

was by Zaffran in the 1960's. According to this record, the plant was found east of Chania, at the westernmost point of Souda Bay (Turland & al. 1993, and pers. com.).

The chromosome number, $2n = 20$, counted here from Kithnos island, is in accordance to that written on three specimens of the Herbarium of the University of Lund (Sweden) collected by Hans Runemark (two specimens no 1212) and Runemark & Snogerup (no 10649) from Naxos island in 1958. Iatrou (1986) characterizes the two species of *Hymenonema* (*H. graecum* and *H. laconicum*) as schizoendemics and refers that the chromosome number of *H. graecum* is also $2n = 20$, but the location of the collection was not mentioned.

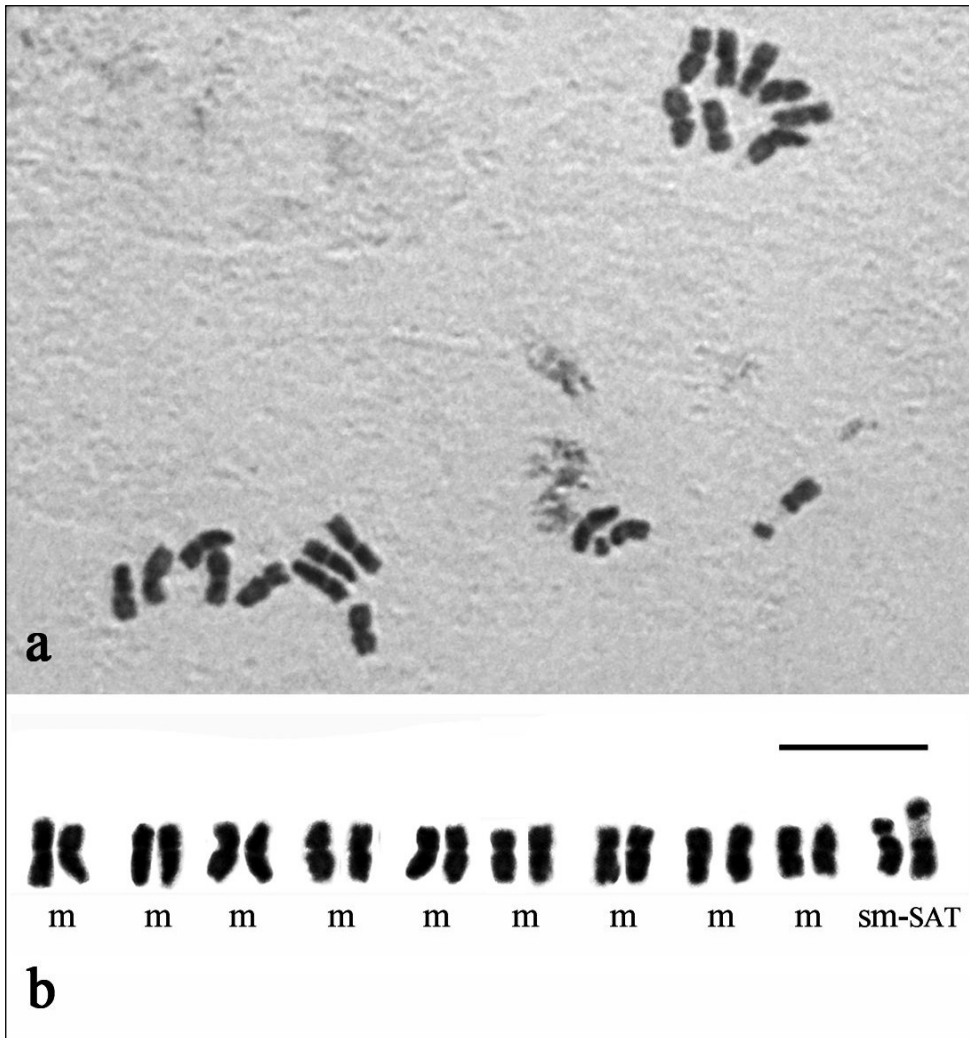


Fig. 2. Microphotograph of mitotic metaphase plate and corresponding karyogram of *Hymenonema laconicum*, $2n = 20$. – Scale bar = 10 μ m.

The karyotype of *H. graecum* is diploid, symmetrical, consisting of mostly metacentric and some submetacentric chromosomes, ranging in size from 2.58 to 4.52 μm (Fig. 1a). It is noteworthy that in the population studied here the two smallest in size chromosome pairs show structural heterogeneity with one metacentric and one submetacentric homologue respectively (Fig. 1b) with the karyotype formula given as: $2n = 2x = 17m + 1sm + 1m\text{-SAT} + 1sm\text{-SAT} = 20$ chromosomes.

1825. *Hymenonema laconicum* Boiss. & Heldr. — $2n = 20$ (Figs 2a & 2b).

Gr: Peloponnisos, Nomos Lakonias, Mt. Taigetos, Langada Gorge at climbing region, 37° 5' 1.07'' N, 22° 18' 38.96'' E, alt. 780-800 m, 25 May 2014, *E. Liveri & I. Kofinas*, s.n., cult. no *H35* (UPA).

Hymenonema laconicum occurs in central and south Peloponnisos, in foothills of Taigetos, Parnonas and Menalon mountains. It grows at dry slopes, margins of roads and abandoned terraces, usually on limestone.

The somatic chromosome number $2n = 20$ found in the hereby studied population is in accordance with that given by Iatrou (1986) and Tan & Iatrou (2001) on material from Taigetos and Parnonas.

Additionally, in the present study the karyotype morphology and a karyogram of the taxon are given for the first time. The karyotype of *H. laconicum* is diploid, symmetrical, consists of metacentric chromosomes, except one pair of satellited chromosomes, which are submetacentric (Fig. 2a). The karyotype formula is given as: $2n = 2x = 18m + 2sm\text{-SAT} = 20$ chromosomes, varying in size from 3.87 to 7.10 μm (Fig. 2b).

References

- Iatrou, Gr. 1986: Contribution to the study of the Endemic Flora of Peloponessos. – PhD Thesis, University of Patras, Greece (in Greek with an English summary).
 Tan, K. & Iatrou, Gr. 2001: Endemic Plants of Greece. The Peloponnese. – København.
 Turland, N.J., Chilton, L. & Press, J.P. 1993: Flora of the Cretan area: An annotated checklist & atlas. – London.

Adresses of the authors:

Eleni Liveri¹, Pepy Bareka² & Georgia Kamari¹,

¹Botanical Institute, Section of Plant Biology, Department of Biology, University of Patras, 265 00, Patras, Greece. E-mails: eleni-liveri@hotmail.com; kamari@upatras.gr

²Laboratory of Systematic Botany, Faculty of Crop Science, Agricultural University of Athens, Iera Odos 75, 118 55 Athens, Greece. E-mail: bareka@aau.gr

Reports (1826-1836) by M. Koçyiğit, N. Özhatay, U. Rastgeldi & E. Kaya

1826. *Fritillaria amana* (Rix) R.Wallis & R.B.Wallis — $2n = 2x = 24$ (Fig. 1).

Tu: Gaziantep: Islahiye, Huzur upland, Tahtalı field, 1520 m, 06 Jun 2007, *U. Rastgeldi 2702* (ISTE).

