Chromosome numbers of flowering plants from Calabria, S Italy

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Abstract

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Chromosome numbers of 11 taxa from nine families of Calabrian angiosperms are reported: *Anthyllis hermanniae* 2n = 14, *Carlina acaulis* subsp. *caulescens* 2n = 20, *Gentianella crispata* 2n = 56, *Lupinus graecus* 2n = 50, *Plantago albicans* 2n = 30, *P. amplexicaulis* subsp. *amplexicaulis* 2n = 10, *Ranunculus flammula* subsp. *flammula* 2n = 32, *Saxifraga aizoides* 2n = 26, *Staphylea pinnata* 2n = 26, *Tricholaena teneriffae* 2n = 36, *Veronica scutellata* 2n = 18. Most of the reports are the first from Italian populations. Mitotic metaphase microphotographs and haploid idiograms or drawings are presented for all taxa studied. Brief comments are given on karyotype morphology, cytogeography and relationships of selected taxa.

Introduction

Several karyological studies in the Calabrian flora have been carried in the past thirty years (Cesca 1976, 1981, 1982, 1984, Brullo & al. 1989, 1994a-b, Bernardo & al. 1995, Cesca & Peruzzi 2001, 2002), but there is still a lack of knowledge about many endemic or phytogeographically otherwise interesting taxa. The present contribution results from research in a program of PhD theses on the biosystematics and phytogeography of critical Calabrian species, carried out in the Museum of Natural History and Botanic Garden of the Calabria University.

Material and methods

Plants were collected in situ and karyologically studied after cultivation in the Botanic Garden of the Calabria University. Root tips or young ovules were pretreated in a 0.3% solution of colchicine and fixed in Carnoy, afterwards hydrolysed in 1N HCl and stained with fuchsine. The samples were squashed in acetic orcein for counting and studying the chromosomes. The karyotype formulas according to Levan & al. (1964) are based on the measurements of at least three somatic metaphase plates. The taxa are arranged alphabetically by family, genera and species.

Results and discussion

Carlina acaulis subsp. ***caulescens*** (Lam.) Schübler & Martens [= *C. acaulis* subsp. *simplex* (Waldst. & Kit.) Nyman] *(Compositae)* – 2n = 20 (Fig. 1-2)
Italy, Calabria, along the road from S. Donato di Ninea (Cosenza) to Piano di Lanzo, 39°43'N, 16°02'E, 18.7.2001, *Bernardo, Passalacqua, Peruzzi & Gargano*, cult. Hort. Bot. Calabria University, acc. no. 707.

C. acaulis is a European taxon, widespread from the Pyrenees to the Alps, in the Iberian and the Balkan peninsula, as well as in northeast central Europe (Meusel & Jäger 1992).

According to Webb (1976) two morphs of *C. acaulis* are distinguished: the first one (subsp. *acaulis*) has flower heads sessile on the ground and occurs throughout the range of the species; the second one (subsp. *caulescens*) has flower heads borne on a more or less elongated stem and occurs only in the southern part of the range of the species. The Calabrian population at the Pollino Massif represents the southernmost occurrence of *Carlina acaulis*. The plants clearly belong to subsp. *caulescens*.

Both subspecies have a chromosome number of 2n = 20 (Fedorov 1969, Borsos 1972, Skalinska & al. 1978, Löve & Löve 1982, Kovanda 1984, Meusel & Kästner 1990, Meusel & Kästner 1994, Druskovic & Lovka 1995). Our report is the first for subsp. *caulescens* in Italy. The karyotype formula is $2n = 2x = 20 = 2sm + 2m + 2st^{sat} + 4sm + 4m + 2st + 2sm + 2st$, the chromosome size ranges between 4.4 and 6 µm.

Gentianella crispata (Vis.) Holub [= *Gentiana crispata* Vis.] *(Gentianaceae)* – 2n = 56 (Fig. 3-4)
Italy, Calabria, Serra Dolcedorme (Cosenza), 39°54'N, 16°13'E, 26.9.2001, *Peruzzi & Gargano*, cult. Hort. Bot. Calabria University, acc. no. 119.

G. crispata is an orophilous species, distributed in S Italy and the Balkan Peninsula (Pritchard & Tutin 1972, Pignatti 1982, Greuter & al. 1986).

