Mediterranean chromosome number reports — 13

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Abstract

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This is the thirteenth 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 58 taxa: *Alyssum, Arabis, Camelina, Erysimum, Iberis, Malcolmia, Roripppa* and *Galium* from Bulgaria, by M. Anchev & V. Goranova (Nos 1319-1327); *Athyrium, Dryopteris, Notholaena, Thelypteris* and *Blechnum* from Bulgaria, by D. Ivanova (Nos 1328-1333); *Scorzonera, Tragopogon, Silene* and *Astragalus* from Bulgaria, by D. Pavlova & A. Tocheva (Nos 1334-1338); *Lathyrus* from Bulgaria, by A. Tosheva (Nos 1339-1343); *Plantago* from Italy, by L. Peruzzi (Nos 1344-1347); *Clematis, Daphne, Hepatica, Lupinus, Ophrys, Orchis, Quercus, Triglochin* and *Veronica* from Italy, by L. Peruzzi & G. Cesca (Nos. 1348-1356); *Androsace, Gentiana, Rosa, Scabiosa* and *Solenopsis* from Italy, by L. Peruzzi & D. Gargano (Nos 1357-1361); *Ornithogalum* from Italy, by L. Peruzzi & N. G. Passalaqua (Nos 1362-1365); *Scirpus* from Italy, by L. Pignotti (Nos 1366-1367); *Genista* from Spain, by T. Cusma Velari, L. Feoli Chiapella & G. Bacchetta (No. 1368); *Cytisus* and *Anthyllis* from Spain, Turkey and Italy, by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & S. Patui (Nos 1369-1371); *Cerastium* from Bulgaria, by K. Stoyanova (Nos 1372-1375).

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Reports (1319-1327) by Mincho Anchev & Valentina Goranova

1319. ***Alyssum orbelicum*** Ancev & Uzunov. — $2n = 64$ [Fig. 1(1)].

Bu: N Pirin Mt., Banski suhodol circus, 41° 49'N, 23° 27'E, 2400 m, leg. D. Uzunov, August 1999, *Anchev* 155156 (SOM).

Endemic to the SW Bulgaria, in the subalpine belt of N Pirin Mt., *A. orbelicum* - with its local distribution, morphological differentiation and high polyploid chromosome number- presents the characteristics of a local glacial relict, product of hybridogenesis in sect. *Odontarrhena.* The chromosome number $2n = 8x = 64$ occurring seldom in *Alyssum* and in sect. *Odonarrhena*, was reported recently from the same population (Anchev & Uzunov 2002). The chromosomes are small, comparatively differentiated in length, with faint position of the centromeres; most of them are of m- and sm-type. A pair of the chromosomes are with microsatellites.

1320. ***Arabis procurrens*** Waldst. & Kit. — $2n = 16$ [Figs 1(2-3)].

Bu: Rila Mt., slopes along the Levi Iskar river valley, 42° 14'N, 23° 32'E, 1200 m, 05.08.1995, *Anchev* 95171 (SOM). - [Fig. 1(2)].

— N Pirin Mt., coniferous forests, in outskirts and glades, 41° 47'N, 23° 28'E, 1850 m, 19.10.1994, *Anchev* 94203 (SOM). - [Fig. 1(3)].

Arabis procurrens is distributed mostly in the mountainous territories of Bulgaria, Former Jugoslavia and Romania. It was reported also for Czech Republic, but has later not been confirmed (Stepanek 1992). In Bulgaria, it occurs in Stara Planina Mts and the mountains of the southwest part of the country, from 700 to 2000 (-2500) m alt.

The chromosome number $2n = 2x = 16$ agrees with counts of Burdet (1967: 141) from Former Jugoslavia and Bulgaria, from where also aneuploid and polyploid numbers have been reported. Especially, from Bulgaria the following have been reported: $2n = 16$, 16+R, 16+2R from S de Etropole pres Sophia; $2n = 24$+2R from Pirin Mt., S du Kyustendil, 1400 m; $2n = 32$ from flancs NE du mont Rujen, 1600 m.

The studied karyotype (Fig. 1-2) consists of small chromosomes (0.48 - 0.92 µm), differentiated in length as follows: two pairs of chromosomes (nos 1 & 2) are comparatively long, four pairs (nos 3, 4, 5 & 6) are of medium size and two pairs (nos 7 & 8) are short; all (apart from the no 1) are with faint position of the centromeres and most of them are of the sm-type.

1321. ***Camelina microcarpa*** DC. — $2n = 24$ [Fig. 1(4)], $2n = 26$ [Figs 1(5-6)].

Bu: Balkan foothill region, "Vrashka chuka", 43° 50'N, 22° 23'E, 580 m, 20.07.1989, *Anchev* 89114 (SOM).). - [Fig. 1(4)].

— Sofia region, near the village of Dushantsi, 42° 44'N, 24° 16'E, 750 m, 29.07.1996, *Anchev* 9680 (SOM). - [Fig. 1(6)].

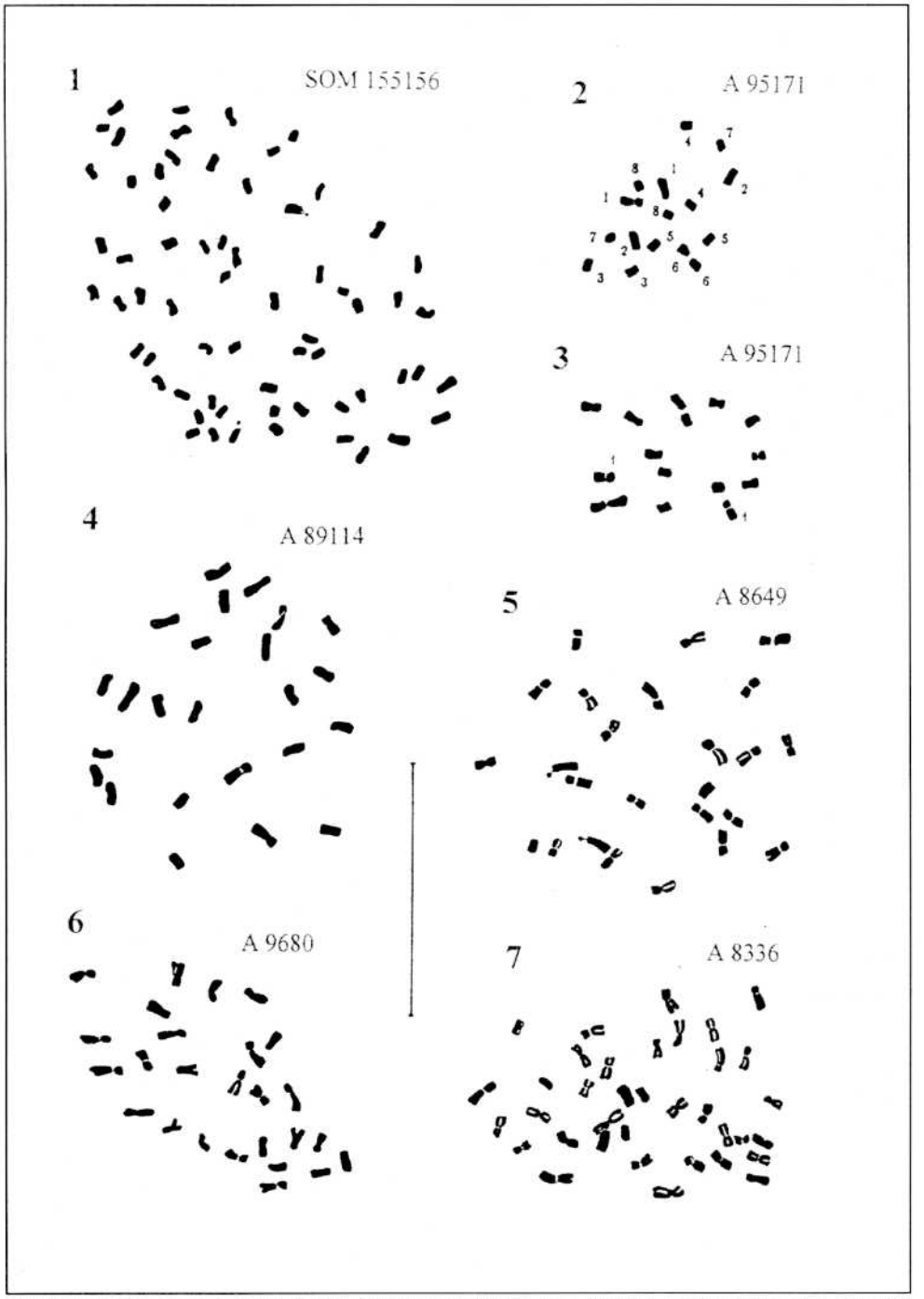


Fig. 1(1-7). Karyotype drawings of: **1,** *Alyssum orbelicum*, $2n = 64$; **2-3,** *Arabis procurrens*, $2n = 16$; **4-6,** *Camelina microcarpa*: **4,** $2n = 24$; **5-6,** $2n = 26$; **7**, *C. sativa*, $2n = 36$. — Scale bar = 10 μm.

— East Rhodope Mts, southeast of Kardzali, 41° 39'N, 25° 25'E, 04.06.1986, *Anchev* 8649 (SOM). - [Fig. 1(5)].

The distribution of *Camelina microcarpa* covers the whole Europe, Asia Minor, the Caucasus, C Asia, W & E Siberia. In Bulgaria, it is distributed in the plains, mountain foothills and low mountains of the north and southeast parts of the country, from the coastal area up to 1000 m.

The somatic number $2n = 24$ counted here, as we suppose, is reported for the first time, while the chromosome number $2n = 26$ (first count in Bulgarian material) agrees with earlier reports from Morocco, France and Spain. Especially, the numbers $2n = 26, 38, 40$ were referred from other European countries and $2n = 16, 18\text{-}20, 32$ in material outside of Europe (see Jalas & al. 1996: 125, for references). A gametic number $n = 19$ was also reported (see Goldblatt & Johnson 2000, for reference).

The both studied cytotypes of *C. microcarpa* $2n = 24$ and $2n = 26$, consist of gradually differentiated in length chromosomes, mostly of sm-type. A pair of SAT-chromosomes was observed in plants from population A8649 ($2n = 26$). The chromosome morphology in both cytotypes is similar. We suppose that the $2n = 24$ is probably a local case of aneuploidy of the wider distributed cytotype with $2n = 26$ chromosomes.

1322. *Camelina sativa* (L.) Crantz — $2n = 36$ [Fig. 1(7)].

Bu: Danube plain, in corn-fields, northern of Knezha, 43° 30'N, 24° 05'E, 350 m, 24.06.1983, *Anchev* 8336 (SOM).

C. sativa is widely distributed in C & S Europe, E Mediterranean, C & SW Asia, Caucasus. In Bulgaria the species occurs in NE Bulgaria, the Danube plane and Balkan foothill floristic regions.

The count $2n = 36$ is the first for the species. The known, up to now, chromosome number was $2n = 40$, which was referred for populations from Iceland and Poland (see Jalas & al. 1996: 124, for references).

The count of $2n = 26$ chromosomes in fruited plants determined as *C. sativa* (Anchev 1981: 855), after additional revision of flowered plants from the locality of Struma valley, SW Bulgaria, showed that it must be referred to *C. microcarpa*.

The chromosomes in the studied karyotype are small of m- and predominantly sm- type.

1323. *Erysimum cuspidatum* (M. Bieb.) DC. — $2n = 16 + 0\text{-}2B$ [Figs 2(1-3)].

Bu: N Pirin Mt., Banderitza glade, 41° 47'N, 23° 28'E, 1900 m, 07.07.1996, *Anchev* 9660 (SOM). - [Fig. 2(1)].

— N Pirin Mt., Baikusheva mura, 41° 47'N, 23° 28'E, 1840 m, 08.08.1994, *Anchev* 94151 (SOM). - [Figs 2(2-3)].

The distribution range of this species covers SE Europe, C & SW Asia and Caucasus. *E. cuspidatum* is a common calcicole plant in Bulgarian flora. It occurs in open habitats, on gravely terrains in lowlands and plains, on foothills and mountain slopes predominantly

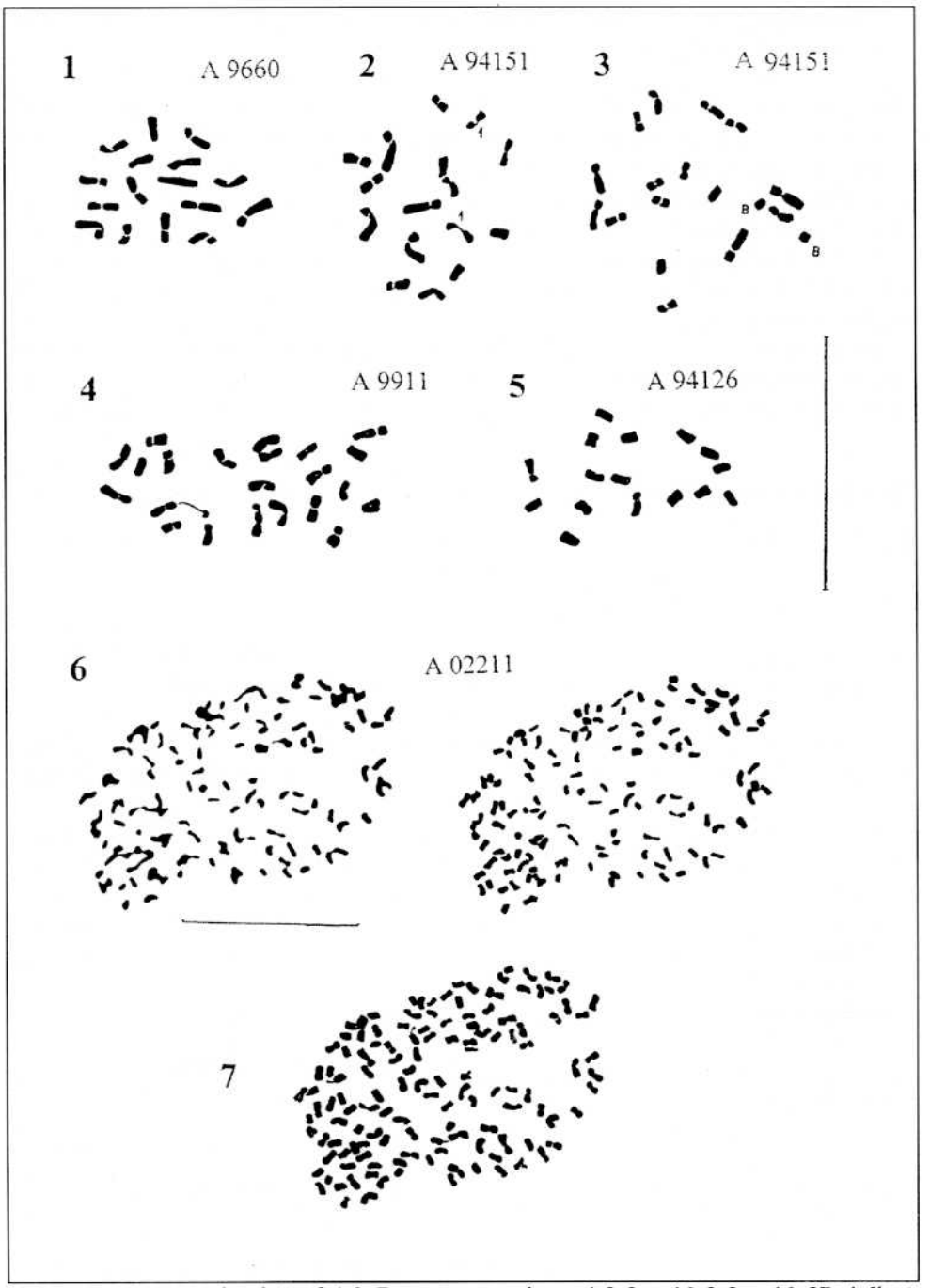


Fig. 2(1-7). Karyotype drawings of: **1-3,** *Erysimum cuspidatum*: **1-2,** $2n = 16$; **3,** $2n = 16+2B$; **4,** *Iberis saxatilis* subsp. *saxatilis*, $2n = 22$; **5,** *Malcolmia orsiniana* subsp. *angulifolia*, $2n = 16$; **6-7,** microphotograph and karyotype drawings of *Galium rubioides*, $2n = 132$. — Scale bar = 10 µm.

in the oak vegetation belt from the sea level up to 1000 m, but also in few localities in the zone of the beach and coniferous forests, from 1400 to 1900 m alt.

The chromosome number $2n = 16$ counted here, confirms our earlier counts from localities in the oak vegetation belt (Anchev 1978: 532). It also agrees with two different reports from Greece (van Loon & Kieft 1980: 539; Polatschek 1997: 548).

The karyotype from the population A9660 consists of sm-type chromosomes, and two pairs of them are longer, differentiated in length from the rest. This karyotype is not different from the karyotypes observed in plants from lower altitudes (Anchev l.c.).

In some karyotypes from the population A94151 two B-chromosomes were observed [Fig. 2(3)]. We believe that this pair of very short, dark stained accessory chromosomes resulted from the chromosome pair (no 1), which was found to be stretched in the centromere zone [Fig. 2(2)]. Similarly stretched chromosomes in the centromere zone were observed also in the diploid karyotypes of *E. comatum* with $2n = 14+0-2B$ (Anchev & al. 1987: 27; Anchev 1995: 98).

1324. *Iberis saxatilis* L. subsp. ***saxatilis*** — 2n = 22 [Fig. 2(4)].

Bu: Easthern Stara Planina Mt., the locality Sinite kamani, North-East of town of Sliven, 42° 39'N, 26° 18'E, 1050 m, 01.07.1999, *Anchev* 9911 (SOM).

The species was divided into two subspecies: *I. saxatilis* subsp. *cinerea* (Poiret) Font Quer, endemic of C & S Spain and the typical subsp. *saxatilis*, distributed in S Europe from Iberian Peninsula eastward to the Balkan Peninsula, Romania (Dobroudja) and Crimea.

In Bulgaria *I. saxatilis* subsp *saxatilis* occurs in E Stara Planina Mt., in the transitional zone between the oak-hornbeam and beech forest belt, from 900 to 1100 m, as well as in N Pirin and Slavjanka mountains, in the coniferous vegetation belt, from 1900 to 2200 m a.s.l.

The chromosome number $2n = 22$ counted here agrees with previous reports from E Stara Planina (Anchev & Goranova 2002: 220) and also from Spain (Moreno 1985: 309) and Greece (Gustavsson 1978: 204; see Jalas & al. 1996: 169-170 for additional references).

