Mediterranean chromosome number reports — 11

edited by G. Kamari, C. Blanché & F. Garbari

Abstract

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This is the eleventh 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 51 taxa: *Symphytum* from Italy and Sicily, by S. Bottega, F. Garbari & L. Peruzzi (Nos.1227-1231); *Hypericum* from Italy, by D. Ciccarelli, F. Garbari & P. Mártonfi (No.1232); *Genista* from Sardinia, by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & G. Bacchetta (Nos. 1233-1234); *Genista* from Balearic Islands, by T. Cusma Velari, L. Feoli Chiapella & M. Vicens Fornés (No.1235); *Bellevalia, Gagea, Gladiolus, Hedysarum, Hyoscyamus, Reichardia* and *Muscari* from Greece, by M. Kapasa, Th. Nikolaidi, E.-P. Bareka & G. Kamari (Nos.1236-1243); *Melilotus, Biserrula* and *Hippocrepis* from Bulgaria, by D. Pavlova & A. Tocheva (Nos.1244-1247); *Geranium* from Bulgaria, by A. Petrova & P. Stanimirova (Nos.1248-1253); *Hypochoeris, Notobasis, Aegilops, Malva, Vincetoxicum, Ranunculus, Allium, Callitriche* and *Lavatera* from Morocco, Italy and Sicily, by C. Serra, B. Valdés, R. Marcucci & N. Tornadore (Nos.1254-1263); *Centaurea, Linaria, Mentha, Senecio, Brassica* and *Dianthus* from Italy, by M. A. Signorini, B. Foggi & B. Mori (Nos.1264-1270); *Hieracium* from Bulgaria, by V. Vladimirov & Z. Szeląg (Nos. 1271-1277).

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Reports (1227-1231) by Stefania Bottega, Fabio Garbari & Lorenzo Peruzzi

1227. ***Symphytum bulbosum*** Schimp. — $2n = 104$ (Figs. 1A-B).

It: Tuscany, Cascine Park of Florence (FI), in shady habitats, 43°47'N, 11°13'E, 17 Apr 1999, *Bottega & Peruzzi 346/1999* (*cult.* Hort. Bot. Pisa).

The species is quite common in Southern Europe with few naturalized stations in Austria, England and Germany (Stearn 1986).

Previous chromosome number reports are $2n = 41$ (Tarnavschi 1935), $2n \approx 72$ (Strey 1931), $2n = 84$ (Grau 1971), $2n = 120$ (Gadella & Kliphuis 1978). Our present count $2n = 104$ is reported for the first time. Due to the chromosome size (1.0 – 2.0 μm), the karyotype characters can not be represented.

1228. ***Symphytum tuberosum*** L. subsp. ***angustifolium*** (Kern.) Nyman — $2n = 120$ (Figs. 1C-D).

It: Tuscany, Monte Senario (FI), in shady and wet habitats, 43°53'N, 11°20'E, 22 May 1999, *Bottega & Peruzzi 404/1999* (*cult.* Hort. Bot. Pisa).

According to Stearn (1986) these taxon is distributed in Southern, Central and Eastern Europe. Widespread in Continental Italy, it lacks in Sardinia and Sicily.

The chromosome number $2n = 120$ supports the previous record of Jaarsma & al. (1990). Also for these unit the karyotype characters can not be detectable.

1229. ***Symphytum gussonei*** Schultz — $2n = 96$ (Figs. 1E-F).

Si: Vallone Cerasa, Mezzojuso (Province of Palermo), c. 300 m, 37°51'N, 13°27'E, 28 Mar 2000, *Bottega 167/2000* (*cult.* Hort. Bot. Pisa).

S. gussonei is considered endemic of Sicily, linked to *S. tuberosum* L. of the European continental areas.

The chromosome number $2n = 96$ appears recorded for the first time.

The size of chromosomes ranges from 1.0 to 2.0 μm.

1230. ***Symphytum officinale*** L. — $2n = 24 + 0\text{-}4B$ (Figs. 2A-B)

It: Tuscany, Natural Reserve of Campolino, Abetone (Province of Pistoia), along the banks of a river close to a *Fagus - Picea – Abies* wood, about 1350 m asl, wet sandy soil, 44°7'N, 10°40'E, 23 Dec 2000, *Bottega 939/2000* (*cult.* Hort. Bot. Pisa).

According to Bucknall (1913) *S. officinale* is common in Northern- Central European countries and also present in some Mediterranean areas. Our record refers to the highest station known for Tuscany so far for the species.

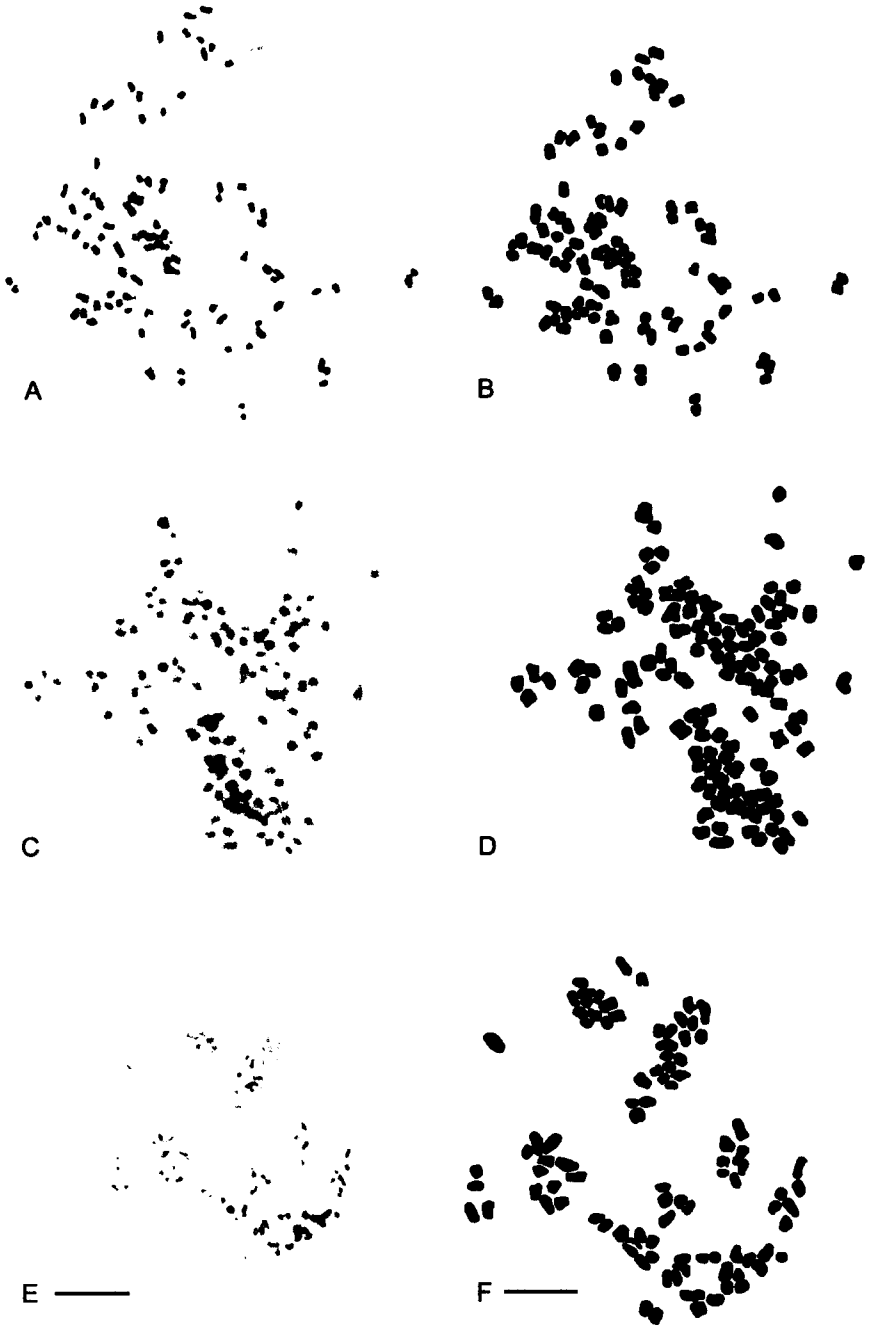

Fig. 1. Microphotographs and drawings of somatic metaphase plates of *Symphytum*: **A-B,** *S. bulbosum*, $2n = 104$; **C-D,** *S. tuberosum* subsp. *angustifolium*, $2n = 120$; **E-F,** *S. gussonei*, $2n = 96$. — Scale bars: left = 10 μm; right = 5 μm.

The diploid chromosome number $2n = 24 + 0\text{-}4B$ was already recorded for a population living close to the Lucca town walls (Peruzzi & al. 2001). Exhaustive karyotype information can be found in Mekki & al. (1987).

1231. ***Symphytum orientale*** L. — $2n = 32$ (Figs. 2C-D).

It: Tuscany, Cascine Park of Florence (FI), in front of the local Police barracks, on rich and shady soil, 43°47'N, 11°13'E, 17 Apr 1999, *Bottega & Peruzzi 344/1999* (*cult.* Hort. Bot. Pisa).

S. orientale is native of Istanbul environs and of SW Ukraine, but locally naturalized

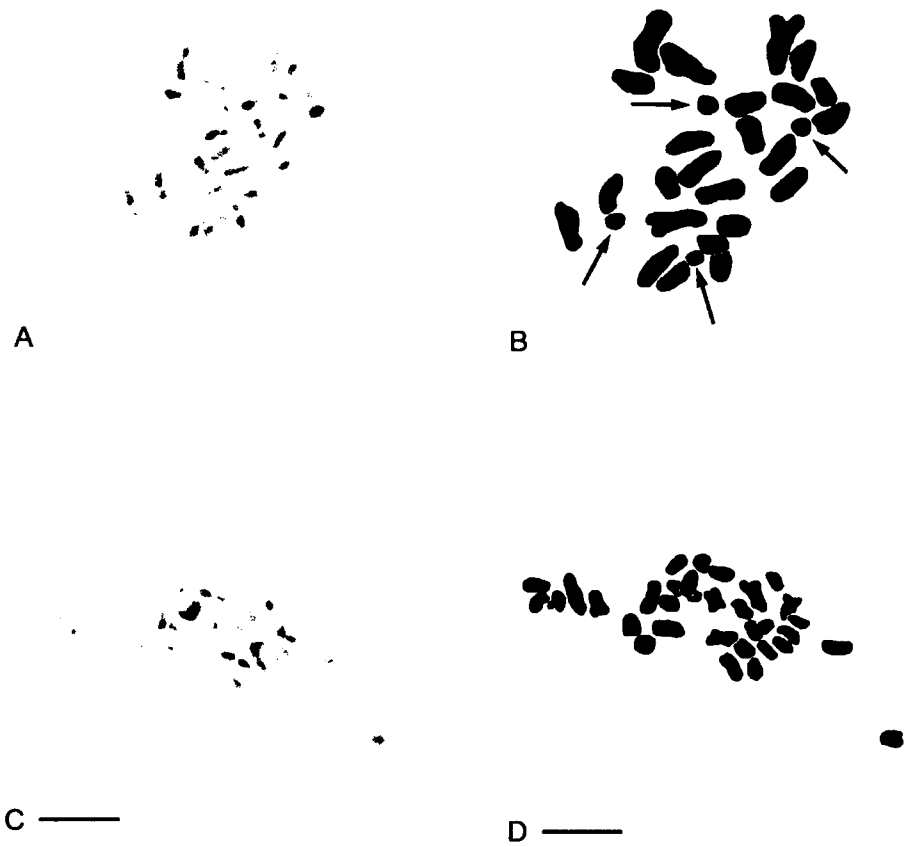

Fig. 2. Microphotographs and drawings of somatic metaphase plates of *Symphytum*: **A-B**, *S. officinale*, $2n = 24 + 0\text{-}4B$; **C-D**, *S. orientale*, $2n = 32$. — Arrows indicate B-chromosomes. — Scale bars: left = 10 μm; right = 5 μm.

elsewhere (Pawlowski 1972). In Italy the species is recorded for the outskirts of Florence and some Botanical Gardens (Viegi & al. 1974).

The chromosome number $2n = 32$ agrees with previous records (Gadella & Kliphuis 1978, Markova 1983). The size of chromosomes ranges from 1.0 to 2.5 μm.

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References

Bucknall, C. 1913: A revision of the genus *Symphytum*. — Journ. Linn. Soc. Bot. London **41**: 491-556.

Gadella, T. W. J. & Kliphuis, E. 1978: Cytotaxonomic studies in the genus *Symphytum*. VIII. Chromosome numbers and classification of ten European species. — Proc. Kon. Ned. Acad. Wetensch. Ser. C **81**: 162-172.

Grau, J. 1971: Cytologische Untersuchungen an Boraginaceae II. — Mitt. Bot. München **9**: 177-194.

Jaarsma, T. A., Lohmanns, E., Hendriks, H., Gadella, T. & Molingré, T. 1990: Chemo- and karyotaxonomic studies on some rhizomatous species of the genus *Symphytum* (Boraginaceae). — Pl. Syst. Evol. **169**: 31-39.

Markova, M. 1983: Reports [In Löve, A. (ed.), IOPB chromosome number reports LXXX]. — Taxon **32**: 509-510.

Mekki, L., Hart, H.'t, El-Alfy, N. Z., Dewerd, A. & Gadella, T. W. J. 1987: The Giemsa C- banded karyotype of diploid *Symphytum officinale* (Boraginaceae). — Acta Bot. Neerl. **36(1)**: 33-37.

Pawłowski, B. 1972: *Symphytum* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds), Flora Europaea **3**: 103-105. — Cambridge University Press.

Peruzzi, L., Garbari, F. & Bottega, S. 2001: *Symphytum tanaicense* (Boraginaceae) new for the Italian flora. —Willdenowia **31(1)**: (in press).

Stearn, W. T. 1985: The Greek species of *Symphytum* (Boraginaceae). — Ann. Musei Goulandris **7**: 175-220.

Strey, M. 1931: Karyologische Studien an Boraginoideae. — Planta **14(3-4)**: 682-730.

Tarnavschi, J. T. 1961: In: Darlington, C. D. & Wylie, A. P., Chromosome Atlas of Flowering Plants. — G. Allen & Unwin Ltd, London.

Viegi, L., Cela Renzoni, G. & Garbari, F. 1974: Flora esotica d'Italia. — Lavori Soc. Ital. Biogeogr., n. s., **4**: 125-220 (1973).

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Report (1232) by Daniela Ciccarelli, Fabio Garbari & Pavol Mártonfi

1232. *Hypericum perforatum* L. — $2n = 16, 32, 48$ (Figs. 1- 8).

It: Pisa Province, San Rossore Estate, loc. "la Sterpaia", 43°44'N, 10°20'E, ca. 4 m, 3 Jun 1999, *D. Ciccarelli 384/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 16$ (Figs. 1a, b).

— Lucca Province, Garfagnana, Valle della Fegana, Tereglio, loc. "Madonna di Foce Cavallaio", 44°03'N, 10°34'E, 1100 m, 14 Jul 1998, *D. Ciccarelli 479/1998* (*cult.* Hort. Bot. Pisa). - $2n = 32$ (Figs. 2a, b).

— Verona, near Avesa, loc. "Costagrande", 45°27'N, 11°E, 250-300 m, 7 Jul 1999, *D. Ciccarelli & F. Di Carlo 442/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 48$ (Figs. 3a, b); *D. Ciccarelli & F. Di Carlo 441/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 16$ (Fig. 4).

— Lucca Province, Alpi Apuane, Ponte Stazzemese, at the base of Monte Procinto, 43°58'N, 10°18'E, 650 m, 30 Jun 1999, *D. Ciccarelli, F. Garbari & P. Mártonfi 429/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 16$ (Fig. 5); *D. Ciccarelli, F. Garbari & P. Mártonfi 428/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 32$ (Fig. 6).

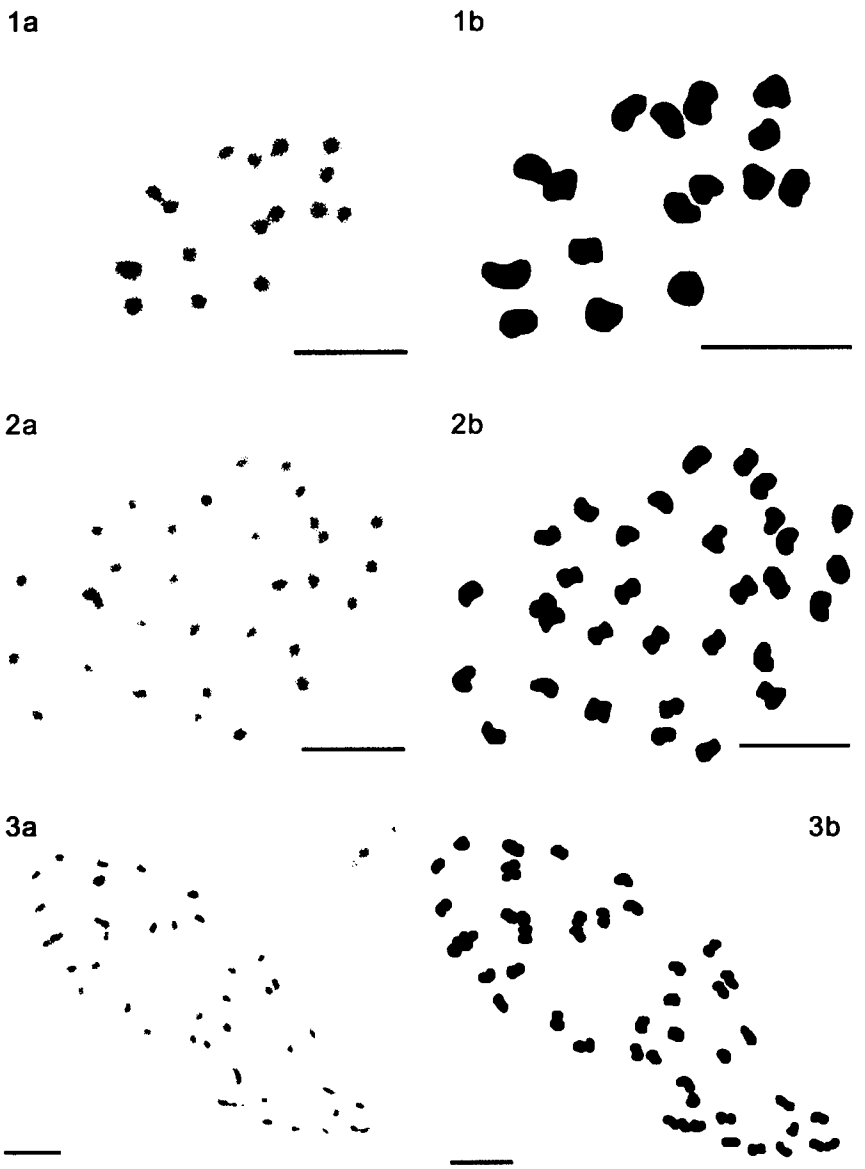
— Verona, near Montorio, loc. "Forte John", 45°27'N, 11°03'E, ca. 150 m, 7 Jul 1999, *D. Ciccarelli & F. Di Carlo 443/1999* (*cult.* Hort. Bot. Pisa; *exsicc.* PI). - $2n = 16$ (Fig. 7).