The chromosome number of the species was reported previously as $n = 12$ (La Cour 1978, 1978a).

1827. *Fritillaria armena* (Rix) R.Wallis & R.B.Wallis — $2n = 2x = 24$ (Fig. 2).

Tu: Adıyaman: Doğanlı village, Aksu field, 1288 m, 23 Apr 2007, *U. Rastgeldi 0202* (ISTE).

The chromosome number of the endemic species was reported previously as $n = 12$ (La Cour 1978, 1978a).

1828. *Fritillaria aurea* Schott — $2n = 2x = 24$ (Fig. 3).

Tu: Adıyaman: Doğanlı village, Aksu field, 1294 m, 23 Apr 2007, *U. Rastgeldi 0203* (ISTE).

The chromosome number of the endemic species was reported previously as $n = 12$ (La Cour 1978, 1978a).

1829. *Fritillaria crassifolia* Boiss. & A. Huet subsp. *crassifolia* — $2n = 2x = 24$ (Fig. 4).

Tu: Adıyaman: Doğanlı village, Aksu field, 1309 m, 22 Apr 2007, *U. Rastgeldi 0201* (ISTE).

The chromosome number of the endemic subspecies was reported previously as $n = 12$ (La Cour 1978, 1978a).

1830. *Fritillaria crassifolia* subsp. *kurdica* (Boiss. & Noë) Rix — $2n = 2x = 24$ (Fig. 5).

Tu: Kahramanmaraş: Ahırdağı, Sulu Tarla, 1267 m, 20 Jul 2007, *U. Rastgeldi 4601* (ISTE).

The chromosome number of the endemic subspecies was reported previously as $n = 12$ (La Cour 1978, 1978a; Zonneveld 2010).

1831. *Fritillaria imperialis* L. — $2n = 2x = 24+0-3B, 26+2-3B$ (Figs 6-9).

Tu: **Adıyaman:** Doğanlı village, Berzan Mountain, east slopes, 1719 m, 02 May 2008, *U. Rastgeldi 0206* (ISTE). – Fig. 6.

Diyarbakır: Çermik, Kuyu village, Taşköprü field, 1230 m, 30 Apr 2007, *U. Rastgeldi 2101* (ISTE). – Fig. 7.

Diyarbakır: Çüngüş, Mirgan Mountain, 1343 m, 27 Apr 2008, *U. Rastgeldi 2102* (ISTE). – Fig. 8.

Diyarbakır: Kulp, Yaylak village, Mehmet Kar field, 1672 m, 27 Sep 2008, *M. Koçyiğit, U. Rastgeldi 2103* (ISTE). – Fig. 9.

The chromosome number of the species was previously reported as $n = 12$ (Chatterjee 1971; Pandita 1979; La Cour 1978, 1978a; Zonneveld 2010), but also $2n = 3x = 36$ (Özhatay 2002).

1832. *Fritillaria minuta* Boiss. & Noë — $2n = 2x = 24$ (Figs 10-12).

Tu: **Adıyaman:** Nemrut Mountain, west slopes, 1985 m, 04 Oct 2007, *U. Rastgeldi 4602* (ISTE). – Fig. 10.

— **Siirt:** Baykan, Yarımca village, Mırgelo Mountain slopes, 1113 m, 27 Apr 2007, *M. gayberi, U. Rastgeldi 5601* (ISTE). – Fig. 11.

— **Siirt:** Baykan, Günbuldu village, Klems Mountain, Şirantepe field, 1905 m, 23 May 2007, *M. gayberi, U. Rastgeldi 5604* (ISTE). – Fig. 12.

The chromosome number of the species was reported previously as $2n = 2x = 24$ (Özhatay 2002).

1833. *Fritillaria persica* L. — $2n = 2x = 24$ (Fig. 13).

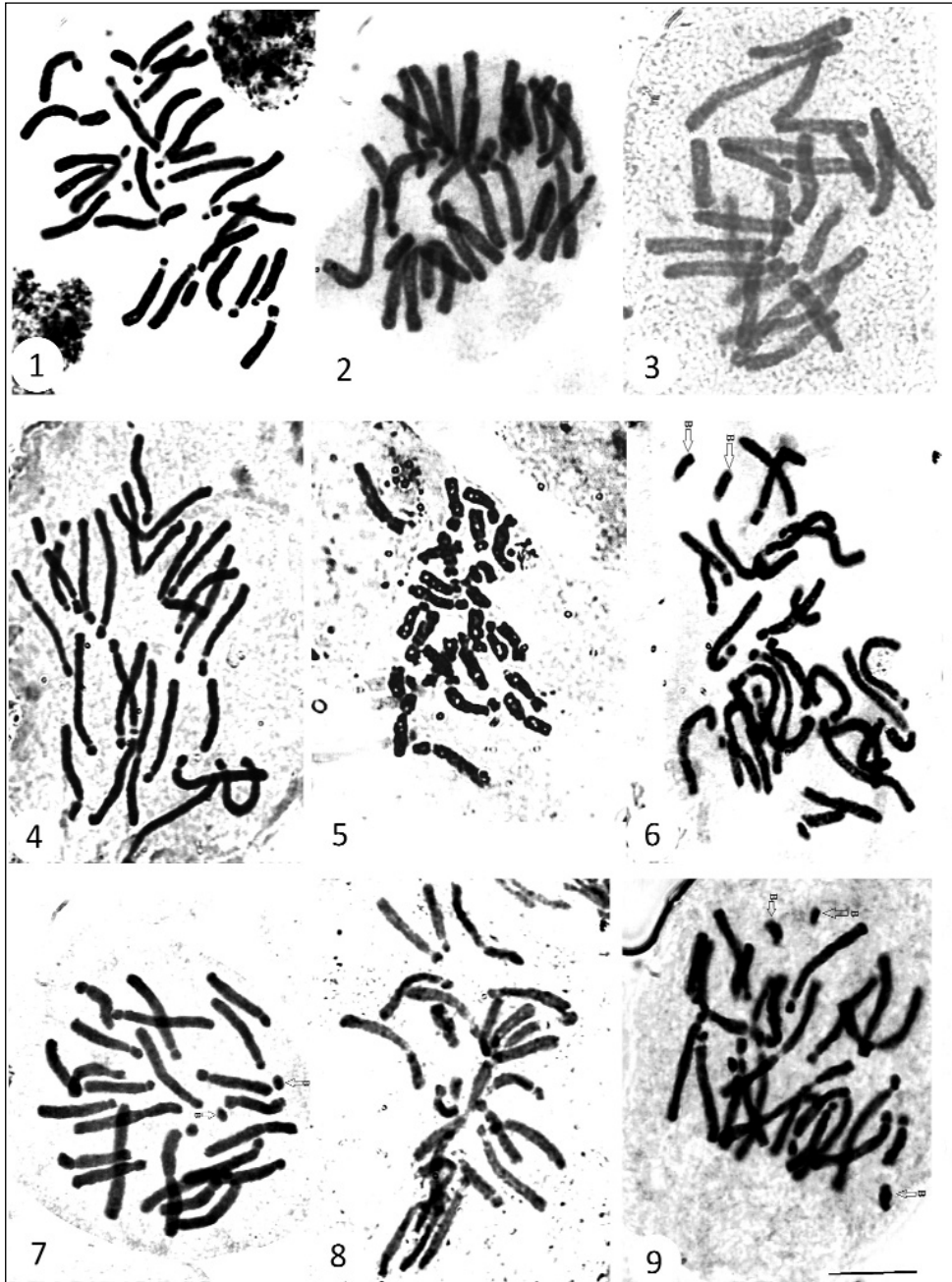
Tu: **Şanlıurfa:** Siverek, İleri village, 1277 m, 25 Apr 2007, *U. Rastgeldi 6301* (ISTE).