Only one count, of 2n = 36 (Löve & Löve 1986), has been reported so far, and it has probably to be referred to another taxon, because of the provenance of the material (Italy, Apulia near Altamura). In fact, the habitat of Altamura is very unsuitable for *G. crispata,* which is known in Italy only from the Serra Dolcedorme (Pollino Massif).

This is the first report of 2n = 56 for both *Gentiana* L. and *Gentianella* Moench. The nearest chromosome number is 2n = 54 (Fedorov 1969, Löve & Löve 1986) for *Gentianella uliginosa* (Willd.) Börner, a species from north central Europe. The chromosome size ranges between 2.9 and 5.3 µm.

Tricholaena teneriffae (L. fil.) Link *(Gramineae)* – 2n = 36 (Fig. 5-6)
Italy, Calabria, Villa S. Giovanni (Reggio Calabria), close to the motorway's exit, 38°14'N, 15°39'E, 15.7.2000, *Cesca*, cult. Hort. Bot. Calabria University, acc. no. 310.

Tricholaena teneriffae is widespread in SW Asia, North Africa and the Atlantic islands (Clayton 1980) in dry and stony places. In Europe it occurs only in Italy, where it is confined to southernmost Calabria and Sicily (Pignatti 1982).

Our chromosome count, being the first for Europe, confirms the reports from North Africa and Makaronesia (Larsen 1960, Borgen 1970, Gould 1970). The chromosome size ranges between 1 and 3 µm.

Anthyllis hermanniae L. *(Leguminosae)* – 2n = 14 (Fig. 7-8)
Italy, Calabria, between Capo Rizzuto and Le Castella (Crotone), Soverito, on sandy saline habitats, 38°55'N, 17°04'E, 15.7.2001, *Cesca*, cult. Hort. Bot. Calabria University, acc. no. 238.

A. hermanniae is a rare species widespread in the Mediterranean basin from Sardinia and Corsica eastwards (Cullen 1968, Pignatti 1982) excluding Sicily (Greuter & al. 1989).

Our count, apparently the first from Italy, confirms the reports by Larsen (1956) and Contandriopoulos & al. (1987). A deviating chromosome number of 2n = 84 was reported by Cardona & al. (1986). The chromosome size ranges between1 and 2 µm.