— Verona Province, along the road between Spiazzi and Caprino Veronese, 45°37' N, 10°50' E, 650 m, 29 Jun 1998, *R. Rebellato 464/1998* (*cult.* Hort. Bot. Pisa). - $2n = 48$ (Fig. 8).

Hypericum perforatum is widespread in the Mediterranean region with the exception of Malta (Robson 1986). The species is usually considered as a tetraploid hybrid ($2n = 32$). However diploids ($2n = 16$) and hexaploids ($2n = 48$) also occur (Robson 1981). Different chromosome numbers are probably a consequence of facultative apomixis in the species (Noack 1939, Mártonfi & al. 1996).

The chromosome counts here reported increase the knowledge of Italian populations of *H. perforatum*. Previous records from Italy were known for tetraploid populations of Aosta Valley (Gadella & Kliphuis 1970) and Tuscany (Löve & Löve 1982).

Chromosome counting in *H. perforatum* is rather difficult because the small chromosome size. Recently, a karyotype study was made by Brutovská & al. (2000) using plants differentiated *in vitro*.



Figs. 1-3. **a**, Microphotographs and **b**, corresponding drawings of mitotic metaphase plates of *Hypericum perforatum* from: **1,** San Rossore Estate (PI), $2n = 16$; **2,** Tereglio (LU), $2n = 32$; **3,** Avesa (VR), $2n = 48$. — Scale bars = 5 μm.

Figs. 4-8. Mitotic metaphase plates of *Hypericum perforatum* from: **4,** Avesa (VR), $2n = 16$; **5,** Ponte Stazzemese (LU), $2n = 16$; **6,** Ponte Stazzemese (LU), $2n = 32$; **7,** Montorio (VR), $2n = 16$; **8,** Spiazzi and Caprino Veronese (VR), $2n = 48$. — Scale bars = 5 μm.

References

Brutovská, B., Kušniriková, P., Bogyiová, E. & Cellárová, E. 2000: Karyotype analysis of *Hypericum perforatum* L. — Biologia Plantarum **43(1)**: 133-136.

Gadella, T. W. J. & Kliphuis, E. 1970: Cytotaxonomic investigations in some angiosperms collected in the Valley of Aosta and in the National Park "Gran Paradiso". — Caryologia **23**: 368.

Löve, A. & Löve, D. 1982: Reports [In Löve, A. (ed.), IOPB chromosome numbers reports LXXVI]. — Taxon **31**: 585.

Mártonfi, P., Brutovská, R., Cellárová, E. & Repcák, M. 1996: Apomixis and Hybridity in *Hypericum perforatum*. — Folia Geobot. Phytotax. **31**: 389-396.

Noack, K. L. 1939: Über *Hypericum* Kreuzungen. VI. Fortpflanzungsverhältnisse und Bastarde von *Hypericum perforatum* L. — Zeitschr. Induk. Abstamm. Vererb. **76**: 569-601.

Robson, N. K. B. 1981: Studies in the genus *Hypericum* L. (Guttiferae) 2. Characters of the genus. — Bull. Br. Mus. nat. Hist. (Bot.) **8(2)**: 55-226.

— 1986: *Hypericum* L. In: Greuter, W., Burdet, H. M. & Long, G. (eds), Med - Checklist **3**: 263-271. — Genève.

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Reports (1233-1234) by Tiziana Cusma Velari, Laura Feoli Chiapella, Vera Kosovel & Gianluigi Bacchetta

1233. *Genista sulcitana* Valsecchi — $2n = 18 + 0\text{-}2B, 27 + 0\text{-}2B$ (Fig. 1a).

Sa: Gonnosfanadiga, Genna Eidadi (Cagliari), late-hercynian granites, 39°29'N, 8°40'E, 1080 m, 19 Jul 2000, *G. Bacchetta s.n.* (CAG).

Genista sulcitana is endemic to a limited zone in the mountains of Southwestern Sardinia (Valsecchi 1986b).

The chromosome number $2n = 18 + 0\text{-}2B$, based on 15 metaphase plates, confirms the only existing reference; in fact Villa (1988) counted $2n = 18$ on material from Montevecchio (Cagliari). In our data 2 B-chromosomes are frequently present. The number $2n = 27 + 0\text{-}2B$ was rarely found, too.

1234. *Genista arbusensis* Valsecchi — $2n = 18, 27 + 0\text{-}2B$ (Fig. 1b).

Sa: Arbus, Piscinas (Cagliari), siliceous sands, 39°32'N, 8°28'E, 30 m, 7 Jun 1999, *G. Bacchetta s.n.* (CAG).

Genista arbusensis is endemic to a restricted area on the coast of Southwestern Sardinia (Valsecchi 1984).

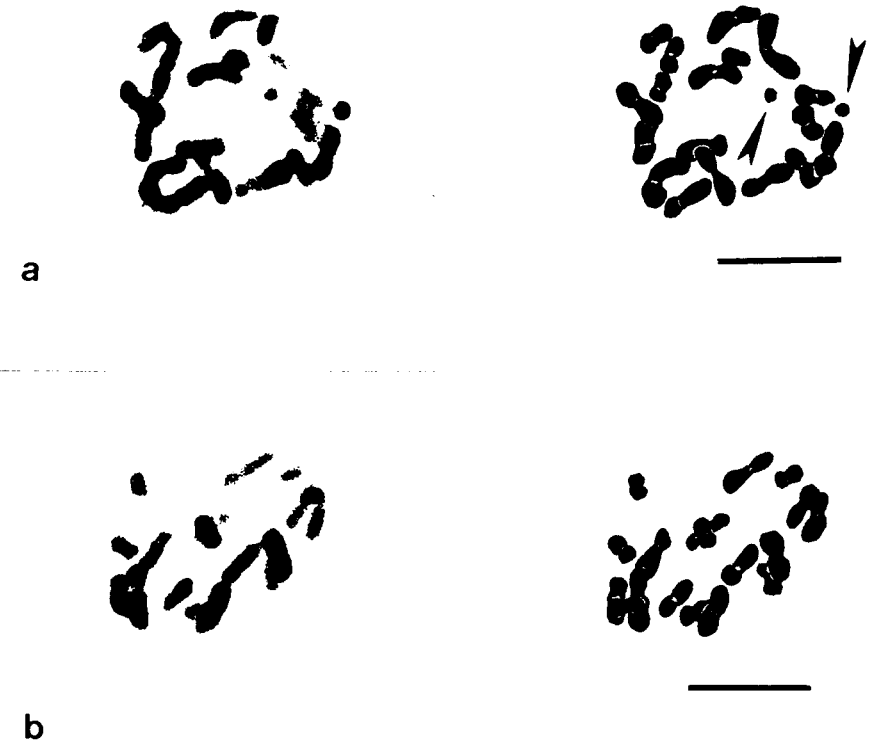

Fig. 1. Microphotographs and a drawings of somatic metaphase plates of *Genista*: **a,** *G. sulcitana*, $2n = 18 + 2B$; **b,** *G. arbusensis*, $2n = 18$. — Arrows indicate B-chromosomes. Scale bars = 5 μm.

Our counts, based on 15 metaphase plates, have shown the number $2n = 18$ in most cases, more seldom $2n = 27 + 0\text{-}2B$. The only reference available for this species is that of Villa (1988), which reports $2n = 18$ for a population of Rio Sessini, Fluminimaggiore (Cagliari).

Genista sulcitana and *G. arbusensis* belong to sect. *Erinacoides* Spach (Valsecchi 1993). In the Sardinian-Corsican district are present several species; besides *Genista sulcitana* and *G. arbusensis* to this group belong *G. pichisermolliana* Valsecchi and *G. toluensis* Valsecchi, which are endemic to Sardinia (Valsecchi 1984, 1993). Villa (1988) counted in both species the number $2n = 18$ on material respectively from M. Scova, Aritzo (sub *G. salzmannii*) and M. Tolui, Dorgali. *Genista salzmannii* DC., endemic to Sardinia and to Corsica (Valsecchi 1993) has both chromosome numbers $2n = 18$ and $2n = 36$; the former was found on Corsican populations of Calvi (Cusma Velari & Feoli Chiapella 1982) and Corte, Valle della Restonica (Villa 1988), the latter on material from M. Limbara, Tempio, Sardinia (Villa 1988). The chromosome number $2n = 18$ was counted also for *G. desoleana*

Valsecchi, a species growing in Sardinia, Corsica, Liguria and Tuscany (Valsecchi 1986a), by Villa (1988) on a Sardinian population from Cuglieri, Badde Urbara.

All these taxa present the basic chromosome number x = 9. The same basic number is also found in various Spanish species, as *Genista longipes* Pau [= *G. lobelii* DC. subsp. *longipes* (Pau) Heywood] with $n = 9$, *G. pumila* (Debeaux & E. Rev. ex Hervier) Vierh. (= *G. mugronensis* Vierh.) with $n = 9$ & $n = 18$, *G. versicolor* Boiss. (= *G. baetica* Spach) with $n = 18$ (Sañudo 1971, 1973). Moreover, *G. lobelii* DC. subsp. *lobelii,* from Southeastern France, presents $2n = 18$ (Verlaque 1988).

On the other hand, other taxa of the section have the basic number x = 12: *Genista hystrix* Lange and *G. polyanthos* R. Roem. ex Willk., Western Iberian species, with $2n = 24$ (Sañudo 1973, Gallego Martín & al. 1985), and *G. lobelii* DC. var. *mauritanica* Batt., Northwestern African taxon, with $2n = 96$ (Cusma Velari & al. 1998).

The basic number x = 10 is observed only in *Genista legionensis* (Pau) M. Laínz, with $n = 20$ (Sañudo 1973).

The nomenclature follows Greuter & al. (1989) for the Tyrrhenian taxa, Talavera (1999) for the Iberian ones.

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References

Cusma Velari, T. & Feoli Chiapella, L. 1982: Numeri cromosomici per la Flora Italiana: 906 - 909. — Inform. Bot. Ital. **14(2-3)**: 259–63.

— , — & Mangiavacchi, L. 1998: Report (996). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports-7]. — Fl. Med. **8**: 294-295.

Gallego Martín, F., Sánchez Anta, M.A. & Navarro Andrés, F. 1985: Datos cariológicos de algunas genisteas supramediterráneas. — Lazaroa **8**: 97–103.

Greuter, W., Burdet, H.M. & Long, G. (eds) 1989: Med-checklist, **4**. — Genève.

Sañudo, A. 1971: Variabilidad cromosómica de las Genisteas de la Flora española en relación con su ecología.1. Número y comportamiento de los cromosomas durante la meiosis. A. Secciones Erinacoides Spach., Scorpioides (L.) DC. y Asterospartum Spach del Gen. *Genista* L. — Cuad.C. Biol. Univ. Granada **1**: 1-21.

— 1973: Variabilidad cromosómica de las Genisteas de la Flora española en relación con su ecología. 1. Número y comportamiento de los cromosomas durante la meiosis. C. Sección Cephalospartum del Gen. *Genista* L. y géneros *Lygos* Adanson, *Spartium* L., *Teline* Medicus, *Calicotome* Link y *Argyrolobium* Ecklon & Zeyher. — Cuad. C. Biol. Univ. Granada **2(2)**: 117-120.

Talavera, S. 1999: *Genista* L. In: Talavera, S., Aedo, C., Castroviejo, S., Romero Zarco, C., Sáez, L., Salgueiro, F.J. & Velayos, M. (eds), Flora Iberica **7(1)**: 45-119. — Madrid.

Valsecchi, F. 1984: Le piante endemiche della Sardegna: 153-156. — Boll. Soc. Sarda Sci. Nat. **23**: 291-310.

— 1986a: Due nuove specie del genere *Genista* L. nel Mediterraneo. — Boll. Soc. Sarda Sci. Nat. **25**: 143-147.

— 1986b: Le piante endemiche della Sardegna: 188-189. — Boll. Soc. Sarda Sci. Nat. **25**: 193-202.
— 1993: Il genere *Genista* in Italia. I. Le specie delle sezioni Erinacoides Spach, Ephedrospartum Spach, Aureospartum sect. nova. — Webbia **48**: 779-824.
Verlaque, R. 1988: Modalités de la speciation chez les Genisteae. — Act. Symp. Int. Bot. Pius Font i Quer **2**: 49-68.
Villa, R. 1988: Numeri cromosomici per la Flora Italiana:1197- 1204. — Inform. Bot. Ital. **20(2-3)**: 647-652.

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Report (1235) by Tiziana Cusma Velari, Laura Feoli Chiapella & Magdalena Vicens Fornés

1235. *Genista valdes-bermejoi* Talavera & L. Sáez — $2n = 48 + 0\text{-}2B, 96$ (Fig. 1).

Bl: Mallorca island, Coll des Coloms (Sóller), "matorrales" on limestone, 39°47'N, 2°49'E, 954 m, 11 Aug 2000, *M. Vicens Fornés s.n.* (HJBS).
— Mallorca island, Tossals Verds (Sóller), "matorrales" on limestone, 39°46'N, 2°49'E, 730 m, 3 Aug 1998, *M. Vicens Fornés s.n.* (HJBS).

Genista valdes-bermejoi (= *G. acanthoclada* DC. var. *fasciculata* Knoche; *G. balearica* Willk. ex Porta) is endemic to Mallorca Island and grows in few localities, mostly on

Fig. 1. A microphotograph and a drawing of somatic metaphase plate of: *Genista valdes-bermejoi*, $2n = 48$. — Scale bar = 5 μm.

Serra de Tramontana, a mountain chain facing the Northwestern coast of the isle (Knoche 1922, Bonafè Barceló 1978, Talavera 1999).

Genista valdes-bermejoi belongs to the *G. acanthoclada* aggr. (Greuter & al. 1989), which includes also *G. acanthoclada* DC., Eastern Mediterranean species (Vierhapper 1919, Gibbs 1966), and *G. sardoa* Valsecchi [= *G. acanthoclada* subsp. *sardoa* (Bèg. et Landi ex Landi) Valsecchi], a Sardinian endemic (Valsecchi 1975, 1984).

The number $2n = 48$, rarely with 2 B chromosomes, based on 20 metaphase plates, was counted for both populations examined. Additionaly, two metaphase plates with $2n = 96$ chromosomes were found. Our counts differ from the only reference available. Cardona & Contandriopoulos (1983) report $2n = 72$ for *Genista balearica* (Es Mal Pas, Mallorca).

The chromosome number $2n = 48 + 0\text{-}2B$ was counted in *Genista acanthoclada* subsp. *acanthoclada* for populations from Mt Taigetos (Greece) and from Cesme (Izmir, Turkey) (Cusma Velari & al. 1997). *G. sardoa* presents $2n = 52$ (Villa 1988, on material from Alghero, Porticciolo, Sardinia).

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References

Bonafè Barceló, F. 1978: Flora de Mallorca, **2**. — Mallorca.

Cardona, M.A. & Contandriopoulos, J. 1983: Reports [In Löve, A. (ed.), IOPB chromosome number reports LXXIX]. — Taxon **32**: 323-324.

Cusma Velari, T. & Feoli Chiapella, L. & Mangiavacchi, L. 1997: Reports (840-842). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports-7]. — Fl. Medit. **7**: 236-240.

Gibbs, P.E. 1966: A revision of the genus *Genista* L. — Not. Roy. Bot. Gard. Edinb. **27(1)**: 11-99.

Greuter, W., Burdet, H.M. & Long, G. (eds) 1989: Med-checklist **4**. — Genève.

Knoche, H. 1922: Flora balearica **2**. — Montpellier.

Talavera, S. 1999: *Genista* L. In: Talavera, S., Aedo, C., Castroviejo, S., Romero Zarco, C., Sáez, L., Salgueiro, F.J. & Velayos, M. (eds), Flora Iberica **7(1)**: 45-119. — Madrid.

Valsecchi, F. 1975: Contributo alla conoscenza sistematica del genere *Genista* in Sardegna: I. *Genista acanthoclada* DC. — Giorn. Bot. Ital. **109**: 239-249.

— 1984: Le piante endemiche della Sardegna 153-156. — Boll. Soc. Sard. Sci. Nat. **23**: 291-310.

Vierhapper, F. 1919: Beiträge zur Kenntnis der Flora Griechenlands 3. — Verh. Zoo.-Bot. Gesell., Wien **69**: 157-185.

Villa, R. 1988: Numeri cromosomici per la Flora Italiana: 1197-1204. — Inform. Bot. Ital. **20**: 647-652.

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Reports (1236-1243) by Maria Kapasa, Theodora Nikolaidi, Eleftheria-Perdiko Bareka & Georgia Kamari

1236. *Bellevalia dubia* (Guss.) Roemer & Schultes subsp. ***boissieri*** (Freyn) Feinbr. — $2n = 8$ (Fig. 1).

Gr: Ionian islands, Nomos Kefallinias, Kefallinia island, close to the castle of Ag. Georgios, along the road, 38°10'N, 20°29'E, 180 m, 2 Apr 2000, *Phitos & Kamari s.n., cult. no* K379 (UPA).

Bellevalia dubia ssp. *boissieri* is an E. Mediterranean element.