The chromosome number of the species was reported previously as $n = 12$ (La Cour 1978, 1978a) and $2n = 24$ (Khaniki 1997, 2002; Özhatay 2002; Kamari & al. 2004).

1834. *Fritillaria pinardii* Boiss. — $2n = 2x = 24 + 0-5B$ (Figs 14 & 15).

Tu: **Adıyaman:** Esence village, 1349 m, 19 Apr 2008, *M. Koçyiğit, U. Rastgeldi 0209* (ISTE). – Fig. 14.

— **Adıyaman:** Yazıbaşı village, Ulubaba Mountain, Körte Kas field, 1900 m, 24 Aug 2008, *U. Rastgeldi 0211* (ISTE). – Fig. 15.



Figs. 1-9. Microphotographs of root tip mitosis of *Fritillaria* taxa: 1. *F. amana*; 2. *F. armena*; 3. *F. aurea*; 4. *F. crassifolia* subsp. *crassifolia*; 5. *F. crassifolia* subsp. *kurdica*; 6. *F. imperialis* (Pop. 0206); 7. *F. imperialis* (Pop. 2101); 8. *F. imperialis* (Pop. 2102); 9. *F. imperialis* (Pop. 2103). – Arrows indicate B-chromosomes. Scale bar = 10 μ m.

The chromosome number of the species was reported previously as $n = 12$ (La Cour 1978, 1978a) and $2n = 24$ (Zonneveld 2010).

1835. *Fritillaria uva-vulpis* Rix — $2n = 3x = 36$ (Fig. 16).

Tu: Şırnak: Cumhuriyet field, 1600 m, 24 May 2007, *U. Rastgeldi* 7301 (ISTE).

The chromosome number of the species was reported previously as $2n = 24$ (Khaniki 2002).

1836. *Fritillaria viridiflora* Post — $2n = 2x = 24$ (Fig. 17).

Tu: Gaziantep: İslahiye, Katran Mountain, 470 m, 19 Apr 2007, *U. Rastgeldi* 2701 (ISTE).

The chromosome number of the species has been counted for the first time.

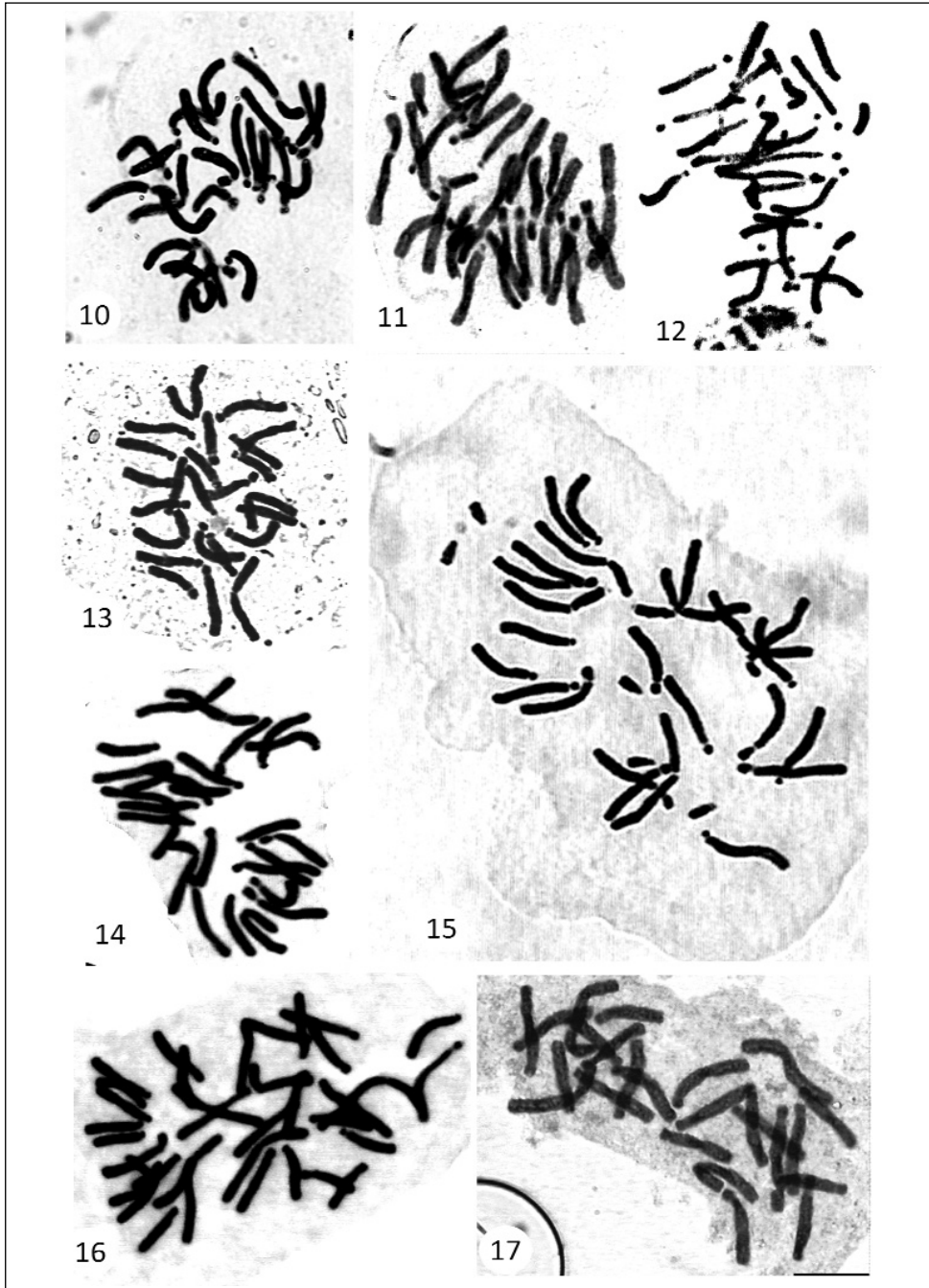
Although the chromosomes of *Liliaceae* have diversity in size, number and structure, the chromosome numbers of *Fritillaria* are larger and morphologically more stable than in other genera (Peruzzi & al. 2009). The karyology of *Fritillaria* has been studied by several researchers with reported chromosome numbers of $n = 9, 12, 13$ (Noda 1975; La Cour 1978, 1978a; Kamari 1991; Khaniki 1997; Özhatay 2002; Kamari & Phitos 2006; Tekşen & Aytaç 2008; Zonneveld 2010). Except for *F. imperialis*, karyomorphological data are completely lacking in Turkish *Fritillaria*, this study has completed the deficiency for the ten taxa.

