

Mediterranean chromosome number reports — 4

edited by G. Kamari, F. Felber & F. Garbari

Abstract

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This is the fourth instalment of a series of reports of chromosome numbers from Mediterranean area, peri-Alpine communities and the Atlantic Islands, in French or English language. It comprises contributions on 95 taxa: *Acinos*, *Calamintha*, *Hyssopus*, *Lycopus*, *Melittis*, *Mentha*, *Sideritis*, *Thymus* and *Ziziphora* from Bulgaria, by M. Markova & V. Goranova (Nos. 240-266); *Bupleurum* from Greece and Italy, *Hermodactylis*, *Asphodeline*, *Crocus*, *Lolium* and *Primula* from Greece and Crete, by S. Snogerup (Nos. 267-284); *Papaver* and *Carex* from Bulgaria, by M. Stoeva (Nos. 285-293); *Allium*, *Asparagus*, *Carlina*, *Carthamus*, *Daucus*, *Echinops*, *Glaucium*, *Onobrychis*, *Onopordum*, *Pancremium*, *Platanus*, *Rhamnus*, *Salsola*, *Scolymus*, *Teucrium*, *Trifolium*, *Urginea*, *Verbascum* and *Zygophyllum* from Cyprus, by C. Oberprieler & R. Vogt (Nos. 294-312); *Alisma*, *Allium*, *Amaranthus*, *Asparagus*, *Bryonia*, *Butomus*, *Calystegia*, *Cicer*, *Circaea*, *Colchicum*, *Cornus*, *Datura*, *Elodea*, *Erodium*, *Ferulago*, *Frangula*, *Geum*, *Gratiola*, *Herniaria*, *Humulus*, *Impatiens*, *Lavatera*, *Lonicera*, *Oenanthe*, *Parietaria*, *Periploca*, *Pimpinella*, *Plantago*, *Ranunculus*, *Rapistrum*, *Ribes*, *Rubia*, *Saponaria*, *Scilla*, *Scrophularia*, *Sternbergia*, *Syringa*, *Viburnum* and *Urtica* from Bulgaria, by I. V. Ceshmedziev (Nos. 313-366); *Luzula* from Spain, Switzerland, Bulgaria, CO, LU, by M. García-Herran (Nos. 367-370); *Hordeum* from Switzerland, by F. Felber & D. Savova (No. 371); *Pituranthos*, *Calendula*, *Carlina* and *Rhanterium* from Turkey, by C. Reynaud, R. Verlaque & G. Bonin (Nos. 372-376); *Aristolochia*, *Carum*, *Centaurea*, *Rindera*, *Dianthus*, *Hesperis*, *Iberis*, *Orchis* and *Silene* from Greece, by T. Constantinidis & G. Kamari (Nos. 377-386); *Lathyrus*, *Lotus*, *Pisum*, *Astragalum* and *Vicia* from Sardinia (Italy), by C. Del Prete & P. Miceli (Nos. 387-393).

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Reports (240-266) by Margarita Markova & Valentina Goranova

240. *Acinos alpinus* subsp. *hungaricus* (Simonk.) Sojak var. *hungaricus* — $2n = 18$ (Fig. 1A, B).

Bu: Rila Mt, locality Borovec, 42°14'N, 23°38'E, open places in the forest, 1971, *Markova L38* (SOM).

— Black Sea coast, close to the Mandrensko lake, 42°25'N, 27°25'E, grassy meadows, 1972, *Markova L231* (SOM).