The diploid chromosome number of $2n = 2x = 8$ reported here and a similar karyotype morphology have previously been reported (see Bareka & al. 2000 for references and also Garbari 1968; Maggini 1972; Maggini & Dominicis 1976). The triploid chromosome number $2n = 3x = 12$ has also been found in material from Italy (Musano & Maggini 1976). Microphotographs of the population from Kefallinia island are presented here. The karyotype formula consists of $2n = 2$m-SAT + 4sm-SAT + 2st = 8 chromosomes, with sizes ranging from 6.8 to 14.0 μm. The six satellites are always visible and often on long chromosomal filaments of the longer arms.

1237. *Gagea graeca* (L.) A. Terracc. [= *Lloydia graeca* (L.) Endl. ex Kunth.] — $2n = 16$ (Fig. 2).

Gr: Peloponnisos, Nomos Argolidas, summit area NW. of Kefalovrison, slopes with *Quercus coccifera*, *Juniperus oxycedrus* and *Abies cephalonica*, 37°43'N, 22°27'E, 860-950 m, 1 Jun 1995, *Kamari & al. s.n., cult. no* IM9 (UPA).

Gagea graeca is an E. Mediterranean element.

To our knowledge, no former records of a chromosome number or a karyotype analysis of this taxon are known. The species has $2n = 16$ chromosomes and the cytotype formula is given as: $2n = 4$m + 4sm + 6st = 16. The karyotype is ± asymmetrical with chromosomes varying in size between 3.0 to 6.2 μm in length.

1238. *Gladiolus italicus* Miller (= *Gladiolus segetum* Ker Kawler) — $2n = 120$ (Fig. 3).

Gr: Ionian islands, Zakinthos island, N. of Korithi village on the way to cape Skinari, 37°54'N, 20°42'E, 3 May 2000, *Kamari & al. s.n., cult no.* G3-5 (UPA).

Gladiolus italicus is distributed in S. Europe and the Mediterranean area extending eastwards to C. Asia.

The basic chromosome number of the genus *Gladiolus* is x = 15. In *G. italicus* the octoploid level of $2n = 8x = 120$ is usually found in material from former Yougoslavia (Sušnic & Lovka 1973), Spain (Löve & Kjellquist 1973) and also from Greece (Strid & Franzén 1981, in material from Mt Olimbos, as *G. segetum*). The dodekaploid level $2n = 12x = 180$ has been reported in material from the Iberian penisula (Queirós 1979, Pérez & Pastor

1994). Additionaly, the chromosome numbers $2n = 60$, 90, 110-120, 120, c. 170, 176 have also been reported (Ohri & Khoshoo 1985, Raamsdonk & Vries 1989) for this taxon. The population examined here was proved to be octoploid, with $2n = 8x = 120$ chromosomes varying in size between 1.0 and 2.6 μm. The karyotype morphology can not be detectable, due to the chromosome size as well as to unclear position of the centromeres.

1239. *Hedysarum coronarium* L. — $2n = 16$ (Fig. 4).

Gr: Ionian islands, Nomos Kefallinias, Kefallinia island, coastal road between the villages Skala and Poros, place named Limenia, marl, 38°08'N, 20°46'E, 16 Apr 2000, *Katsouni s.n., cult. no* M18 (UPA).

Distributed mainly in the W. and C. Mediterranean region. Naturalized in the eastern Mediterranean area, too.

The chromosome number $2n = 16$ counded in the population studied here, confirms the data of previous records from elsewhere (Abdelguefri-Berrekia & al. 1986 in material from Algeria, Fernandes & Santos 1975; Fernandes & Queirós 1978 in material from Portugal and Colombo & Trapani 1990 in material from Italy). This is the first cytological study in material from Greece. The karyotype is symmetrical, consisting of mostly metacentric chromosomes varying in size from 1.3 to 2.7 μm. A significant observation in the population studied here, was the presence of a submetacentric chromosome pair (sm-SAT), which bears satellites very large, bigger than their shorter arms.

1240. *Hedysarum glomeratum* F. G. Dietrich — $2n = 16$ (Fig. 5).

Gr: Ionian islands, Nomos Kefallinias, Kefallinia island, seaport of the village Spartia, marl, 38°10'N, 20°26'E, 3 Apr 2000, *Phitos, Kamari & Katsouni 26539* (UPA).
Ionian islands, Nomos Kefallinias, Kefallinia island, coastal road between the villages Skala and Poros, place named Limenia, marl, 38°08'N, 20°46'E, 5 May 2000, *Katsouni s.n., cult. no* M16 (UPA).

Hedysarum glomeratum is a Mediterranean element, distributed from Portugal eastwards to Greece.

To our knowledge no former records of the chromosome number of this taxon is known so far from Greece. The somatic number of $2n = 16$ has also counted by Abdelguerfi-Berrekia & al. (1986) in material from Algeria. A karyotype microphotograph of the population studied from the seaport of the village Spartia is presented here. The karyotype of the species is symmetrical, consisting of mostly metacentric (m) chromosomes, ranging in size from 1.5 to 3.0 μm.

1241. *Hyoscyamus albus* L. — $2n = 34$ (Fig. 6).

Gr: Kiklades, Naxos island, on the castle of the town, 37°06'N, 25°22'E, 20 Jul 2000, *Kapasa s.n., cult. no* M6 (UPA).

Hyoscyamus albus is widely distributed in the Mediterranean area, from Spain to S. Russia and N. Iraq/Syrian Desert.

The tetraploid chromosome number $2n = 4x = 68$ has been reported from different countries of W. Mediterranean (Dahlgren & al. 1971; Palomeque Messia & Ruiz Rejón 1976; Aboucaya & Verlaque 1990; Pastor & al. 1990; Dioscado & al. 1993; Badr & al. 1997), as well as from Bulgaria (Andreev 1981). Moreover, a triploid chromosome number with $2n = 3x = 51$ has been reported by Labadie (1976), in material from France. The diploid chromosome number $2n = 2x = 34$ counted here has also been given by Miège & Greuter (1973) in material from Kriti and also by Bhattacharya & al. (1971) in material from Libya. The karyotype of the taxon, presented here for the first time, is symmetrical, consisting of mostly metacentric (m) chromosomes, six of which bear small, spherical and not always visible satellites. Chromosome size varies from 1.4 to 3.0 μm.

1242. *Reichardia picroides* (L.) Roth — $2n = 14$ (Fig. 7).

Gr: Kiklades, Paros island, Parikia, place named Krios, 34°05'N, 25°08'E, 15 Jul 2000, *Kapasa s.n. cult. no* M2 (UPA).

Reichardia picroides is a Mediterranean element.

The somatic number of $2n = 14$ and a similar karyotype morphology have also been reported by several authors in material from elsewhere (see Mejías 1998 for references and also Nilsson & Lassen 1971, Šiljak-Yakovlev 1986, 1996, Brullo & al. 1990). The chromosome number of $2n = 16$, which has been reported for *R. picroides* var. *intermedia* (Sch.-Bip.) Fiori by Romano & al. (1991), probably belongs to *R. intermedia* (Schultz Bip.) Coutinho, which has always $2n = 16$ (Šiljak-Yakovlev 1996).

R. picroides is a common perennial species in Greece, distributed mainly in the Aegean area. The chromosome number of $2n = 14$ and the karyotype morphology have also previously reported by Snogerup (1980) in material from several Aegean islands (Allonisos, Skiros, Andros, Ananes and Kriti). Our count originating from Paros island confirms the already known somatic number of $2n = 14$. The karyotype is symmetrical, consisting of $2n = 10m + 2m\text{-SAT} + 2m/sm = 14$, with chromosomes varying in size between 1.9 and 3.5 μm.

1243. *Muscari comosum* (L.) Mill. [= *Leopoldia comosa* (L.) Parl.] — $2n = 18$ (Figs. 8a, b).

Gr: Thessalia, Nomos Larissis, c. 2 km E. of the village Palaiopyrgos, with *Fraxinus angustifolius*, ca. 5 m, 39°54'N, 22°42'E, 27 Apr 1999, *Bareka 15* (UPA). (Fig. 8a).

— Peloponnisos, Nomos Arkadhias, Mt Parnon, c. 0.5 km from the village of Agios Petros on the way to Tripolis, deciduous forest with *Castanea sativa* and *Quercus* ssp., 37°19'N, 22°32'E, 950 m, 3 Jun 1995, *Kamari & al. s.n., cult. no* IM17-2 (UPA). (Fig. 8b).

This taxon is widely distributed almost all over Europe and the Mediterranean region.

Figs. 1-8. Microphotographs of mitotic metaphase plates of: 1, *Bellevalia dubia* ssp. *boissieri*, $2n$ = 8; 2, *Gagea graeca*, $2n$ = 16; 3, *Gladiolus italicus*, $2n$ = 120; 4, *Hedysarum coronarium*, $2n$ = 16; 5, *H. glomeratum*, $2n$ = 16; 6, *Hyoscyamus albus*, $2n$ = 34; 7, *Reichardia picroides*, $2n$ = 14; 8a, b, *Muscari comosum*, $2n$ = 18. — Arrows indicate SAT-chromosomes and arrowheads structural heterozygosity. Scale bar = 10 μm.

It is also found in the Canary islands, Madeira, and in southern Russia and the Middle East (Benzer 1973).

Our count ($2n = 18$) and the karyotype formula studied here from continental Greece, is in accordance to those given by several authors from the greek Aegean islands (Benzer 1972, Benzer & Ellmer 1975, Benzer & Landström 1975, Montmollin 1986), as well as from other countries (Garbari 1966, 1969, Dahlgren & al. 1971, Ruiz Rejón 1976, Natarajan 1979, Valdès & al. 1978, Van Loon & Snelders 1979, Löve & Löve 1982, Dalgiç 1991, Steck-Blaser 1992, Lovka 1995, Corsi & al. 1996, Özhatay & Johnson 1996, Johnson & al. 1996 and Johnson & Brandham 1997). Additionaly, Bentzer (1972), Ruiz Rejón & al. (1981) and Ruiz Rejón & al. (1986) have also reported the presence of 1-2 B chromosomes, a trisomic karyotype with $2n = 18 + 1 = 19$, triploid with $2n = 3x = 27$ and tetraploid karyotypes with $2n = 4x = 36$ chromosomes, as well as a great variation in the karyotype morphology of *M. comosum*. In the population from Thessalia the acrocentric chromosome pair shows a structural heterozygosity (Fig. 8a), which also has been reported by Garbari (1969) in material from Italy.

The karyotype formula is given as: $2n = 10m + 2m\text{-SAT} + 2sm + 2st + 2t = 18$ chromosomes. The chromosome size ranges from 1.8 to 8.8 μm. The satellites are small spherical and not always visible.

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References

Abdelguerfi-Berrekia, R., Abdelguerfi, A., Bounaga, N. & Guittonneau, C. G. 1986: Reports. [In Löve, Á. (ed.), IOPB Chromosome number reports LC]. — Taxon **35**: 197.

Aboucaya, A. & Verlaque, R. 1990: Reports [In Stace, C. A. (ed.), IOPB chromosome data 2]. — IOPB Newsletter **15**: 10-11.

Andreev, N. 1981: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LXX]. — Taxon **30**: 74-75.

Badr, A., Khalifa, A., Aboel-Atta, A. I. & Abou-El-Enain, M. M. 1997: Chromosomal criteria and taxonomic relationships in the Solacaceae. — Cytologia **62**: 103-113.

Bareka, E. P., Koutoula, M. & Kamari, G. 2000: Reports (1106-1109). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports –10]. — Flora Mediterranea **10**: 382-386.

Bentzer, B. 1972: Variation in the chromosome complement of *Leopoldia comosa* (L.) Parl. (Liliaceae) in the Aegean (Greece). — Bot. Notiser **125**: 406-418.

— 1973: Taxonomy, variation and evolution in representatives of *Leopoldia* Parl. (Liliaceae) in the Southern and Central Aegean. — Bot. Notiser **126**: 69-132.

— & Ellmer, M. 1975: Polymorphism in chromosomes of *Leopoldia comosa* (Liliaceae). — Hereditas **81**: 127-132.

— & Landström, Th. 1975: Polymorphism in chromosomes of *Leopoldia comosa* (Liliaceae) revealed by Giemsa staining. — Hereditas **81**: 127-132.

Bhattacharya, S. S., Khalifa, M. M. & Chaudhri, I. I. 1971: Reports [In Löve, Á. (ed.), IOPB chromosome number reports XXXII]. — Taxon **20**: 349-350.

Brullo, S., Guglielmo, A., Pavone, P. & Terrasi, M.C. 1990: Chromosome counts of flowering plants from N Cyrenaica. — Candollea **45**: 65-74.

Colombo, P. & Trapani, S. 1990: Números cromosomáticos de plantas occidentales, 556-567. — Anales Jard. Bot. Madrid **47**: 179-183.

Corsi, G., Garbari, F. & Ghelardi, A. 1996: Reports (684-691). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports -6]. — Flora Mediterranea **6**: 249-262.

Dahlgren, R., Karlsson, Th. & Lassen, P. 1971: Studies on the flora of the Balearic islands I. Chromosome numbers in Balearic angiosperms. — Bot. Notiser **124:** 249-269.

Dalgiç, G. 1991: Cytotaxonomic studies on the genus *Muscari* in European Turkey. — Bot. Chron. **10**: 819-825.

Dioscado, J.C.,Ojeda, F. & Pastor, J. 1993: Reports [In Stace, C. A. (ed.), IOPB chromosome data 5]. — IOPB Newsletter **20**: 6-7.

Fernandes, A. & Santos, M. F. 1975: Contribution à la connaisance cytotaxonomique des Spermatophyta du Portugal. IV. Leguminosae (Suppl. 1). Bol. Soc. Brot. Sér. 2, **49**: 173-196.

— & Queirós, M. 1978: Contribution à la connaisance cytotaxonomique des Spermatophyta du Portugal. IV. Leguminosae (Suppl. 3). — Bol. Soc. Brot. Sér. 2, **52:** 79-164.

Garbari, F. 1966: Contributo allo studio citologico dei Muscari Italiani. — Caryologia **19(4)**: 419-428.

— 1968: Iconografia cromosomica di alcune Liliaceae. — Atti Soc. Tosc. Sc. Nat. Mem. Ser. B **75**: 163-178.

— 1969: Nuove osservazioni citologiche sui generi *Muscari* e *Leopoldia*. — Giorn. Bot. Ital. **103**: 1-9.

Johnson, M. A. T., Özhatay, N. & Garbari, F. 1996: The Genus *Muscari* (Hyacinthaceae) in Turkey: taxonomy, distribution and chromosome analysis. In: Ozturk, M., Seçmen, O. Gork, G. (eds), "Plant life in Southwest and Central Asia". Proceedings of the IV th. Plant life in Southern Asia Symposium (Izmir, Turkiye 21-28 May, 1995) **1**: 34-35. — Ege Univ. Press.

— & Brandham, P. E. 1997: New chromosome numbers in petaloid monocotyledons and in other miscellaneous angiosperms. — Kew Bull. **52(1)**: 121-138.

Labadie, J. P. 1976: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LIV]. — Taxon **25**: 636-639.

Löve, Á. & Kjellquist, E. 1973: Numeros cromosómicos para la flora Española. 556-591. — Lagascalia **15**: 269-282.

— & Löve, D. 1982: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LXXVI]. — Taxon **31**: 583-587.

Lovka, M. 1995: Reports [In Stace, C. A. (ed.), IOPB chromosome data 9]. — IOPB Newsletter **24**: 21-23.

Maggini, F. 1972: The chromosome complement of *Bellevalia dubia* (Guss.) R. et S. and the problem of *Bellevalia webbiana* Parl. — Ann. Bot. (Roma) **31**: 115-123.

— & de Dominicis, I. R. 1977: The ribosomal RNA gene number and the length of the nucleolar secondary constrictions in *Bellevalia romana* and *B. dubia* (Liliaceae): A possible correlation. — Caryologia **30(1)**: 97-103.

Mejìas, J. A. 1998: Reports (936-940). [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports –8]. — Flora Mediterranea **8**: 245-251.

Miège, J. & Greuter, W. 1973: Nombres chromosomiques de quelques plantes récoltées en Crète. — Ann. Mus. Goulandris **1**: 105-111.

Montmollin, B. de 1986: Etude cytotaxonomique de la flore de la Crète III. Nombres chromosomiques. — Candollea **41**: 431-439.

Musano, L. & Maggini, F. 1976: Triploidia in *Bellevalia dubia* (Guss.) Roemer & Schultes. — Inform. Bot. Ital. **8**: 186.

Natarajan, G. 1979: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LXV]. — Taxon **28**: 629.

Nilsson, Ö. & Lassen, P. 1971: Chromosome numbers of vascular plants from Austria, Mallorca and Yugoslavia. — Bot. Notiser **124**: 270-276.

Ohri, D. & Khoshoo, T. N. 1985: Cytogenetics of garden *Gladiolus* II. Variation in chromosome complement and meiotic system. — Cytologia **50**: 213-231.

Özhatay, N., Johnson, M. A. T. 1996: Some karyological remarks on Turkish *Allium* sect. *Allium, Bellevalia, Muscari,* and *Ornithogalum* subg. *Ornithogalum.* — Bocconea **5**: 239-249.

Palomeque Messia, T. & Ruiz Rejón, M. 1976: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LI]. — Taxon **25**: 164.

Pastor, J., Dioscado, J. C., Santa Bárbara, C., Vique, J. & Pérez E. 1990: Cytotaxonomy of Spanish plants. II. Monocotyledons. — Lagascalia **3**: 147-182.

Pérez, E. & Pastor, J. 1994: Contribution al estudio cariologico de la familia Iridaceae en Andalucia occidental. — Lagascalia **17(2)**: 257-272.

Queirós, M. 1979: Números cromossómicos para a Flora Portuguesa. 16-37. — Bol. Soc. Brot. Sér. 2, **53**: 15-28.

Raamsdonk, L. W. D. van & Vries, T. de 1989: Biosystematic studies in European species of *Gladiolus* (Iridaceae). — Pl. Syst. Evol. **165**: 189-198.

Romano, S., Colombo, P. & Marcenò, C. 1991: Numeri cromosomici per la Flora Italiana: 1273-1283. — Inform. Bot. Ital. **23**: 123-132.

Ruiz Rejón, C., Lozano, R. & Ruiz Rejón, M. 1986: Numeros cromosómicos para la flora Española. 479-484. — Lagascalia **10**: 292-297.