The karyotype in the Bulgarian diploid cytotype consists of differentiated in length middle-sized and short chromosomes of meta- and submetacentric type. A pair of SAT-chromosomes of sm-type is observed.

In the typical subspecies a polyploid number with $2n = 33$ chromosomes was also reported from three different localities in Slavjanka and N Pirin Mts. It was considered as a product of local process of hybridogenesis and genetic differentiation (Anchev & Goranova 1997: 254, 2002: 220).

1325. *Malcolmia orsiniana* (Ten.) Ten. subsp. ***angulifolia*** (Boiss. & Orphan.) Stork — $2n = 16$ [Fig. 2(5)].

Bu: Slavjanka Mt., Ambar dere, 41° 25'N, 23° 41'E, 1400 m, 04.08.1994, *Anchev* 94126 (SOM).

The subspecies *angulifolia* is a Balkan endemic, distributed from Albania eastwards

through Serbia, F.Y.R.O.M. to SW Bulgaria and southwards to Greece.

The chromosome number $2n = 16$ is the first report for the Bulgarian flora, which agrees with an earlier report from Greece (Jalas & Suominen 1994: 107).

The karyotype consists of small chromosomes, most of them similar in length, without distinct position of the centromeres.

1326. *Rorippa prolifera* (Heuffel) Neilr. — $2n = 16$.

Bu: Pirin Mt., the locality "Popski preslap", 41° 32'N, 23° 36'E, 1300 m, 06.08.1998, *Anchev* 98105 (SOM).

R. prolifera is distributed from SE Europe (the Balkans) to W Turkey (Jonsell 1968). In Bulgaria it occurs mostly in the mountains in the southwest part of the country.

The chromosome number $2n = 16$, probably the first report for the species, was counted in flower buds.

1327. *Galium rubioides* L. — $2n = 132$ [Figs 2(6-7)].

Bu: Black Sea coast, in the vicinity of Batova river, Leg. L. Evstatieva, 43°22'N, 28°05' E, 23.06.2000, *Anchev* 02211 (SOM).

The species is distributed from Austria eastwards to Bulgaria.

In the Bulgarian flora, *G. rubioides* occurs in wet meadows and alluvial low grounds along rivers and swamps in scattered localities, mainly in the north part of the country.

The highly polyploid chromosome number $2n = 12x = 132$ is the first counting in Bulgarian material. It agrees with that reported by Fagerlind (1934) in plants very likely from garden origin. A hexaploid number $2n = 66$ has also been reported (Fedorov 1969: 647; Ehrendorfer & Krendl 1976: 20).

The karyotype consists of small chromosomes, mostly of m- and sm-type. Two pairs of SAT-chromosomes were observed in some karyotypes [Fig. 2(7)].

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Reports (1328-1333) by Daniella Ivanova

1328. ***Athyrium distentifolium*** Opiz — $2n = 2x = 80$ (Figs 1A-B).

Bu: Central Balkan range, Kaloferski Balkan, at the foot of the peak Maluk Kademliya, 42° 44'N, 25° 03'E, among rocks and stones, c. 2000 m, 30 Jul 1996, *Ivanova DI*-59.96 (SOM).
— Central Balkan range, Kaloferski Balkan - Rousaliyski Prohod, near "Tuzha" hut, 42° 45'N, 25° 00'E, along a stream, c. 1700 m, 31 Jul 1996, *Ivanova DI*-67.96 (SOM).
— Northern Pirin Mt., by the lake Golyamo Kremensko Ezero, 41° 42'N, 23° 31'E, among rocks or in rock fissures, 29 Aug 1998, *Ivanova DI*-115.98 (SOM).

The general distribution of the species has already been referred in Ivanova (1997). Until 1989 *A. distentifolium* was known to be a rare species in the Bulgarian flora (Velev 1984a), distributed only in few localities in Rila and Pirin mountains. During the last decade it has been found by the author in many other localities in these two mountains, where it forms large, dense populations. The species has also been discovered as new floristic records in the central Balkan range and Mt. Vitosha. Plants from Vitosha and Rila mountains are diploids with $2n = 80$ (Ivanova l.c.). We report here the results of a cytological investigation of plants from the central Balkan range and Pirin Mt.

The chromosome count here confirms our previous report (Ivanova l.c.). For chromosome counts of foreign localities see Löve & al. (1977: 276) and Ivanova (1997: 226-228), for references.

1329. *Athyrium filix-femina* (L.) Roth — $2n = 2x = 80$ (Figs 1C-D).

Bu: Central Balkan range, Kaloferski Balkan - the peak Rousalka, northwestward from "Tuzha" hut, 42° 45'N, 24° 58'E, in rock fissures, 1800 m, 31 Jul 1996, *Ivanova DI*-72.96 (SOM).

— Vitosha Mt., near the Boyana waterfall, 42° 38'N, 23° 16'E, in a deciduous forest, 1200 m, 07 Aug 1997, *Ivanova DI*-14.97 (SOM).

— Vitosha Mt., Bistrishko Branishte reserve, along the path from the "Aleko" hut to Bistritsa, 42° 34'N, 23° 18'E, spruce forest, 04 Aug 1995, *Ivanova DI*-254.95 (SOM).

— Belasitsa Mt., southwestward from the village Kolarovo (Petrich district), 41° 21'N, 23° 06'E, in *Castanea sativa*-forest, by the stream, 450-500 m, 01 Sep 1994, *Ivanova DI*-170.94 (SOM).

— Slavyanka Mt., between loc. Livadata and the peak Gotsev Vruh, near the timberline, 41° 23'N, 23° 36'E, coniferous forest, 16 Aug 1995, *Ivanova DI*-305.95 (SOM).

— Northern Pirin Mt., by the "Vihren" hut, 41° 45'N, 23° 25'E, open stony places, 1950 m, 17 Aug 1994, *Ivanova DI*-103.94 (SOM).

— Rila Mt., loc. Gyolechitsa, along the Cherni Iskur river, 42° 14'N, 23° 24'E, coniferous forest, c. 1300 m, 09 Aug 1998, *Ivanova DI*-83.98 (SOM).

— Central Rhodope Mts, between the Observatory and the motel "Rozhen", 41° 40'N, 24° 45'E, stony places by the road, 27 Jul 1995, *Dimitrova DI*-242.95 (SOM).

The distribution of this species has already been referred by Ivanova (1997).

The diploid chromosome number $2n = 80$ confirms our previous results from Bulgarian accessions (Ivanova l.c.), as well as reports from other countries (Mahabale & Kamble 1981; Cody & Mulligan 1982; Montgomery & al. 1997). For other references see Löve & al. (1977: 277), and Ivanova (1997: 225-226). Our result, however, does not confirm the meiotic number $n = 45$ given by Horjales & al. (1990). Kurita (1986) reported $n = 80$ for var. *dombei* in South America, as well.

1330. *Dryopteris villarii* (Bellardi) Woyn. ex Schinz & Thell. — $2n = 2x = 82$ (Figs 2A-B).

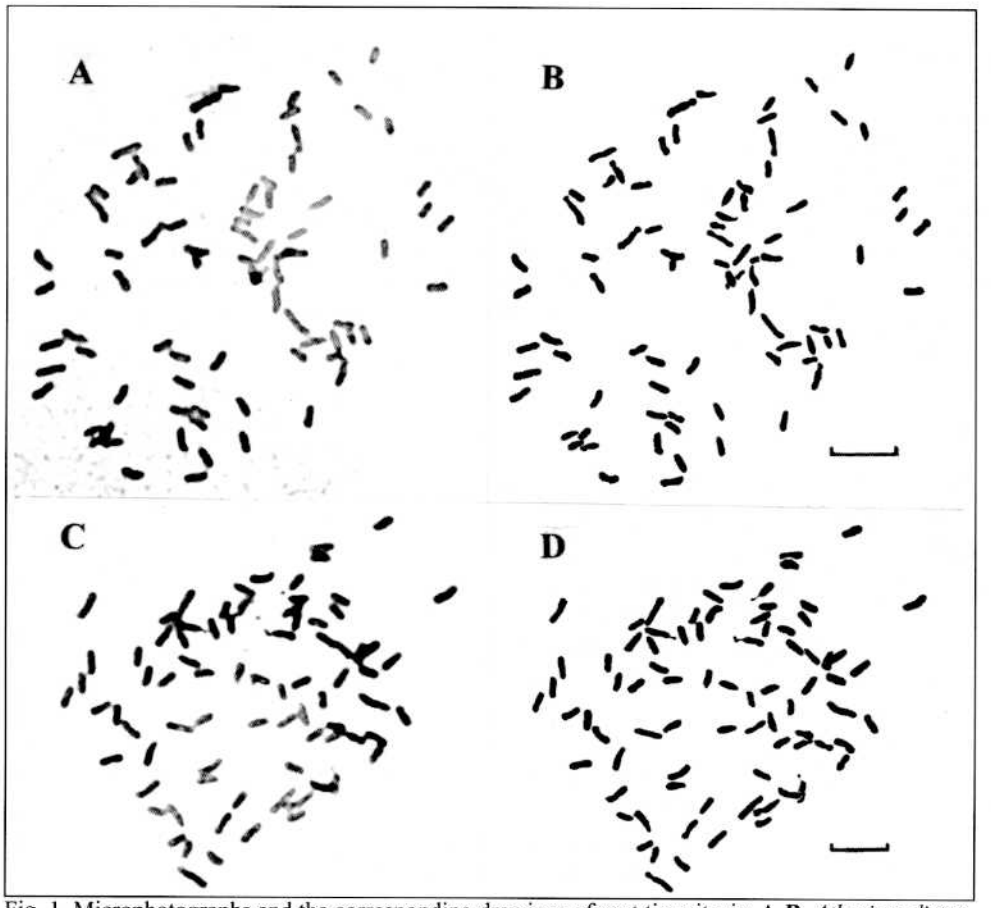


Fig. 1. Microphotographs and the corresponding drawings of root tip mitosis: **A-B,** *Athyrium distentifolium*, $2n = 80$; **C-D**, *A. filix-femina*, $2n = 80$. — Scale bars = 10 μm.

Bu: Slavyanka Mt., above the village Paril (Blagoevgrad district), loc. Hambar dere (Parilski Dol), 41° 24'N, 23° 38'E, open grassy places, limestone, c. 1430 m, 13 Jul 2000, *Ivanova DI*-17.00 to 22.00 (SOM).

The general distribution of this species has already been recorded in Ivanova (1999). So far *D. villarii* has been found in Bulgaria only in northern Pirin Mt. and Slavyanka Mt.

Cytological investigation of four plants from Pirin Mt. has proved that they are diploid with $2n = 82$ chromosomes (Ivanova l.c.). We present here the same chromosome number, counted in six plants from Slavyanka Mt. This is the second cytologically confirmed record of *D. villarii* in Bulgarian material. Previous reports from other European countries are cited in Löve & al. (1977: 321), and Ivanova (1999: 353).

1331. *Notholaena marantae* (L.) Desv. subsp. ***marantae*** — $2n = 2x = 58$ (Figs 2C-D).

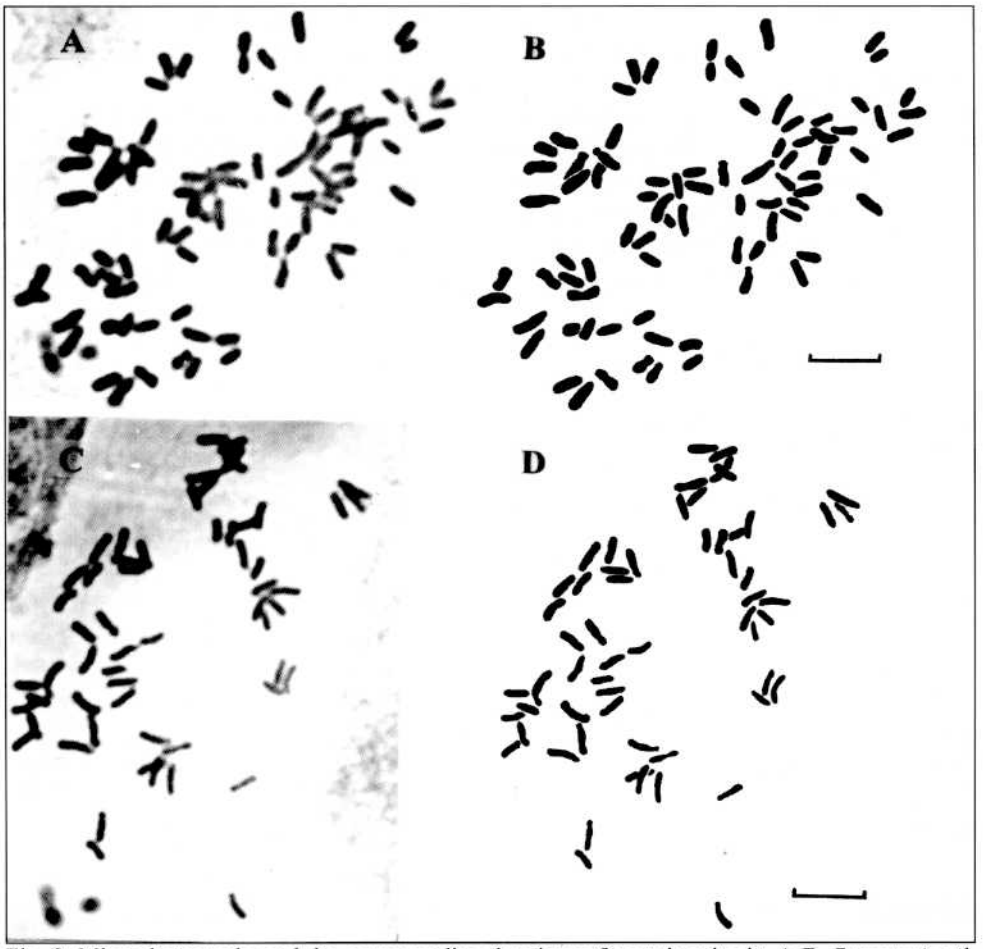


Fig. 2. Microphotographs and the corresponding drawings of root tip mitosis: **A-B,** *Dryopteris villarii*, $2n = 82$; **C-D**, *Notholaena marantae* subsp. *marantae*, $2n = 58$. — Scale bars = 10 μm.

Bu: Belasitsa Mt., southwestward from the village Kolarovo (Petrich district), 41° 21'N, 23° 06'E, on dry, sunny, serpentine rocks, c. 500 m, 31 Aug 1998, *Ivanova DI*-133.98 to 135.98 (SOM).

The established diploid chromosome number $2n = 58$ confirms the previous report of Ivanova (1998) from Bulgarian localities, as well as the reports of other authors from elsewhere (see Löve & al. 1977: 107 and Ivanova 1998: 263-265, for references).

1332. *Thelypteris palustris* Schott — $2n = 2x = 70$ (Figs 3A-B).

Bu: South River Strouma valley, between Petrich and village Belasitsa, 41° 22'N, 23° 07'E, marshy places, 11 Jul 2000, *Ivanova DI*-2.00 (SOM).

T. palustris is a threatened species, included in the Red Data Book of the Bulgarian flora (Velev 1984b) and is protected by law. It is distributed in fens and marshes in most of Europe (except the extreme north), Azores, N Africa (Morocco, Algeria), Asia (from Caucasus and Turkey to China, Kamchatka and Japan), the eastern half of N America, Bermudas and Cuba in C America (Hutchinson & Thomas 1996; Prelli & Boudrie 2001).

No former record of a chromosome number of *T. palustris* is known from Bulgaria. Our count yielded a diploid mitotic chromosome number of $2n = 70$. It confirms $n = 35$ or $2n = 70$ given by Kurita (1976), Löve & Löve (1976), Cody & Mulligan (1982), Khullar & al. (1983), Kurizono (1987), as well as by many other authors cited in Löve & al. (1977: 213).

1333. *Blechnum spicant* (L.) Roth — $2n = 2x = 68$ (Figs 4A-D).

Bu: Central Balkan range, nearby the "Tuzha" hut, 42° 45'N, 24° 59'E, beech forest, by a stream, Aug 1998, *Evstatieva DI*-190.98 (SOM).

B. spicant has a disjunct distribution in the temperate zones of Northern Hemisphere. It is distributed in most of Europe (but locally in the Mediterranean region and in the east), Iceland, Faeroes, Azores, Madeira and Canary Islands, in N Africa, in Asia (Caucasus, Asia Minor, W China), in Pacific North America from Alaska to California (Hutchinson & Thomas 1996; Prelli & Boudrie 2001). In Bulgaria it has been found only in the western and central Balkan range and in Rila Mt.

The established chromosome number $2n = 68$ is reported for the first time from a Bulgarian accession. Previous reports for this species, given by Cody & Mulligan (1982), Manton & al. (1986), Queirós & al. (1988), Horjales & al. (1990), as well as by other authors cited in Löve & al. (1977: 369), have referred it as a diploid species with $n = 34$ bivalents or $2n = 68$ chromosomes.

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Fig. 3. **A,** microphotograph and **B,** corresponding drawing of root tip mitosis of *Thelypteris palustris*, $2n = 70$. — Scale bar = 10 μm.