The chromosome number $2n = 18$ confirms the previous count on a population, sub *Calamintha alpina* subsp. *hungarica* (Simonk.) Hayek from Bulgaria (Jasiewicz &

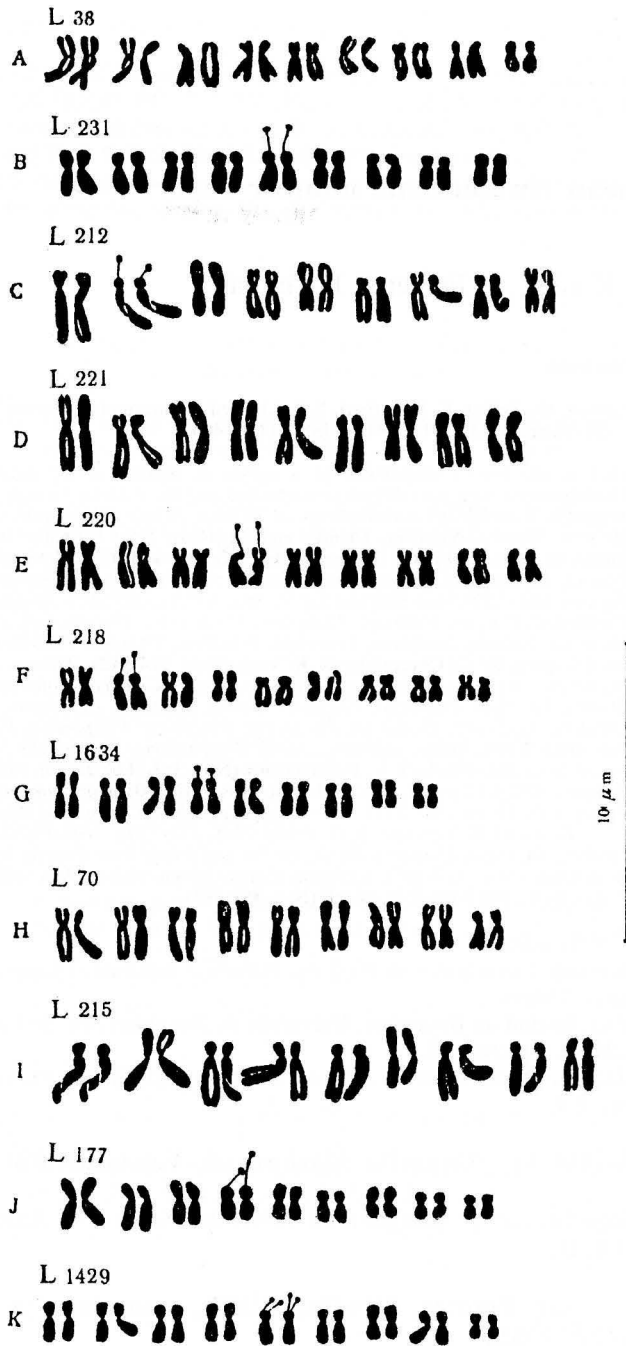


Fig. 1. Karyograms of: A, B, *Acinos alpinus* var. *hungaricus*, $2n = 18$; C, *A. alpinus* var. *adrianopolitanus*, $2n = 18$; D-E, *A. alpinus* var. *elatior*, $2n = 18$; F-G, of *A. arvensis* var. *arvensis*, $2n = 18$; H-I, *A. arvensis* var. *villosus*, $2n = 18$; J, *A. rotundifolius*, $2n = 18$; K, *A. suaveolens*, $2n = 18$.

Mizianty 1975) as well as the counts made on plants from other regions (see Moore 1977 and Goldblatt 1984, 1985). A karyotype analysis of 2 populations has been carried out by us. The karyotype of population L38 includes $2n = 2x = 2m + 16sm = 18$ chromosomes (Fig. 1A); that of population L231, $2n = 2x = 16sm + 2sm - SAT = 18$ chromosomes (Fig. 1B).

240a. *Acinos alpinus* subsp. *hungaricus* var. *adrianopolitanus* (Podp.) Ančev — $2n = 18$ (Fig. 1C).

Bu: Thracian plain, the locality Uludere near the town Harmanli, 41°56'N, 25°50'E, stony places, 1971, *Markova L212* (SOM).

The diploid chromosome number $2n = 18$ had been established through the study of the same population, L212 (Markova & Thu 1974, sub *Calamintha nepeta*). The karyotype consists of $2n = 2x = 4m + 8sm + 4st + 2st - SAT = 18$ chromosomes.

240b. *Acinos alpinus* subsp. *hungaricus* var. *elatior* Griseb. — $2n = 18$ (Fig. 1D, E).