The karyotypes are generally different in their chromosomal characteristics although the chromosome types are similar to each other. Mostly the first two or three chromosome pairs are metacentric (m), metacentric/submetacentric (m/sm) or submetacentric (sm), additionally all the other pairs are subtelo-centric (at) or acrocentric (a) and they characterize the karyotype of the genus *Fritillaria*.

The basic chromosome numbers (the most frequently $x=12$) are mostly well-defined within *Fritillaria* genus, and our results agree with previous investigations.

The shortest chromosome pair (7.5 μm) was measured in *F. imperialis* from Adıyaman, Doğanlı village (0206) and the longest, (25.2 μm) in *F. amana*. *F. persica* had the greatest arm ratio of 13.07 and *F. aurea* had the smallest arm ratio of 1.08. The centromeric index of *F. persica* had the smallest index value of 7.11 and *F. aurea* had the largest index value of 48.10. *F. imperialis* from Adıyaman, Doğanlı village (0206) had the shortest total haploid complement length of 114.25 μm , whereas, *F. amana* had the longest one 225.42 μm . All the studied material by us was diploid ($2n = 24$ or 26), with the exception of *F. uva-vulpis*, which was a triploid ($2n = 3x = 36$).

Two populations (0206 and 2103) of *F. imperialis* and two subspecies of *F. crassifolia* presented a secondary constrictions on the long arm of the submetacentric (sm) and subtelo-centric (st) chromosome pairs.



Figs 10-17. Microphotographs of root tip mitosis of *Fritillaria* taxa: **10.** *F. minuta* (Pop. 4602); **11.** *F. minuta* (Pop. 5601); **12.** *F. minuta* (Pop. 5604); **13.** *F. persica*; **14.** *F. pinardii* (Pop. 0209); **15.** *F. pinardii* (Pop. 0211); **16.** *F. uva-vulpis*; **17.** *F. viridiflora*. – Scale bar = 10 μ m.

The satellite in one acrocentric chromosome pair of *F. amana* is small and spherical.

Three populations (0206, 2101 and 2103) of *F. imperialis* and one population of *F. pinardii* possessed the B-chromosomes.

References

- Chatterjee, A. 1971: Cytogenetical investigation on a few Himalayan species of *Fritillaria*. – J. Cytol. Genet. **6**: 117-122.
- Kamari, G. 1991: The genus *Fritillaria* L. in Greece: Taxonomy and karyology. – Bot. Chron. **10**: 253-270.
- Bareka, P., Constantinidis, Th. & Phitos, D. 2004: Karyosystematic studies of plant taxa from the east Mediterranean region (Greece, Cyprus, Syria). – Phytol. Balc. **9(3)**: 487-502.
- & Phitos, D. 2006: Karyosystematic study of *Fritillaria messanensis* s.l. (*Liliaceae*). – Willdenowia **36**: 217-233.
- Khaniki, G.B. 1997: Karyomorphological studies on *Fritillaria persica*. – Phytomorphology **47**: 27-44.
- 2002: Chromosome number of *Fritillaria* subgenera *Petilium* and *Theresia* (*Liliaceae*). – Nucleus (Calcutta) **45**: 6-11.
- La Cour, L.F. 1978: Two types of constitutive heterochromatin in the chromosomes of some *Fritillaria* species. – Chromosoma **67**: 67-75.
- 1978a: Notes and comments Differential giemsa staining of b chromosomes of *Fritillaria tenella*. – Heredity **41**: 101-103.
- Noda, S. 1975: Achiasmatic meiosis in the *Fritillaria Japonica* group I. Different modes of bivalent formation in the two sex mother cells. – Heredity **34**: 373-380.
- Özhatay, N. 2002: Diversity of bulbous monocots in Turkey with special reference. Chromosome numbers. – Pure Appl. Chem., **74**: 547-555.
- Pandita, T.K. 1979: Cytological investigations of some monocots of Kashmir. – Ph.D. Thesis, Chandigarh.
- Peruzzi, L., Leitch, I.J. & Caparelli, K.F. 2009: Chromosome diversity and evolution in *Liliaceae*. – Ann. Bot. **103**: 459-475.
- Tekşen, M. & Aytaç, Z. 2008: *Fritillaria mughlae* (*Liliaceae*), a new species from Turkey. – Ann. Bot. Fennici **45**: 141-147.
- Zonneveld, B.J.M. 2010: New Record Holders for Maximum Genome Size in Eudicots and Monocots. – Journal of Botany, doi:10.1155/2010/527357.

Addresses of the authors:

Mine Koçyiğit¹, Neriman Özhatay¹, Ufuk Rastgeldi² & Erdal Kaya³,

¹Department of Pharmaceutical Botany, Faculty of Pharmacy, İstanbul University, Beyazıt 34452, Beyazıt/İstanbul, Turkey. E-mails: minekocyigit@hotmail.com; nozhatay@istanbul.edu.tr

²GAP Agricultural Research Institute, Sanlıurfa/Turkey. E-mail: ufukrastgeldi@hotmail.com

³Department of Ornamental Plant Breeding and Agronomy, Atatürk Central Horticultural Research Institute, Yalova, Turkey. E-mail: erdal_kaya@msn.com

Reports (1837) by E. Di Gristina, G. Domina & A. Geraci

1837. *Hieracium pallidum* subsp. *aetnense* Gottschl., Raimondo & Di Grist. — $2n = 4x = 36$ (Fig. 1).

Si: Mt. Etna, Mt. Pomiciaro, Zafferana Etnea (Catania), 37° 42' 49,36" N, 15° 03' 41,24" E, volcanic soil, on the clearings of scrubland, 1610 m a.s.l., 27 Jun 2012, E. Di Gristina s.n. (PAL).

Hieracium pallidum subsp. *aetnense* (*Asteraceae*) is an endemic subspecies recently discovered in Sicily (Gottschlich & al. 2013). This taxon is a scapose hemicryptophyte flowering in June-July, exclusive to the Mt Etna (NE-Sicily) (Gottschlich & al. 2013). Regarding to the taxonomic relationships *H. pallidum* subsp. *aetnense* belongs to the new *H.* sect. *Grovesiana* Gottschl. (Gottschlich 2009a). The Italian endemic *H. grovesianum* Belli is the most representative taxon of the section. It is a variable species and occurs in the whole Apennine range, with centre of diversity in the Central and North Apennine (Gottschlich & al. 2013). Hybridisation processes of *H. grovesianum* and *H. racemosum* Willd. with other local taxa have apparently resulted in a complex of similar morphotypes, which have recently been grouped together in *H.* sect. *Grovesiana* (Gottschlich 2009a-c, 2011).