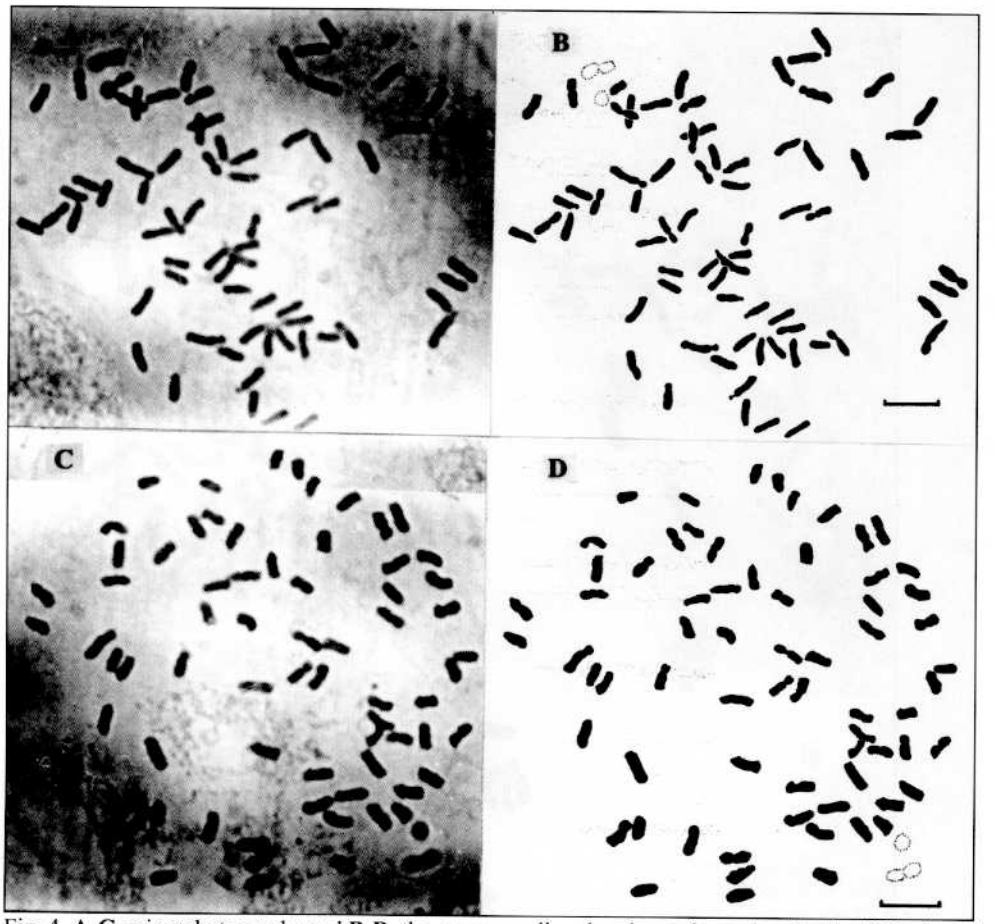


Fig. 4. **A-C**, microphotographs and **B-D**, the corresponding drawings of root tip mitosis of *Blechnum spicant*, $2n = 68$. — Scale bars = 10 μm.

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Reports (1334-1338) by Dolja Pavlova & Anita Tosheva

1334. *Scorzonera purpurea* L. subsp. ***rosea*** (W. et K.) Nym. — $2n = 14$ (Fig. 1).

Bu: Central Stara Planina Mts, on the path from Beklemeto to the touristic hut Kozjata stena, 42 64' N 24 55'E, 15 Jul 2002, *A. Tosheva* 102331(SO).

The distribution range of this species covers Europe without its northern parts, the Mediterranean, Caucasus Mts, south-western and central Asia, Siberia and northern Africa. This species is rarely distributed in Bulgaria, between 2000-2800 m a.s.l. in Stara Planina Mts, the Znepole region and Pirin Mts (Peev 1992).

The chromosome number $2n = 14$ confirms previous counts (see Fedorov 1969: 132; Goldblatt & Johnson 1990: 48, for references).

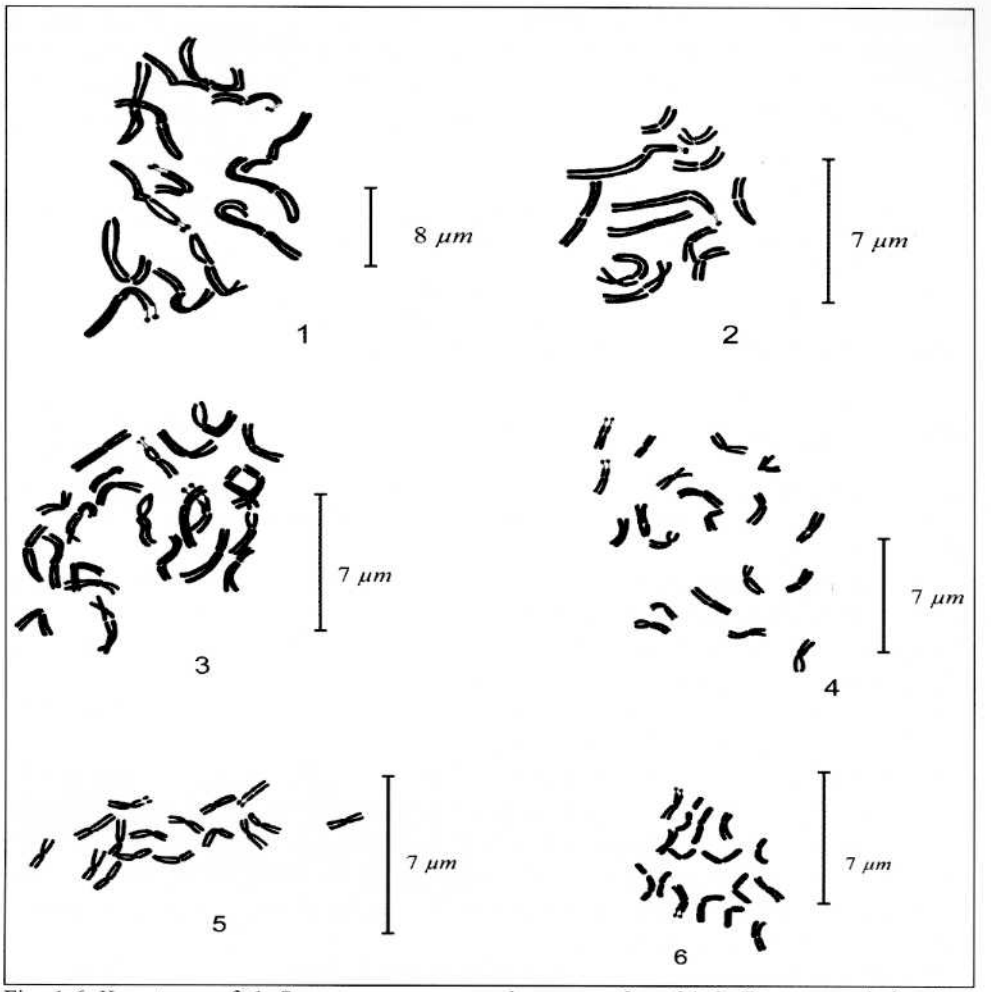
Populations of this taxon from Bulgaria were previously investigated by Kuzmanov & al. (1990, 1993), who reported the chromosome numbers $2n = 14$ and $2n = 12$. The number $2n = 12$ was reported for populations from Slavjanka Mts (in Parilski dol, 25 June 1969, BK - 69642). The composition of this karyotype is quite different from both ours and previously reported karyotypes. The mentioned data are probably doubtful and the examined material was wrongly determined.

The centromereric index Ic = S/L+S (Grif & Agapova 1986) gives reasons to consider the chromosomes being of metacentric (m) and submetacentric (sm) types. The shortest pair of metacentric and submetacentric chromosomes bears small ball-shaped satellites. The karyotype is symmetrical. It consists of $2n = 2x = 4m + 6sm + 2m\text{-SAT} + 2sm\text{-SAT} = 14$ chromosomes. The chromosome size varies between 11.2 to 5.6 μm; the shortest and the longest chromosomes are of metacentric type. The ratio $X^{max} : X^{min}$ is 2 : 1.

1335. *Tragopogon balcanicus* Velen. — $2n = 12$ (Fig. 2).

Bu: East Rhodopes Mts, on serpentine rocky places near the Goljamo Kamenjane village, 41 23'N, 25 45'E, with flowers, 9 Jun 2000, *D. Pavlova* 99 896 (SO).

This species is rarely distributed in Bulgaria up to 1000 m a.s.l. in the Danube plain, the Balkan foothill region, Stara planina Mts, the Sofia region, the Znepole region, Vitosha Mts, the Struma valley, Slavjanka, Pirin and Rhodopes mountaints and the Thracian plain



Figs 1-6. Karyotypes of: **1,** *Scorzonera rurpurea* subsp. *rosea*, $2n = 24$; **2,** *Tragopogon balcanicus*, $2n = 14$; **3,** *Silene flavescens*, $2n = 24$; **4,** *S. subconica*, $2n = 20$; **5-6,** *Astragalus onobrichis* subsp. *chlorocarpus*: **5,** west frontier mountains, $2n = 16$; **6,** central Rhodopes Mts, $2n = 16 + 2B$.

(Peev 1992). This Balkan endemic species is included in the Red Data Book of Bulgaria with category "rare" (Penev 1984).

The chromosome number $2n = 12$ confirms previous counts of Kozuharov & Kuzmanov (1968), Kuzmanov & al. (1973) in material from Bulgaria, Sopova & Sekovski (1982) in material from F.Y.R.O.M. and Anagnostopoulos & Kamari (1992) in material from Greece.

The karyotype consists of $2n = 2x = 10m + 2sm\text{-}SAT = 12$ chromosomes. The centromere index is Ic = S/L+S (Grif & Agapova 1986), giving reasons to consider the chromosomes being of metacentric and submetacentric types. The satellites are small ball-shaped, attached to the short arms of the submetacentric chromosomes. The chromosome size varies between 7.2 to 2.8 μm. The ratio $X^{max} : X^{min}$ is 2.7 : 1.0. The shortest pair is

of metacentric type while the longest is of submetacentric with satellites. The karyotype of this population differs from the karyotypes of populations from non serpentine areas (Kuzmanov & al. 1973) by the number of metacentric chromosomes. In our karyotype they are two more pairs. This fact can be explained by the different way of calculating the centromere index.

1336. *Silene flavescens* Waldst. & Kit. — $2n = 24$ (Fig. 3).

Bu: Thracian plain, on dry places on Nebet Tepe hill in the town of Plovdiv, 42 09' N, 24 45'E, with flowers, 9 Jun 2000, *D. Pavlova* 102328 (SO).

The distribution range of *Silene flavescens* s.l. covers the mountains of the east-central Balkan Peninsula, extending northwards to Transylvania and Hungary (Chater & al. 1996) and southwards to east Kriti (Greuter 1997). This species is distributed rarely in Bulgaria on dry, stony places, predominantly on calcareous areas, up to 1600 m alt. (Petrova 1992).

The chromosome number $2n = 24$ confirms previous counts of Fedorov 1969, Petrova (1975) and Strid (1987).

The karyotype is symmetrical, consisting of $2n = 14m + 8sm + 2m\text{-SAT} = 24$ chromosomes. The satellites are spherical, attached to the short arms of the chromosomes. The chromosome size varies between 4.8 to 2.8 µm. The ratio $X^{max} : X^{min}$ is 1.7 : 1.0. The shortest pair with satellites is of metacentric type.

1337. *Silene subconica* Friv. — $2n = 20$ (Fig. 4).

Bu: Central Rhodopes Mts, on serpentine areas near to Parvenetz village, 42 07'N, 24 80' E, with flowers, 9 June 2000, *D. Pavlova* 102329 (SO).

The distribution range of *Silene subconica* covers the southeast Europe, from Italy (where it is perhaps not native), Caucasus, Crimea, S Russia and southwest Anatolia (Jordanov & Panov 1966; Greuter 1997).

In Bulgaria the species is distributed in the following floristic regions: the Black Sea coast, northeastern Bulgaria, the Danube plain, the Balkan foothill region and Stara planina Mts up to 1400 m a.s.l. (Petrova 1992).

The chromosome number $2n = 20$ confirms previous reports of Petrova (1995) in material from Bulgaria and Runemark (1996) in material from Greece and differs from the count of $2n = 24$, given by Gukasian & Safarian (1990) in material from Armenia.

The karyotype is symmetrical, consisting of $2n = 14m + 4sm + 2sm\text{-SAT} = 20$ chromosomes. The longest chromosomes (4.0 µm) and the shortest ones (2.4 µm) are of metacentric type. One of the submetacentric chromosome pairs has ball-shaped satellites attached to the short arms.

1338. *Astragalus onobrychis* L. subsp. ***chlorocarpus*** (Griseb.) Koz. & D. Pavlova — $2n = 16$ (Fig. 5) & $2n = 16 + 2B$ (Fig. 6).

Bu: West frontier mountains, on dry places near to Boboshevo village, 42 09'N, 23 00'E, 17 Aug 1985, *D. Pavlova* 94 570 (SO). - (Fig. 5).

— Central Rhodopes Mts, on serpentine areas near to Parvenetz village, 42 09'N, 24 39'E, with flowers, 9 Jun 2000, *D. Pavlova* 102330 (SO). - (Fig. 6).

This taxon is distributed in all floristic regions in Bulgaria up to 1000 m a.s.l. (Pavlova & Kozhuharov 1994).

The karyotype of the first investigated population is symmetrical, consisting of $2n = 2x = 8m + 6sm + 2sm\text{-}SAT = 16$ chromosomes. The karyotype of the second population is similar with the addition of 2 B-chromosomes. The size of the chromosomes varies between 4.8 and 2.0 μm and of B-chromosomes is 1.2 μm.

To our knowledge the chromosome number for this taxon is given for the first time here.

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Reports (1339-1343) by Anita Tosheva

1339. *Lathyrus venetus* (Mill.) Wohlf. — $2n = 14$ (Fig. 1).

Bu: Znepole region, Kalista village, Kostevtzi locality, 42 28' N, 22 52' E, 25 May 2002, *A. Tosheva* 102336 (SO).

The distribution range of *Lathyrus venetus* covers the whole Europe without its northern and western parts, and also the eastern Mediterranean and southwestern Asia. This species is widely distributed in Bulgaria up to 1500 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number $2n = 14$ is reported for the first time for a population from Bulgaria.

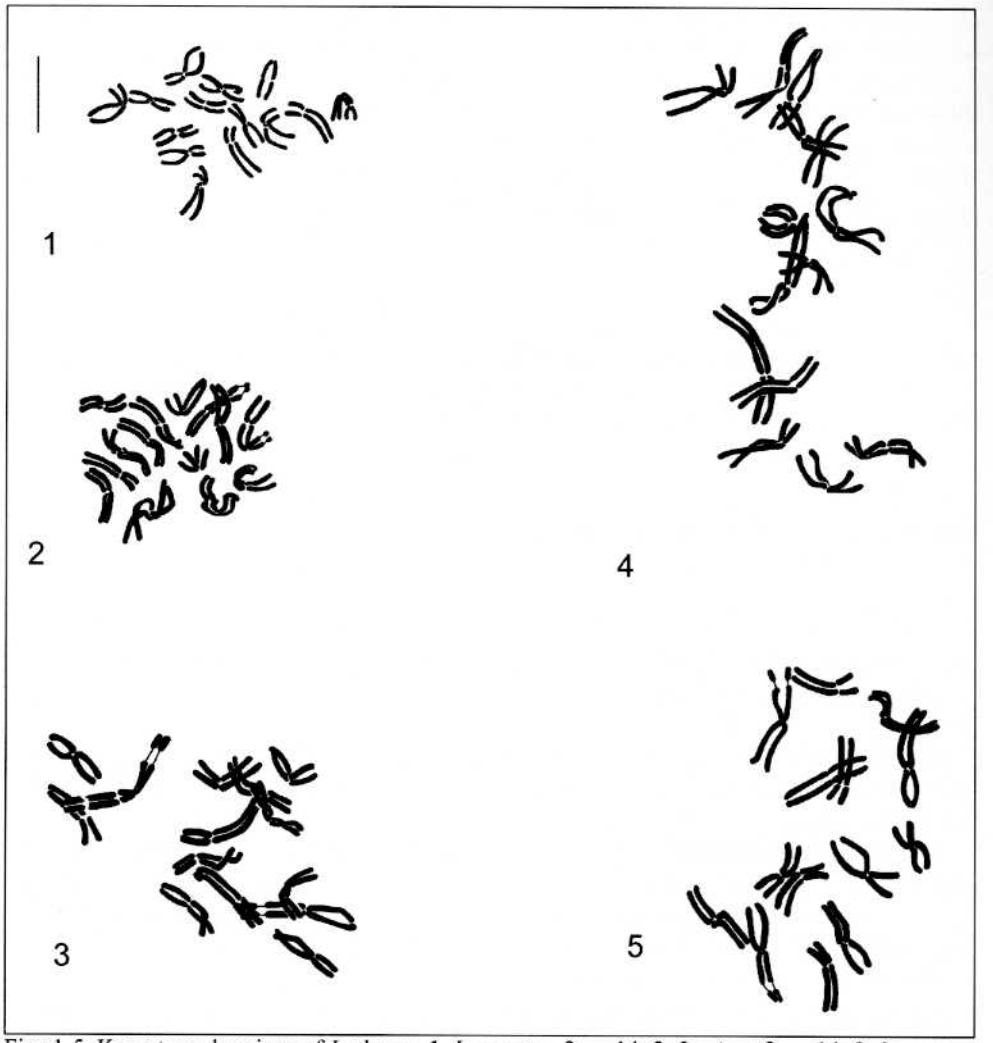
This chromosome number confirms previous data from elsewhere (see Fedorov 1969: 302; Sekovski & al. 1994, for references).

The centromere index I^c = s/l+s (Grif & Agapova 1986) gives reasons to consider the chromosomes being of metacentric, submetacentric and intercentric types. The karyotype is rather symmetrical. The karyotype consists of $2n = 2x = 6m + 6sm + 2I$ chromosomes. A metacentric chromosome pair is heteromorfic. The chromosome size varies between 5.6 and 4.0 µm. The ratio $X^{max} : X^{min}$ is 1.4 : 1. The shortest chromosome pair is metacentric while the longest one is intercentric. The total length of the karyotype is s+l = 69.6 µm. This karyotype differs from the count $2n = 4m + 8sm + 2sm\text{-}SAT = 14$ of Sekovski & al. (1994), who observed satellited chromosomes.

1340. *Lathyrus niger* (L.) Bernh. — $2n = 14$ (Fig. 2).

Bu: Znepole region, Kalista village, Kostevtzi locality, 42 28'N, 22 52'E, 25 May 2002, *A. Tosheva* 102335 (SO).

The distribution range of *Lathyrus niger* covers Europe, the Caucasus Mts and northern



Figs 1-5. Karyotype drowings of *Lathyrus*: **1**, *L. venetus*, $2n = 14$; **2**, *L. niger*, $2n = 14$; **3**, *L. pratensis*, $2n = 14$; **4**, *L. latifolius*, $2n = 14$; **5**, *L. tuberosus*, $2n = 14$. Scale bar = 8 μm.

Africa. This species is widely distributed in Bulgaria up to 1200 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number $2n = 14$ counted here confirms previous findings (see Fedorov 1969: 302; Kozuharov & al. 1972, 1975; Fernandes & Santos 1975; Fernandes & Queiros 1978; Goldblatt & Johnson 1990: 89, 1991: 104, 2000: 71; Shopova & al. 1993, for references).

The centromere index shows the presence of metacentric, submetacentric and intercentric chromosomes. The shortest and the longest chromosomes are metacentric. One of the metacentric pairs (the second in length) bears small ball-shaped satellites.

Endopolyploidy is also established. The chromosome size ranges between 9.2 and 4.2 µm, and the ratio $X^{max} : X^{min}$ = 2.2 : 1. The total length of the karyotype is s+l = 91.6 µm. The karyotype is slightly asymmetrical and consists of $2n$ = 2x = 6m + 4sm + 2l + 2l-SAT = 14 chromosomes.