Ruiz Rejón, M. 1976: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LII]. — Taxon **25**: 341-342.

— , Pascual, L., Ruiz Rejón, C. & Oliver, J. L. 1981: Numeros cromosómicos para la flora Española. 240-244. — Lagascalia **10**: 247-252.

Šiljak-Yakovlev, S. 1986: Etude cytogénétique et palynologique de Compositae endémiques ou reliques de la flore yougoslave. Thèse de doctorat d' Etat, Université Paris-Sud, Orsay.

— 1996: La dysploïdie et l' évolution du caryotype. — Bocconea **5**: 211-220.

Snogerup, B. 1980: The genus *Reichardia* (Asteraceae) in the Aegean area. — Bot. Notiser **133**: 515-520.

Steck-Blaser, B. 1992: Karyologische Untersuchungen an *Muscari comosum* (L.) Miller, *M. botryoides* (L.) Miller emend. DC., und *M. racemosum* (L.) Miller emend. DC. im Gebiet der Schweiz. — Bot. Helvetica **102**: 211-227.

Strid, A. & Franzén, R. 1981: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LXXII]. — Taxon **30**: 829-842.

Sušnik, F. & Lovka, M. 1981: Repors [In Löve, Á. (ed.), IOPB chromosome number reports XLI]. — Taxon **22**: 262-263.

Valdés, B., Pastor, J. & Ubera, J. 1978: Numeros cromosómicos para la flora Española. 1-14. Lagascalia **7**: 192-199.

Van Loon, J. & Snelders, H. C. M. 1979: Reports [In Löve, Á. (ed.), IOPB chromosome number reports LXV]. — Taxon **22**: 262-263.

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Reports (1244-1247) by Dolja Pavlova & Anita Tosheva

1244. ***Melilotus officinalis*** (L.) Pall. — $2n = 16$ (Fig. 1) & $2n = 16 + 2B$ (Fig. 2).

Bu: Black Sea Coast, on the sea shore near to town of Kavarna, 4323'N, 2820' E, 02 Aug 1999, *À. Òosheva* (SO *100591*). - (Fig. 1).

— Danube plain, in Kaylaka Park, in town of Pleven, 4324'N, 2435' E, 10 July 1994, *D. Pavlova* (SO *100589*). - (Fig. 2).

This species is widespread in Europe, common also in Bulgaria.

The chromosome number $2n = 16$ studied here, confirms previous data (see Fedorov 1969: 310, Goldblatt 1981: 248; 1988: 109, Goldblatt & Johnson 1990: 90; 1991: 106, 1994: 100, 1996: 117 for references). Lesins (1952) reports a tetraploid chromosome number ($2n = 32$).

The arm index calculated on the basis of the ratio r = l/s gives reasons to accept that the karyotype of the population from Kavarna consists of meta and submetacentric chromosomes, with a dominance of the first type (63%). The shortest and the longest chromosomes are of submetacentric type. Satellites are found on the short arms of the shortest pair of metacentric chromosomes. The total length of the chromosomes in the karyotype is s+l = 60.8 μm. The karyotype consists of $2n$ = 8m + 6sm + 2m-SAT = 16 chromosomes. The chromosome size is ranged between 2.8 and 4.8 μm, and the ratio Xmax:Xmin = 1.7 : 1. The population studied differs from the data already published for this taxon (Pavlova & Tosheva 2000) by the higher number of submetacentric chromosomes (6 instead of 4) and one pair less of metacentric chromosomes. The satellite chromosomes in both karyotypes are quite different. The morphological and karyological characteristics give reasons to link this material with the variety var. *arenaria* (Grec.) Hayek of *M. officinalis* (Kozuharov 1976).

The arm index for the second population from Kaylaka Park indicates that the chromosomes are of meta and submetacentric types. The metacentric chromosomes prevail. Satellites are found on the third in length submetacentric chromosome pair. The total length of the chromosomes in the karyotype is s+l = 63.2 + 3.2 μm. In addition 2B-chromosomes are observed for this population in contrast to a previous investigation (Pavlova & Tosheva 2000). The additional B-chromosomes 1.6 μm in length, are of metacentric type. The karyotype consists of $2n$ = 10m + 4sm + 2m-SAT = 14 + 2B. The chromosome size ranges between 3.2 and 4.8 μm, and the ratio Xmax:Xmin = 1.5 : 1.

The karyotype of *M. officinalis* (subgen. *Melilotus*) shows insignificant differences compared to the report by Kita (1966), expressed by the higher percentage of submetacentric chromosomes 37% instead of 12.5%.

1245. ***Melilotus neapolitana*** Ten. — $2n = 16 + 1B$ (Figs. 3, 4).

Bu: Thracian plain, Besapara hills, calcareous terrains near to Ognjanovo village, 4207'N, 2428'E, 150 m, 26 May 1995, *D. Pavlova* (SO *97803*). - (Fig. 3).

— Eastern Rhodopes Mts, Goljamo Kamenjane village in the region of Krumovgrad town, on serpentine rocks, 4122'N, 2548'E, 9 Jun 2000, *D. Pavlova* (SO *101148*). - (Fig. 4).

The distribution range of this species covers South Europe, the Mediterranean, the Caucasus Mts and Southwest Asia. This species is rarely distributed in Bulgaria up to 1000 m (Kozuharov 1976, 1992). *Melilotus neapolitana* is one of the eleven species belonging to subgen. *Micromelilotus* included in the monography of Schulz (1901).

The chromosome number established confirms previous data (see Fedorov 1969: 310, Fernandes & Santos 1975) but differs by the presence of 1B-chromosome.

The arm index for the first population shows the presence of meta- and submetacentric chromosomes. Two pairs of metacentric chromosomes (the second and fifth in length) carry large, spherical satellites, with long chromosomal filaments. The metacentric chromosomes prevail (63%). The shortest and the longest chromosomes are metacentric. The total length of the karyotype is s+l = 55.2 + 1.6 μm. The karyotype is clearly asymmetrical and consists of $2n$ = 6m + 6sm + 4m-SAT = 16 + 1B chromosomes. The chromosome size is ranged between 1.6 and 4.8 μm and the ratio Xmax:Xmin = 3 : 1.

The arm index for the second population shows the presence of meta- and submetacentric chromosomes. The metacentric chromosome prevail again. Like the preceding population, the availability of two pairs of chromosomes with a secondary constriction and shapely satellites is established. Unlike the preceding population both chromosome pairs are quite different, of meta and submetacentric types respectively. The satellites are large, spherical, on long chromosomal filaments. The shortest chromosome (2 μm) of metacentric type is with satellites. The longest chromosome (3.2 μm) is of the same type. The total length of the karyotype is s+l = 40.0 + 1.6 μm. The karyotype of this population is slightly asymmetrical in comparison with that from the Thracian plain and consists of $2n$ = 8m + 4sm + 2m-SAT + 2sm-SAT = 16 + 1B chromosomes. The chromosome size is ranged between 2.0 and 3.2 μm and the ratio Xmax:Xmin = 1.6 : 1.

The analysis of the karyotypes confirms the data by Kita (1966) that the species of subgen. *Micromelilotus* have smaller chromosomes compared to those of subgen. *Melilotus* with the dominance of metacentric chromosomes.

The karyotypes of the bulgarian populations investigated contain two pairs of chromosomes with a secondary constriction and 1B-chromosome in contrast to the data reported by Kita (1966).

This chromosome number is reported for the first time in Bulgaria.

1246. *Biserrula pelecinus* L. — $2n$ = 16 (Fig. 5).

Bu: Struma valley, on dry calcareous terrains, the hill Pchelina near to the railway station General Todorov, 4125 N, 2321'E, 9 May 1995, *D. Stojanov* (SO *97440*).

The distribution range of this species covers South Europe, the Mediterranean, North Africa, Macaronesia and Southwest Asia. This species is distributed in Bulgaria in Struma valley up to 200 m (Kuzmanov 1976, 1992).

The chromosome number $2n$ = 16 established confirms previous investigations (Scrugli

& Bocchieri 1976, Fernandes & al. 1977, Humphries & al. 1978, Colombo & al. 1979, Shopova & al. 1992).

The arm index shows the presence of meta and submetacentric chromosomes. A characteristic rupture near the centromere is observed for one submetacentric chromosome pair. The chromosomes are small, insignificant differences in size are recorded, similar to the results reported by Shopova & al. (1992) from F.Y.R. Macedonia. The metacentric chromosomes prevail (75%). The shortest chromosome pair is also metacentric while the longest one is submetacentric. The total length of the karyotype is s+l = 28.8 μm. The chromosome size is ranged between 1.6 and 2.4 μm, and the ratio Xmax:Xmin = 1.5 : 1. The karyotype is symmetrical and consists of $2n$ = 12m + 4sm = 16 chromosomes.

The karyotype presented by Shopova & al. (1992) consists only of metacentric chromosomes whereas in our case two pairs of submetacentric chromosomes are established.

The chromosome number is reported for the first time in Bulgaria.

1247. *Hippocrepis ciliata* Willd. — $2n$ = 14 (Figs. 6, 7).

Bu: Thracian plain, Besapara hills, calcareous terrains near to Ognjanovo village, 4207'N, 2428'E, 150 m, 26 May 1995, *D. Pavlova* (SO *101275*). - (Fig. 6).

— Strandza Mts, on dry terrains in the territory of the Reserve Vitanovo, 4203'N 2725'E, 14 Jun 1995, *D. Pavlova* (SO *101 274*). - (Fig. 7).

The distribution range of this species covers South Europe and the Mediterranean. The species is rarely distributed in Bulgaria up to 600 m (Kozuharov 1976, 1992).

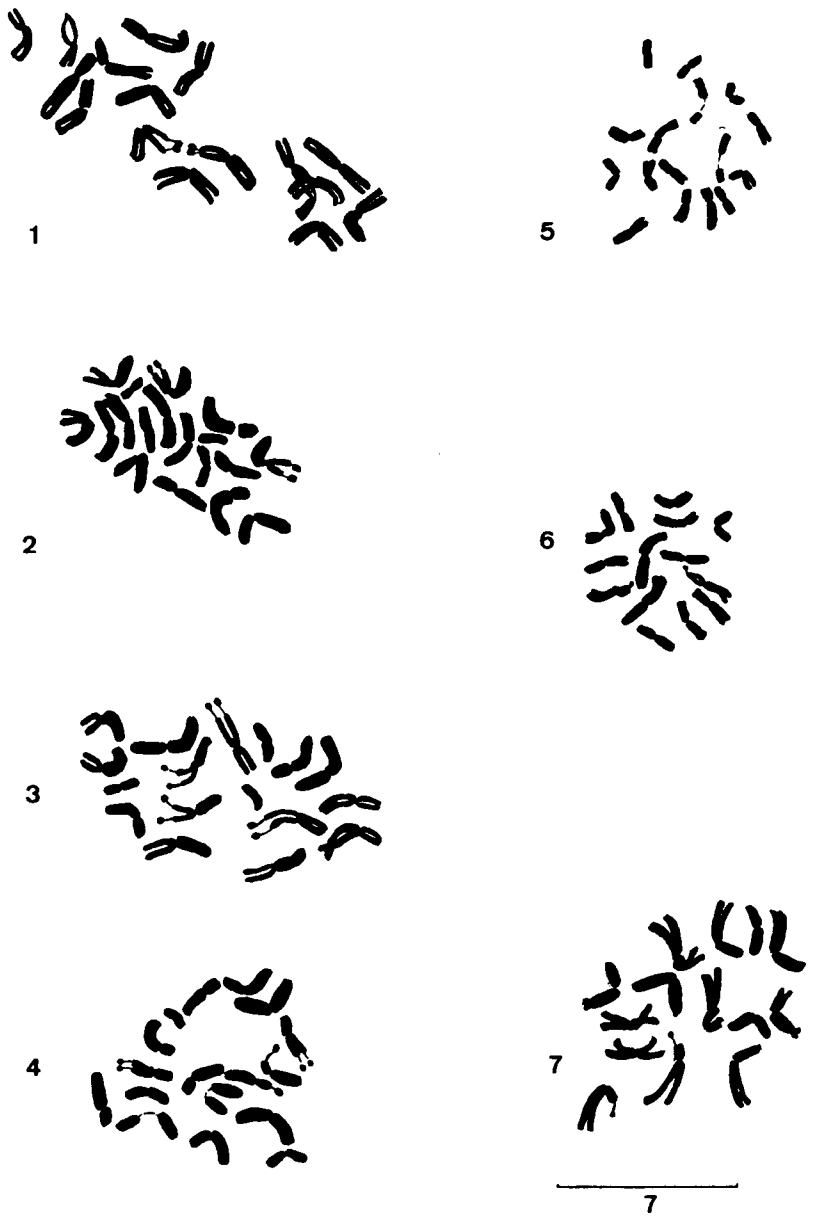
The chromosome number $2n$ = 14 established confirms the data reported by Dominguez (1976) and Shopova & Sekovski (1982).

The karyotype of the first population consists of metacentric (71.43%) and submetacentric chromosomes (28.57%) : $2n$ = 10m + 2sm + 2sm-SAT = 14. The larger submetacentric chromosome pair carries small, ball-shaped satellites, attached to the short arm by short chromosomal filaments. The total length of the karyotype is s+l = 33.6 μm. The chromosome size is ranged between 2 and 3.6 μm, and the ratio Xmax:Xmin = 1.8:1.

The arm index for the second population indicates metacentric chromosomes (71.43%), submetacentric chromosomes (14.29%) and acrocentric chromosomes (7.14%). The shortest and the longest chromosome pairs are metacentric. The chromosome pair with the satellites is acrocentric. The satellites are small, ball-shaped, attached to the short arm by long chromosomal filaments. The length of the chromatides in two pairs of chromosomes, metacentric and submetacentric, differs most probably as a result of non-reciprocal translocations. The total length of the karyotype is s+l = 52.0 μm. The chromosome size is ranged between 2.8 and 4.2 μm, and the ratio Xmax:Xmin = 1.5:1. The karyotype consists of $2n$ = 10m + 2sm + 2st-SAT = 14 chromosomes and is clearly asymmetrical.

The karyotype of this population is similar to that reported by Shopova & Sekovski (1982) : $2n$ = 4m + 8sm + 2st-SAT = 14, but differs by the higher number of submetacentric chromosomes.

The chromosome number is reported for the first time in Bulgaria.



Figs. 1-7. Karyotypes of: **1,** *Melilotus officinalis*, $2n = 16$; **2,** *M. officinalis*, $2n = 16 + 2B$; **3,** *M. neapolitana*, $2n = 16 + 1B$; **4,** *M. neapolitana*, $2n = 16 + 1B$; **5,** *Biserrula pelecinus*, $2n = 16$; **6,** *Hippocrepis ciliata*, $2n = 14$; **7,** *Hippocrepis ciliata*, $2n = 14$. — Scale bar = 7μm.

References

Colombo, P., Marcenò, C. & Princiotta, R. 1979: Numeri cromosomici per la Flora Italiana: 662-675. Inform. Bot. Ital. **10**: 315-323.

Dominguez, E. 1976: Revision de les especies anuales del genero *Hippocrepis* L. — Lagascalia **5**: 225-261.

Fedorov, A. N. (ed.) 1969: Chromosome numbers of flowering plants. Leningrad

Fernandes, A. & Santos, M. F. 1975: Contribution a la connaissance cytotaxonamique des *Spermatophyta* du Portugal, IV. *Leguminosae*. (Suppl. 1). — Bol. Soc. Brot., Sér. 2, **49**: 173-196.

— , — & Queirós, M. 1977: Contribution a la connessance cytotaxonomique des Spermatophyta du Portugal (Suppl. 1). — Bol. Soc. Brot. Sér. 2, **51**: 137-186.

Goldblatt, P. 1981: Index to chromosome numbers for 1975-1978. — Monogr. Syst. Botany, Missouri Bot. Gard. **5**.

— 1988: Index to plant chromosome numbers for 1984-1985. — Monogr. Syst. Botany, Missouri Bot. Gard. **23**.

— & Johnson, D. E. 1990: Index to plant chromosome numbers for 1986-1987. — Monogr. Syst. Botany, Missouri Bot. Gard. **30**.

— & 1991: Index to plant chromosome numbers for 1988-1989. — Monogr. Syst. Botany, Missouri Bot. Gard. **40**.

— & 1994: Index to plant chromosome numbers for 1990-1991. — Monogr. Syst. Botany, Missouri Bot. Gard. **51**.

— & — 1996: Index to plant chromosome numbers for 1992-1993. — Monogr. Syst. Botany, Missouri Bot. Gard. **52**.

Humphries, C. J., Murray, B. G., Bocquet, G. & Vasudevan, K. N. 1978: Chromosome numbers of phanerogams from Morocco and Algeria. — Bot. Not. **131**: 391-404.

Kita, F. 1966: Studies on morphology of the somatic chromosomes of the genus *Melilotus*. — Jap. Journ. Bot. **19(2)**: 149-174.

Kozuharov, S. 1976: *Biserrula* L. In: Jordanov, D. (ed.), Flora NR Bulgaria **6**: 182. — BAN, Sofia.

— 1976: *Hippocrepis* L. In: Jordanov, D. (ed.), Flora NR Bulgaria **6**: 229-231. — BAN, Sofia.

— 1976: *Melilotus* Mill. In: Jordanov, D. (ed.), Flora NR Bulgaria **6**: 318-327. — BAN, Sofia.

— 1992: Fabaceae In: Kozuharov, S. (ed.), Opredelitel na vischite rastenija v Balgarija: 382-441. Nauka i Izkustvo, Sofia.

Lesins, K. 1952: Some data on the cytogenetics of alfalfa-dour. — Heredity **43(6)**: 287-291.

Pavlova, D. & Tosheva, A. 2000: Reports (1208 - 1212). [In Kamari, G., Felber, F. & F. Garbari (eds), Mediterranean chromosome number reports-10]. — Flora Mediterranea **10**: 419-423.

Schulz, O. E. 1901: Monographie der Gatting *Melilotus*. — Bot. Jahrb. **29**: 660-735.

Scruglia, A. & Bocchieri, E. 1976: Numeri cromosomici per la Flora Italiana: 263-269. — Inform. Bot. Ital. **8**: 216-223.

Shopova, M. & Sekovski, Z. 1982: Chromosome atlas of some Macedonian Angiosperms — Macedonian Acad. Sci. and Arts, Skopje, 41pp.