Bu: Vitoša region above the village Pančarevo, 42°36'N, 23°28'E, stony places, 1971, *Markova L221* (SOM).

— Central Stara Planina Mt, above the town Zlatica, 42°41'N, 24°11'E, stony slopes, 1971, *Markova L220* (SOM).

The diploid chromosome number $2n = 18$ established in two populations coincides with the result previously published for one of them, L221 (Markova & Thu 1974, sub *Calamintha alpina*). Two cytotypes have been established. The karyotype of population L221 consists of $2n = 2x = 6m + 12sm = 18$ chromosomes (Fig. 1D), that of L220, $2n = 2x = 16sm + 2sm - SAT = 18$ chromosomes (Fig. 1E).

241. *Acinos arvensis* (Lam.) Dandy var. *arvensis* — $2n = 18$ (Fig. 1F, G).

Bu: Vitoša Mt., the locality Baj Krāstjo, 42°34'N, 23°20'E, dry grassy places, 1971, *Markova L218* (SOM).

— Vitoša Mt, the locality Krāsta near the village Bosnek, 1986, *Markova & Goranova L1364* (SOM).

The chromosome number $2n = 18$ confirms the counts from foreign regions (see Fedorov 1969, Moore 1977, Goldblatt 1981, 1984, 1985, for references) and from Bulgaria (Loon & Setten 1982). Loon & Setten (l.c.) have also published $2n = 18 + 3B$ for plants from Bulgaria. The karyotype of population L218 includes $2n = 2x = 6m + 10sm + 2sm - SAT = 18$ chromosomes (Fig. 1F), that from L1634, $2n = 2x = 2m + 14sm + 2sm - SAT = 18$ chromosomes (Fig. 1G).

241a. *Acinos arvensis* var. *villosus* (Pers.) Šilic — $2n = 18$ (Fig. 1H, I).

Bu: Thracian plain, Bessapara hills, 42°07'N, 24°26'E, stony places, 1971, *Markova L70* (SOM).

— Znepole region, near the village Paramun, 43°38'N, 22°57'E, stony places, 1971, *Markova L215* (SOM).

The diploid chromosome number $2n = 18$ had been established through the study of two populations: L215 (Markova & Thu 1974, sub *Calamintha acinos* f. *villosa*) and L70 (Markova & Thu, l.c., sub *C. acinos* f. *acinos*). The karyotype of L70 is $2n = 2x = 6m + 12sm = 18$ chromosomes (Fig. 1H), that of L215, $2n = 2x = 2m + 8sm + 8st = 18$ chromosomes (Fig. 1I). The karyotype of the plants belonging to four populations from Mt Galičica (two of them sub *Satureja acinos* and two sub *Calamintha acinos*) established by Šopova & al. (1983) are not similar to each other, as well as to the karyotypes from Bulgarian populations.

242. *Acinos rotundifolius* Pers. — $2n = 18$ (Fig. 1J).

Bu: Struma valley, Malák Kožuh, 41°23'N, 23°20'E, stony places, 1971, *Markova L177* (SOM).

This new chromosome number does not agree with the number $2n = 36$ found by Bothmer (1970, sub *Calamintha exigua*). The karyotype consists of $2n = 2x = 4m + 12sm + 2sm - SAT = 18$ chromosomes.

243. *Acinos suaveolens* (Sm.) G. Don. fil. — $2n = 18$ (Fig. 1K).

Bu: Struma valley, the locality Kartaleca near the village Kulata, 41°21'N, 23°22'E, rocky places, 1983, *Markova & Ančev L1429* (SOM).

The chromosome number $2n = 18$ is reported here for the first time from a Bulgarian population and confirms the earlier counts for this taxon (see Loon 1987). The karyotype consists of $2n = 2x = 2m + 14sm + 2sm - SAT = 18$ chromosomes.

244. *Calamintha grandiflora* (L.) Moench — $2n = 22$ (Fig. 2A).