The karyotype of this population is more similar to the one reported by Kozuharov & al. (1975): $2n$ = 4m + 8sm + 2a-SAT and $2n$ = 4m + 4sm + 4a + 2a-SAT, but differs by the presence of acrocentric chromosomes. It also differs from the karyotype formula 2n = 2m + 10sm + 2m-SAT given by Sopova & al. (1993) in the lower number of metacentric chromosomes.

1341. *Lathyrus pratensis* L. — $2n$ = 14 (Fig. 3).

Bu: Central Stara Planina Mts, Buzludza locality, 42 40' N, 25 30' E, 05 Jul 2002, *A. Tosheva* 102337 (SO).

The distribution range of this species covers Europe, the Caucasus Mts, south-western and central Asia, Siberia, Sino-Japannian and Indo-Himalayan regions, northern and central Africa. It is also widely distributed in Bulgaria up to 1500 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number $2n$ = 14 confirms previous data from Bulgaria (Kozuharov & al. 1972, 1973, 1975) and from other European countries (see in Meldris & Viksne 1931; Fedorov 1969: 302; Magulaev 1980; Goldblatt & Johnson 1990: 89, 1991: 104, 1996: 115, 2000: 71; Shopova & al. 1990,).

Polyploid variants with $2n$ = 16, 21, 28, on the basis of x = 7, have also been reported (see Meldris & Viksne 1931; Fedorov l.c.; Magulaev 1980; Goldblatt & Johnson 1991: 104, for references).

The karyotype consists of $2n$ = 2x = 6m + 4sm + 2l + 2m-SAT = 14. The investigated karyotype is slightly asymmetrical. These results differ from previous data (Kozuharov & al. 1975) by the absence of acrocentric chromosomes. The karyotype presented by Shopova & al. (1990) consists only of metacentric and submetacentric chromosomes ($2n$ = 2m + 10sm + 2sm-SAT = 14).

One submetacentric chromosome pair of the examined karyotype is different in size (Fig. 3). The size of the chromosomes varies between 8.8 and 5.6 µm. The shortest and the longest chromosomes are of metacentric type. The ratio $X^{max} : X^{min}$ is 1.4 : 1. The total length of the karyotype is s+l = 99.4 µm.

1342. *Lathyrus latifolius* L. — $2n$ = 14 (Fig. 4).

Bu: Znepole region, Kalista village, near the Struma river, under the railway bridge, 42 28' N, 22 52' E, 21 Jul. 2002, *A. Tosheva* 102333 (SO).

The distribution range of this species covers Europe without its eastern parts and the Mediterranean. This species is widely distributed in Bulgaria up to 900 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number confirms previous reports (see Meldris & Viksne 1931;

Fedorov 1969: 302; Kuzmanov & Kozuharov 1969; Fernandes & Santos 1975; Goldblatt & Johnson 1990: 89, 1991: 104, 1994: 98, 1998: 85, 2000: 71; Schifino-Wittman & al. 1994, for references).

The centromere index shows chromosomes of metacentric, submetacentric and intercentric types. The karyotype is rather symmetrical. It consists of $2n = 2x = 6m + 6sm + 2I$ chromosomes. The chromosome size ranges between 13.2 and 7.5 µm. The ratio Xmax : Xmin is 1.5 : 1. The shortest chromosomes are of metacentric type but the longest are of submetacentric type. The total length of the karyotype is s+l = 134.2 µm.

1343. *Lathyrus tuberosus* L. — $2n = 14$ (Fig. 5).

Bu: Znepole region, Kalista village, near the Struma river, 42 28'N, 22 52'E, 21 Jul 2002, *A. Tosheva* 102334 (SO).

The distribution range of *Lathyrus tuberosus* covers Europe, the Caucasus Mts, southwestern and central Asia, Siberia and northern Africa. This species is widely distributed in Bulgaria up to 1000 m a.s.l. (Kozuharov 1976, 1992).

The chromosome number $2n = 14$ is reported for the first time for a population from Bulgaria.

This chromosome number confirms previous counts (see Fedorov 1969: 302; Goldblatt & Johnson 1990: 89, 1991: 104, 2000: 71; Shopova & al. 1990, for references).

The karyotype consists of $2n = 2x = 6m + 4sm + 2I + 2m\text{-}SAT = 14$ chromosomes. The karyotype presented by Shopova & al. l.c. consists only of metacentric and submetacentric chromosomes ($2n = 2m + 10sm + 2sm\text{-}SAT = 14$), whereas in our case a pair of intercentric chromosomes is established. The karyotype is slightly asymmetrical. A pair of metacentric chromosomes (the second in length) carries large satellites. The chromosome size varies between 8.4 and 5.6 µm. The ratio $X^{max} : X^{min}$ is 1.8 : 1. The shortest chromosome pair is intercentric, while the longest one is submetacentric. The total length of the karyotype is s+l = 3.6 µm.

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Reports (1344-1347) by Lorenzo Peruzzi

1344. ***Plantago atrata*** Hoppe subsp. ***fuscescens*** (Jordan) Pilger — $2n = 24$ (Figs 1-2).

It: Calabria, Mount Cozzo del Pellegrino, 1900 m a.s.l., 39° 45'N, 16° 01'E, 10 May 2002, *Peruzzi, Gargano & Donato* (*cult.* Hort. Bot. Calabria University, acc. n. 695, 699).

This taxon is widespread in the southern-eastern part of France and Italy (Greuter & al. 1989), where it occurs in dry and rocky mountainous grasslands (Pignatti 1982).

Our count confirms a previous report for specimens collected near Pollino Massif (Serra del Prete) published by Brullo & al. (1994), as well as reports from elsewhere (Fedorov 1969). For this unit the chromosome number of $2n = 36$ has been reported too (Fedorov l.c., Kliphuis & Wieffering 1972). The karyotype formula of the studied material can be expressed as follows: $2n = 4m + 2M + 12m + 2sm + 2sm\text{-}SAT + 2m = 24$. By examining our results, this unit appears to be of allotetraploid genesis, probably deriving either from two $2n = 12$ ancestors or possibly from diploid cytotypes of *P. media* L., which show one pair of satellited chromosomes of sub-median/sub-terminal type (Zemskova 1977), and diploid cytotypes of *P. atrata* Hoppe, which all show a chromosomic set of median/sub-median type and a lack of satellites (Petrova & Stoyanova 1997). Chromosome size ranges between 5.2 and 3.3 μm.

1345. ***Plantago crassifolia*** Forsskål — $2n = 20$ (Figs 3-4).

It: Apulia, Porto Cesareo (Lecce), Isola dei Conigli, on sandy habitats, 40° 16'N, 17° 53'E, 25 Sep 2002, *Uzunov, Gangale, Cesca, Peruzzi & Gargano* (*cult.* Hort. Bot. Calabria University, acc. n. 726).

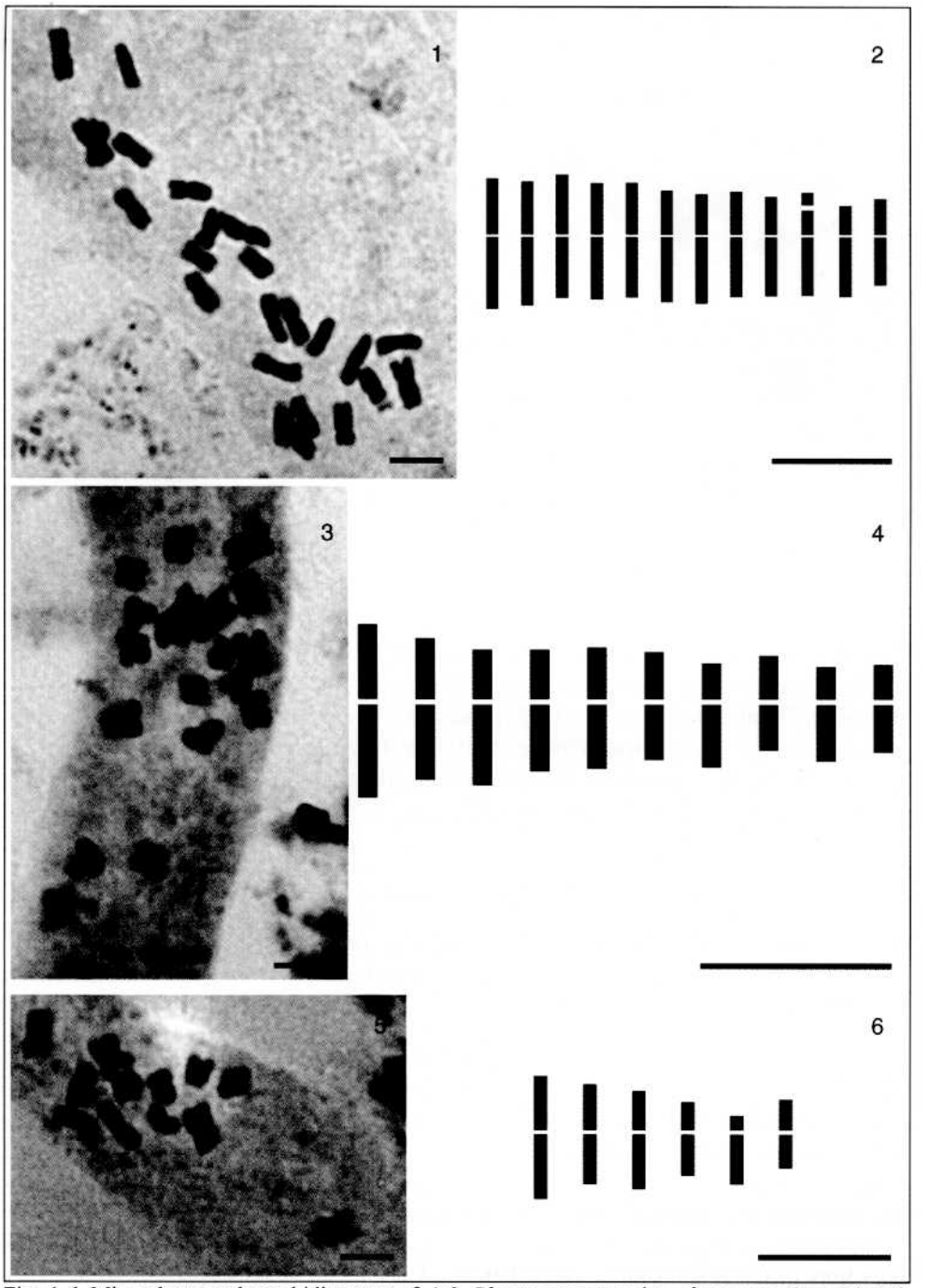
According to Chater & Cartier (1976) and Greuter & al. (1989), this species occurs in saline habitats all over the Mediterranean region, from Spain to Turkey.

Our result confirms data published in Fedorov (1969), Brullo & al. (1985), in plants from Sicily), Snogerup (1985), in plants from Italy, Apulia, Mount Gargano and Badr & El-Kholy (1987), in plants from Egypt. A single $2n = 24$ counting reported in Fedorov (1969) is probably wrong or refers to another taxon.

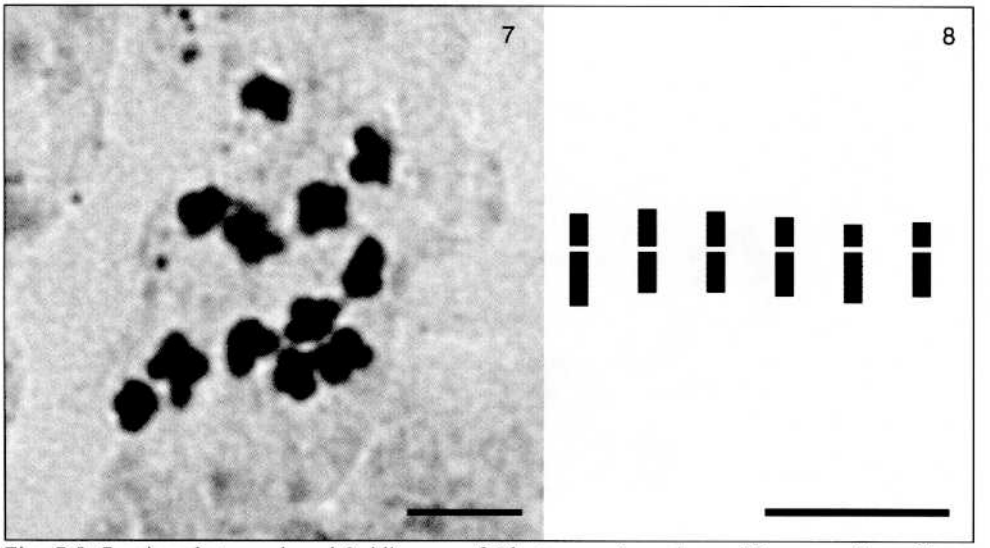
The karyotype formula of the studied material can be expressed as follows: $2n = 2M + 12m + 2sm + 2sm + 2m = 20$. Chromosome size ranges between 4.3 and 2.0 μm.

1346. ***Plantago lanceolata*** L. – $2n = 12$ (Figs 5-6).

It: Calabria, Pollino massif, Campotenese, North to Colle del Fago, little mountain between the Statal road n. 106 and the Motorway A3, 39° 53'N, 16° 04'E, 11 Mar 2002, *Peruzzi & Gargano* (*cult.* Hort. Bot. Calabria University, acc. n. 722).



Figs 1-6. Microphotographs and idiograms of: 1-2, *Plantago atrata* subsp. *fuscescens*, $2n = 24$; 3-4, *P. crassifolia*, $2n = 20$; 5-6, *P. lanceolata*, $2n = 12$. — Scale bars = 5 μm.



Figs 7-8. 7, microphotograph and 8, idiogram of *Plantago major* subsp. *pleiosperma*, $2n = 12$. — Scale bars = 5 μm.

This species is widespread in the whole Europe (Chater & Cartier 1976); it often shows a synanthropic behavior (Pignatti 1982), occurring in every possible habitat.

Our count confirms previous reports by Petrova & Stoyanova (1997, in plants from Bulgaria), Dmitrieva & Parfenov (1985) and Fedorov (1969). The chromosome complements of $2n = 12+$ B, 24, 96 are reported for this unit too (Fedorov l.c.). The karyotype formula of the studied material can be expressed as follows: $2n = 2x = 8m + 2sm + 2m = 12$. Chromosome size ranges between 4.6 and 2.5 μm.

1347. *Plantago major* L. subsp. ***pleiosperma*** Pilger — $2n = 12$ (Figs 7-8).

It: Calabria, Piano della Lacìna (Vibo Valentia), on damp habitats, 990 m a.s.l., 38° 36'N, 16° 25'E, 6 Apr 2002, *Peruzzi & Cesca* (*cult.* Hort. Bot. Calabria University, acc. n. 706).

According to Peruzzi & Passalacqua (2003) this trinomial combination has to be used to identify the unit, which most previous floras wrongly named alternatively *P. major* L. subsp. *intermedia* (Godr.) Lange; *P. major* subsp. *intermedia* (Gilib.) Lange or *P. major* subsp. *intermedia* (DC.) Arcangeli. This widely distributed subspecies occurs in humid places, and is characterized by $2n = 12$ as *P. major* subsp. *major* and *P. major* subsp. *winteri* (Wirtgen) W. Ludwig (Peruzzi & Passalacqua 2003, for additional bibliography).

Our count, coming from Mid-southern Calabria, confirms a previous report from the proximity of the administrative limits between Calabria and Basilicata (Peruzzi & Cesca 2003). The karyotype formula can be expressed as follows: $2n = 2x = 8m + 4sm = 12$. Chromosome size ranges between 2.5 and 2.0 μm.

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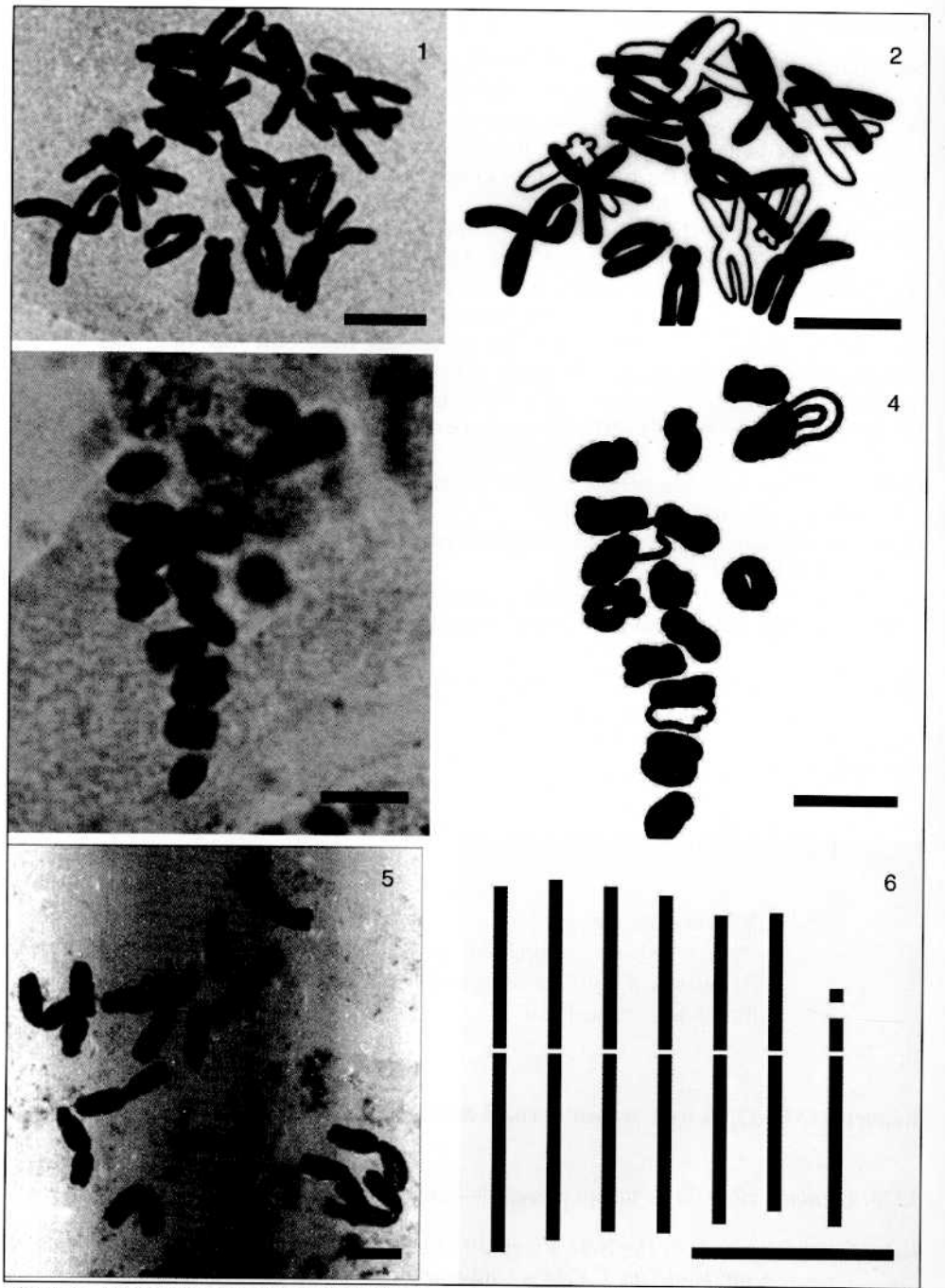
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Reports (1348-1356) by Lorenzo Peruzzi & Giuliano Cesca

1348. ***Clematis viticella*** L. subsp. ***viticella*** — $2n = 16$ (Figs 1-2).