— , —, Micevski, K., Matevski, V. & Dimeska, G. 1992: Chromosome atlas of some Macedonian Angiosperms VII. — God. zb., Biol., Skopje **45**: 239-248.

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Reports (1248-1253) Ana Petrova & Pepa Stanimirova

1248. *Geranium columbinum* L. — $2n = 18$ (Fig. 1).

Bu: Black Sea coast, grassy places in the forest around "Aladzha manastir", 4317'N, 2802'E, *Petrova 23242* (SOM).

The chromosome number found $2n = 18$ confirms the previous reports of Löve & Löve (1944) from Sweden, Strid (1971) from Albania, Murin (1974) from Slovakia, Alves & Leitao (1976) from Portugal, Turala-Szybowska (1976) from Poland, Strid & Franzen (1981) from Southern France and others (see Fedorov 1969). The species was studied karyologycally on material with Bulgarian origin by van Loon (1984b). The karyotype studied consists of $2n = 14$ sm + 4sm-SAT= 18 chromosomes almost equal in size. Alves & Leitao (1976) mentioned only one SAT-chromosome pair. In some slides together with the diploid plates, tetraploids ($2n = 36$) have also been observed (Fig. 2). This phenomenon often occurs in the *Geranium* species.

1249. *Geranium pratense* L. — $2n = 28$ (Fig. 3).

Bu: Balkan Range (western), grassy places at the foot of the summit Midzhour, 4324'N, 2243'E, 1500 m, *Petrova 3998* (SOM).

The chromosome number found $2n = 28$ is in accordance with previous records of Löve & Löve (1956) from Iceland, Murin & Uhrikova (1970) from Slovakia, Belaeva & Siplivinsky (1975) from Baikal, Trela-Sawicka (1978) from Poland, Javurková (1979) from Czech. The species was not studied on Bulgarian material up to now. The karyotype consists of $2n = 12$m + 14sm + 2sm-SAT = 28 chromosomes, almost equal in size.

1250. *Geranium pyrenaicum* Burm. fil. — $2n = 26$ (Fig. 4, 5).

Bu: Balkan range (middle), rocky, grassy places between the rest houses "Echo" and "Kozjata stena", 4247'N, 2429'E, 1580 m, *Petrova 6298* (SOM). - (Fig. 4).

— Pirin Mt, grassy, rocky places near the summit Orelek, 4133'N, 2336'E 1800 m, *Petrova* 2498 (SOM). - (Figs. 5, 6).

The counted chromosome number $2n = 26$ coincides with the results of previous authors (Alves & Leitao 1976 from Portugal, Murin 1974 from Slovakia, Strid 1980 and Strid & Franzén 1981 from Greece, Turala-Szybowska 1978 from Poland and Baltisberger 1991 from Greece). Van Loon & van Setten (1982) and van Loon (1984b) reported the same chromosome number from different parts of Bulgaria (Balkan Range, Pirin Mt, and the Rhodopes). The karyotype studied from Pirin Mt consists of $2n = 14$m + 2m-SAT + 8sm + 2sm-SAT = 26 chromosomes, with well-expressed 8 smaller in size chromosomes. From this locality in some slides together with diploid plates tetraploids with $2n = 52$ have been

observed (Fig. 6). The karyotype of the plants studied from Balkan Range show only 2 SAT-chromosomes (Fig. 6).

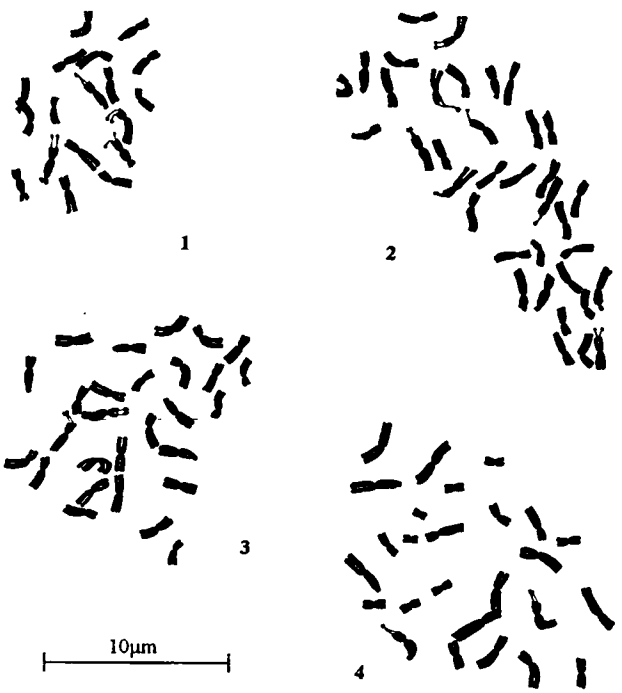
1251. ***Geranium rotundifolium*** L. — $2n = 26$ (Fig. 7).

Bu: Predbalkan region, rocky, grassy places, the hill Venetsa, near Belogradchik, 4338'N, 2241'E, 800 m, *Petrova 23433* (SOM).

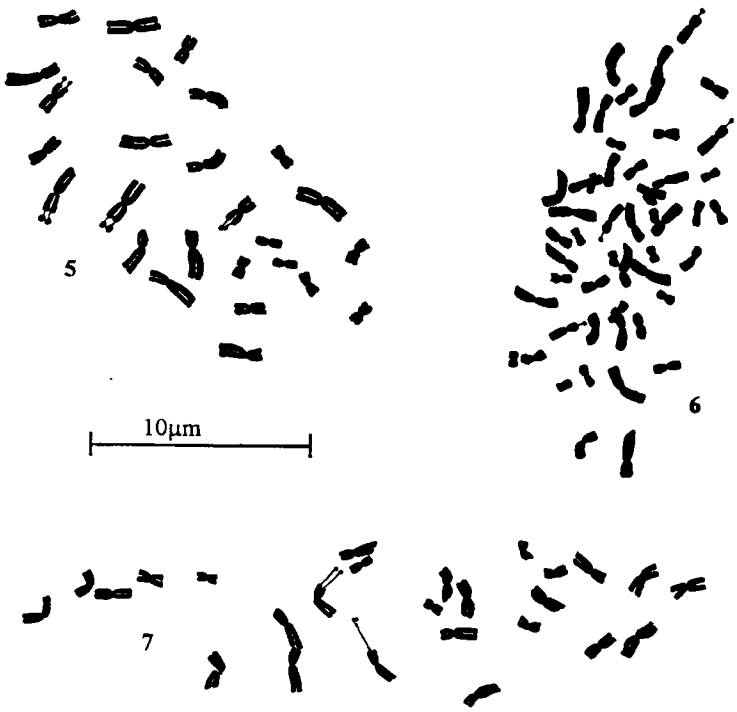
The chromosome number 2n = 26 confirms the data of previous authors (Larsen 1956, Natarajan 1978, Strid & Franzén 1981, van Loon 1984). It is a first count on Bulgarian material. The karyotype of the species studied consists of $2n$ = 18m + 6sm + 2sm-SAT = 26, with 6 smaller in size chromosomes.

1252. ***Geranium sanguineum*** L. — $2n = 84$ (Fig. 8).

Bu: Pirin Mt, grassy, rocky places, near the summit Orelek, 4133'N, 2336'E, 1800 m, *Petrova 2598* (SOM).



Figs. 1-4. Karyotypes of: **1-2,** *Geranium columbinum*, $2n$ = 18, 36; **3,** *G. pratense*, $2n$ = 28; **4,** *G. pyrenaicum*, $2n$ = 26.



Figs. 5-7. Karyotypes of: **5-6,** *Geranium pyrenaicum*, $2n$ = 26, 52 (2498); **7,** *G. rotundifolium*, $2n$ = 26.

The chromosome number confirms the data reported by Hindaková (1974) from Slovakia, Turala-Szybowska (1978) from Poland and others (see Fedorov 1969). Van Loon (1984a) reported the same chromosome number on Bulgarian materials from Rila Mt and Nikolov (1991) from the Biosphere Reserve "Bajuvi dupki - Dzhindzhiritsa" in Pirin Mt. The karyotype $2n$ = 84 chromosomes consists of meta- and submetacentric chromosomes almost equal in size.

1253. *Geranium sylvaticum* L. — $2n$ = 28 (Fig. 9, 10, 11).

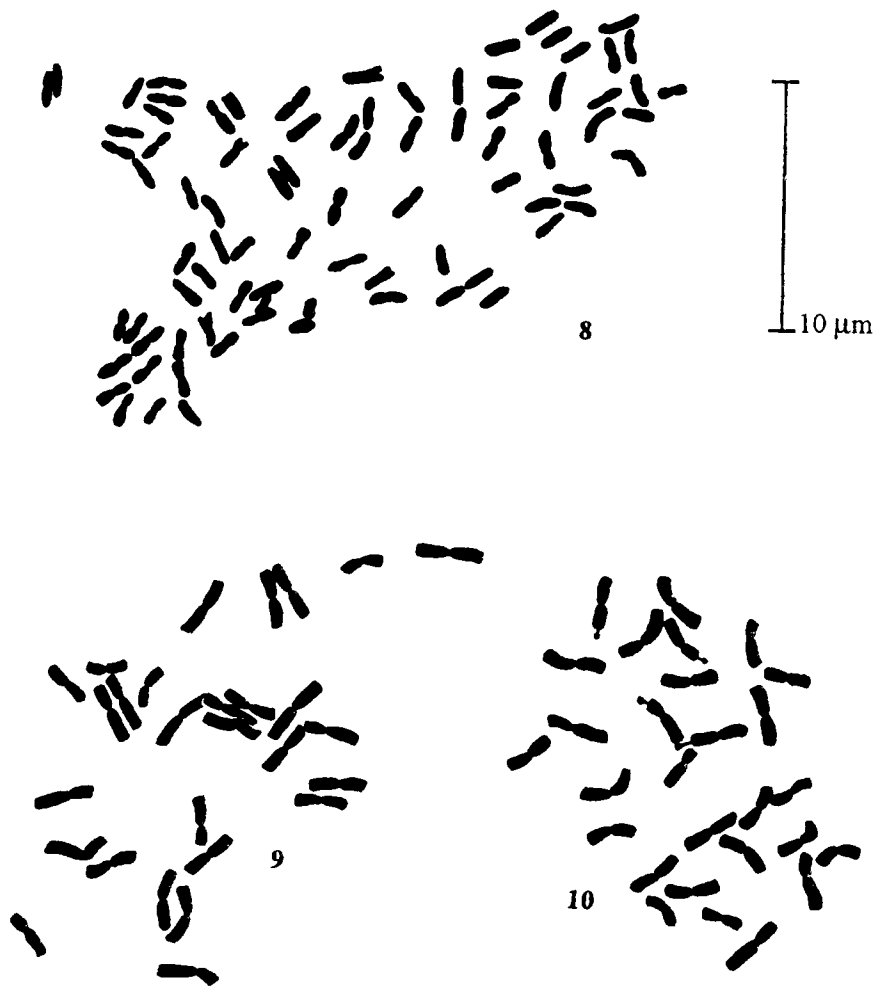
Bu: Vitosha Mt, above the village Zheleznitsa, 4233'N, 2321'E, 1300 m, *Petrova* 1896 (SOM). - (Fig. 10).

— Central Rhodopes, above the village Gela, along the road to the rest house "Lednitsata", 4139'N, 2433'E, 1500 m, *Petrova 5298* (SOM). - (Fig. 9).

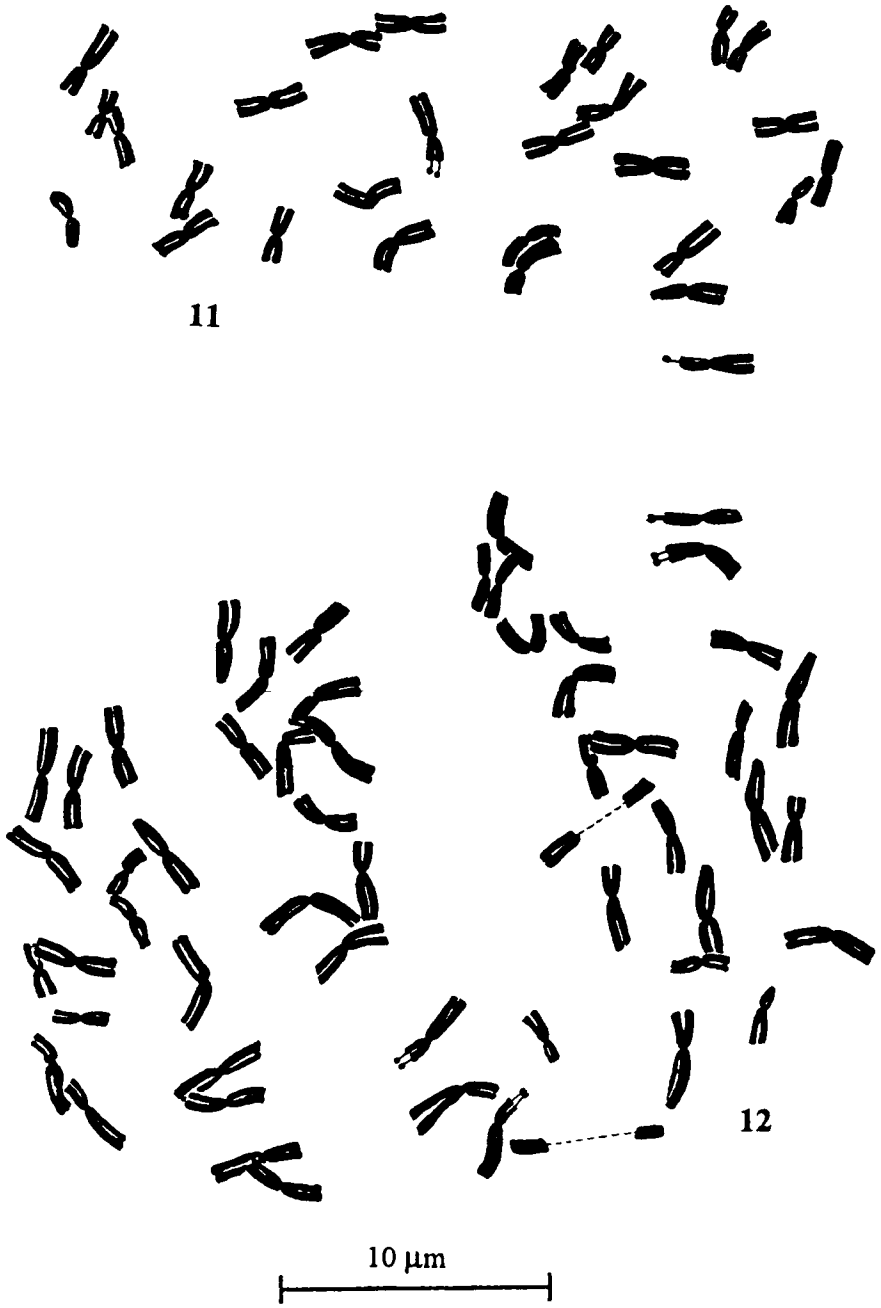
— Slavjanka Mt, near the summit Tsarev vrah, grassy places, 4123'N, 2338'E, 1800 m, *Petrova* 3598 (SOM). - (Figs. 11, 12).

The chromosome number $2n$ = 28 is in accordance with this reported by Löve & Löve (1944) from Sweden, Skalinska (1959) from Poland, Uhriková & Majovsky (1980) from

Slovakia and others (see Fedorov 1969). Nikolov (1991) reported the same chromosome number on Bulgarian material collected from Biosphere Reserve "Bajuvi dupki - Dzhindzhiritsa" in Pirin Mt. The karyotypes studied from different localities consist of meta- and submetacentric chromosomes and show differences in the number of SAT-chromosomes varying from 2 pairs (Fig. 10), one pair (Fig. 11) or no SAT-chromosomes (Fig. 9). Plates with 56 chromosomes from the locality of Mt Slavjanka have also been observed (Fig. 12).



Figs. 8-10. Karyotypes of: **8,** *Geranium sanguineum*, $2n = 84$; **9-10,** *G. sylvaticum*, $2n = 28$.



Figs. 11-12. Karyotypes of *Geranium sylvaticum*, $2n = 28, 56$ (3598).

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References

Alves, M. C. & Leitao, M. T. 1976: Contribuiçao para o conhecimento citotaxonómico das *Spermatophyta* de Portugal. XIII. *Geraniaceae*. — Bol. Soc. Brot. **50**: 231-245.

Baltisberger, M. 1991: Cytological investigations of some Greek plants. — Fl. Medit. **1**: 157-173.

Belaeva, V. A. & Siplivinsky, V. N. 1975: Chromosome numbers and taxonomy of some species of Baikal flora. — Bot. Journ. **60**: 864-872.

Fedorov, A. A. (ed.) 1969: Chromosome numbers of flowering plants. — Leningrad.

Hindáková, M. 1974: Reports. [In Majovsky, J. & al. (eds), Index of chromosome Numbers of Slovakian Flora. 3]. — Acta Fac. Rerum Nat. Univ. Comenianae, Bot. **22:** 1-20.

Javurkova, V. 1979. Reports [In Löve, A. (ed.), IOPB Chromosome number reports LXIV].— Taxon **28**: 400-401.

Larsen, K. 1956: Chromosome studies in some Mediterranean and South European flowering plants. — Bot. Notiser **109(3)**: 293-307.

Löve, A. & Löve, D. 1944: Cytotaxonomical studies on boreal plants. III. Some new chromosome numbers of Scandinavian plants. — Arkiv. Bot. **31A, 12**: 1-22.

— & — 1956: Cytotaxonomical conspectus of the Icelandic flora. — Acta Horti Gothoburgensis, **20**: 65-291.

Mizianty, M., Mirek, Z. & Frey, L. 1983: Chromosome numbers of Polish vascular plants (Part 4). — Acta Soc. Bot. Polon. **52**: 205-214.

Murin, A. 1974. Reports. [In Majovsky, J. & al. (eds), Index of chromosome Numbers of Slovakian Flora. 4]. — Acta Fac. Rerum Nat. Univ. Comenianae, Bot. **23**: 1-23.

— & Uhriková, A. 1970. Reports [In Majovsky, J. & al. (eds), Index of chromosome Numbers of Slovakian Flora. 1]. — Acta Fac. Rerum Nat. Univ. Comenianae, Bot. **16**: 1-26.