Bu: Pirin Mt, near the hut Sinanica, 41°42'N, 23°22'E, scrubby places, 1980, *Markova L50* (SOM).

The chromosome number $2n = 22$ had been established through the study of the same population, L50 (Markova & Thu 1974), and supports those indicated by Favarger (1969) and Wieffering (1969). The karyotype consists of $2n = 2x = 12m + 10sm = 22$ chromosomes.

245. *Calamintha nepeta* (L.) Savi var. *nepeta* — $2n = 48$ (Fig. 2B, C).

Bu: Balkan foothill region, the hill Carevec in the town Veliko Tŕrnovo, 48°03'N, 25°37'E, 1986, *Markova L1643* (SOM).

— Central Stara Planina Mt, above the village Kŕrnare, 42°42'N, 24°38'E, scrubby places, 1984, *Markova L1533* (SOM).

245a. *Calamintha nepeta* (L.) Savi var. *nepeta* — $2n = 46$ (Fig. 2D).

Bu: Eastern Stara Planina Mt, near town Kotel, 42°51'N, 26°26'E, open grassy places, *Markova L1647* (SOM).

The chromosome number $2n = 48$ established by us agrees with that given for *Calamintha nepeta* s.l. by Morton (1973) from Great Britain. The other chromosome

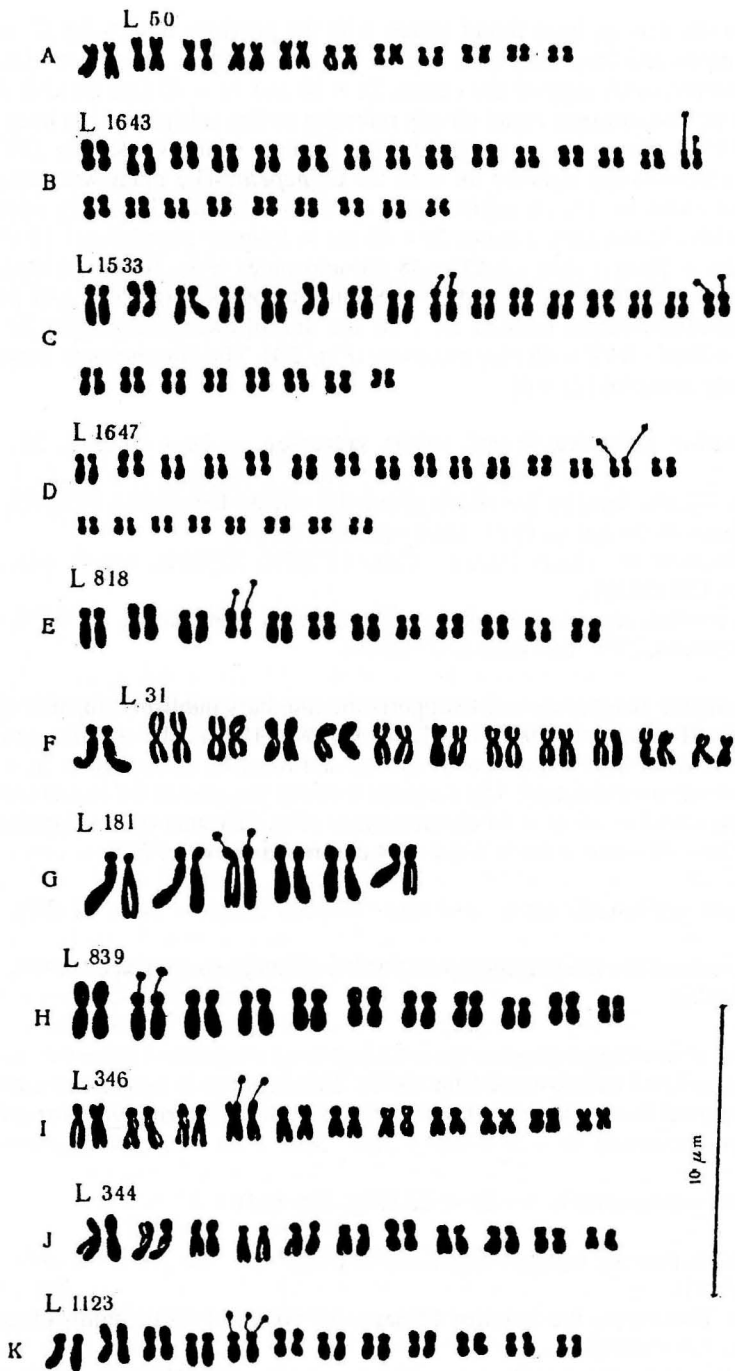


Fig. 2. Karyograms of: A, *Calamintha grandiflora*, $2n = 22$; B-D, *C. nepeta* var. *nepeta*, $2n = 48$ and $2n = 46$; E-F, *C. sylvatica* subsp. *sylvatica*, $2n = 24$; G, *Hyssopus officinalis* subsp. *aristatus*, $2n = 12$; H-K, *Lycopus europaeus*, $2n = 22$ and $2n = 24$.

number, $2n = 46$, that we have found agrees with the previous reports for *C. nepeta* s.l. from Mt Olympus and from Italy (see Strid & Anderson 1985). These two chromosome numbers, however, don't support the counts $2n = 20$ and $2n = 40$ (see Strid & Anderson 1985). Only one chromosome count clearly referring to this subspecies has been made by Natarajan (1978), $2n = 42$, on material from France. Markova & Thu (1974) have published a chromosome number $2n = 18$ for *C. nepeta*. The plant was not correctly identified and refers to *Acinos alpinus* var. *adrianopolitanus*. The karyotypes of the populations with chromosome