It: Calabria, mouth of the Neto River, 39° 13'N, 17° 09'E, 27 May 2002, *Gangale & Uzunov* (*cult.* Hort Bot. Calabria University, acc. n. 227).

According to a recent survey of Brandenburg & al. (2001), two subspecific units can be distinguished in *C. viticella*: the subsp. *viticella*, widespread from south-west Spain to



Figs 1-6. Microphotographs and relative drawings of: **1-2,** *Clematis viticella* subsp. *viticella*, $2n = 16$; **3-4,** *Daphne laureola*, $2n = 18$; **5-6,** microphotograph and idiogram of *Hepatica nobilis*, $2n = 14$. — Scale bars = 5 µm.

Italy, Balkan Peninsula, Greece, Turkey and Syria and the subsp. *campaniflora* (Brot.) Font Quer, which occurs in Portugal, NW Spain and C Spain.

Our count is the first in Italian material of the typical subspecies of *C. viticella*, and agrees with data published by Meurman & Therman (1939) and Keener (1967). Chromosome size ranges between 8.0 and 4.0 µm.

1349. *Daphne laureola* L. — $2n = 18$ (Figs 3-4).

It: Calabria, Coastal Chain, Luta Forest, 1200 m a.s.l., 39° 22'N, 16° 06'E, 15 Nov 2001, *Cesca & Peruzzi* (*cult.* Hort Bot. Calabria University, acc. n. 203).

This species is widespread in Europe, mostly in Mediterranean habitats (Webb & Ferguson 1968; Pignatti 1982).

Our count is the first for peninsular Italy and confirms previous reports in Fedorov (1969) from Austria, Strid & Franzén (1981) from Greek material, Lentini & al. (1988) from Sicily, Galland (1988) from Morocco, Al-Bermani & al. (1993) from British Islands. Chromosome size ranges between 3.0 and 2.0 µm.

1350. *Hepatica nobilis* Miller — $2n = 14$ (Figs 5-6).

It: Calabria, coastal Chain, near Mt. Cocuzzo, 1000 m a.s.l., 39° 14'N, 16° 07'E, 14 Mar 2002, *Peruzzi & Passalacqua* s.n. (CLU).

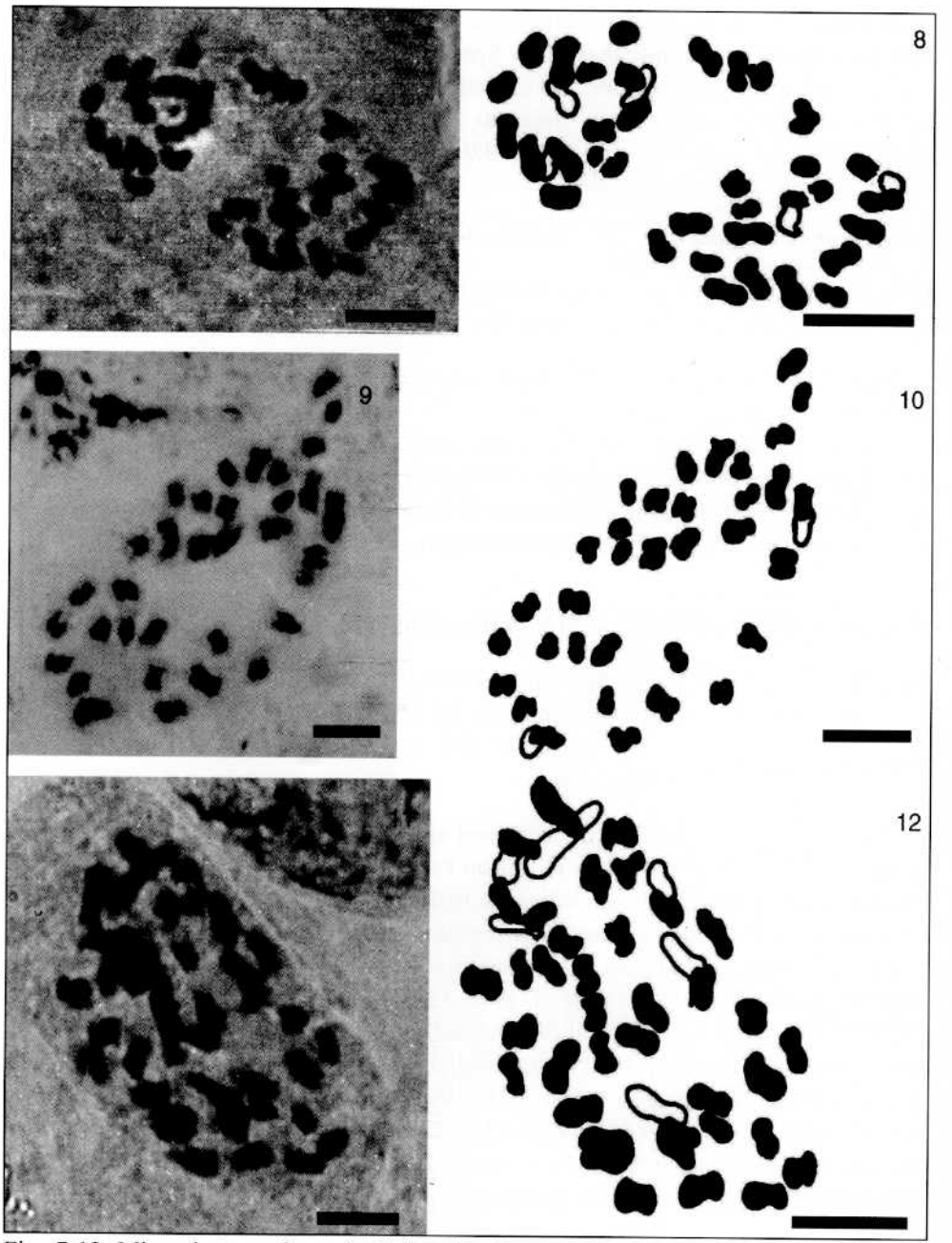
— Calabria, Mt. Pollino, 39° 56'N, 16° 12'E, Apr 1981, *Cesca* (*cult.* temporarily Hort Bot. Calabria University).

Hepatica nobilis Miller is a Circumboreal species, widespread in the Mediterranean basin from Spain, France, Corsica to Balkan Peninsula (Greuter & al. 1989) and on the mountains of peninsular Italy, excluding the islands (Pignatti 1982).

Our count refers to the most southern populations in Europe for this taxon, and agrees well with data published by several authors from elsewhere (Fedorov 1969; Baumberger 1970; Bochantzeva 1971; Lovka & al. 1971; Lovka 1972; Susnik & al. 1972; Marks & Schweizer 1974; Tornadore & al. 1974; Vachova 1976; Arohonka 1982; Šopova & Sekowski 1989; Semerenko 1990; Javurková-Jarolímová 1992; Mesícek 1992; Druskovic & Lovka 1995). According to Levan & al. (1964), the karyotype formula of the studied material can be expressed as follows: $2n = 2x = 2M + 4m + 6m + 2t\text{-}SAT = 14$. A tetraploid chromosome complement with $2n = 4x = 28$ is also reported by Kurita (1957). Chromosome size ranges between 10.0 and 5.5 µm.

1351. *Lupinus angustifolius* L. subsp. ***angustifolius*** — $2n = 40$ (Figs 7-8).

It: Calabria, Sila, Cecita lake (Cosenza), close to the banks, 1150 m a.s.l., 39° 23'N, 15° 33'E, 2 Jul 2001, *Peruzzi* (*cult.* temporarily Hort. Bot. Calabria University).



Figs 7-12. Microphotographs and relative drawings of: **7-8,** *Lupinus angustifolius* subsp. *angustifolius*, $2n = 40$; **9-10,** *Ophrys lutea* subsp. *lutea*, $2n = 36$; **11-12,** *Orchis purpurea*, $2n = 40$. — Scale bars = 5 μm.

This taxon occurs in Mediterranean habitats on light and acid soils (Amaral Franco & Pinto da Silva 1968; Pignatti 1982).

Our count confirms data reported by several authors from elsewhere (Fedorov 1969; Fernandes & Santos 1971; Larsen & Lagaard 1971; Fernandes & Queiros 1978; Pastor 1979; Colombo & al. 1982; Pastor & al. 1988; Izmailow 1989). A chromosome complement of $2n = 48$ is present in Fedorov (1969), and the countings $2n = 38, 42, 44$ have also been reported from Turkey by Ghrabi Gammar & al. (1997). Chromosome size ranges between 2.5 and 1.0 µm.

1352. *Ophrys lutea* Cav. subsp. ***lutea*** — $2n = 36$ (Figs 9-10).

It: Calabria, Greek Sila, near Cropalati, 300 m a.s.l., 39° 32'N, 16° 42'E, 28 Mar 2002, *Cesca & Aquaro* (*cult.* Hot. Bot. Calabria University, acc. n. 449).

According to Grünanger (2000), *O. lutea* is a steno-mediterranean element which grows in garigues. The type subspecies rarely occurs in Italy and only in the southern part and islands (Rossi 2002).

Our count is the first for peninsular Italy, and agrees with data reported in Fedorov (1969) and with counts published by Löve & Kjellqvist (1973) from Spain and Scrugli (1977) from Sardinia. The same chromosome number was also reported by Mazzola & al. (1982) for *O. lutea* subsp. *murbeckyii* (Fleischm.) Soó from Sicily. Chromosome size ranges between 2.0 and 1.0 µm.

1353. *Orchis purpurea* Hudson — $2n = 42$ (Figs 11-12).

It: Calabria, Carolei (Cosenza), Park of Cappuccini, 650 m a.s.l., 39° 15'N, 16° 13'E, 15 Apr 2002, *Romeo* 830 (CLU).

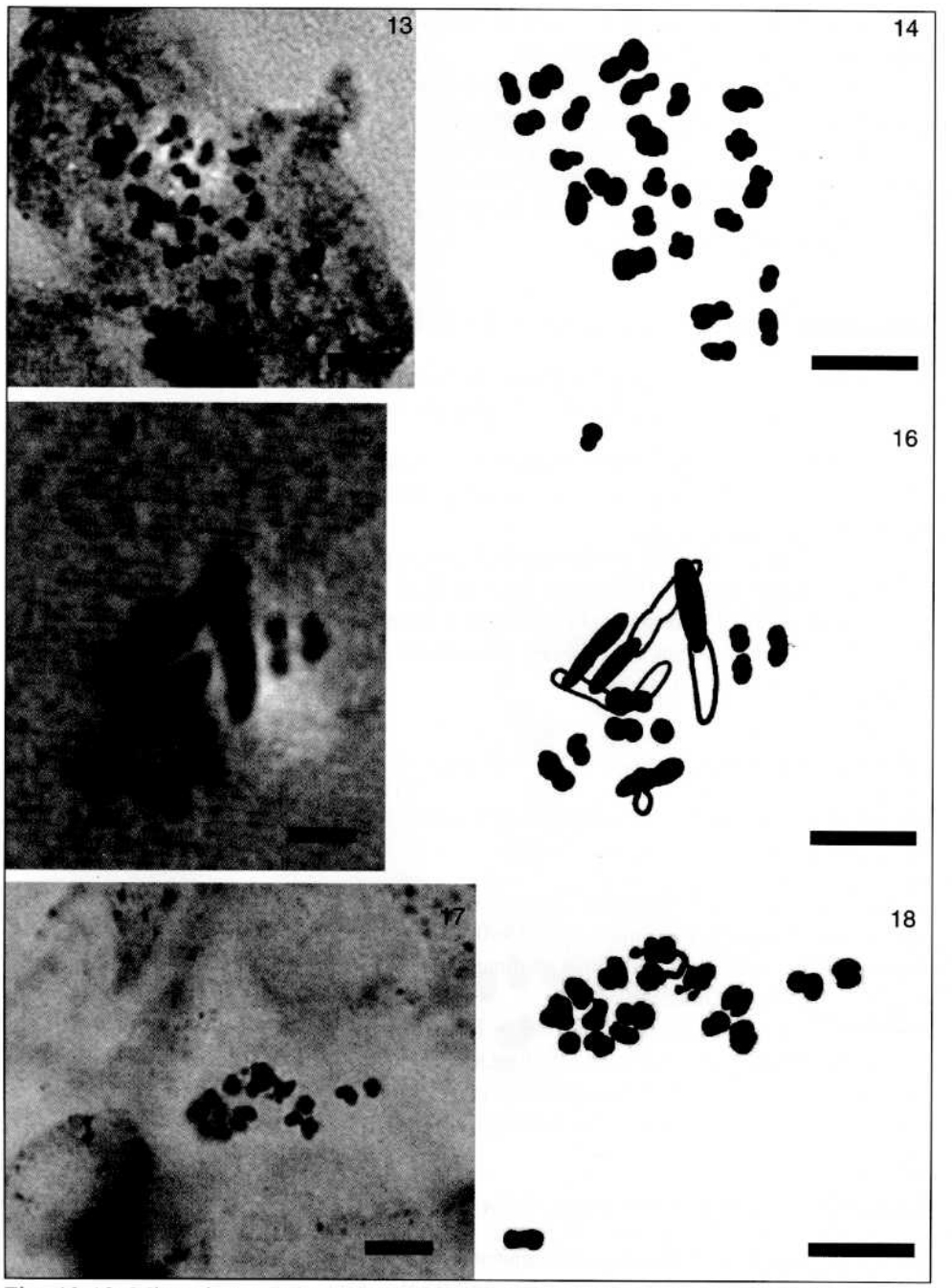
Orchis purpurea is a Eurasiatic element, spread from the north of Spain to the Crimea, and towards the north in Finland (Soó 1980). This species is present in all the regions of the Italian Peninsula and in Sardinia (Grünanger 2000); its precense in Sicily was recently confirmed by Rossi (2002).

Our count agrees with data reported in Fedorov (1969), Corrias & Villa (1973) from Sardinia, Uhrikova (1976), Murin (1978); Del Prete (1977) from Tuscany and Ruiz (1995) from Spain. A $2n = 40$ chromosome count, reported in Fedorov (1969), is probably incorrect. Chromosome size ranges between 4.0 and 2.0 µm.

1354. *Quercus virgiliana* (Ten.) Ten. — $2n = 24$ (Figs 13-14).

It: Calabria, Botanic Garden of Calabria University, where it grows spontaneously, 39° 18'N, 16° 11'E, 25 Nov 2002, *Peruzzi* (from germinating seeds).

This species spreads in the whole peninsular Italy, Sardinia, Sicily and Balkan Peninsula (Brullo & al. 1999).



Figs 13-18. Microphotographs and relative drawings of: **13-14,** *Quercus virgiliana*, $2n$ = 24; **15-16,** *Triglochin laxiflora*, $2n$ = 18; **17-18,** *Veronica beccabunga*, $2n$ = 18. — Scale bars = 5 μm.

Our count agrees with a previous report made by D'Emerico & al. (1995). Chromosome size ranges between 3.0 and 1.0 μm.

1355. *Triglochin laxiflora* Guss. — 2n = 18 (Figs 15-16).

It: Apulia, Salento, coast between Porto Cesareo and Santa Caterina (Lecce), on damp saline habitats, 40° 10'N, 17° 57'E, 25 Sep 2002, Uzunov, Gangale, Cesca, Peruzzi, Gargano (*cult.* Hort. Bot. Calabria University, acc. n. 214).

According to Dandy (1980) and Pignatti (1982), this unit occurs in damp and saline habitats from Balkan Peninsula westwards to Portugal. *T. laxiflora* appears to be closely related with *T. bulbosa* L., but while the first one shows an autumn flowering, the latter regularly blooms in springtime.

Our count agrees with a previous one reported by Talavera & al. (1995) in plants from Morocco. Chromosome size ranges between 5.0 and 1.5 μm.

1356. *Veronica beccabunga* L. — $2n$ = 18 (Figs 17-18).

It: Calabria, Piano della Lacina (Vibo Valentia), on damp habitats, 990 m a.s.l., 38° 36'N, 16° 25'E, 6 Apr 2002, *Peruzzi & Cesca* (from root tips collected *in situ*).

This species is widespread on ditches, streams and marshes of Europe (Walters & Webb 1972).

Our count is the first for peninsular Italy, and confirms data that many authors published from elsewhere (Marchant 1967; Fedorov 1969; Kuzmanov & Kozuharov 1969; Gadella & Kliphuis 1972; Peev 1972; Vasudevan 1975; Vachova 1976; Vachova & Ferakova 1977; Favarger & al. 1979; Ozturk & Fischer 1982; Parfenov & Dmitrieva 1987; 1988; Wentworth & al. 1991; Al-Bermani & al. 1993). A tetraploid chromosome complement of $2n = 4x = 36$ has been reported for Sicily (Ferrarella & al. 1981) and other provenances (Fedorov l.c.); the chromosome complement with $2n = 16$ is rarely reported for this species (Fedorov l.c.; Davlianidze 1980). Chromosome size ranges between 2.0 and 1.0 μm.

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Reports (1357-1361) by Lorenzo Peruzzi & Domenico Gargano

1357. *Androsace villosa* L. — $2n = 20$ (Figs 1-2).

It: Calabria, Mount Cozzo del Pellegrino, 1980 m a.s.l., 39° 45'N, 16° 01'E, 10 May 2002, *Peruzzi, Gargano & Donato* 5247(CLU).

This plant occurs in mountainous habitats of southern and central Europe, from Spain to Russia (Ferguson 1972). In Italy, *A. villosa* is widespread on the Alps and Apennines (Pignatti 1982).