Natarajan, G. 1978. Reports. [In Löve, A. (ed.), IOPB Chromosome number reports LXII]. — Taxon **27:** 519-535.

Nikolov, N. A. 1991: Chromosome numbers of Bulgarian Angiosperms from North Pirin mountain: reserve "Bajuvi dupki-Dzindzirica". — Fitologija **41**: 70-75.

Skalinska, M. 1959: Reports [In Skalinska, M., Czapik, R., Piotrowicz, M. & al. Further studies in chromosome numbers of Polish Angiosperms (Dicotyledones)]. — Acta Soc. Bot. Polon. **28**: 487-529.

Strid, A. 1971: Chromosome numbers in some Albanian Angiosperms. — Bot. Not. **124**: 490-496.

— 1980. Reports [In Löve, A. (ed.), IOPB Chromosome number reports LXIX]. — Taxon **29**: 709-710.

— & Franzén, R. 1981: Reports [In Löve, A. (ed.), IOPB Chromosome number reports LXXIII]. — Taxon **30**: 829-830.

Trela-Sawicka, Z. 1978: Reports [In Skalinska, M., Pogan, E., Czapik, R. & al. (eds), Further studies in chromosome numbers of Polish Angiosperms. XII]. — Acta Biol. Cracov., Ser. Bot. **21**: 31-63.

Turala-Szybovska, K. 1976: Reports [In Skalinska, M., Jankun, A., Wcislo, H. & al. (eds), Further studies in chromosome numbers of Polish Angiosperms. XI. — Acta Biol. Cracov., Ser. Bot. **19**: 107-148.

— 1978: Reports [In Skalinska, M., Pogan, E., Czapik, R. & al. (eds), Further studies in chromosome numbers of Polish Angiosperms. XII]. — Acta Biol. Cracov., Ser. Bot. **21**: 31-63.
Uhriková, A. & Majovsky, J. 1980: Reports [In Löve, A. (ed.), IOPB Chromosome number reports LXIX]. — Taxon **29**: 725-726.
Van Loon, J. Chr. 1984a: Chromosome numbes in *Granium* from Europe. I. The perennial species. — Proc. Kon. Ned. Akad. Wetensch. Ser. C, **87**: 263-277.
— 1984b: Chromosome numbes in *Granium* from Europe. II. The annual species. — Proc. Kon. Ned. Akad. Wetensch. Ser. C, **87**: 279-296.
— & van Setten, A. K. 1982: Reports [In Löve, A. (ed.), IOPB Chromosome number reports LXXVI]. — Taxon **31**: 589-592.

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Reports (1254-1263) by Chiara Serra, Benito Valdés, Rossella Marcucci & Noemi Tornadore

1254. *Hypochoeris radicata* L. — $2n = 8$ (Fig. 1a, b).

Ma: Between Ketama and Taounate, 34°47'N, 4°39'W, 21 Jun 1998, *Rossini Oliva & Valdés s.n.* (SEV).

Hypochoeris radicata is widely distributed in Europe, N. Africa, W. Asia and S. America.

The somatic number $2n = 8$ has already been reported by several authors (Izuzquiza 1989, Barghi & al. 1989, Pogan & al. 1990, Luque & Díaz Lifante 1991, Valdés & al. 1998, 1999). The karyotype consists of $2n$ = 2m-SAT + 2m + 2sm-SAT +2m = 8 chromosomes.

1255. *Notobasis syriaca* (L.) Cass. — $2n = 34$ (Fig. 1c, d).

Ma: Medium Atlas, Beni-Mella, 32°11'N, 8°50'W, 20 Jun 1998, *Rossini Oliva & Valdés s.n.* (SEV).

The chromosome number found agrees with the diploid $2n = 2x = 34$ given by Devesa (1979), Ghaffari (1987) and Romano & al. (1994) for plants from Spain, Iran and Italy respectively. It is the first cytological record from Morocco. Chromosome size ranges between 1.0 and 2.0 μm. There is one metacentric SAT-pair of intermediate size.

1256. *Aegilops neglecta* Req. ex Bertol. — $2n = 28$ (Fig. 1e, f).

Ma: Ketama-Chaouene (Between Ketama and Chaouene), 34°44'N, 4°37'W, 22 Jun 1998, *Rossini Oliva & Valdés s.n.* (SEV).

The species is distributed in Southern Europe (Tutin & Humphries 1980).

The somatic number $2n = 28$ agrees with the count found by Shopova & Sekovski (1989) and consists of $2n = 4x = 8m + 8m\text{-SAT} + 8sm + 4sm\text{-SAT} = 28$ chromosomes. There are three types of SAT-chromosomes, which differ in size and position.

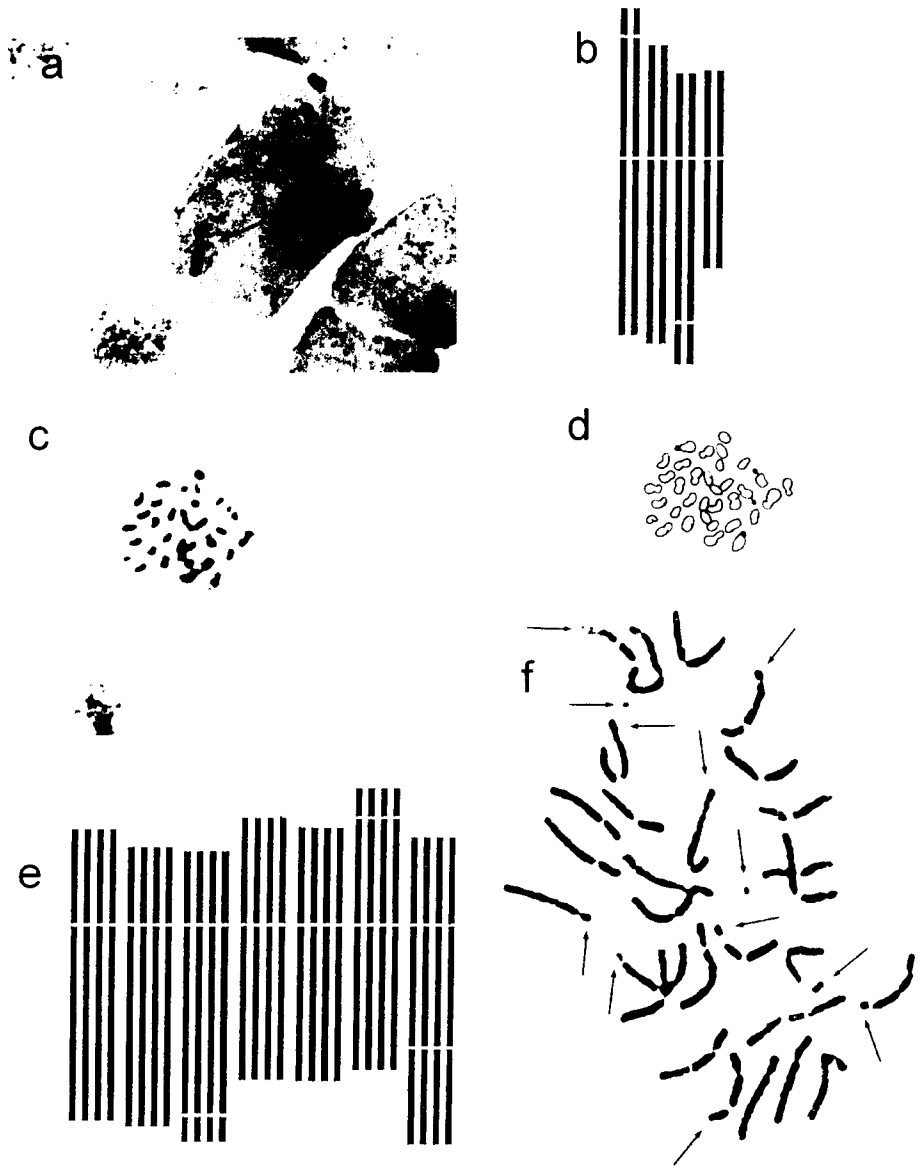

Fig. 1. **a,** Microphotograph and **b,** idiogram of *Hypochoeris radicata*, $2n = 8$; **c,** microphotograph and **d,** drawing of *Notobasis syriaca*, $2n = 34$; **e,** idiogram and **f,** microphotograph of *Aegilops neglecta* $2n = 28$. — Mag. of microphotographs x 1920.

1257. ***Malva tournefortiana*** L. — $2n = 42$ (Fig. 2a).

Ma: Bab-Berred, 34°59'N, 4°54'W, 22 Jun 1998, *Rossini Oliva & Valdés s.n.* (SEV).

This species is distributed in Portugal, Spain, France (Dalby, 1968) and Morocco (Greuter & al. 1989).

The chromosome number $2n = 42$ agrees with previous counts (Queirós 1977, Gonzáles Zapatero & Elena Rosselló 1986), but this is the first report on Moroccan plants. Two pairs of SAT-chromosomes were observed.

1258. ***Vincetoxicum hirundinaria*** Medicus ssp. ***adriaticum*** (G. Beck) Markgraf — $2n = 22$ (Fig. 2b).

It: Cesarea Terme to Gallipoli (LE), at the main road, calcareous soil, 100 m, 40°3'N, 18°28'W, 1 Feb 1998, *Marchiori s.n.* (PAD).

This is a NW. Balkanian subspecies but in 1993 it was recorded by Marchiori & al. from the Apulian coast.

No former record of any chromosome number or karyotype morphology of this subspecies is known. The chromosome number $2n = 22$ counted here for subsp. *adriaticum* has also been reported by La Valva & al. (1979-1980) for subsp. *luteolum*, by Papanicolau (1984) for subsp. *nivale* (Boiss. & Heldr.) Markgraf and by some authors (e.c. Arohonka 1982, Semerenko 1990) for subsp. *hirundinaria*. The chromosomes are small, similar in length, without any distinct position of the centromeres.

1259. ***Ranunculus bullatus*** L. — $2n = 16$ (Fig. 2c, d).

It: Close to Cutruffiano (LE), 40°8'N, 18°10'W, 19 Nov 1991, *Tornadore s.n.* (PAD).

The diploid chromosome number confirms previous counts (see Fedorov 1969, Marchi 1971, Scrugli & Mossa 1972). The karyotype of the material studied consists of $2n = 2x =$ 1sm + 1m + 4m + 2sm + 4st + 2sm + 2st = 16 chromosomes. It is characterized by an heteromorphic chromosome pair, which has one submetacentric and one metacentric chromosome.

1260. ***Allium sphaerocephalon*** L. — $2n = 24$ (Fig. 2e).

It: Marina di Tricase (LE), cultivated ground, 39°56'N, 18°18'W, 22 Nov 1990, *Marchioris s.n.* (PAD).

The chromosome numbers reported for this species are $2n = 2x = 16$ (Pastor 1982, Tornadore 1993) and $2n = 3x = 24$ (Loidl & Jones 1986). Our plants are triploid with a symmetrical karyotype, $2n = 3x =$ 3m + 3sm + 15m + 3sm = 24. No satellited chromosomes have been observed.

Fig. 2. Metaphase plates of: **a,** *Malva tournefortiana*, $2n = 42$; **b,** *Vincetoxicum hirundinaria* ssp. *adriaticum*, $2n = 22$; **c,** microphotograph and **d,** idiogram of *Ranunculus bullatus*, $2n = 16$; **e,** *Allium sphaerocephalon*, $2n = 24$. — Mag. of microphotographs x 1920.

1261. *Callitriche platycarpa* Kütz. — $2n = 10$ (Fig. 3a, b).

It: Euganean Hills between Mt Cero and Mt Gemola, fresh still water, 45°19'N, 11°43'W, 25 May 2000, *Nardi s.n.* (PAD).

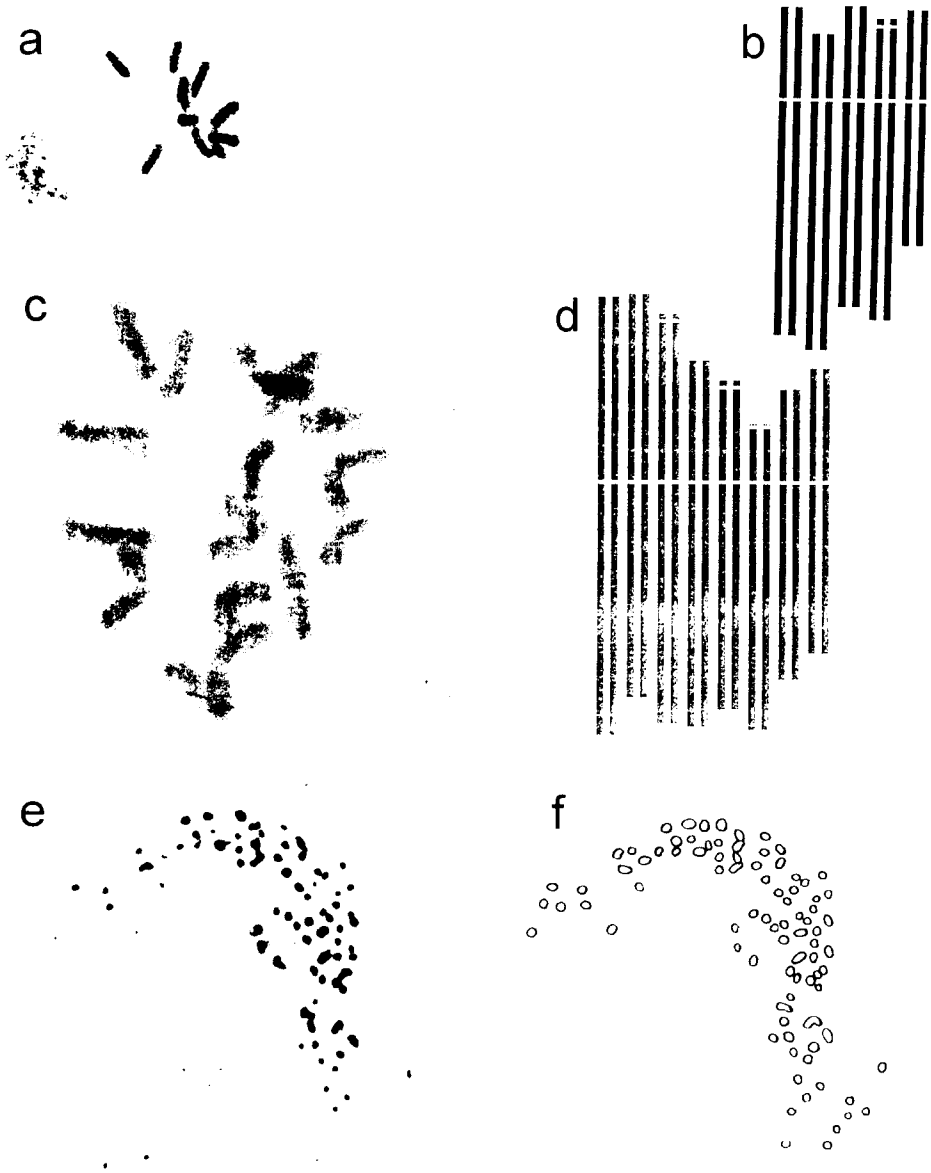

Fig. 3. **a,** Microphotograph and **b,** idiogram of *Callitriche platycarpa*, , $2n = 10$; **c,** microphotograph and **d,** idiogram of *Allium pentadactyli*, $2n = 16$; **e,** microphotograph and **f,** drawing of *Lavatera agrigentina*, $2n = 88$. — Mag. of microphotographs x 1920.

This species is distributed in NW. and C. Europe; in Italy it was given as uncertain (Schotsman 1972). The chromosome number $2n = 10$ is reported here for the first time; the karyotype shows the following formula: $2n = 2x = 2sm + 2st + 2sm + 2st\text{-}SAT + 2m = 10$ chromosomes. One pair of micro-satellited chromosomes has been observed. Tetraploid cytotypes with $2n = 4x = 20$ were usually reported from different European countries (Schotsman 1967, Casper & Krausch 1981, Fernández Bernaldo de Quirós 1987, Wentworth & al. 1991).

1262. ***Allium pentadactyli*** Brullo, Pavone et Spampinato — $2n = 16$ (Fig. 3c, d).

It: Capo dell' Armi (Reggio Calabria), 38°57'N, 15°48' W, dry and rocky grassland, 31 May 1999, *Sburlino s.n.* (PAD).

Allium pentadactyli is a rare species of S. Italy (Brullo & al. 1989). Our population comes from a place near the locus classicus; the karyotype consists of $2n = 2x = 6m + 4sm + 4sm\text{-}SAT + 2st\text{-}SAT = 16$ chromosomes, with three pairs of small satellites. This is the second cytological report for the species.

1263. ***Lavatera agrigentina*** Tineo — $2n = 88$ (Fig. 3e, f).

Si: 20 Km North of Agrigento, 37°20'N, 13°35'W, 25 June 1998, *Rossini Oliva & Valdés s.n.* (SEV).

Endemic to Sicily and Calabria (Zangheri 1976, Pignatti 1982), grows on dry and clayed substrates.

Our tetraploid count $2n = 4x = 88$ does not confirm the previous one by Brullo & al. (1978) who reported $2n = 44$ for this species. Chromosome size ranges between 0.6 and 2.0 μm.

References

Arohonka, T. 1982: Chromosome counts of vascular plants of the island Seili in Nauvo, SW Finland. — Turun Yliopiston Biologian-Laitoksen Julkaisuja **3**: 1-12.

Barghi, N., Mugnier, C. & Šiljak-Yakovlev, S. 1989: Karyological studies in some *Hypochoeris* spp. (Compositae). — Pl. Syst. Evol. **168**: 49-57.

Brullo, S., Pavone, P. & Spampinato, G. 1989: *Allium pentadactyli* (Liliaceae), a new species from S Italy. — Willdenowia **19**: 115-120.

—, — & Terrasi, M. C. 1978: Numeri cromosomici per la Flora Italiana: 632-646. — Inform. Bot. Ital. **8**: 67-74.

Casper, S. J. & Krausch, H. D. 1981: Pteridophyta und Anthophyta. 2. Süßwasserflora von Mitteleuropa. — Fischer. Stuttgart, New-York.

Dalby, D. H. 1968: *Malva* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb D. A. (eds), Flora Europaea **2**: 249-251. — Cambridge University Press.

