

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*, *Rorippa* 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. Passalacqua (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* Anchev & Uzunov. — $2n = 64$ [Fig. 1(1)].

Bu: N Pirin Mt., Banski suhodol circus, $41^{\circ} 49'N$, $23^{\circ} 27'E$, 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. *Odontarrhena*, 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, $42^{\circ} 14'N$, $23^{\circ} 32'E$, 1200 m, 05.08.1995, *Anchev* 95171 (SOM). - [Fig. 1(2)].

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

Arabis procurrens is distributed mostly in the mountainous territories of Bulgaria, Former Yugoslavia 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 Yugoslavia 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", $43^{\circ} 50'N$, $22^{\circ} 23'E$, 580 m, 20.07.1989, *Anchev* 89114 (SOM). - [Fig. 1(4)].

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

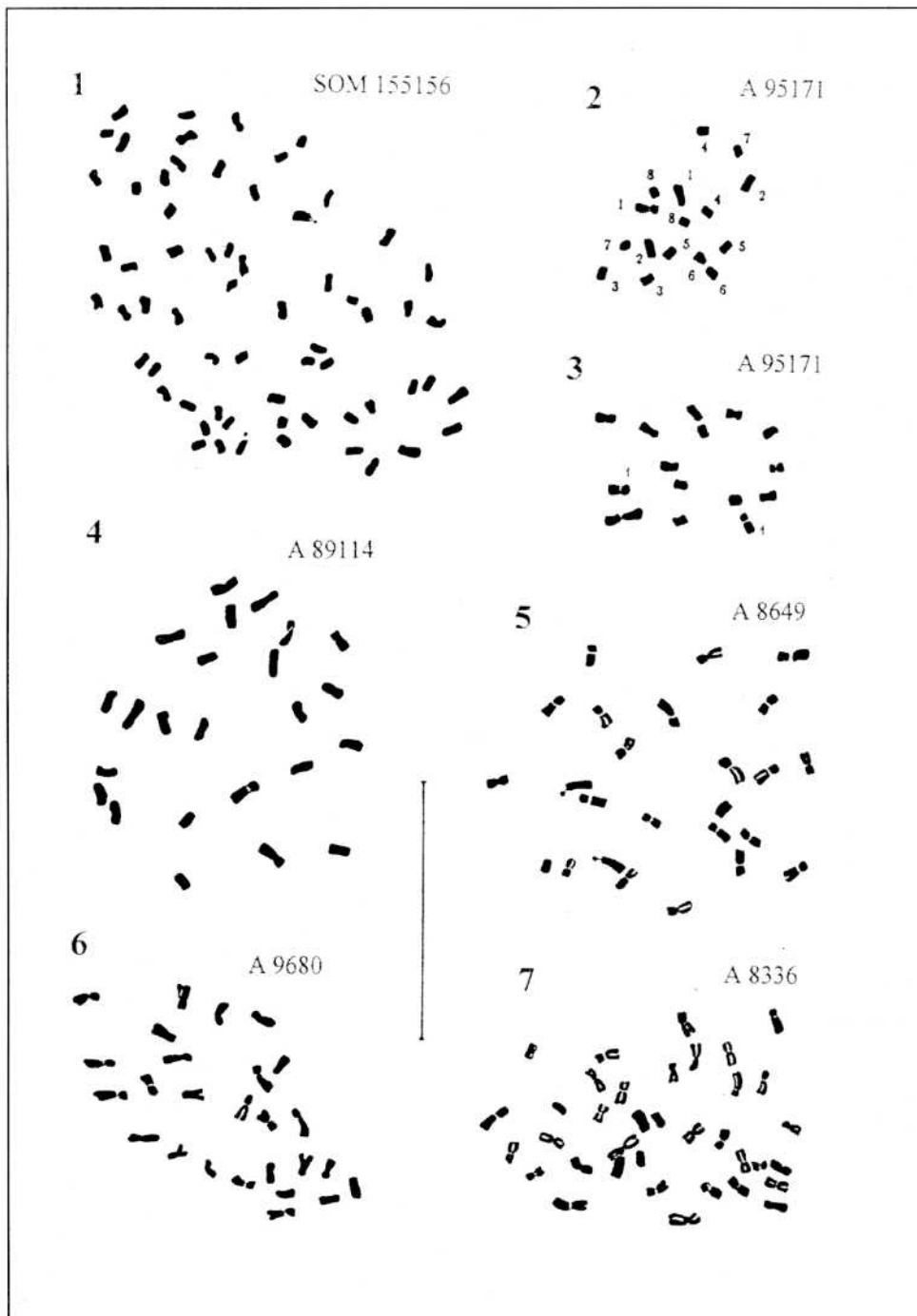


Fig. 1(1-7). Karyotype drawings of: 1, *Alyssum orbelicum*, $2n = 64$; 2-3, *Arabis procurrans*, $2n = 16$; 4-6, *Camelina microcarpa*: 4, $2n = 24$; 5-6, $2n = 26$; 7, *C. sativa*, $2n = 36$. — Scale bar = 10 μm .