Our count is the first for Italian populations, and confirms data reported by several authors from elsewhere (Zhukova 1967; Fedorov 1969; Lovka & al. 1971; Ritter 1972; Kress 1984). Chromosome complements of $2n = 72, 74$ have also been also reported (Fedorov l.c.). The stand investigated appears to be the southernmost in Italy. Chromosome size ranges between 7.0 and 2.0 µm.

1358. *Gentiana verna* L. subsp. ***verna*** — $2n = 28$ (Figs 3-4).

It: Calabria, Mount Cozzo del Pellegrino, 1900 m a.s.l., 39° 45'N, 16° 01'E, 10 May 2002, *Peruzzi, Gargano & Donato* 5246 (CLU).

The systematic aspects of this taxon have been treated differently, by the authors (Tutin 1972; Greuter & al. 1986), however, *G. verna* s.l. exhibits a very large distribution, on the mountains of central, southern and northern Europe, from France to Artic Russia (Tutin 1972). In Italy, *G. verna* occurs in the Alps and Apennines, but its actual distribution is uncertain (Pignatti 1982).

Our report is the first for Italy and agrees with countings reported in Fedorov (1969), and also with data published by Müller (1982) in plants from Austria, by Baltisberger & Huber (1993) in plants from Switzerland. For this species, the chromosome complements with $2n = 26$ (Fedorov l.c.) and $2n = 26 + 0\text{-}2B$ (Druskovic & Lovka 1995, in Slovenian material) are reported too. Chromosome size ranges between 5.5 and 2.0 µm.

1359. *Rosa heckeliana* Tratt. — $2n = 35$ (Figs 5-6).

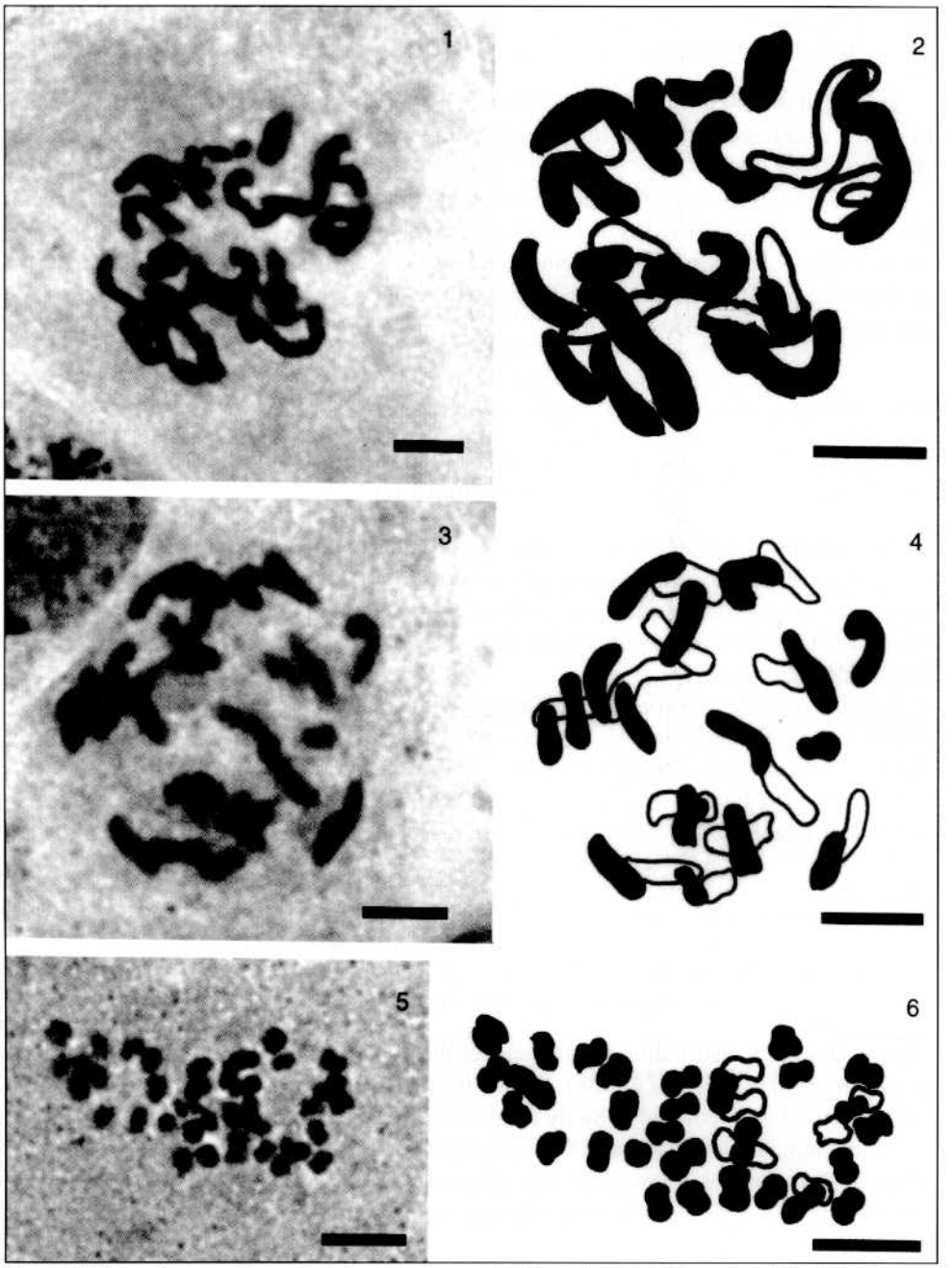
It: Basilicata, Mount Alpi, 1750 m a.s.l., 40° 07'N, 15° 59'E, 25 Jul 2002, *Peruzzi, Gargano & Caparelli* (*cult.* Hort. Bot. Calabria University, acc. n. 279).

This species has a distribution which includes the mountains of the eastern Mediterranean region and Sicily (Klášterský 1968). In Italy the plant occurs in some mountains of central and southern Apennines and in Sicily (Pignatti 1982).

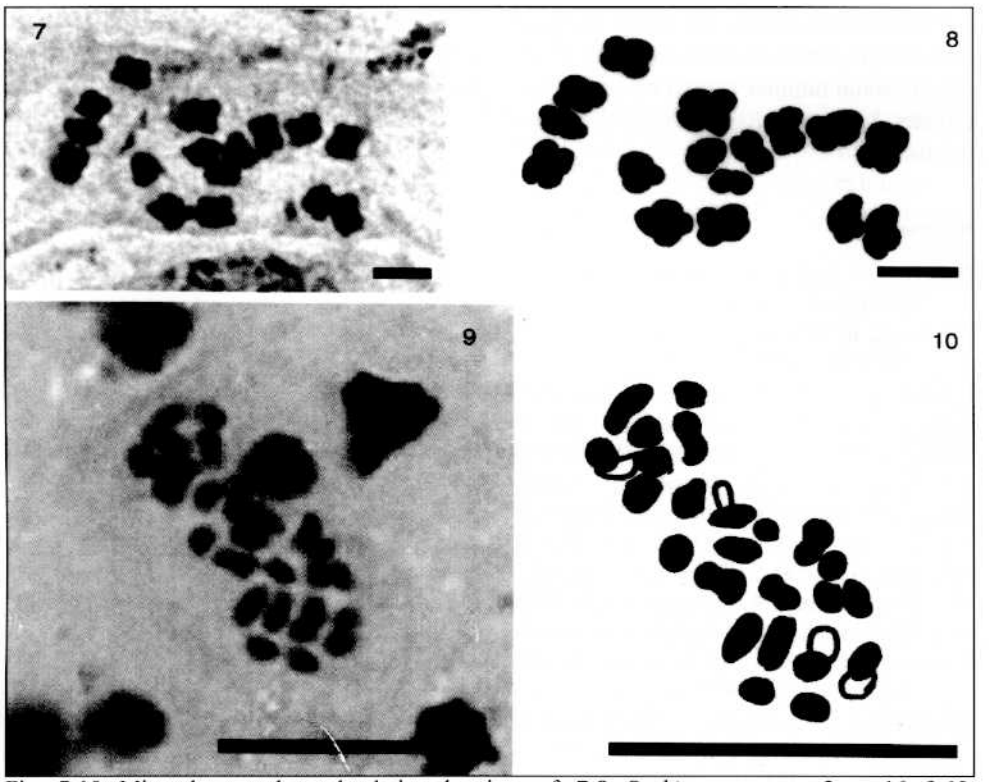
Our count is the first report for Italian populations and differs from the $2n = 28$ chromosome complement known for this species from the Balkan Peninsula (Strid & Andersson 1985; Popek & al. 1991). Chromosome size ranges between 2.0 and 1.0 µm.

1360. *Scabiosa taygetea* Boiss. et Heldr. — $2n = 16$ (Figs 7-8).

It: Basilicata, Mount Alpi, 1700 m a.s.l., 40° 07'N, 15° 59'E, 25 Jul 2002, *Peruzzi, Gargano & Caparelli* (*cult.* Hort. Bot. Calabria University, acc. n. 170).



Figs 1-6. Microphotographs and relative drawings of: **1-2,** *Androsace villosa*, $2n = 20$; **3-4,** *Gentiana verna* subsp. *verna*, $2n = 28$; **5-6,** *Rosa heckeliana*, $2n = 35$. — Scale bars = 5 μm.



Figs 7-10. Microphotographs and relative drawings of: **7-8,** *Scabiosa taygetea*, $2n = 16$; **9-10,** *Solenopsis minuta* subsp. *nobilis*, $2n = 28$. — Scale bars = 5 μm.

The presence of this species is distributed on limestones in former Jugoslavia, Greece and in some areas in the south-eastern Italian Peninsula (Jasiewicz 1976). The exact distribution in Italy needs to be clarified, because its relations with *Scabiosa holosericea* Bertol. and *S. columbaria* L. are uncertain for some authors (i.e. Pignatti 1982).

Our count is the first report for Italian populations and confirms previous data by Verlaque (1975, 1977, 1986) from Greece. This species appear to be karyologically a little distinct from *S. holosericea* Bertol. ($2n = 16$ too), which shows a couple of chromosomes strongly heteromorphic (Peruzzi & Cesca 2002). Chromosome size ranges between 3.0 and 2.0 μm.

1361. *Solenopsis minuta* J. & C. Presl subsp. ***nobilis*** (F. E. Wimmer) R. D. Meikle [= *Laurentia bivonae* (Tin.) S. Pignatti] — $2n = 28$ (Figs 9-10).

It: Calabria, near Papasidero, on the banks of the Lao river, 39° 53'N, 15° 54'E, 4 Jul 2002, *Peruzzi & Gargano* 5245 (CLU).

This taxon occurs in Italy and Cyprus (Greuter & al. 1984); in Italy its presence is known from Calabria, Sicily and Sardinia (Pignatti 1982).

Our datum is the second report for this taxon and the first for peninsular Italy; it agrees with the previous one (Romano & al. 1986), based on plants coming from Sicily. The same chromosome number is also reported by Kamari & Matthäs (1986) for the subsp. *annua* Greuter, Matthäs & Risse in material from Kriti. Chromosome size ranges between 1.0 and 0.5 μm.

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Reports (1362-1365) by Lorenzo Peruzzi & Nicodemo Giuseppe Passalacqua

1362. *Ornithogalum divergens* Boreau — $2n = 6x = 54$ (Figs 1-2).

It: Calabria, Little Sila, Ciricilla region, 1300 m a.s.l., 39° 09'N, 16° 35'E, 31 May 2002, *Peruzzi & Passalacqua* (*cult.* Hort. Bot. Calabria University, acc. n. 749).

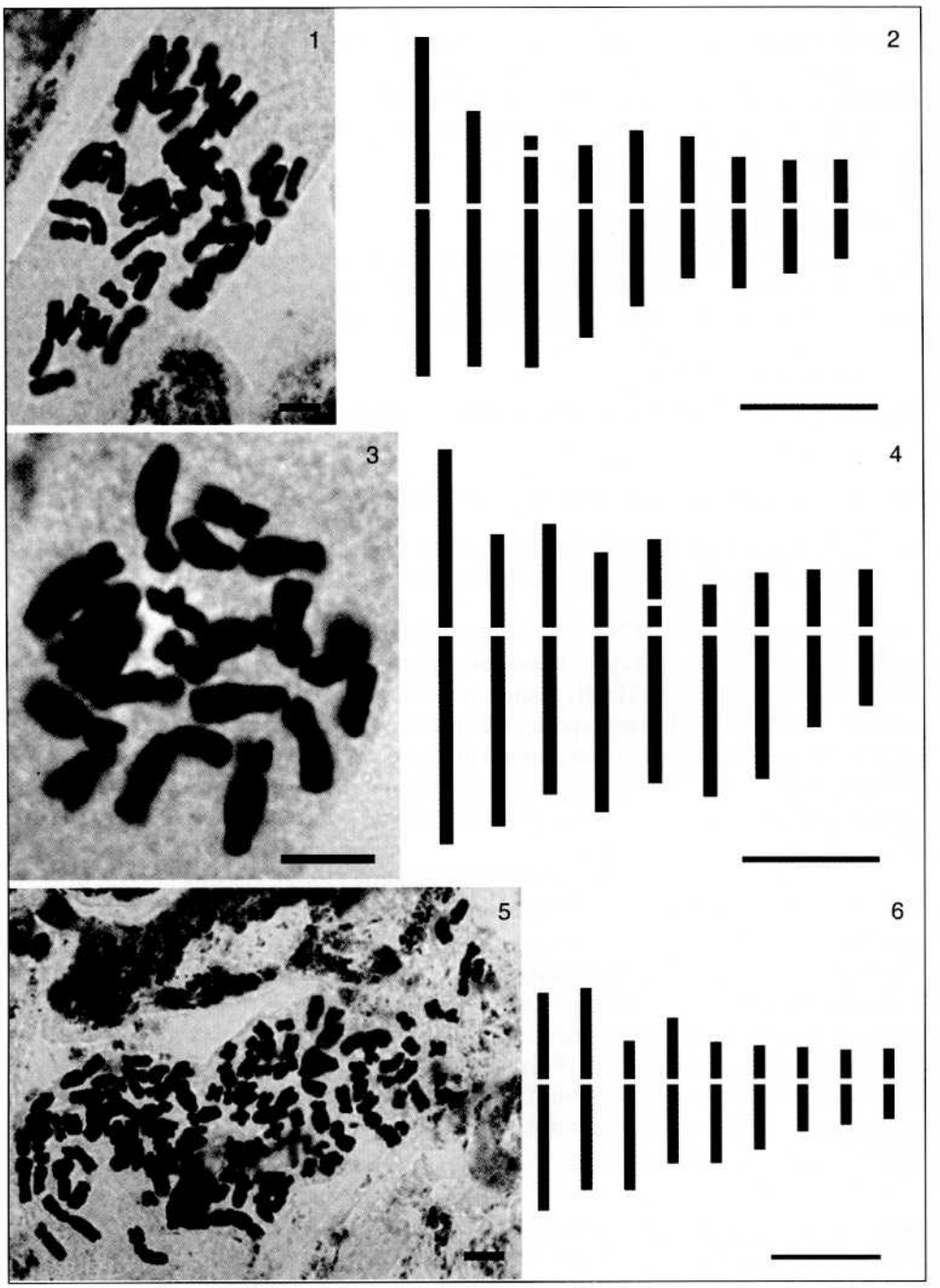
According to Zahariadi (1980), *O. divergens* Boreau widely occurs in southern Europe. As already noted by Gadella (1972a) and subsequently by other authors (i.e. Garbari & al. 2002), *O. divergens* is a unit closely related to *O. umbellatum* L. In the circle of the euploid series that countersigns the latter species (see over), *O. divergens* could represent the hexaploid cytotypes. This ploidy level appears in fact constantly correlated with a series of esophenotypic characters (also confirmed in the present study) that render its identification on the field possible, as for instance the horizontal – arched pedicels, often slightly deflexed during the fructification.

Our count agrees with reports published by Fedorov (1969), Gadella (1972a, b) from Netherlands; Susnik & Lovka (1973), Speta (2000) from Austria; Garbari & al. (2002) from Italy.

For this taxon, chromosome countings of $2n = 27, 36, 45, 54$ (Kushnir & Galil 1977), $2n = 42$ (Lungeanu 1971, 1972) and $2n = 11$-108 (Couderc & al. 1984) were also reported, which in most cases refer probably to *O. umbellatum*. Instead, a report of $2n = 54$ sub *O. umbellatum* made by Marchi (1971) on Italian material could be referred to *O. divergens*. According to Levan & al. (1964), the karyotype formula of the studied material can be expressed as follows: $2n = 6x = 6M + 24m + 18sm + 6st\text{-}SAT = 54$. Chromosome size ranges between 11.2 and 3.6 μm.

1363. *Ornithogalum montanum* Cirillo — $2n = 2x = 18$ (Figs 3-4).

It: Calabria, Greek Sila, 1 Km after Paludi, pointing to Cropalati, 400 m a.s.l., 39° 32'N, 16° 42'E, 18 Apr 2002, *Peruzzi*, *Cesca*, *Aquaro* (*cult.* Hort. Bot. Calabria University, acc. n. 603).



Figs 1-6. Microphotographs and idiograms of *Ornithogalum*: **1-2,** *O. divergens*, $2n = 6x = 54$; **3-4,** *O. montanum*, $2n = 2x = 18$; **5-6,** *O. refractum*, $2n = 12x = 108$. — Scale bars = 5μm.

— Calabria, Piano della Lacìna (Vibo Valentia), reforested pine wood, 1000 m a.s.l., 38° 36'N, 16° 25'E, 6 Apr 2002, *Peruzzi & Cesca* (*cult.* Hort. Bot. Calabria University, accession number 114).
— Basilicata, Mount Sirino-Papa (Potenza), above the lake Remmo, rocky grasslands, alt. ca. 1700 m a.s.l., 40° 08'N, 15° 51'E, 25 Jul 2002, *Peruzzi, Gargano, Caparelli* (cult. Hort. Bot. Calabria University, acc. n. 19).

O. montanum Cirillo is widespread from S Italy, Balkan peninsula (Zahariadi 1980) to eastern Mediterranean regions and Caucasus (Stearn & Landström 1991).