Devesa, J. A. 1979: Números cromosómicos para la flora Española 84-120. — Lagascalia **9**: 115-130.

Fedorov, A. A. 1969: Chromosome numbers of flowering plants. — Leningrad.

Fernández Bernaldo de Quirós, C. 1987: Números cromosomáticos de algunas especies acuáticas de *Ranunculus* L. y Callitriche en Asturias. — Revista Biol. Univ. Oviedo **5**: 65-70.

Ghaffari, S. M. 1987: Chromosome studies in some flowering plants of Iran. — Rev. Cytol. Biol. Vég., Bot. **10**: 3-8.

González Zapatero, M. A. & Elena Rosselló, J. A. 1986: Notas cariológicas sobre algunos endemismos ibéricos. II. — Stvd. Bot. (Salamanca) **5**: 203-208.

Greuter, W., Burdet, H. M. & Long, G. (eds) 1989: Med-Checklist **4**. — Conservatoire et Jardin botaniques de la Ville de Genève, Genève.

Izuzquiza, A. 1989: Numeros cromosomáticos de plantas occidentales 533-538. — Anales. Jard. Bot. Madrid **45**: 509-513.

La Valva, V., Moraldo, B. & Caputo, G. 1979: *Vincetoxicum hirundinaria* Medicus subsp. *luteolum* (Jord. et Fourr.) La Valva, Moraldo et Caputo stat. et comb. nov. (Asclepiadaceae) entità nuova per la flora italiana. — Delphinoa **21-22**: 91-96.

Loidl, J. & Jones, G. H. 1986: Synaptonemal complex spreading in *Allium*. I. Triploid *A. sphaerocephalon*. — Chromosoma **93**: 420-428.

Luque, T. & Díaz Lifante, Z. 1991: Chromosome numbers of plants collected during Iter mediterraneum I in the SE of Spain. — Bocconea **1**: 303-364.

Marchi, P. 1971: Numeri cromosomici per la Flora Italiana, 45-56. — Inform. Bot. Ital. **3**: 93.

Marchiori, S., Medagli, P., Sabato, S. & Ruggiero, L. 1994: Remarques chorologiques sur quelques taxa nouveaux ou rares dans le Salento (Pouilles, Italie). — Inform. Bot. Ital. **25(1)**: 37-45 (1993).

Papanicolaou, K. 1984: Reports [In Löve, Á. (ed.), IOPB Chromosome Number Reports LXXXII]. — Taxon **33**: 126-134.

Pastor, J. 1982: Karyology of *Allium* species from the Iberian Peninsula. — Phyton (Austria) **22**: 171-200.

Pignatti, S. 1982: *Lavatera* L. In: Pignatti, S. (ed.), Flora d' Italia **2**: 89-91. — Edagricole, Bologna.

Pogan, E., Jankun, A. & Sawicka, Z. 1990: Further studies in chromosome numbers of Polish angiosperms, part 22. — Acta Biol.Cracov., Ser.Bot. **31**: 1-17.

Queirós, M. 1977: Contribuicão para o conhecimento citotaxonómico das Spermatophyta de Portugal. Malvaceae. — Bol. Soc. Brot. **51**: 187-199.

Romano, S., Ottonello, D. & Marcenò, C. 1994: Numeri cromosomici per la Flora Italiana, 1302-1313. — Inform. Bot. Ital. **26(2-3)**: 197.

Schotsman, H. D. 1967: Les Callitriche Espèces de France et taxa noveaux d' Europe. — Paul Lechevalier, Paris.

Schotsman, H. D. 1972: *Callitriche* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds), Flora Europaea **3**: 123-126. — Cambridge University Press.

Scrugli, A. & Mossa, L. 1972: Sulla esistenza di due diverse varietà di *Ranunculus bullatus* L. Osservazioni cariologiche ed ecologiche su materiale della Sardegna. — Giorn. Bot. Ital. **106**: 11-19.

Semerenko, L.V. 1990: Chromosome numbers of some flowering plants from Berezinsky Biosphere Reservation (the Byellorussian Soviet Socialist Republic). — Bot. ≥urn. **75**: 279-282.

Shopova, M. & Sekovski, Z. 1989: Chromosome atlas of some Macedonian angiosperms. — V. God. Zborn. Biol. Prir. - Mat. Fak. Univ. Kiril and Metodij **39-40**: 353-365.

Tornadore, N. 1993: Intrasubspecific variability in *Allium sphaerocephalon* L. ssp. *sphaerocephalon*. — Proceedings of the 5th OPTIMA Meeting, Istanbul: 789-797.

Tutin, T. G. & Humphries, C. J. 1980: *Aegilops* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds), Flora Europaea **5**: 200-

202. — Cambridge University Press.
Valdés, B., Parra, R., Parrilla, R. & Reina, C. 1998: Números cromosómicos de plantas de Marruecos, II. — Lagascalia **20**: 223-230.
— , —, Sánchez, A. M. & Diaz, M. D. 1999: Números cromosómicos de plantas de Marruecos, IV. — Lagascalia **21**: 235-240.
Wentworth, J. E., Bailey, J. P. & Gornall, R. J. 1991: Contributions to a cytological catalogue of the British and Irish flora, 1. — Watsonia 18: 415-417.
Zangheri, P. 1976: *Lavatera* L. In: Flora italica **1**: 388-390. — CEDAM, Padova.

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Reports (1264-1270) by M. Adele Signorini, Bruno Foggi & Bruno Mori

1264. *Centaurea aplolepa* Moretti subsp. ***aetaliae*** (Sommier) Dostàl — $2n = 18$ (Fig. 1).

It: Elba island, Volterraio, cliffs along the road, 42°48'N, 10°27'E, 300 m, 20 May 1999, *Foggi & Grigioni, cult.* Hort. Bot. Firenze, accession number *8453* (F).

C. aplolepa subsp. *aetaliae* is endemic to the island of Elba (Tuscan Archipelago), where it is widespread in the eastern part of the Island (cf. Fossi Innamorati 1989), in dry and rocky stands.

The diploid chromosome number $2n = 18$ agrees with those previously reported by Viegi & Cela Renzoni (1976). Two SAT-chromosome pairs of chromosomes have also been observed.

This number is common to all the taxa belonging to Sect. Aplolepidae (J. Arènes) Dostàl: cf. Arrigoni & al. (1980) for *Centaurea aplolepa* Moretti subsp. *carueliana* (Micheletti) Dostàl; Viegi & Cela Renzoni (1976) for *C. aplolepa* subsp. *cosana* (Fiori) Dostàl, subsp. *lunensis* (Fiori) Dostàl, subsp. *maremmana* (Fiori) Dostàl, subsp. *subciliata* (DC.) Arcangeli; Viegi & al. (1972) for *C. aplolepa* subsp. *aeolica* (Guss. ex Lojac.) Dostàl (sub. *C. aeolica* Guss. in Lojac.) and *C. paniculata* L. var. *aplolepa* (Moretti) Fiori (most likely *C. aplolepa* subsp. *lunensis*); Amore & al. (1999) for *C. aplolepa* subsp. *subciliata* (DC.) Arcangeli.

1265. *Centaurea dissecta* Ten. var. ***intermedia*** (Micheletti) Fiori — $2n = 18$ (Fig. 2).

It: P.za al Serchio (Lucca), cliffs along the road, 44°11'N, 10°18' E, Jul 1999, *Foggi, Landi & Signorini, cult.* Hort. Bot. Firenze, accession numbers *8595, 8594* (F).

C. dissecta var. *intermedia* is an endemic plant growing in N-Central Apennines and pre-Apennines, from Tuscany to Marche (Fiori 1927). This taxon is not acknowledged either by Dostàl (1976) or by Pignatti (1982). Yet, studies currently in progress (P. V. Arrigoni *pers. comm.*) demonstrate that it is a well distinct taxon and is quite worthy to be considerd at specific level.

This is its first chromosome count.

1266. *Linaria capraria* Moris & De Not. — $2n = 12$ (Fig. 3).

It: Capraia island (Tuscan Archipelago), near the castle (Castello), 43°02'N, 9°50'E, rocks close to the Ristorante "La Garitta", 19 May 1984, *Fabbri & Luzzi, cult.* Hort. Bot. Firenze, accession number *8447* (F).

Linaria capraria is endemic to some islands of the Tuscan Archipelago (Elba, Capraia, Gorgona, Montecristo, Pianosa, Giglio and minor islets), where it occurs on rocks and stone walls.

The same chromosome number is reported by Garbari & Tornadore (1972) for plants from Marina di Campo (Elba island).

The closely related species *L. purpurea* (L.) Mill. shows the same chromosome number, according to Valdés (in Moore 1982) and Colombo & al. (1978) for provenances from Sicily, as well as Pedrotti & Cortini Pedrotti (1971) for provenances from Umbria (central Italy).

1267. *Mentha requienii* Benth. subsp. ***bistaminata*** Mannocci & Falconcini — $2n = 18$ (Fig. 4).

It: Capraia island, Vado del Fondo, 43°01'N, 9°48'E, 250 m, May 1995, *Foggi, Grigioni & Luzzi, cult.* Hort. Bot. Firenze, accession number *8456* (F).

This subspecies endemic to the Island of Capraia (Tuscan Archipelago) differs from the typical one, mainly in the corolla shape (bilabiate instead of regular) and in the number of stamens, almost always 2 (rarely 3), instead of 4 (rarely 3, exceptionally 2).

Our datum agrees with the chromosome number reported in the original description (Mannocci & Falconcini 1985).

The same number $2n = 18$ has also been reported by Diana Corrias (1980) from Sardinia (Gennargentu) and by Contandriopoulos (in Moore 1982) and Ruttle (in Mannocci & Falconcini 1985) from Corsica, for the subsp. *requienii*.

1268. *Senecio incanus* L. subsp. ***incanus*** — $2n = 40$ (Fig. 5).

It: Mt Prado, 44°15'N, 14°29'E, 1900 m, 15 Jul 1999, *Foggi, Landi & Signorini, cult.* Hort. Bot. Firenze, accession number *8574* (F).

S. incanus subsp. *incanus* is an orophyte growing in pastures and rocky stands. Its distribution is restricted to the western Alps and to only one very narrow area in the northern Apennines (Barbero 1966), between Mt Vecchio and Mt Prado.

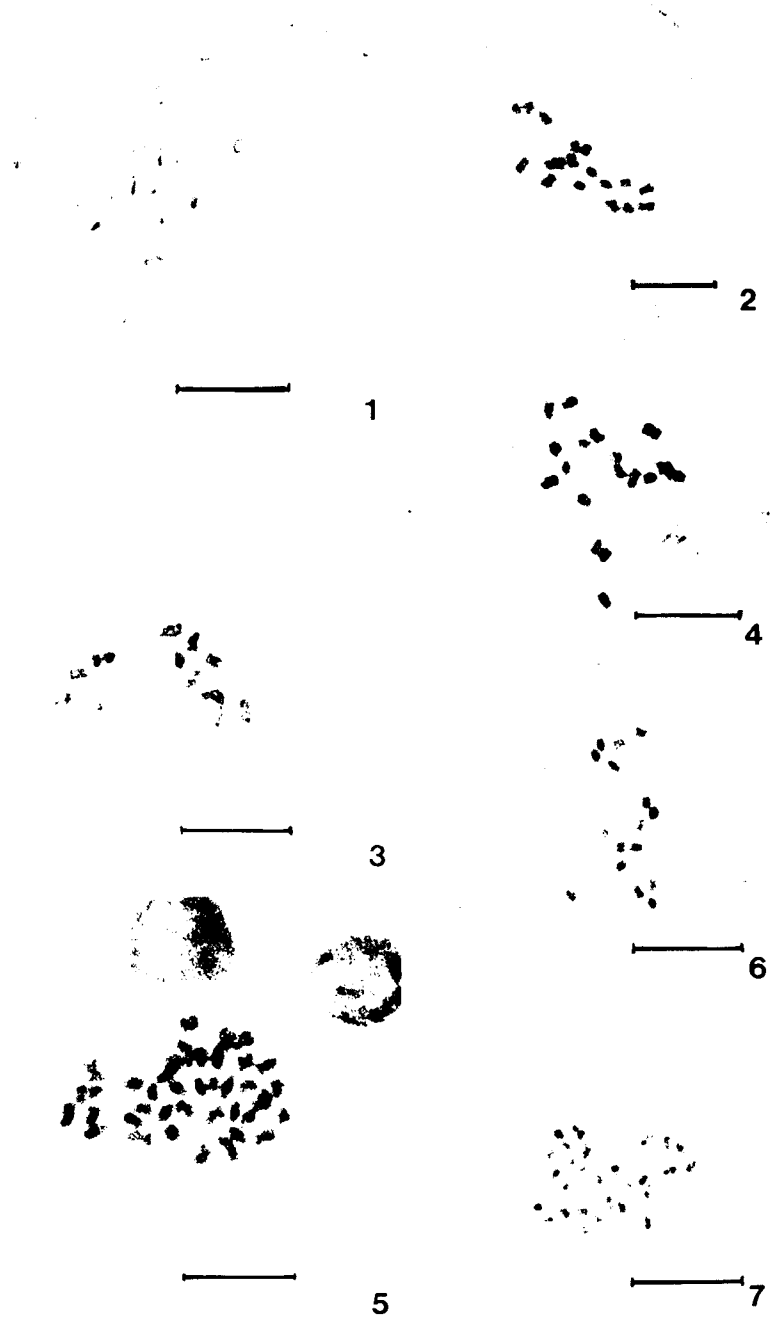

Fig. 1-7. Microphotographs of mitotic metaphase plates of: **1,** *Centaurea aplolepa* ssp. *aethaliae*, $2n = 18$; **2,** *C. dissecta* var. *intermedia*, $2n = 18$; **3,** *Linaria capraria*, $2n = 12$; **4,** *Mentha requienii* ssp. *bistaminata*, $2n = 18$; **5,** *Senecio incanus* ssp. *incanus*, $2n = 40$; **6,** *Brassica fruticulosa* ssp. *fruticulosa*, $2n = 16$; **7,** *Dianthus rupicola*, $2n = 30$. — Scale bars = 10 μm.

The chromosome number here reported, observed on populations from N. Apennines, agrees with that reported by Favarger (in Moore 1982) for Swiss provenances.

The close related *S. incanus* subsp. *carniolicus* (Willd.) Br.-Bl., endemic to CE. Alps and Carpathians, shows a higher ploidy level: Favarger (in Moore 1982) reports $2n$ = c.120 for Italian and $2n$ = c.140 for Swiss provenances; respectively, the latter possibly being a typographical error, as in Chater & Walters (1976) the numbers $2n$ = c.120, c.160 are reported.

1269. *Brassica fruticulosa* Cyr. subsp. ***fruticulosa*** — $2n = 16$ (Fig. 6).

It: Stromboli island (isl. Eolie), near the beach "Fico Grande", 38°48'N, 15°14'E, 50 m from the seashore, 5 m, volcanic sand. 10 Jul 2000, *Signorini s.n.* (FIAF).

Brassica fruticulosa subsp. *fruticulosa* is a Mediterranean element, very common in Stromboli island, as stated also in Ferro & Furnari (1967: 35).

The same chromosome number $2n = 16$ has been reported for this subspecies in Akeroyd (1993), without any mention of the provenance.

In the genus *Brassica* the chromosome numbers $2n = 18$, 20 and 38 have also been reported (Moore 1982). All the reports for varius species from italian provenances were $2n = 18$ (Raimondo & Garbari, 1975, Miceli & Garbari 1976, Colombo & al. 1978, Ferrarella & al. 1979a, b, Raimondo & al. 1979, 1980, Lentini & al.1988). Moreover, Miceli & Garbari (1976) observed $2n = 20$ in *Brassica glabrescens* Poldini.

1270. *Dianthus rupicola* Biv. — $2n = 30$ (Fig.7).

It: Stromboli island (isl. Eolie), near the beach "Fico Grande", 38°48'N, 15°14'E, 100 m from the seashore, 10 m, volcanic cliffs, 10 Jul 2000, *Signorini s.n.* (FIAF).

The distribution area of this Central-Mediterranean species includes Southern Italy, Sicily and neighbouring islets, Balearic Islands and part of Tunisia (Greuter & al. 1984). Populations of *D. rupicola* grow on rocks, sea cliffs and walls (see Francini & Messeri 1956 for a map of the distribution area and a full description of the anatomic features of the species), usually on calcareous substrates. Unlike its habitual ecology, in the island of Stromboli it is widespread on lavic substrates, mainly cliffs close to the seashore. According to Brullo (*pers. comm.*), populations growing in the isl. Eolie Archipelago should be referred to *D. aeolicus* Lojac. (Fl. Sic. 1(1): 163, 1888).

Our datum for this taxon agrees with that reported by Bartolo & al. (1977) for Sicilian provenances.

References

Akeroyd, J. R. 1993: *Brassica* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb D. A. (eds), Flora Europaea **1**: 405-409. — Cambridge.

Amore, I., Bedini, G. & Garbari, F. 1999: Report 1066. [In Kamari, G., Felber, F. & Garbari, F. (eds), Mediterranean chromosome number reports -9]. — Fl. Medit. **9**: 359.

Arrigoni, P. V., Giannerini, M. & Mori, B. 1980: Numeri cromosomici per la Flora Italiana, 715. — Inform. Bot. Ital. **12**: 137,139.

Barbero, M. 1966: A propos de trois espèces rupicoles endémiques des Alpes Ligures. — Bull. Soc. Bot. Fr., **113**: 330-344.

Bartolo, G., Brullo, S., Majorana, G. & Pavone, P. 1977: Numeri cromosomici per la Flora Italiana, 315. — Inform. Bot. Ital. **9**: 71, 73.

Chater, A. O. & Walters, S. M. 1976: *Senecio* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb D. A. (eds), Flora Europaea **3**: 191-205. — Cambridge.

Colombo, P., Colombo, R., Marcenò, C. & Pavone, P. 1978: Numeri cromosomici per la Flora Italiana, 517-522. — Inform. Bot. Ital. **10**: 406-408.

Diana Corrias, S. 1980: Numeri cromosomici per la Flora Italiana, 704. — Inform. Bot. Ital. **12**: 127-128.

Dostàl, J. 1976: *Centaurea* L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb D. A. (eds), Flora Europaea **3**: 254-301. — Cambridge.