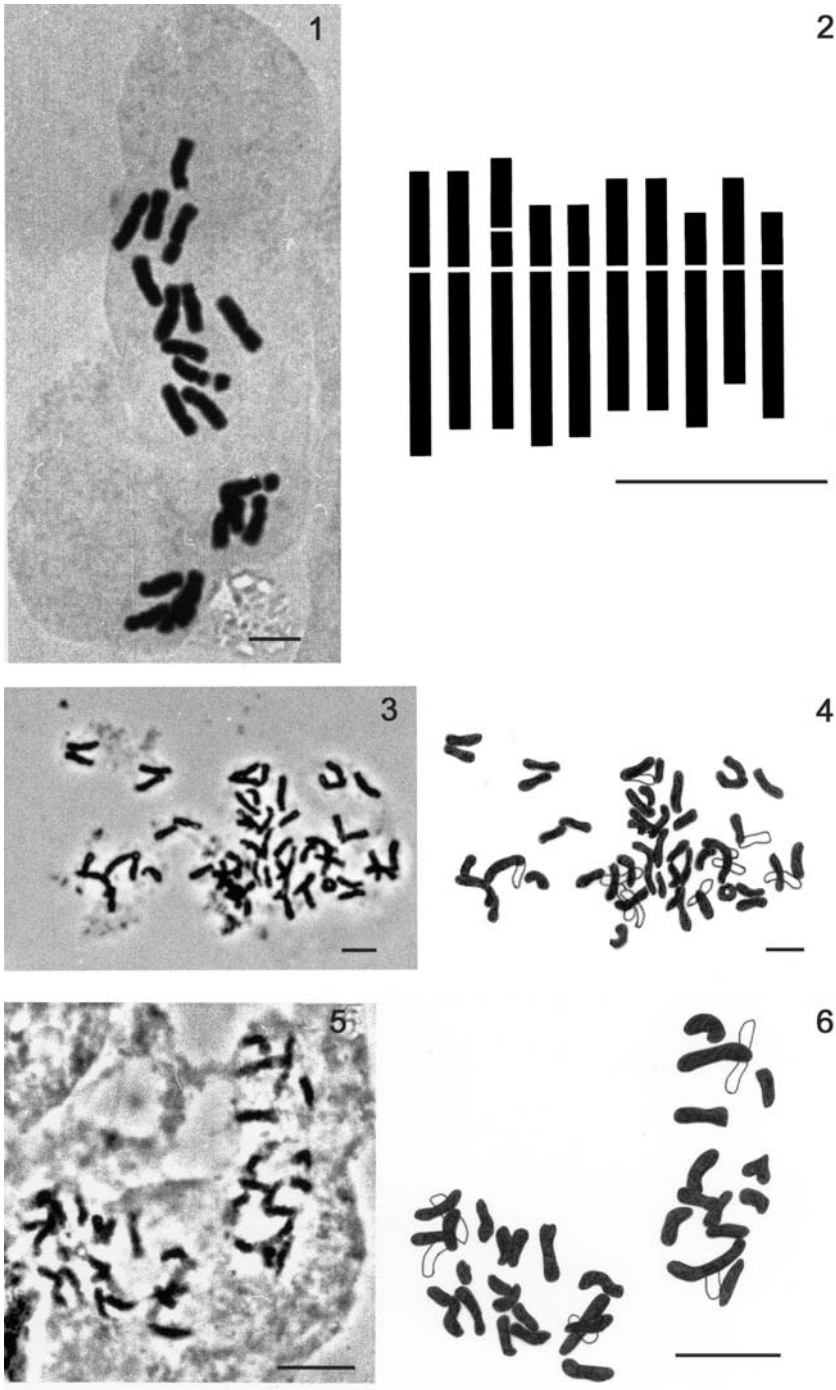


Fig. 1-6. Chromosome complements – microphotographs and haploid idiograms or drawings of: 1-2: *Carlina acaulis* subsp. *caulescens,* 2n = 20; 3-4: *Gentianella crispata*, 2n = 56; 5-6: *Tricholaena teneriffae*, 2n = 36. – Scale bars = 5 µm.