The chromosome number $2n = 4x = 36$ reported here, obtained by the observation of 30 metaphase plates of 10 individuals, represents the first record for *H. pallidum* subsp. *aet-*

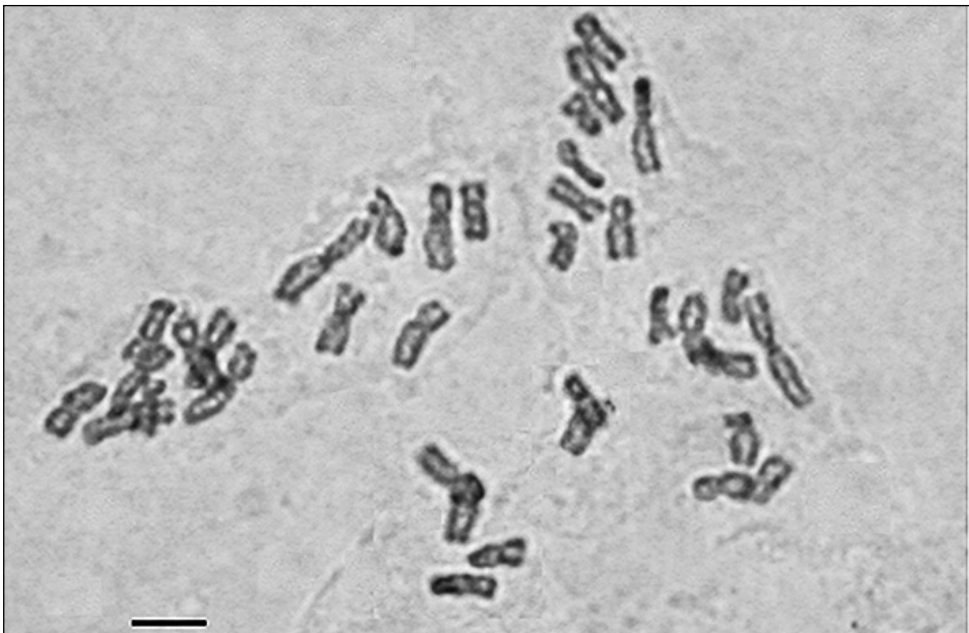


Fig. 1. Microphotograph of mitotic metaphase plate of *Hieracium pallidum* subsp. *aetnense*, $2n = 4x = 36$. – Scale bar = 5 μ m.

nense. The tetraploid number coincides with the data obtained for *H. pallidum* Biv. by Brullo & al. (2004) and Di Gristina & al. (2005) and, among of the *H.* sect. *Grovesina*, it adds to the hitherto known triploid number ($2n = 3x = 27$) reported by Selvi & Fiorini (1997) for *H. grovesianum*.

References

- Brullo, S., Campo, G. & Romano, S. 2004: Indagini citotassonomiche sul genere *Hieracium* L. (*Asteraceae*) in Sicilia. – *Inform. Bot. Ital.* **36**: 481-485.
- Di Gristina, E., Geraci, A. & Raimondo, F.M., 2005: Osservazioni citotassonomiche su popolazioni siciliane afferenti a *Hieracium pallidum* (*Asteraceae*). – *Inform. Bot. Ital.* **37**: 26-27.
- Gottschlich, G. 2009a: Die Gattung *Hieracium* L. (*Compositae*) in der Region Abruzzen (Italien). Eine floristisch-taxonomische Studie. – *Stapfia* **89**: 1-328.
- 2009b: *Hieracium boreoapenninum* Gottschl., a new species from the Northern Apennine (Italy). – *Webbia* **64**: 3-7.
- 2009c: New species of the genus *Hieracium* L. (*Compositae*) from the Northern Apennine (Italy). – *Webbia* **64**: 175-186.
- 2011: New taxa of *Hieracium* L. and *Pilosella* Vaill. (*Compositae*) from the Central Apennine (region of Marche incl. Umbrian and Latio parts of Monti Sibillini, Italy). (Revisions of italian *Hieracium* collections VII.). – *Webbia* **66**: 195-230.
- , Raimondo, F.M. & Di Gristina, E. 2013: *Hieracium pallidum* subsp. *aetnense* (*Asteraceae*), a new subspecies from Sicily (Italy), with notes on the taxonomy of *H. pallidum* Biv. – *Pl. Biosyst.* **147**(3): 826-831.
- Selvi, F. & Fiorini, G. 1997(1996): Karyology of *Hieracium* L. subg. *Hieracium* (*Asteraceae*) from Mount Amiata (Central Italy). – *Caryologia* **49**(3-4): 287-299.

Addresses of the authors:

Emilio Di Gristina¹, Giannantonio Domina² & Anna Geraci¹

¹Dipartimento STEBICEF, Sezione di Botanica ed Ecologia Vegetale, Università degli Studi di Palermo, via Archirafi 38, 90123 Palermo, Italy.

E-mail: emilio.digristina@unipa.it

²Dipartimento Scienze Agrarie e Forestali, Università degli Studi di Palermo, via Archirafi 38, 90123 Palermo, Italy. E-mail: giannantonio.domina@unipa.it

Reports (1838-1839) by A. Troia, G. Domina & V. Spadaro

1838. *Bellevalia dolichophylla* Brullo & Miniss. — $2n = 4x = 16$ (Fig. 1).

Tn: Zembra island, Cap Grosso, 37° 08' 26" N, 10° 48' 15" E, 90 m a.s.l., 27 Jun 2012, G. Domina s.n. (PAL).

Bellevalia dolichophylla, described by Brullo & Minissale (1997) from Cap Bon (NE Tunisia), where it is very rare (Brullo & al. 2009), appears to be endemic to

Tunisia where it occurs also in the island of Zembra (Domina & El Mokni 2012, Domina & Jaouadi 2013). Here we confirm the chromosome number, already reported for the population of the *locus classicus* (Brullo & Minissale 1997), also in the island population of Zembra.

Dobignard & Chatelain (2013), and also Le Floc'h & al. (2010) dubitatively, consider *B. dolichophylla* synonym of *B. dubia* (Guss.) Schult. & Schult. f., which, however, is a diploid with $2n = 8$, as ascertained in the several different subspecies (Bothmer & Wendelbo 1981, Bareka & al. 2008, Borzatti & al. 2013). Further studies are underway to verify the taxonomic relationships within this group.

1839. *Leopoldia maritima* (Desf.) Parl. — $2n = 2x = 18$ (Fig. 2).

Tn: Cap Bon Region, Korba Lagoon, 36° 38' 00" N, 10° 54' 21" E, 2 m a.s.l., 25 Apr 2010, G. Domina s.n. (PAL).

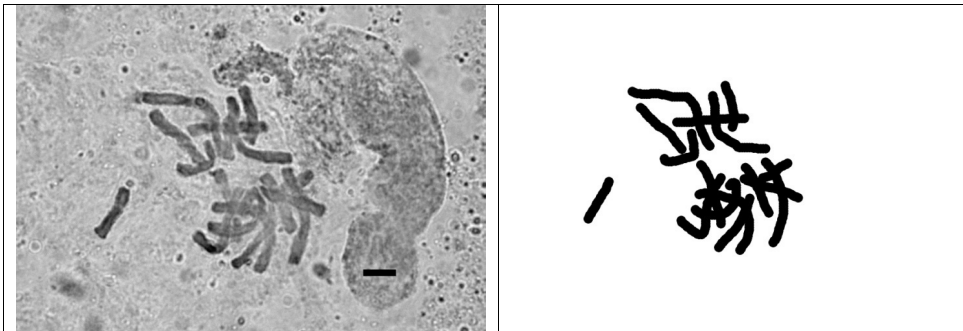


Fig. 1. Mitotic metaphase plate (microphotograph and drawing) of *Bellevalia dolichophylla*, $2n = 16$. – Scale bar = 5 μ m.