— 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 $2n = 16, 18-20, 32$ 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. — $2n = 16 + 0-2B$ [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 gravelly terrains in lowlands and plains, on foothills and mountain slopes predominantly

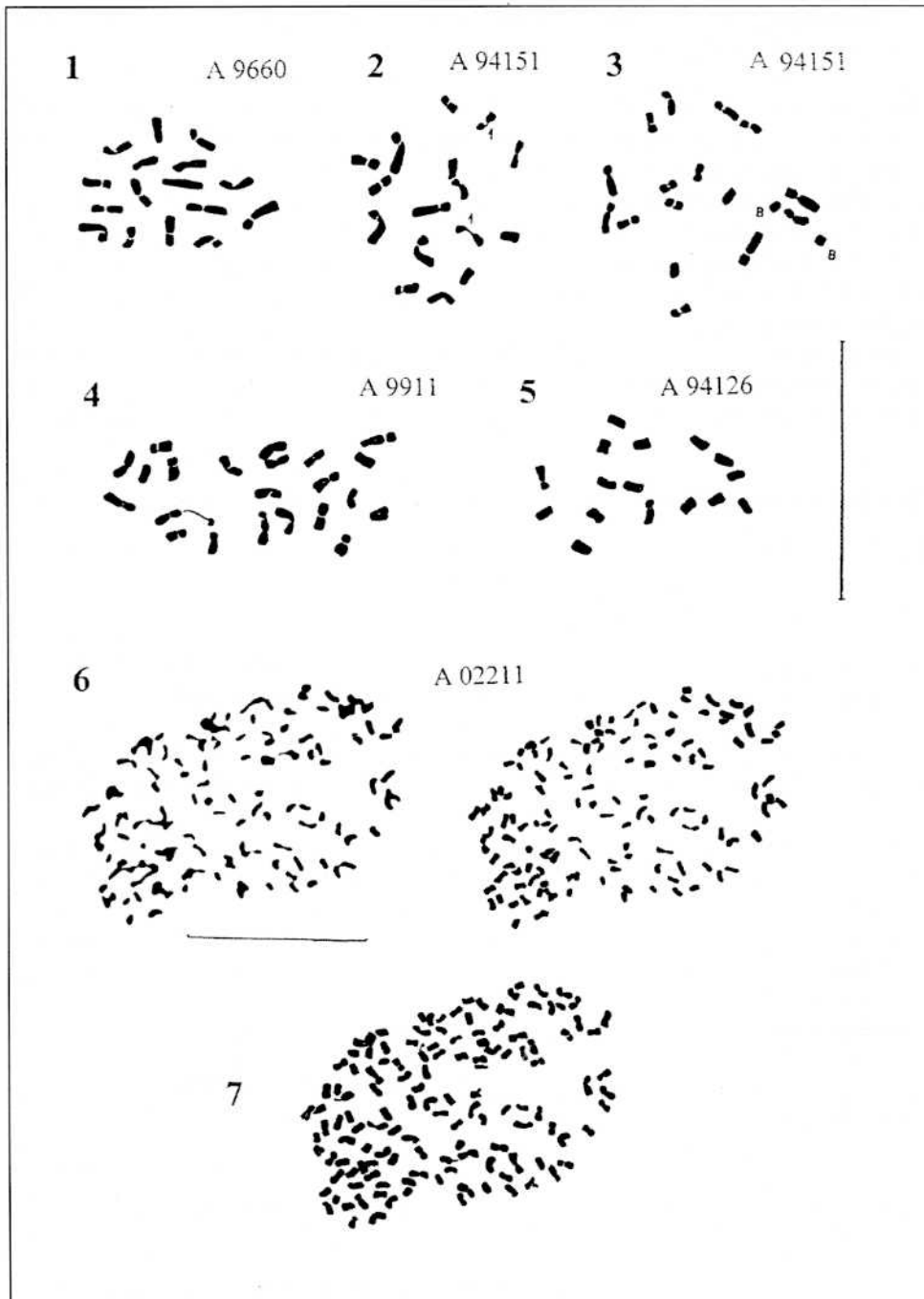


Fig. 2(1-7). Karyotype drawings of: 1-3, *Erysimum cuspidatum*: 1-2, $2n = 16$; 3, $2n = 16+2B$; 4, *Iberis saxatilis* subsp. *saxatilis*, $2n = 22$; 5, *Malcolmia orsiniana* subsp. *angulifolia*, $2n = 16$; 6-7, microphotograph and karyotype drawings of *Galium rubioides*, $2n = 132$. — Scale bar =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

References

- Anchev, M. 1978: Reports. [In Löve, A. (ed.), IOPB Chromosome number reports LXII]. — *Taxon* **27(5-6)**: 532-533.
- 1981: Reports. [In Löve, A. (ed.), IOPB Chromosome number reports LXXIII]. — *Taxon* **30(4)**: 855.
- 1995: Karyological variation and taxonomic notes on *Erysimum* L. (*Brassicaceae*) in Bulgarian flora. — *Giornale Bot. Italiano* **129**: 94-103.
- & Goranova, V. 1997: Reports (855-872). [In Kamari, G., Felber, F. & Garbari, F. (eds), *Mediterranean chromosome number reports - 7*]. — *Fl. Medit.* **7**: 246-258.
- & — 2002: Cytotaxonomical study of *Iberis* (*Brassicaceae*) in Bulgarian flora. — Pp. 219-223 in: Temniskova, D. (ed.), *Proceedings of Sixth National Conference of Botany, Sofia, June 18-20, 2001*. — Sofia.
- , Hardalova, R. & Trifonova, D. 1987: Cytotaxonomic study of the perennial species of *Erysimum* L. in Bulgaria. — Pp.24-31 in: Kuzmanov, B. (ed.), *Proceedings Fourth National*