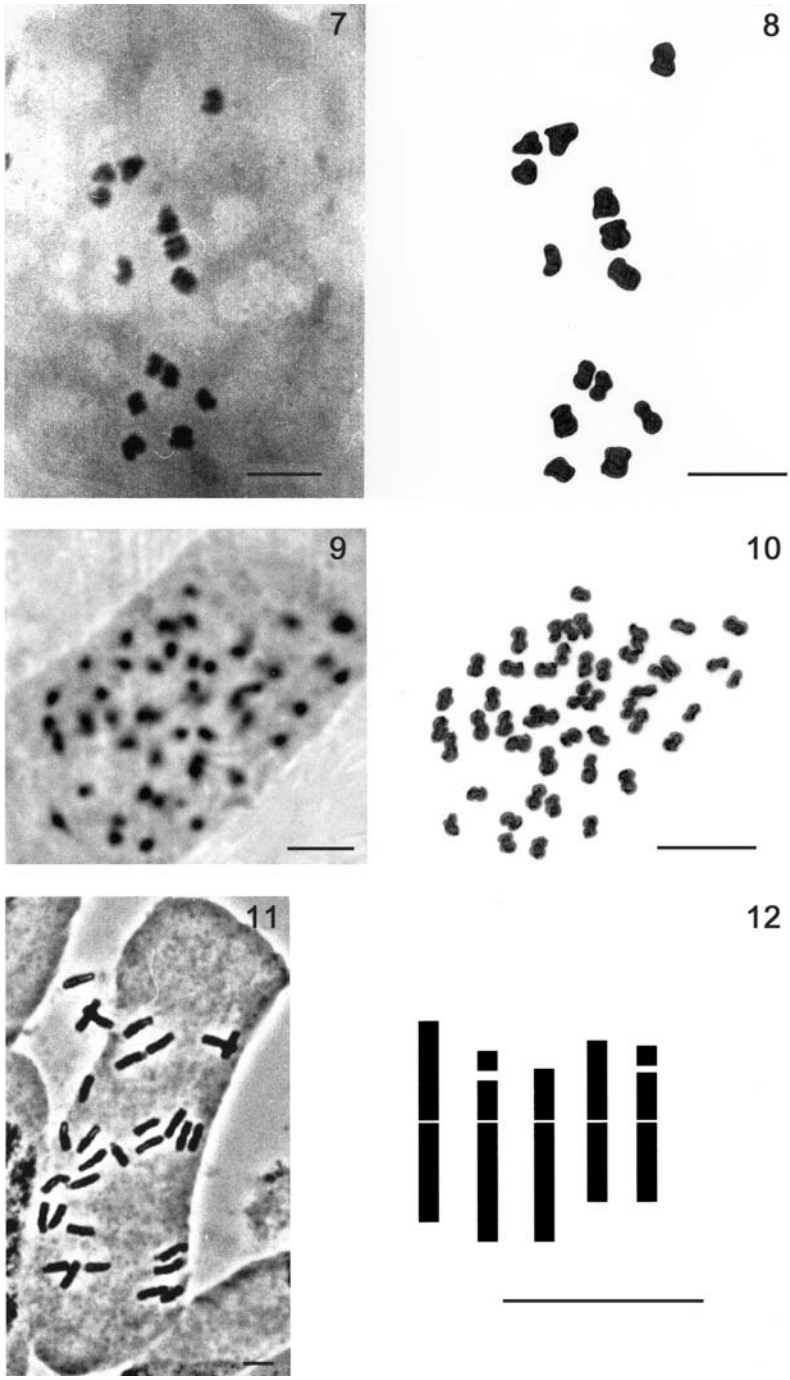


Fig. 7-12. Chromosome complements – microphotographs and haploid idiograms or drawings of: 7-8: *Anthyllis hermanniae*, 2n = 14; 9-10: *Lupinus graecus*, 2n = 50; 11-12: *Plantago albicans*, 2n = 6x =30. – Scale bars = 5 µm.

Lupinus graecus Boiss. & Spruner [= *Lupinus albus* subsp. *graecus* (Boiss. & Spruner) Franco & P. Silva] *(Leguminosae)* – 2n = 50 (Fig. 9-10)
Italy, Calabria, Sila, Cecita lake (Cosenza), close to the shore, 39°23'N, 15°33'E, 2.7.2001, *Peruzzi*, cult. Hort. Bot. Calabria University, acc. no. 226.

This species, only recently reported for Italy from Latium and Calabria (Anzalone & Lattanzi 1989), is widespread in the Balkan Peninsula and Aegean region (Amaral Franco & Pinto da Silva 1968).

Our report is the first from an Italian provenance and agrees with Kuzmanov (1975), who studied plants from the Balkan Peninsula. The number of 2n = 50 is also reported for the closely related *L. albus* L. (Larsen & Lagaard 1971, Fernandes & al. 1977, Fernandes & Queiros 1978, Ghrabi Gammar & al. 1997). The two taxa can easily be distinguished by the flower colour (purplish-blue and white, respectively) and by the seeds, which are dark variegated in *L. graecus*. The chromosome size ranges between 1 and 2 µm.

Plantago albicans L. *(Plantaginaceae)* – 2n = 30 (Fig. 11-12)
Italy, Calabria, Capo dell'Armi (Reggio Calabria), 37°57'N, 15°41'E, 23.5.2001, *Peruzzi & Passalacqua*, cult. Hort. Bot. Calabria University, acc. no. 100.

P. albicans is present in the entire S Mediterranean region (Greuter & al. 1989), but rare in Italy (Liguria, Apulia, Basilicata, Calabria, Sicily, Sardinia), where it is restricted to dry and sandy habitats (Pignatti 1982).

Chromosome numbers of 2n = 10, 12, 20, 24, 30 (Fedorov 1969, Badr & El-Kholy 1987, Badr & al. 1987, Puech 1987, 1988) were reported for this species from North Africa and Spain. Our count, the first for peninsular Italy, agrees with counts in Sicilian material (Bartolo & al. 1978, Brullo & al. 1985). The karyotype formula is $2n = 6x = 30 = 6M + 6st^{sat} + 6sm + 6M + 6sm$, the chromosome size ranges between 4.1 and 5.7 µm.

Plantago amplexicaulis Cav. subsp. ***amplexicaulis*** *(Plantaginaceae)* – 2n = 10 (Fig. 13-14)
Italy, Calabria, Capo S. Giovanni, Bova Marina (Reggio Calabria), 37°56'N, 15°56'E, 23.5.2001, *Peruzzi & Passalacqua*, cult. Hort. Bot. Calabria University, acc. no. 298.