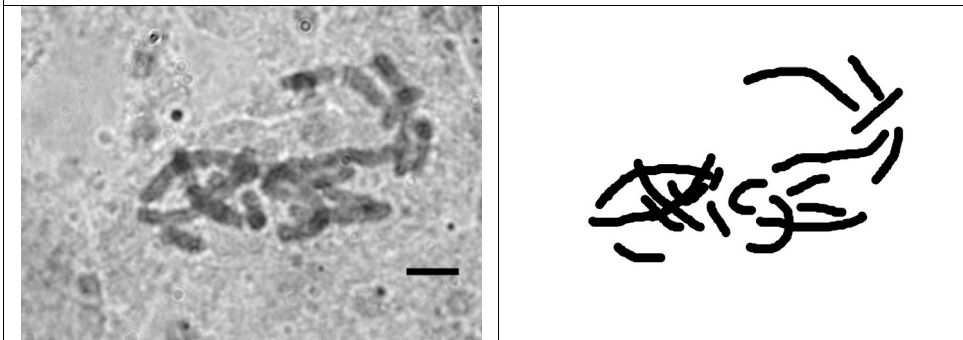


Fig. 2. Mitotic metaphase plate (microphotograph and drawing) of *Leopoldia maritima*, $2n = 18$. – Scale bar = 5 μ m.

Leopoldia maritima occurs on the southern coasts of the Mediterranean Basin, from Morocco to Lebanon (Euro+Med 2006-2014). The chromosome number $2n = 18$ found here is in accordance with the only previous count we were able to find, made on cultivated plants of unspecified origin (Garbari & Di Martino 1972).

References

- Bareka, P., Phitos, D. & Kamari, G. 2008: A karyosystematic study of the genus *Bellevalia* Lapeyr. (*Hyacinthaceae*) in Greece. – Bot. J. Linn. Soc. **157**: 723-739. doi: 10.1111/j.1095-8339.2008.00817.x
- Borzatti Von Loewenstern, A., Giordani, T., Astuti, G., Andreucci, A. & Peruzzi, L. 2013: Phylogenetic relationships of Italian *Bellevalia* species (*Asparagaceae*), inferred from morphology, karyology and molecular systematics. – Pl. Biosyst. **147**: 776-787. doi: 10.1080/11263504.2013.829884
- Bothmer, R. v. & Wendelbo, P. 1981: Cytological and morphological variation in *Bellevalia*. – Nordic J. Bot. **1**: 4-11.
- Brullo, S. & Minissale, P. 1997: *Bellevalia dolichophylla* (*Liliaceae*), a new species from Tunisia. – *Bocconea* **5**: 749-754.
- Brullo, C., Brullo, S. & Pasta, S. 2009: *Bellevalia pelagica* (*Hyacinthaceae*), a new species from the islet of Lampione (Pelagian Archipelago, Sicily). – Edinburgh J. Bot. **66**: 65-75. doi: 10.1017/S0960428609005265
- Dobignard, A. & Chatelain, C. 2013: Index synonymique de la flore d'Afrique du nord, **5**. – Genève.
- Domina, G. & El Mokni, R. 2012: Suivi floristique de l'archipel de Zembra et Zembretta (Tunisie), Note naturaliste PIM. – Aix-en-Provence.
- & Jaouadi, W. 2013: Suivi floristique de l'archipel de Zembra (Tunisie), Note naturaliste PIM. – Aix-en-Provence.
- Euro+Med (2006-2014): Euro+Med PlantBase - the information resource for Euro-Mediterranean plant diversity. – Published on the Internet <http://ww2.bgbm.org/EuroPlusMed/> [accessed 28 Nov 2014].
- Garbari, F. & Di Martino, A. 1972: *Leopoldia gussonei* Parl. (*Liliaceae*), specie endemica siciliana. – *Webbia* **27**: 289-297.
- Le Floc'h, E., Boulos, L. & Vêla, E. 2010: Catalogue synonymique commenté de la flore de Tunisie. – Tunis.

Addresses of the authors:

Angelo Troia¹, Gianniantonio Domina² & Vivienne Spadaro¹,

¹Dipartimento STEBICEF, Sezione di Botanica ed Ecologia Vegetale, Università degli Studi di Palermo, via Archirafi 38, 90123 Palermo, Italy. E-mail: angelo.troia@unipa.it; vivienne.spadaro@unipa.it

²Dipartimento di Scienze Agrarie e Forestali, Università degli Studi di Palermo, via Archirafi 38, 90123 Palermo, Italy. E-mail: gianniantonio.domina@unipa.it

Reports (1840-1844) by Ch. Kyriakopoulos, P. Bareka & G. Kamari**1840. *Bubon arachnoideum* (Boiss. & Orph.) Hand. — $2n = 22$ (Fig. 1a).**

Gr: Peloponnisos, Mt. Taigetos, at the gorge Langada, 37° 05' N, 22° 19' E, alt. 600 m, 5 Aug 2012, *Ch. Kyriakopoulos* s.n., cult. no 33 (UPA).

Bubon arachnoideum (Boiss. & Orph.) Hand (\equiv *Athamanta arachnoidea* Boiss. & Orph.) is an endemic species of S & SE Peloponnisos, which occurs mostly at the lower altitudinal range of Mts Taigetos, Parnon and the southernmost Mts Korakia and Koulochera of Zarakas range (Kalpoutzakis & al. 2009).

Tan & Iatrou (2001) recorded the chromosome number $2n = 22$. This record is confirmed by the present study and additionally the karyotype morphology is given to our knowledge for the first time (Fig. 1a). The karyotype is symmetrical, with mostly submetacentric (sm) chromosomes varying in size from 5.2 to 2.4 μm .

The same chromosome number, $2n = 22$, is also given for other species of the genus.

1841. *Centaurea subsericans* Halácsy — $2n = 4x = 36$ (Fig. 1b).

Gr: Peloponnisos, Nomos Messinias, Mt. Taigetos, at the summit area of Neraidovouna, at the place named Malameikes korites, west forming limestone slopes, in petrosis, 37° 2.803' N, 22° 18.545' E, alt. 1700 m, 13 Jul 2012, *Ch. Kyriakopoulos & E. Kartsonas*, 1205, cult no 2 (UPA).

— Peloponnisos, Nomos Lakonias, Mt. Taigetos, northern ridge, summit Tsouga, at the place Neraidovrachos, 37° 05' N, 22° 18' E, alt. 1600-1700 m, 31 Jul 2012, *Ch. Kyriakopoulos* 1292, cult. no 4, 29 (UPA). – Fig.1b.

— Peloponnisos, Nomos Lakonias, Mt. Taigetos, at the summit area of Neraidovouna, ad loco Paximadi, 37° 02.554' N, 22° 19.036' E, alt. 1950 m, 15 Jun 2012, *Ch. Kyriakopoulos* 1029 (UPA).

Centaurea subsericans is an endemic species, which was firstly collected by Heldreich from Mt. Pateras (Sterea Ellas), in 1878 ($=C. parlatoris$ Heldr.). The taxon was described by Halácsy (1912) and the type description was based on a Tounta's specimen (*Tuntas* 848/1910, W, WU) from the same mountain (Gamal-Eldin & Wagenitz 1991). *C. subsericans* belong to *Centaurea* sect. *Acrolophus* and grows in petrosis, limenstone, open slopes or ringes. Until 2006, the taxon was known only from two mountains of Sterea Ellas (Pateras, Helikon), where it was discovered on the Mts Zarakas and Chionovouni (SE Peloponnisos) (Kalpoutzakis & Constantinidis 2006). In 2012 the first author of the present study discovered *C. subsericans* at the summit area of Neraidovouna, of Mt. Taigetos.