Ferrarella, A. M., Fiore, I., Dia, M. G. & Alliata, N. 1979: Numeri cromosomici per la Flora Italiana, 649. — Inform. Bot. Ital. **11**: 303-304.

— , Dia, G. & Raimondo, F. M. 1979: Numeri cromosomici per la Flora Italiana, 584. — Inform. Bot. Ital. **11**: 21-23.

Ferro, G & Furnari, F. 1967: Flora e vegetazione di Stromboli (Isole Eolie). — Arch. Bot. Biogeogr. Ital., **44:** 21-45, 59-87.

Fiori, A. 1927: *Centaurea* L. in Nuova Flora Analitica d'Italia, **2**: 713-743. — Firenze.

Fossi Innamorati, T. 1989: La flora vascolare dell'Isola d'Elba (Arcipelago Toscano). Parte 2. — Webbia **43(2)**: 256.

Francini, E. & Messeri, A. 1956: L'isola di Marettimo nell'arcipelago delle Egadi e la sua vegetazione. — Webbia **11**: 607-846.

Garbari, F. & Tornadore, N. 1972: Numeri cromosomici per la Flora Italiana, 112. — Inform. Bot. Ital. **4**: 62.

Greuter W., Burdet, H. M. & Long, G. (eds) 1984: Med-Checklist **1**: 202. — Genève.

Lentini, F., Romano, S. & Raimondo, F. M. 1988: Numeri cromosomici per la Flora Italiana, 1189. — Inform. Bot. Ital. **20**: 640-642.

Mannocci, M. & Falconcini, E. 1985: *Mentha requienii* B. ssp. *bistaminata*. Nuova sottospecie dell'Isola di Capraia (Livorno). — Quad. Mus. Storia Nat. Livorno **6**: 37-41.

Miceli, P. & Garbari, F. 1976: Numeri cromosomici per la Flora Italiana, 260. — Inform. Bot. Ital. **8**: 210.

Moore, D. M. (ed.) 1982: Flora Europaea check-list and chromosome index. — Cambridge.

Pedrotti, F. & Cortini Pedrotti C. 1971: Numeri cromosomici per la Flora Italiana, 16. — Inform. Bot. Ital. **3**: 48.

Pignatti, S. 1982: *Centaurea* L. In: Pignatti, S. (ed.), Flora d'Italia **3**: 173-209. — Bologna.

Raimondo, F. M. & Garbari, F. 1975: Numeri cromosomici per la Flora Italiana, 206. — Inform. Bot. Ital. **7**: 374-375.

— , Rossitto, M. & Ottonello, D. 1979: Numeri cromosomici per la Flora Italiana, 985. — Inform. Bot. Ital. **15**: 181-183.

— , —, Ferrarella, A. & Mazzola, P. 1980: Numeri cromosomici per la Flora Italiana, 773. — Inform. Bot. Ital. **12**: 314-317.

Viegi, L., Cela Renzoni, G., Corsi, G. & Garbari, F. 1972: Numeri cromosomici per la Flora Italiana, 139, 144. — Inform. Bot. Ital. **4**: 230-236.

— , —, 1976: Numeri cromosomici per la Flora Italiana, 278-282. — Inform. Bot. Ital. **8**: 277.

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Reports (1271-1277) by Vladimir Vladimirov & Zbigniew Szeląg

1271. ***Hieracium divergens*** Naegeli & Peter — $2n = 36$ (Fig. 1a, b).

Bu: Konjavska Mt, the peak of Viden, 42°20'N, 22°50'E, grassy places on calcareous bedrock; c. 1480 m, 22 Jul 1999, *Vladimirov VV 6080* (SOM).

This is the first determination of the chromosome number for the species, which is endemic to Bulgaria.

1272. ***Hieracium jankae*** R. Uechtr. s.l. — $2n = 27$ (Fig. 2).

Bu: Pirin Mt, above the hut of Javorov in Razlozhki Suhodol valley, 41°49'N, 23°22'E, calcareous outcrops in a coniferous forest, 1900-1950 m, 3 Aug 1999, *Vladimirov VV 5196* (SOM).

Triploid chromosome numbers has been reported so far for the species (Schuhwerk & Lippert 1998).

1273. ***Hieracium naegelianum*** Pančić subsp. ***ferdinandi-regis*** Stoj. & Zahn — $2n = 27$ (Fig. 3a, b).

Bu: Pirin Mt, Razlozhki Suhodol valley, 41°48'N, 23°22'E, siliceous grassy places, c. 2200 m, 3 Aug 1999, *Vladimirov VV 5340* (SOM).
— Pirin Mt, below the peak of Vihren, 41°46'N, 23°24'E, rocky and grassy places on calcareous bedrock, c. 2500 m, 4 Aug 1999, *Vladimirov VV 5090* (SOM).

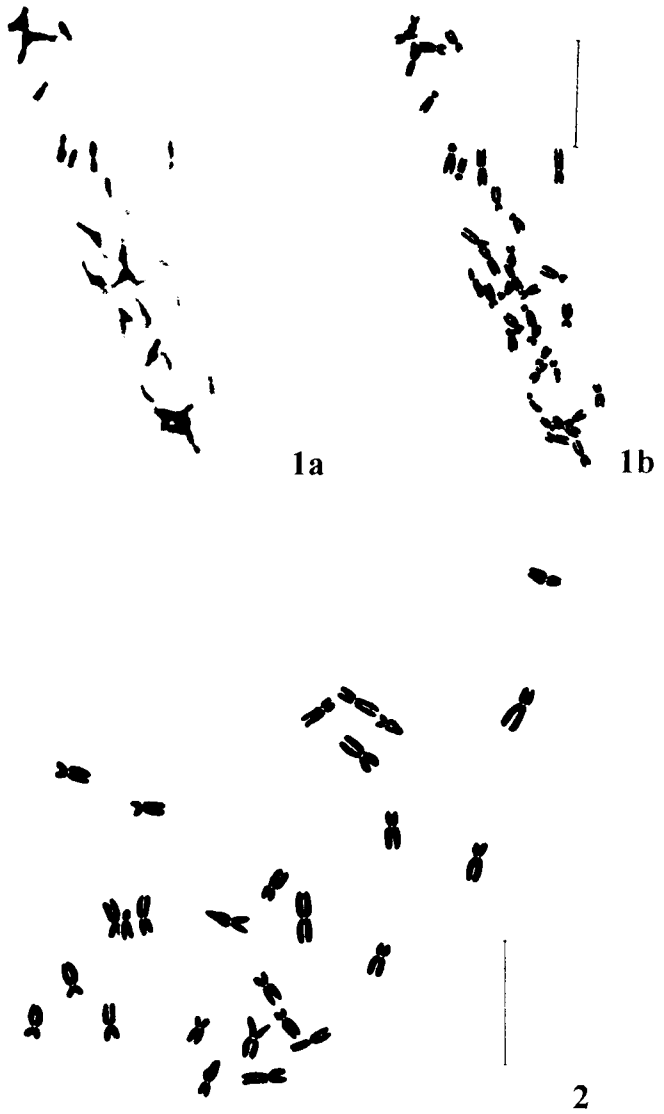
The species is distributed in the Balkan Peninsula and the Central Apennines.

These are the first determinations of the chromosome number from Bulgarian accessions, which confirm the triploid number that has already been reported for Greek plants (Grau & Erben 1988).

1274. ***Hieracium olympicum*** Boiss. subsp. ***olympicum*** — $2n = 27$ (Fig. 4a, b).

Bu: Pirin Mt, below Gradeshka Tumba peak, 41°46'N, 23°32'E, by road at the edge of *Pinus sylvestris* L., forest on siliceous bedrock, c. 1400 m, 31 Jul 1999, *Vladimirov VV 5720* (SOM).

This is the first determination of the chromosome number for the species.



Figs. 1-2. Mitotic metaphase plates of: **1,** *Hieracium divergens*, $2n = 36$ (**a**, microphotograph and **b**, drawing); **2,** *H. jankae*, $2n = 27$. — Scale bars = 10 μm.

1275. ***Hieracium pannosum*** Boiss. subsp. ***pannosum*** — $2n = 36$ (Fig. 5a, b).

Bu: Pirin Mt, above the hut of Javorov in Razlozhki Suhodol valley, 41°49'N, 23°22'E, calcareous outcrops in a coniferous forest, 1900-1950 m, 3 Aug 1999, *Vladimirov VV 5191* (SOM).

The tetraploid chromosome number is reported for the first time from a Bulgarian accession. It confirms the determinations of Christoff & Popoff (1933) and Papanicolaou (1984). Triploid chromosome number has been reported, as well (Rosenberg 1926, Strid & Franzén 1981, Schuhwerk & Lippert 1998).

1276. ***Hieracium sparsum*** Friv. subsp. ***sparsum*** — $2n = 18$ (Figs. 6a, b &7a, b).

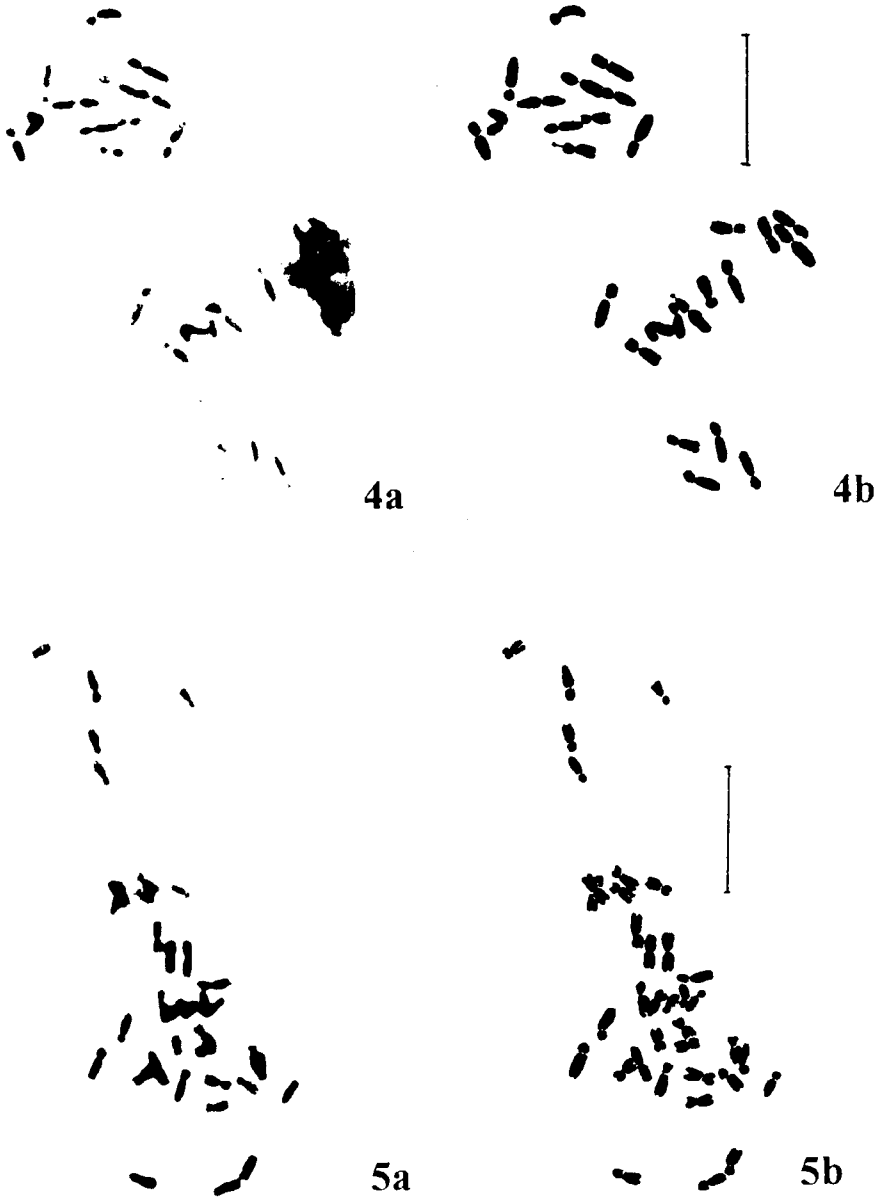
Bu: Osogovska Mt, near the peak of Ruen, 42°11'N, 22°32'E, granite outcrops in the subalpine belt, c. 1950 m, 23 Jul 1999, *Vladimirov VV 6030* (SOM). - (Fig. 6a, b).

— Pirin Mts, Demjanitsa valley - by the road above the place of Demjanishka poljana, 41°45'N, 23°27'E, rocky slope at the edge of *Picea*-forest on siliceous bedrock, c. 1800 m, 2 Aug 1999, *Vladimirov VV 5516* (SOM). - (Fig. 7a, b).

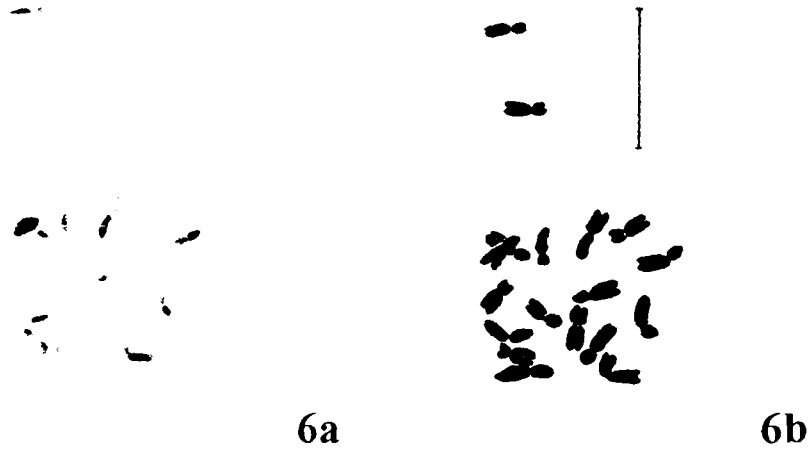
— Pirin Mts, below the peak of Vihren, 41°45'N, 23°23'E, siliceous grassy places in openings of *Pinus mugo* Turra - communities, 2200-2300 m, 4 Aug 1999, *Vladimirov VV 5130* (SOM).

The diploid chromosome number coincides with the determination made by Christoff (1942).

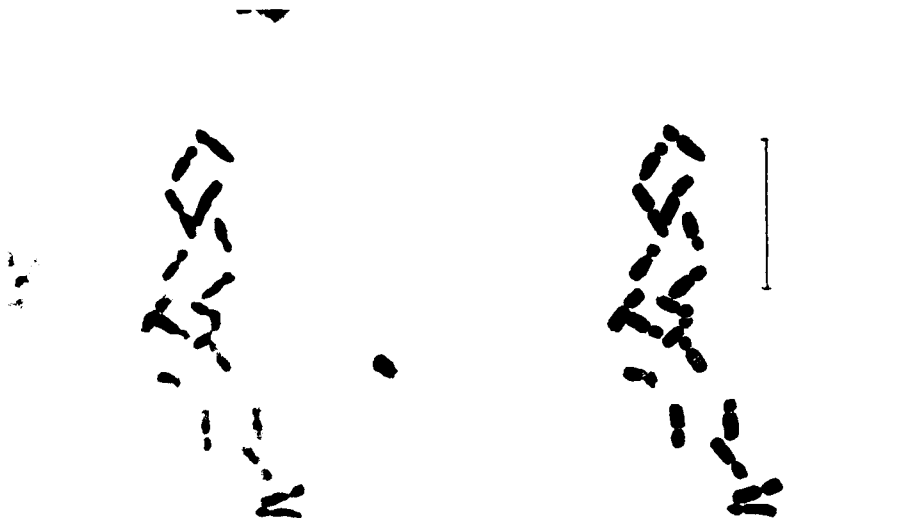
Fig. 3. Microphotograph (**a**) and drawing (**b**) of mitotic metaphase plate of *Hieracium naegelianum* ssp. *ferdinandi-regis*, $2n = 27$. — Scale bar = 10 µm.



Figs. 4-5. Microphotographs (a) and drawings (b) of mitotic metaphase plates of: **4a, b,** *Hieracium olympicum* ssp. *olympicum*, $2n = 27$; **5a, b,** *H. pannosum* ssp. *pannosum*, $2n = 36$. — Scale bars = 10 μm.



6a 6b



7a 7b

Figs. 6-7. Microphotographs (**a**) and drawings (**b**) of mitotic metaphase plates of *Hieracium sparsum* ssp. *sparsum*, $2n = 18$. — Scale bars = 10 μm.

Fig. 8. Drawing of a mitotic metaphase plate of *Hieracium sparsum* aff. ssp. *secundum*, $2n = 27$. — Scale bar = 10 μm.

1277. *Hieracium sparsum* Friv. aff. subsp. ***secundum*** (Freyn) Zahn — $2n = 27$ (Fig. 8).

Bu: Osogovska Mt, Bistritsa valley, 42°10'N, 22°31'E, man-made rocky habitat on granite slope, 1650-1700 m, 24 Jul 1999, Vladimirov *VV 5871* (SOM).

This is first determination of the chromosome number for the subspecies.

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References

Christoff, M. 1942: Die genetische Grundlage der apomiktischen Fortpflanzung bei *Hieracium aurantiacum* L. — Zeitschr. Indukt. Abstamm. Vererbungslehere **80(1)**: 103-125.

— & Popoff, A. 1933: Cytologische Studien über die Gattung *Hieracium*. — Planta **20**: 440-447.

Grau, J. & Erben, M. 1988: Chromosomenzahlen von griechischer Hieracien. — Mitt. Bot. Staatssamml. München **27**: 97-98.

Papanicolaou, K. 1984: Reports. [In Löve, A. (ed.), IOPB Chromosome number reports LXXXII]. — Taxon **33**: 126-134.

Rosenberg, O. 1926: Die semiheterotypische Teilung und ihre Bedeutung für die Entstehung verdoppelter Chromosomenzahlen. — Hereditas **8** : 305-338.

Schuhwerk, F. & Lippert, W. 1998: Chromosomenzahlen von *Hieracium* L. (Compositae, Lactuceae). Teil 2. — Sendtnera **5**: 269-286.

Strid, A. & Franzén, R. 1981: Reports. [In Löve, A. (ed.), IOPB chromosome number reports LXIX.] — Taxon **29**: 709-710.

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