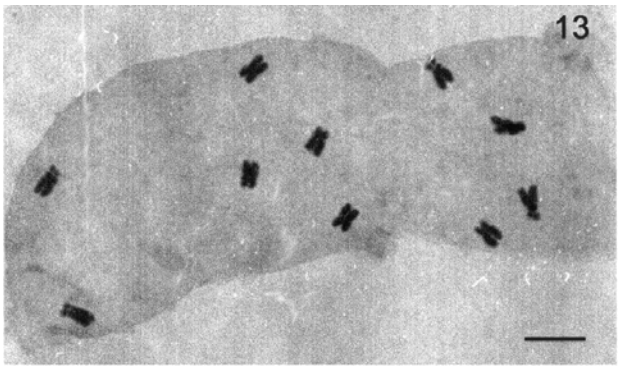
This taxon is present in the S Mediterranean region (Greuter & al. 1989) and occurs in Italy only in the extreme south of Calabria (Pignatti 1982).

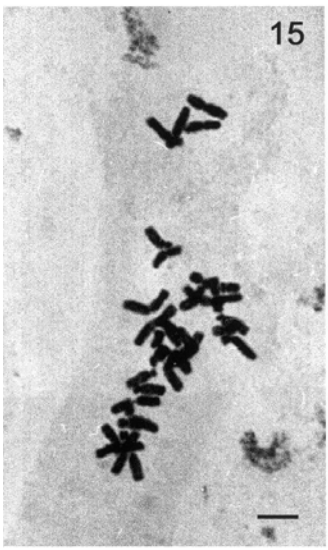
Our count agrees with earlier reports from Calabrian populations (Bartolo & al. 1980, Brullo & al. 1994b) and other Mediterranean provenances (McCullagh, 1934, Runemark 1967, Humpries & al. 1978, Silvestre 1991). The karyotype formula is $2n = 2x = 10 = 2st + 2sm^{sat} + 6m$. The chromosome size ranges between1.9 and 3 µm.

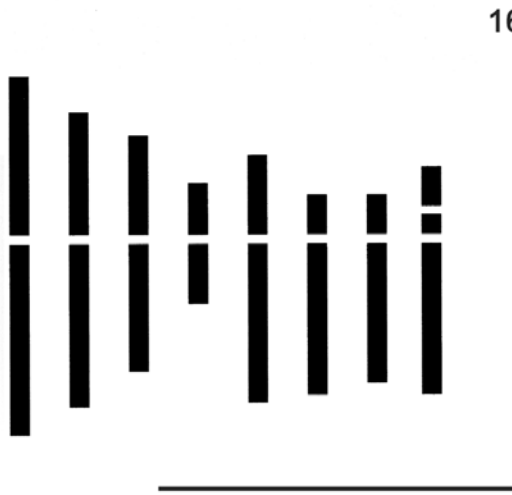
Ranunculus flammula L. subsp. ***flammula*** *(Ranunculaceae)* – 2n = 32 (Fig. 15-16)
Italy, Calabria, Piano della Lacìna (Vibo Valentia), along the Alaco river, on marsh habitats, 990 m, 38°36'N, 16°25'E, 28.4.2001, *Passalacqua & Ouzonov,* cult. Hort. Bot. Calabria University, acc. no. 549.

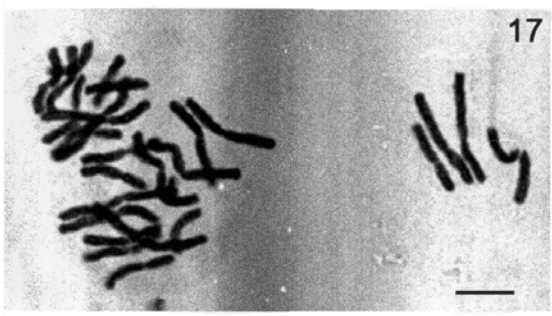
This taxon is an Eurasiatic element, which is rare in the Mediterranean region (Tutin 1993, Pignatti 1982).