According to Constantinidis & Kalpoutzakis (2009) the taxon is morphologically similar to *C. pseudocadmea* Wagenitz, which, however, belongs to the sect. *Phalolepis*, but its geographical distribution on Mt. Kithaeron (Sterea Ellas) and Mts Gaidorovouni and

Chionovouni (SE Peloponnisos) is almost overlapped. One of the most important differences among the two species was considered that *C. subsericans* was diploid with $2n = 2x = 18$ chromosomes (Constantinidis & al. 1997) while *C. pseudocadmea* tetraploid $2n = 4x = 36$ (Constantinidis & Kamari 1994).

However, Trigas & al. (2008) counted tetraploid karyotypes also in *C. subsericans* in material from Mt. Pateras and Constantinidis & Kalpoutzakis (2009) diploid karyotypes in *C. pseudocadmea* from SE Peloponnisos.

Our results, the first from Peloponnisos (Mt. Taigetos), confirm that in *C. subsericans* both diploid and tetraploid karyotypes occur. This phenomenon is also happening in some other *Centaurea* taxa like *C. subciliaris* Boiss. & Heldr. s.l., *C. attica* subsp. *megarensis* (Halácsy & Hayek) Dostál etc., even in the same population.

1842. *Crepis heldreichiana* (Kuntze) Greuter — $2n = 10x = 40$ (Fig. 1c).

Gr: Peloponnisos, Mt. Taigetos, on the trace between the places Plakes to Portes, $36^{\circ} 57.457' N$, $22^{\circ} 21.134' E$, alt. 2200 m, 1 Oct 2010, *Kyriakopoulos 821*, cult. no *TCH* (UPA).

Crepis heldreichiana is an endemic species of S Peloponnisos, which occurs on the higher altitudes of the two main mountains, Taigetos and Parnonas.

Babcock (1947a, b), the main investigator of the genus *Crepis*, counted the chromosome number $2n = 41$, while Iatrou (1986) and Kamari (1992) refer $2n = 40$. The latter author, using additionally C-banding technique, substantiate that the species is decaploid and polyploid, with $2n = 10x = 40$ chromosomes.

Our result from a new subpopulation of Mt. Taigetos is in accordance to the previous references, with $2n = 10x = 40$ chromosomes (Fig. 1c).

1843. *Rindera graeca* (A. DC.) Boiss & Heldr. — $2n = 24$ (Fig. 1d).

Gr: Peloponnisos, Mt. Taigetos, on the trace between the places Mouzia to Ai-Giorgi, $36^{\circ} 56' N$, $22^{\circ} 21' E$, alt. 2000 m, 19 Jul 2008, *Ch. Kyriakopoulos* s.n., cult. no *T223* (UPA).

Rindera graeca is a mountain endemic species growing from Peloponnisos (Taigetos, Parnon, Chelmos and Kyllini), Sterea Ellas (Mts Bardousia, Giona, Parnassos and Mts Kitheron), Evia (Mt. Dirphis), towards N Pindos (Mt. Timfi) on the higher altitudes of them (Gustavsson 1978, Strid 1991).

Our count of $2n = 24$ chromosomes agree with the results given by Gustavsson (1978) from Mt. Bardousia and by Constantinidis & Kamari (1994) on material from Mt. Kitheron. The latter authors also given the karyotype formula, as well as the presence of two B-chromosomes ($2n = 24 + 0-2B$).

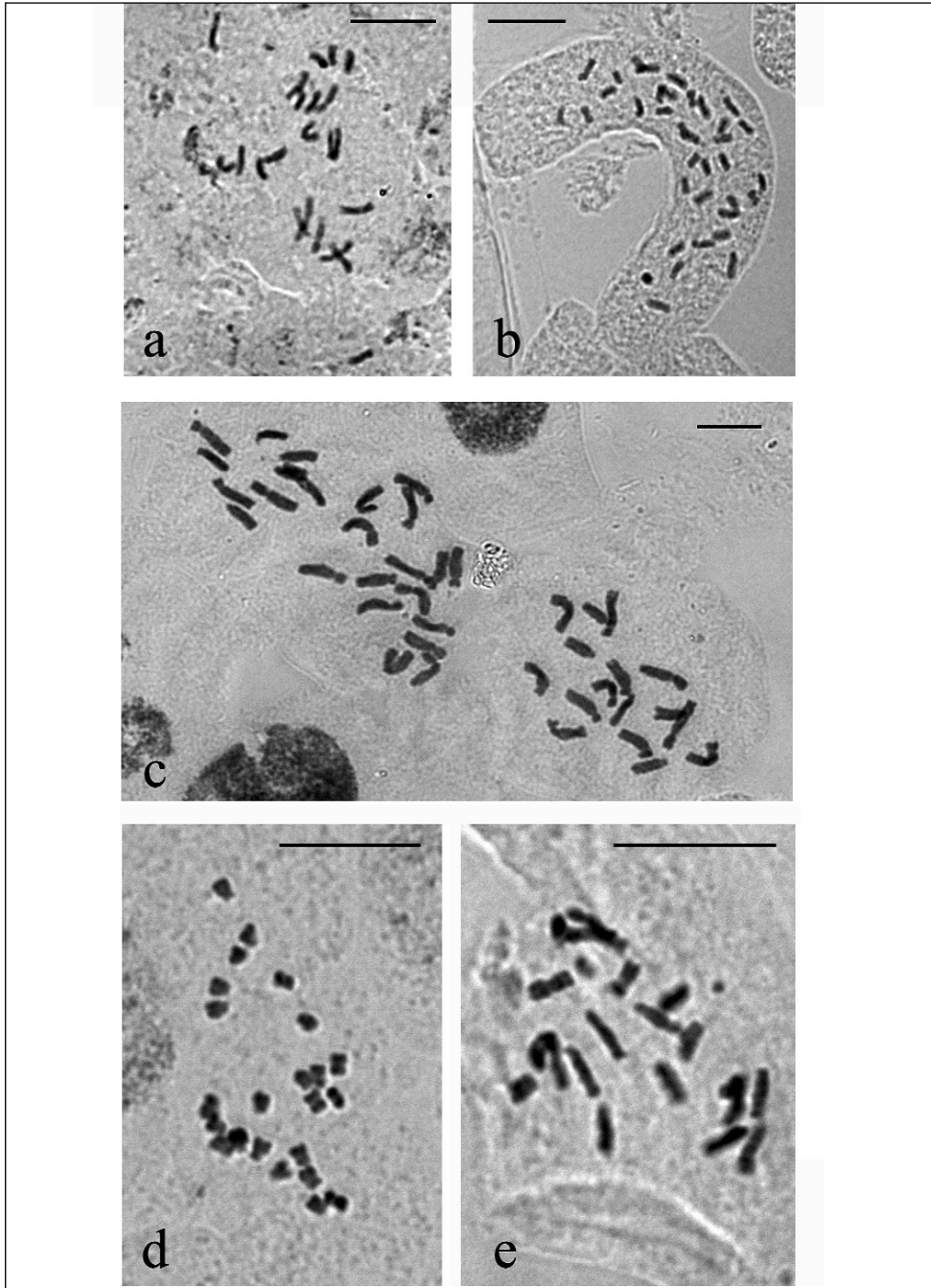


Fig. 1. Microphotograph of mitotic metaphase plates of: **a.** *Bubon arachnoideum*, $2n = 22$; **b.** *Centaurea subsericans*, $2n = 4x = 36$; **c.** *Crepis heldreichiana*, $2n = 10x = 40$; **d.** *Rindera graeca*, $2n = 24$; **e.** *Scaligeria moreana*, $2n = 20 + 0-2B$. – Scale bars = 10 μm .