Our count agrees with previous reports of Cullen & Ratter (1967) in plants from Sicily, Greece, Lebanon and Turkey; Lungeanu (1971, 1972), Garbari & Tornadore (1971), Capineri & al. (1975) and Tornadore & Garbari (1979) in plants from Calabria; Phitos (1980) and Kriemadi & al. (2002) in plants from Greece. Many authors often evidenced the presence of B-chromosomes, as: Johnson & Brandham (1997), $2n = 18, 20$, Tornadore & Garbari (1979), $2n = 18+0\text{-}6$ B in plants from Sicily, Barbujani & Pigliucci (1989), $2n = 18 + 0\text{-}2$B in plants from Italy, Cesca (1982) in plants from Calabria, Özhatay & Johnson (1996), $2n = 18 + 0\text{-}2$B in material from Turkey, Pogosian (1997), $2n = 20$ in plants from Transcaucasia. Additionally, Bolkhovskich & Alexandrova (1988) evidenced the occurrence of tetraploid cytotypes ($2n = 18 + 2$B and $2n = 4x = 36 + 4$B).

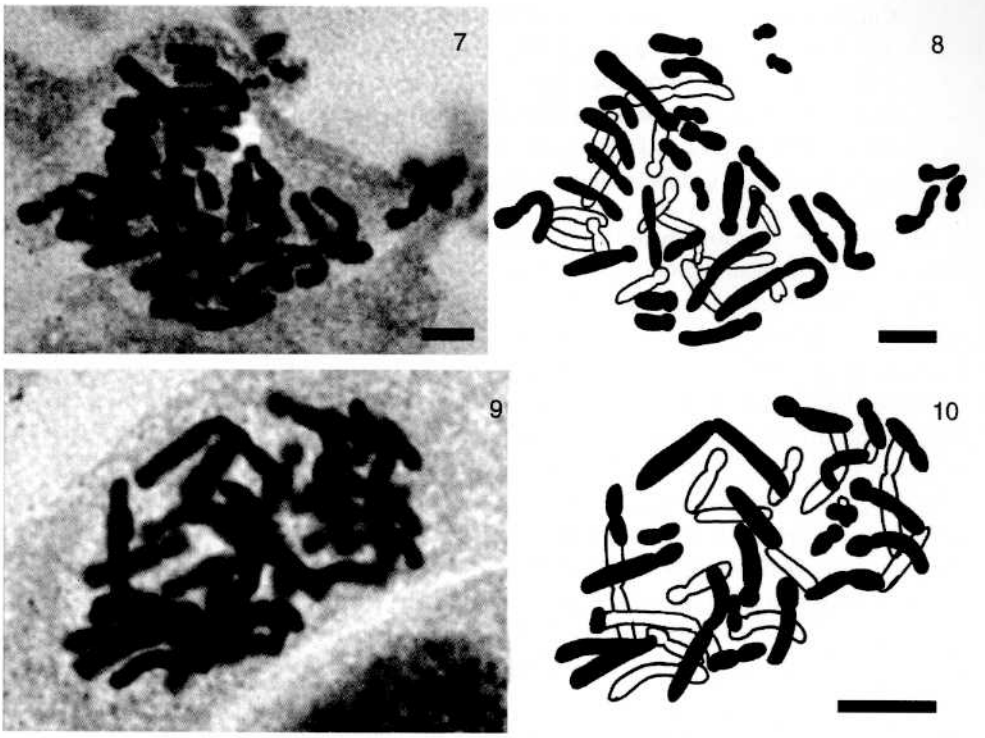
Other countings, such as $2n = 16, 20$ (Kushnir & Galil 1977), $2n = 14, 16$ (Markova & al. 1974), $2n = 16, 18$ (Fedorov 1969; Loon & Oudemans 1982), $2n = 14$ (Cullen & Ratter 1967, in plants from Turkey, Markova & al. 1972) are of difficult interpretation. These data mainly come from the eastern Mediterranean basin, and they are perhaps due to confusion with similar taxa, which occur in these areas, i.e. *O. lanceolatum* Labill. and *O. oligophyllum* E. D. Clarke. The karyotype formula of the studied material can be expressed as follows: $2n = 2x = 6m + 8sm + 2sm\text{-}SAT + 2st = 18$. Chromosome size ranges between 15.0 and 4.3 μm.

1364. *Ornithogalum refractum* Kit. ex Willd. — $2n = 12x = 108$ (Figs 5-6).

It: Calabria, structural High of Cassano allo Jonio, 500 m a.s.l., 39° 47'N, 16° 17'E, 15 Jan 2002, *Cesca* (*cult.* Hort. Bot. Calabria University, acc. n. 161).

According to a recent survey of the Italian representatives of *Ornithogalum* L. with reflexed pedicels (Peruzzi & Passalacqua 2002), this unit occurs in the Balkan Peninsula and Italy and is characterized by short scape, the presence of a motor pulvinus at the base of the pedicels, subglobose concrescent-scaled bulb with bulbils in and out of the tunics, bracts almost equal to or slightly longer than the pedicels.

Our datum adds a new ploidy level (12x) to this species, previously known to be characterized by a euploid series from 4x to 10x: $2n = 36, 45, 54$ (+B), 72, 90 (Peruzzi & Passalacqua 2002 and related literature). The pattern of the ploidy levels of this taxon show a singular affinity with that of *O. umbellatum* L. (see over). The karyotype formula of the studied material can be expressed as follows: $2n = 12x = 72m + 36sm = 108$. Chromosome size ranges between 11.7 and 2.9 μm.



Figs 7-10. Microphotographs and relative drawings of *Ornithogalum umbellatum*: **7-8,** $2n = 4x = 36$; **9-10,** $2n = 5x = 45$. — Scale bars = 5µm.

1365. *Ornithogalum umbellatum* L. — $2n = 4x = 36$ (Figs 7-8) & $2n = 5x = 45$ (Figs 9-10).

It: Calabria, Greek Sila, Cropalati, locality S. Maria ad Gruttam, 400 m a.s.l., 39° 31'N, 16° 42'E, 18 Apr 2002, *Peruzzi*, *Cesca*, *Aquaro* (from young ovaries collected *in situ*).

— Calabria, Laino Borgo (Cosenza), at the bivio to the main road to Mormanno, 300 m a.s.l., 39° 57'N, 15° 59'E, 15 Apr 2002, *Peruzzi & Gargano* 5248 (CLU).

According to Zahariadi (1980), *O. umbellatum* L. occurs widely in southern-central Europe. Stearn & Landström (1991) proposed to reject this name because it can be a source of confusion, but other specialists (Speta 2000; Garbari & al. 2002) are of the opinion that this name has to be maintained.

Our counts agrees with other ones reported for the euploid series of *O. umbellatum* $2n = 27, 36, 45, 72, 90, 108$ (Raamsdonk 1986; Marcucci & Tornadore 1997, Garbari & al. 2002 and related literature) in plants from Italy and elsewhere. Chromosome size ranges between 10.0 and 3.7 µm.

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Reports (1366-1367) by Lia Pignotti

1366. *Scirpus atrovirens* Willd. — $2n = 56$ (Fig. 1a).

It: Parco Regionale La Mandria, Venaria Reale (Torino), 305 m, 45° 09'N, 7° 34'E, 23 Jul 1999. *Pignotti & Tardelli* (*cult.* Hort. Bot. Firenze n. PI4434).

S. atrovirens is native of North America. It has been reported frequently as a casual in C Europe and NE France (De Filipps 1981). *S. atrovirens* is present in Italy, in the park of La Mandria in Piedmont (near Turin), where it was first observed in the early fifties (Tosco & Ariello 1954).

Schuyler (1976) count for this species a haploid number of ca. 28, on plants from eastern North America. Harriman (1981) reported $2n = 50, 56, 62$ from North America and Löve & Löve (1981) 2n = 56 from Canada. The somatic chromosome number was hitherto unknown from Europe.

The present count confirms the literature data from North America. The chromosomes range from 3.09 to 1.45 m in length, with an average value of 1.70 μm.

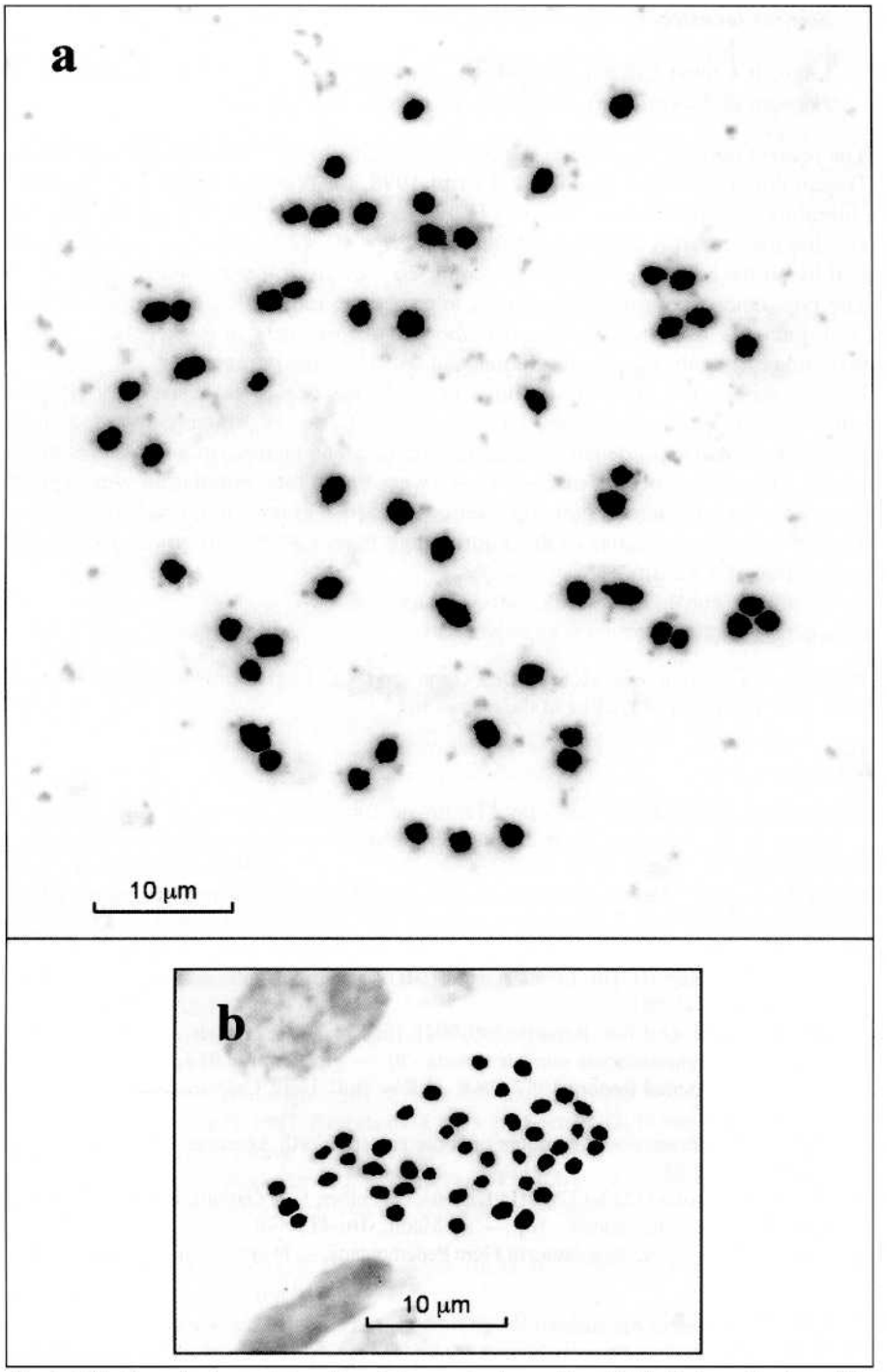


Fig. 1. Mitotic metaphase plates of: **a**, *Scirpus atrovirens*, $2n = 56$; **b**, *S. lacustris*, $2n = 42$.

1367. *Scirpus lacustris* L. – $2n = 42$ (Fig. 1b).

It: Lago di Chiusi (Siena), 250 m, SE Tuscany, 43° 3'N, 11° 57'E, 20 May 1996, *Pignotti & Turrini* (*cult.* Hort. Bot. Firenze n. PI4711).

The present number is added to the previous counts of $2n = 38, 40$ reported from another Tuscan population (see Pignotti & Fiorini 1998, for previous reports) and agrees with the literature data from other countries (Löve & Löve 1974, sub *Schoenoplectus*). Stoeva (2000) has also recently reported the numbers $2n = 40, 42$ from Bulgaria, which are confirmed by all the results, except for the count $2n = 80$ from India (Sharma 1970).

The population examined here shows intermediate morphological characters between the ssp. *lacustris* and the ssp. *tabernaemontani*, respectively in its vegetative (glaucous stems) and reproductive (smooth glumes and trifid stigmas) organs.

In this respect, the previous findings on *S. lacustris* s. l. from Tuscany (Pignotti & Fiorini 1998) are worth mentioning: the cytotypes of $2n = 38, 40$ were assessed on a population with typical ssp. *lacustris* characters (dark green stems, smooth glumes and trifid stigmas), while the cytotypes of $2n = 40, 42$ were found on a population with typical ssp. *tabernaemontani* characters (glaucous stems, verrucose glumes and bifid stigmas).

The $2n = 42$ chromosomes of this count range from 1.89 to 1.01 μm in length, with an average value of 1.42 μm.

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Report (1368) by T. Cusma Velari, L. Feoli Chiapella & G. Bacchetta

1368. *Genista spartioides* Spach — $2n = 40 + 0\text{-}2B$ (Fig. 1).

Hs: Almería, Pechina, Rambla de Pechina, on limestone alluvial deposits, 36° 53'N, 2° 28'W, 60 m, 26 Mar 1998, *G. Bacchetta* s.n. (CAG).

Genista spartioides occurs in the western Mediterranean region: southern Spain (from the provinces of Albacete and Murcia to Sierra Almijara, Málaga), northern Morocco and northern Algeria (Maire 1987; Greuter & al. 1989; Talavera 1999).

The chromosome number $2n = 40$, sometimes with two accessory chromosomes, confirms the only reference ($n = 20$) reported by Sañudo (1971) concerning two populations attributed to *Genista spartioides* subsp. *retamoides* (Spach) Riv. God. & Riv. Martínez: Sorbas (Almería) and Nerja (Málaga). Chromosome size ranges from 1.84 to 0.66 µm and 0.40 µm for B-chromosomes.

The species grows mainly on calcareous substrates, at altitudes between 0 m and 850 m; the bioclimate is Mediterranean xeric-oceanic: the thermotypes range between upper inframediterranean and upper thermomediterranean, the ombrotypes between lower semiarid and lower dry, after Rivas-Martínez & al. 2002. *Genista spartioides* can be found in thermophilous "maquis" and garrigue, in coenoses of class *Rosmarinetea officinalis* (Rivas Martínez & al. 2002).

Sañudo (1971) reported $n = 20$ also for *Genista haenseleri* Boiss. (material from Orgiva, Granada). On the other hand Talavera (1999) ascribes this number to *G. spartioides*.

The chromosome number $2n = 40$ can be traced back to the basic number x = 10, rare in *Genista*. It was reported only for *G. legionensis* (Pau) M. Laínz ($n = 20$, Sañudo 1971), of sect. *Erinacoides* Spach, *G. scorpius* (L.) DC. ($n = 20$ and/or $2n = 40$, Sañudo 1971; Verlaque & al. 1987) and *G. carpetana* Lange ($n = 20$ and/or $2n = 40$, Sañudo 1971; Cubas & al. 1998), both of sect. *Scorpioides* Spach.

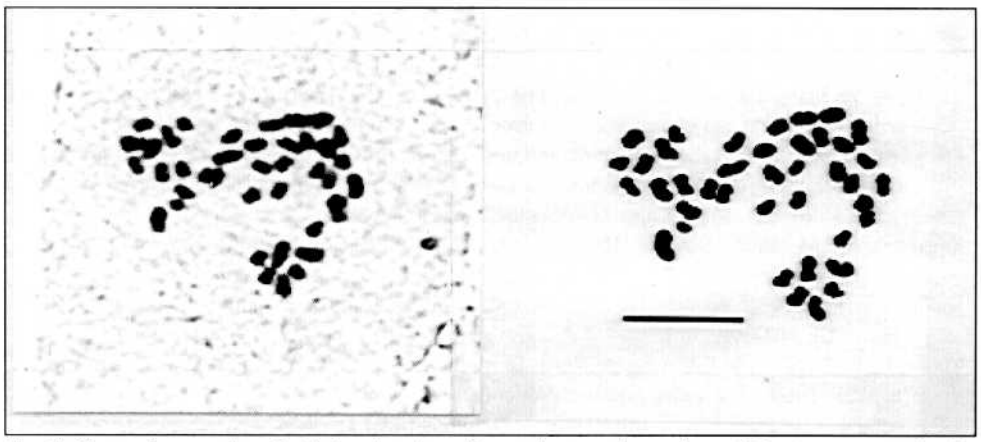


Fig. 1. Photomicrograph and relative drawing of somatic metaphase plate of *Genista spartioides*, $2n = 40$. — Scale bar = 5 µm.

Genista spartioides belongs to sect. *Spartocarpus* Spach (= *Asterospartum* Spach, *Retamospartum* Spach ex Coss.), which appears karyologically heterogeneous. The species of this section present several basic numbers: besides x = 10, x = 11, x = 12 and x = 13 were reported. The number x = 11 is present in *G. sessilifolia* DC. ($2n$ = 22, Kuzmanov 1974; Krusheva 1975); x = 12 is the most common, $2n$ = 48 having been found in *G. radiata* (L.) Scop. var. *radiata* (Cusma Velari & Feoli Chiapella 1987a), *G. holopetala* (Koch) Bald. (Cusma Velari & Feoli Chiapella 1987b), *G. ephedroides* DC. (Villa 1980), *G. gasparrinii* (Guss.) C. Presl (Colombo & al. 1979, sub *G. ephedroides*), *G. cilentina* Valsecchi (Pizzolongo 1960, sub *G. ephedroides*) and *G. dorycnifolia* Font Quer (Cardona & Contandriopoulos 1983), $2n$ = 96 in *G. radiata* var. *sericopetala* Buchegger (Cusma Velari & Feoli Chiapella 1987a); x = 13 was reported only for *G. aetnensis* (Biv.) DC. (n = 26, Forissier 1973; $2n$ = 52, Villa 1988; Cusma Velari & al. 1997).

The chromosome number variation of *Genista*, due to polyploidy, disploidy and aneuploidy (Sañudo 1979; Verlaque 1988) is well known.

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Reports (1369-1371) by T. Cusma Velari, L. Feoli Chiapella, V. Kosovel & S. Patui

1369. *Cytisus fontanesii* Spach [= *Chronanthus biflorus* (Desf.) Frodin & Heywood] — $2n = 48 + 0\text{-}2B$ (Fig. 1a) & $2n = 50 + 0\text{-}2B$.