R. flammula is invariably reported as a tetraploid across its entire distribution area (Fedorov 1969, Moore 1973, Agapova 1980, Amadei & al. 1982, Arohonka 1982, Marchi & Visonà 1982, Kapoor & al. 1987, Parfenov & Dmitrieva 1988, Diosdado & Pastor 1991, 1996, Hollingsworth 1992, Javůrková-Jarolìmová in Měsìček & Javůrková-Jarolìmová 1992, Al-Bermani & al. 1993, Dempsey & al. 1994). Our report from the only Calabrian population known at present corroborates the other reports. The karyotype formula is $2n = 4x = 32 = 8m + 4sm + 4m + 4st^{sat} + 8st + 4m$. The idiogram (Fig. 16) shows the eight chromosomes of the basic set of the tetraploid genome (cf. D'Ovidio & Marchi 1986); the chromosome size ranges between1.8 and 5.3 µm.









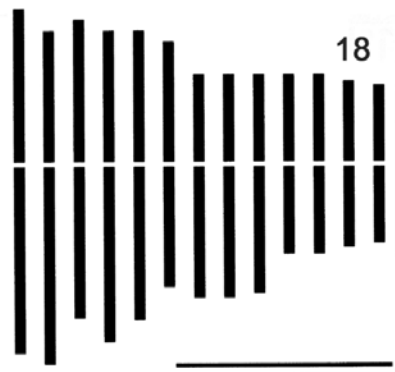


Fig. 13-18. Chromosome complements – microphotographs and haploid idiograms of: 13-14: *Plantago amplexicaulis* subsp. *amplexicaulis*, 2n = 10; 15-16: *Ranunculus flammula* subsp. *flammula*, 2n = 4x = 32; 17-18: *Saxifraga aizoides*, 2n = 26 – Scale bars = 5 µm.