1844. *Scaligeria moreana* Engstrand — $2n = 20 + 0-2B$ (Fig. 1e).

Gr: Peloponnisos, Mt. Taigetos, at the gorge Langada, 37° 05' N, 22° 19' E, alt. 650 m, 18 Jun 2011, *Ch. Kyriakopoulos 854*, cult. no *TSM* (UPA).

Scaligeria DC. is a widespread genus with c.15 species, some of which now are separated in different genera, like *Eleosticta* Fenzl, in which four species are included (Degtjareva & al. 2009). The genus *Scaligeria* s.l. is distributed from SW Balkan Peninsula, Greece, Turkey, Cyprus, eastwards to Syria, Lebanon, Israel and Jordan.

The genus *Scaligeria* is represented in Greece by three species: the endemic *S. moreana* Engstrand in Peloponnisos and in the island Kephallonia; *S. halophila* (Rech. f.) Rech. f., endemic of the S Aegean area; and *S. napiformis* (Spreng.) Grande [= *S. cretica* (Mill.) Boiss.] with a wide geographical distribution. Recently, was described by Hand & al. (2012) a new local endemic species from Cyprus, *S. alziarii* Hand, Hadjik. & Zetsche.

The chromosome number $2n = 20$ was also given for the species *S. halophila* on material from Greece (Engstrand 1970) and for *S. napiformis* from Cyprus (Vogt & Aparicio 1999). Additionally, Pimenov & al. (1998) referred the number $2n = 22$ for *S. napiformis* in material from Turkey. No count was recorded, so far, for *S. moreana*.

To our knowledge the chromosome number $2n = 20 + 0-2B$ and the karyotype of *S. moreana* (Fig. 1e) is given here for the first time.

References

- Babcock, E. B. 1947a: The genus *Crepis*. Part one. – Berkeley, Los Angeles: Univ. California Publ., Bot. **21**: 1-197.
- 1947b: The genus *Crepis*. Part two. Systematic Treatment. – Berkeley, Los Angeles: Univ. California Publ., Bot. **22**: 199-1030 + 36 plates.
- Constantinidis, Th. & Kalpoutzakis, E. 2009: *Centaurea pseudocadmea* Wagenitz. – Pp. 244-246 in: Phitos, D., Constantinidis, Th. & Kamari, G. (eds), The Red Data Book of Rare and Threatened Plants of Greece, **1(A-D)**. – Patra.
- & Kamari, G. 1994: Reports (Nos. 377-386). [In Kamari, G. Felber, F. & Garbari, F. (eds), Mediterranean Chromosome Number Reports - 4]. – Fl. Medit. **4**: 290-295.
- , — & Phitos, D. 1997: A cytological study of 28 phanerogams from the mountains of SE Sterea Ellas, Greece. – Willdenowia **27**: 121-142.
- Degtjareva, G.V., Kljuykov, E. V., Samigullin, T. H., Valiejo-Roman, C. M. & Pimenov, M. G. 2009: Molecular appraisal of *Bunium* and some related arid and subarid geophilic *Apiaceae-Apioideae* taxa of the ancient Mediterranean. – Bot. J. Linn. Soc. **160**: 149-170.
- Engstrand, L. 1970: The European species of *Scaligeria* (*Umbelliferae*). – Bot. Not. **123**: 505-511.
- Gamal-Eldin, E. & Wagenitz, G. 1991: *Centaurea* L. – Pp. 488-524 in Strid, A. & Tan, K. (eds), Mountain Flora of Greece, **2**. – Edinburgh Univ. Press, Edinburgh.
- Gustavsson, L. Å. 1978: Floristic reports from the high mountains of Sterea Ellas, Greece 1. – Bot. Not. **131**: 7-25.
- Halácsy, E. de 1912: Supplementum secundum conspectus florae graecae. – Magyar botanikai lapok Budapest **11**: 114-202.
- Hand, R., Hadjikyriakou, G. & Zetsche, H. 2012: *Scaligeria alziarii* (*Apiaceae*), a new sibling species of *S. napiformis* from Cyprus. – Willdenowia **42**: 199-207.
- Iatroù, Gr. 1986: Contribution to the study of the Endemic Flora of Peloponessos. – PhD Thesis,

- University of Patras, Greece (in Greek with an English summary).
- Kalpoutzakis, E. & Constantinidis, Th. 2006: Additions and annotations to the flora of Peloponnisos (S Greece). – *Willdenowia* **36**: 271-284.
- , Kyriakopoulos, Ch. & Constantinidis, Th. 2009: *Athamanta arachnoidea* Boiss. & Orph. – Pp. 140-143 in: Phitos, D., Constantinidis, Th. & Kamari, G. (eds), *The Red Data Book of Rare and Threatened Plants of Greece*, **1(A-D)**. – Patras.
- Kamari, G. 1992: Karyosystematic studies on three *Crepis* species (*Asteraceae*) endemic to Greece. – *Pl. Syst. Evol.* **182**: 1-19.
- Pimenov, M. G., Alexeeva, T. V. & Kljuykov, E. V. 1998: Reports (905-935). [In: Kamari, G., Felber, F. & Garbari, F. (eds), *Mediterranean chromosome number reports - 8*]. – *Fl. Medit.* **8**: 221-245.
- Strid, A. 1991: *Rindera* Pallas. – P. 65 in: Strid, A. & Tan, K. (eds), *Mountain flora of Greece*, **2**. – Edinburgh.
- Tan, K. & Iatrou, G. 2001: *Endemic Plants of Greece: The Peloponnese*. – København.
- Trigas, P., Constantinidis, Th. & Touloumenidou, T. 2008: A new hexaploid species of *Centaurea* (sect. *Acrolophus*, Compositae: *Cardueae*) from Evvia island, Greece. – *Bot. J. Linn. Soc.* **158(4)**: 762-774.
- Vogt, R. & Aparicio, A. 1999: Chromosome numbers of plants collected during Iter Mediterraneum IV in Cyprus. – *Bocconea* **11**: 117-169.

Adresses of the authors:

Charalambos Kyriakopoulos¹, Pepy Bareka² & Georgia Kamari¹,

¹Botanical Institute, Section of Plant Biology, Department of Biology, University of Patras, 265 00, Patras, Hellas (Greece). E-mails: hakyri@yahoo.gr; kamari@upatras.gr

²Laboratory of Systematic Botany, Faculty of Crop Science, Agricultural University of Athens, Iera Odos 75, 118 55 Athens, Greece. E-mail: bareka@aau.gr

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