Hs: Granada, Sierra Nevada, in open "maquis", 37° 05'N, 3° 39'W, 900 m, 8 Aug 1989, *L. Feoli Chiapella & E. Feoli* s.n. (TSB).

Cytisus fontanesii is distributed in the southern and eastern parts of the Iberic Peninsula, in Balearic Islands (Ibiza), in northern Algeria and northern Morocco (Maire 1987; Greuter & al. 1989; Talavera 1999).

The chromosome numbers $2n = 48$ and $2n = 50$, sometimes with one or two accessory chromosomes, confirm in part the reference reported by Sañudo (1973), who counted $n = 25$ for *Chronanthus biflorus* var. *biflorus* [populations of Zaragoza, El Fargue, Puerto Lope, Sierra de Lújar (Granada)], for var. *apiculatus* Porta & Rigo (population of Vélez Rubio, Almería) and for var. *plumosus* (Boiss.) Willk. (population of Serranía de Ronda, Málaga). On the other hand, De Castro (1949) found $2n = 24$ in cultivated material. Chromosome size ranges from 1.70 to 0.98 µm and 0.60 µm for B- chromosomes.

1370. *Cytisus orientalis* Loisel. [= *Chronanthus orientalis* (Loisel.) Frodin & Heywood] — $2n = 48 + 0\text{-}2B$ (Fig. 1b) & $2n = 50 + 0\text{-}2B$.

Tu: Izmir, Aydin Dağlari, near the road between Tire and Aydin, clearing in a *Quercus*

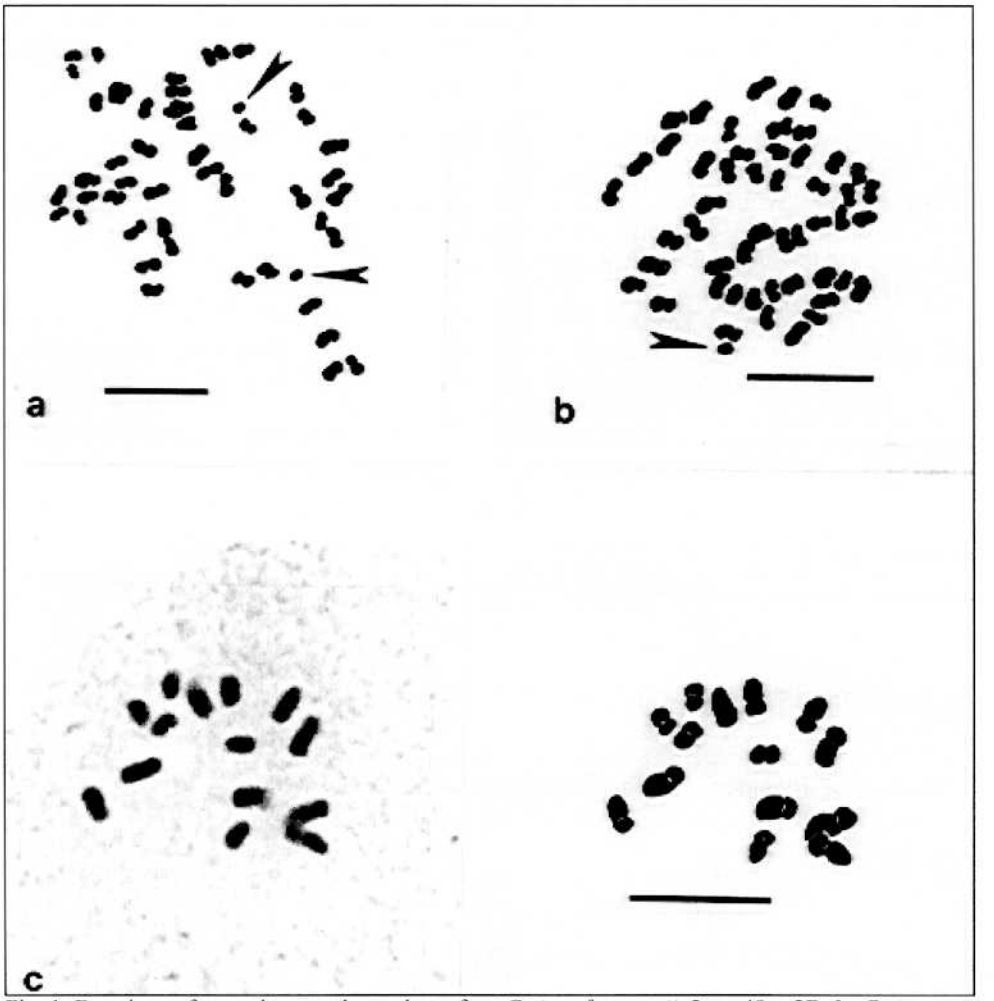


Fig. 1. Drawings of somatic metaphase plate of: **a,** *Cytisus fontanesii*, $2n = 48 + 2B$; **b,** *Cytisus orientalis*, $2n = 48 + 1B$; **c**, photomicrograph and relative drawing of somatic metaphase plate of *Anthyllis barba-jovis*, $2n = 14$. — Arrows indicate B-chromosomes. Scale bars = 5 μm.

scrub, 38° 3'N, 27° 47'E, 700 m, 3 Aug 1996, *L. Feoli Chiapella* & *E. Feoli* s.n. (TSB).

Cytisus orientalis is endemic to a small zone of western Anatolia, near Izmir (Gibbs 1970).

No previous karyological data are known for this taxon. The chromosome numbers $2n = 48$ and $2n = 50$, sometimes with one accessory chromosome, were counted on the basis of 10 metaphase plates. Chromosome size ranges from 1.50 0 to 0.8 μm and 0.40 μm for B-chromosomes.

Cytisus fontanesii and *C. orientalis* belong to sect. *Chronanthus* DC. after Polhill (1976) (= sect. *Heterocytisus* Nyman ex Briq.), and form a homogeneous group of species attrib-

uted by Frodin (1965), Frodin & Heywood (1968) and Gibbs (1970) to *Chronanthus* (DC.) C. Koch, a small autonomous genus segregated from *Cytisus* for the corolla persistent enclosing the legume and some characters typical of *Genista* (narrowly oblong keel, short legume with few seeds and upper lip of the calyx deeply bifid in *C. orientalis*). On the other hand, Polhill (1976), Greuter & al. (1989) and Talavera (1999) include it in *Cytisus*. This two species are an example of vicarism westeast in the Mediterranean region.

The contemporaneous presence in the same taxon of eupolyploid ($2n = 48$) and hyperaneuploid ($2n = 50$) numbers is relatively common in *Cytisus* s.l., having been found in various species of sect. *Cytisus* (= *Trianthocytisus* Griseb.) and *Tubocytisus* DC. (see Cusma Velari & Feoli Chiapella 1994).

1371. *Anthyllis barba-jovis* L. — $2n = 14$ (Fig. 1c).

It: Grosseto, Castiglione della Pescaia, 42° 47'N, 10° 52'E, seeds obtained from Botanical Garden, Siena (s.n., s.coll., s.exsicc.).

— Genova, along the coast, 44° 24'N, 8° 57'E, seeds obtained from Botanical Garden, Genova (s.n., s.coll., s.exsicc.).

Anthyllis barba-jovis is a Mediterranean species with a range centred in the western part (eastern Spain, southern France, Corse, Sardinia, Sicily, western Italy from Liguria to Campania, Algeria and Tunisia), while it is rare in the eastern part, being present in Gargano, Dalmatia and Libya, sometimes doubtfully native (Hayek 1924-1927; Pampanini 1930; Pogliani 1970-71; Pignatti 1982; Greuter & al. 1989; Benedì 2000). The species grows on rocky grounds, often near the sea, and in garrigue, indifferently on various soils.

The chromosome number $2n = 14$ confirms the references reported by Gilot (1965), Tschechow & Kartaschowa (cited in Fedorov 1969), Fernández Piqueras (1976, 1979), Fernández Piqueras & Sañudo (1980), all from cultivated material, by Pogliani (1970-71, for the population of Calignaia, Livorno) and Aboucaya & Verlaque (1990, for populations of southern Corse and Var). Chromosome size ranges from 2.10 to 1.06 μm.

This chromosome number can be traced back to the basic number $x = 7$, common in the species of the sections *Oreanthyllis* Griseb. (to which *Anthyllis barba-jovis* belongs), *Terniflorae* (V.N. Tikhom. & Sokoloff) Benedì and *Aspalathoides* DC. (Fernández Piqueras 1979; Fernández Piqueras & Sañudo 1980; Benedí 2000; Cusma Velari & al. 2002).

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Reports (1372-1375) by Kalina Stoyanova

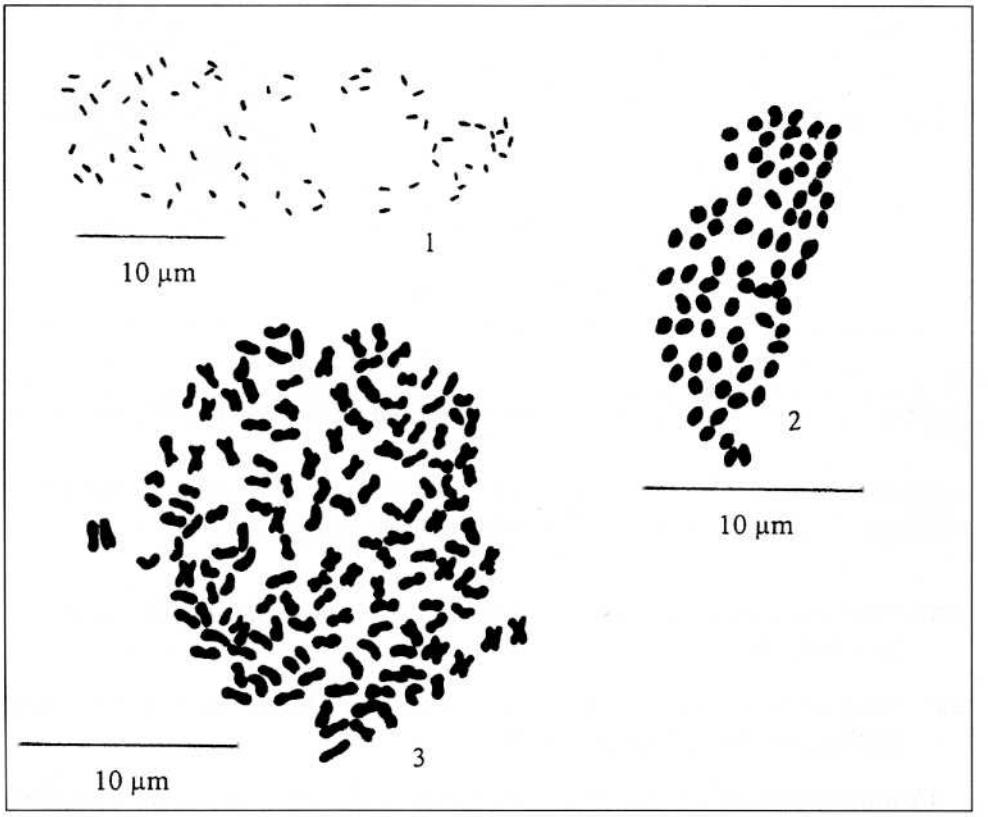
1372. ***Cerastium arvense*** L. subsp. ***arvense*** — $2n = 72$ (Fig. 1-2).

Bu: Vitosha Mt., grassy, stony places above village Zheleznitsa, 42° 32' N, 23° 22'E, May 1994, Stoyanova 94504 (SOM).

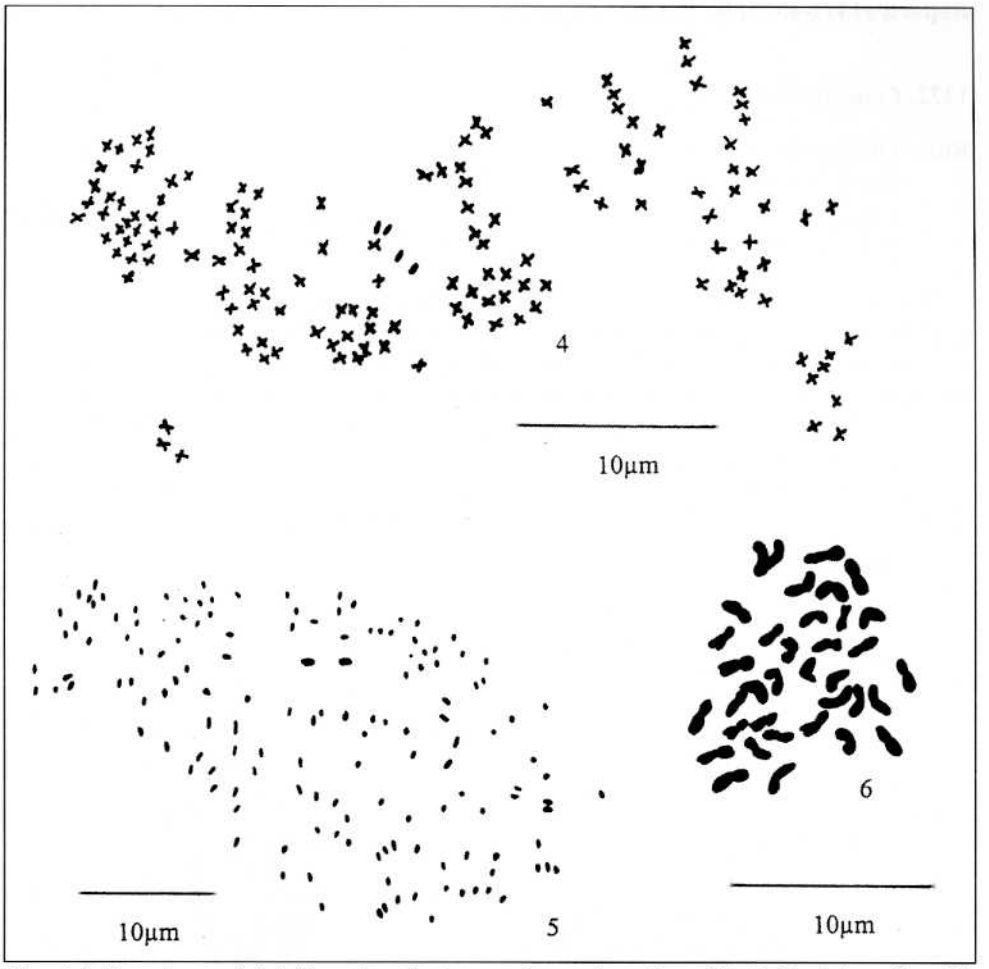
— Vitosha Mt., around monument of Javorov, a big meadow, 42° 37'N, 23° 15'E, 1725 m, June 1995, Stoyanova 95605 (SOM).

The chromosome number $2n = 72$ is referred for *Cerastium arvense* L. s.l. by Uchrikova & Zaborsky (1980) from Czechoslovakia, Brett (1954) from British material and Ugborogho (1977) from North America. Additionally, Hartman (1971), has reported $2n = 36$ in material from Albania and Söllner (1954) the chromosome numbers $n = 18$, $n = 36$ and $2n = 54$. Moreover, Petrovsky & Zhukova (1981) mentioned $2n = 79\text{-}140$ and $n = 36$ in material from Wranglel island.

Especially for *Cerastium arvense* L. subsp. *arvense*, the chromosome number 2n = 72



Figs. 1-3. Karyotypes of: **1-2,** *Cerastium arvense* subsp. *arvense*, $2n = 72$; **3,** *C. decalvans* subsp. *adamovicii*, $2n = 144$.



Figs. 4-6. Karyotypes of: **4-5**, *Cerastium fontanum* subsp. *vulgare*, $2n = 144$; **6**, *C. alpinum*, $2n = 36$.

counted here, confirms the results of Löve & Löve (1975) from Sweden. Also, Hindakova (1976) reported $2n = 36$ in material from Male Carpaty, Bratislava.

1373. *Cerastium decalvans* Schlosser & Vukot. subsp. ***adamovicii*** (Vel.) Stoj. & Stef. — $2n = 144$ (Fig. 3).

Bu: Slavjanka Mt., forest places by the road to the Gocev summit, 41° 24'N, 23° 37'E, 2000 m, July 1995, Stoyanova, 9517 (SOM).

Cerastium decalvans s.l. is endemic to the Balkan Peninsula and apparently a polyploid complex (Strid 1986: 114). Söllner (1954) reported for this taxon the chromosome number $2n = 72$. Moreover, based on Greek material, the chromosome numbers $2n = 36 \pm 2$ & $2n$

= ca. 36 were referred by Favarger (1969:434), $2n = 72$ by Franzén & Gustavsson (1983: 102) and $2n = 126$ by Strid & Franzén (1983: 139, for *C. decalvans* subsp. *orbelicum*).

In the literature, cited karyological data for *Cerastium decalvans* subsp. *adamovicii* were not found and we suppose the chromosome number $2n = 144$ to be the first count, based on Bulgarian plants.

1374. *Cerastium fontanum* Baumg. subsp. ***vulgare*** (Hartman) Greuter & Burdet — $2n = 144$ (Fig. 4-5).

Bu: Rila Mt., around village Beli Iskar by the road to the dam, 42° 11' N, 23° 23' E, 1900 m, August 1995, Stoyanova 95809 (SOM).

— Rila Mt., stony, grassy places nearby the top Mramorets, 42° 06' N, 23° 30' E, 2400 - 2500 m, July 1995, Stoyanova 1095 (SOM).

The chromosome number $2n = 144$ reported here for the first time on Bulgarian material, coincides with the results of Çelebioğly & Favarger (1993) on material from Turkey. Strid (1997) reported $2n$ = c. 126 on material from Greece (Franzén & Gustavsson 1983) and also $2n = 144, 162$ from elsewhere (see Strid 1986: 116, for additional references).

1375. *Cerastium alpinum* Boiss. — $2n = 36$ (Fig. 6).

Bu: Rila Mt., near the rest house Mussala, 42° 11'N, 23° 37'E, 2390 m, August 1996, Stoyanova 9623 (SOM).

The chromosome number $2n = 36$, which is the lowest and rarely recorded in the *Cerastium alpinum* group (which is usually polyploid), was known previously only for two Greek endemic taxa (Strid 1997): *C. theophrasti* Merxm. & Strid, from Mt. Olympos and *C. runemarkii* Möschl & Rech. fil., from Naxos island (Kiklades).

The chromosome number $2n = 72$, common in the *Cerastium alpinum* group, has been reported by Brett (1954), Söllner (1954) and Blackburn & Morton (1956).

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