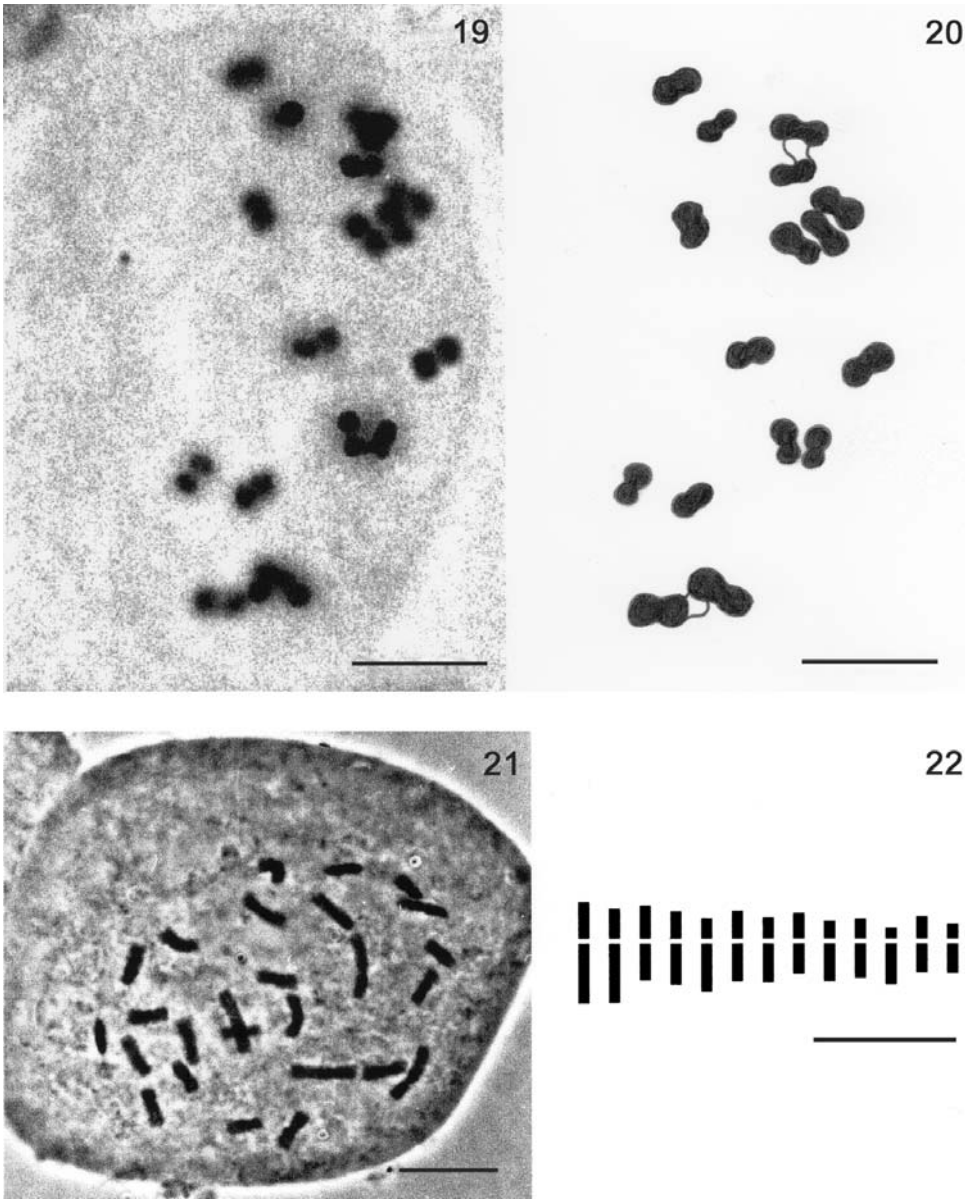


Fig. 19-22. Chromosome complements – microphotographs and drawings or haploid idiograms of: 19-20: *Veronica scutellata*, 2n = 18; 21-22: *Staphylea pinnata*, 2n = 26. – Scale bars = 5 µm.

Saxifraga aizoides L. *(Saxifragaceae)* – 2n = 26 (Fig. 17-18)
Italy, Calabria, Cozzo del Pellegrino, 39°45'N, 16°01'E, 18.7.2001, *Bernardo, Passalacqua, Peruzzi & Gargano*, cult. Hort. Bot. Calabria University, acc. no. 323.

S. aizoides has a circumboreal distribution (Hultén 1958, Meusel & Jäger 1965) and is restricted in Italy to the Alps and the central Apennines (Pignatti 1982). The Calabrian population studied is the southernmost one in Europe and isolated from the main distribution area of the species.

All reports give 2n = 26 (Skovsted 1934, Böcher 1941, Arwidsson 1943, Löve & Löve 1951, Jörgensen & al. 1958, Packer 1964, Javorska 1965, Mulligan & al. 1972, Engelsjon 1979, Murin & Paclova 1979, Küpfer & Rais 1983, Murin & Paclova 1986). Our count, being the first for Italy, confirms these data. The karyotype formula is 2n = 2x = 26 = 4m + 2M + 4m + 2M + 14 m. The chromosome size ranges between 5.6 and 10 µm.

Veronica scutellata L. *(Scrophulariaceae)* – 2n = 18 (Fig. 19-20)
Italy, Calabria, Sila, Macchia Sacra (Cosenza), peaty habitat, 39°18'N, 16°26'E, 5.7.2001, *Peruzzi & Passalacqua*, cult. Hort. Bot. Calabria University, acc. no. 524.

This species has a circumboreal distribution (Hultén 1958, Meusel & Jäger 1978), is common in wet habitats and rare in peninsular Italy (Pignatti 1982). The Calabrian populations are the southernmost in Europe.

This first count in Italian material revealed a chromosome number of 2n = 18 as is given in all other reports (Fedorov 1969, Moore 1973, Arohonka 1982, Löve & Löve 1982, Dmitrieva & Parfenov 1983, Probatova & al. 1989, Jankun 1990, Chuang & Heckard 1992, Montgomery & al. 1997). The chromosome size ranges between 1 and 2 µm.

Staphylea pinnata L. *(Staphyleaceae)* – 2n = 26 (Fig. 21-22)
Italy, Calabria, valley of Rosa river, S. Sosti (Cosenza), 400 m, in damp and shady habitats, 39°40'N, 15°59'E, 28.10.2000, *Cesca & Peruzzi*, cult. Hort. Bot. Calabria University, acc. no. 242, 795.

S. pinnata is a small tree widespread in south central Europe and extending to peninsular Italy, Bulgaria and W Ukraine (Ball 1968). It is a rare element of thermophilous wood communities (Pignatti 1982).

Our count agrees with earlier reports from south central Europe (Foster 1933, Kiehn & al. 1991, Měsìček in Měsìček & Javůrková-Jarolìmová 1992). An early count of 2n = 24 (Winge 1917) is probably incorrect. The karyotype formula is 2n = 2x = 26 = 2m + 2sm + 4m + 2sm + 2m + 2sm + 2m + 4sm + 2st + 4sm. The chromosome size ranges between1.6 and 3.8 µm.

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