number $2n = 48$ are as follows: population L1643 includes $2n = 8x = 20m + 26sm + 2sm - SAT = 48$ chromosomes (Fig. 2B); population L1533, $2n = 8x = 18m + 26sm + 4sm - SAT = 48$ chromosomes (Fig. 2C); and population L1647 has the chromosome number $2n = 46$ and the following karyotype: $2n = 8x - 2 = 20m + 24sm + 2sm - SAT = 46$ chromosomes (Fig. 2D). The chromosome number $2n = 46$ is apparently aneuploid ($x = 6$).

246. *Calamintha sylvatica* Bromf. subsp. *sylvatica* — $2n = 24$ (Fig. 2E, F).

Bu: Strandža Mt, the locality Supotloto above the village Brodilovo, 42°03'N, 27°43'E, open places in the forest, 1977, *Markova L818* (SOM).

— Pirin Mt, near the chalet Papaz - Čair, 41°32'N, 23°02'E, woody places, 1970, *Markova L31* (SOM).

— Balkan foothill region, around the village Petko Slaveikovo, 43°02'N, 25°02'E, scrubby places, 1970, *Markova L52* (SOM).

The chromosome number $2n = 24$ supports the numbers published for this species by Bakšay (1958), Holub & al. (1970) and Löve & Löve (1974). The chromosome number $2n = 20$ (Markova & Thu 1974) was incorrect, and must be corrected to $2n = 24$. Two cytotypes have been established. The karyotype of the population L818 consists of $2n = 4x = 6m + 2m - SAT + 16sm = 24$ chromosomes (Fig. 2E), that of the populations L31 and L52 has $2n = 4x = 6m + 16sm + 2st = 24$ chromosomes (Fig. 2F).

247. *Hyssopus officinalis* subsp. *aristatus* (Godr.) Briq. — $2n = 12$ (Fig. 2G).

Bu: Rila Mt, around the town Samokov, 42°19'N, 23°39'E, rocky slopes, 1969, *Markova L181* (SOM).

The diploid chromosome number $2n = 12$ had been established from the study of the same population L181 (Markova & Thu 1974). That result is in agreement with the data previously reported (see Goldblatt 1984, 1985, Majovsky & Murin 1987, for references). The karyotype consists of $2n = 2x = 6sm + 2sm - SAT + 4st = 12$ chromosomes.

248. *Lycopus europaeus* L. — $2n = 22$ (Fig. 2H, I, J).

Bu: Strandža Mt, near the village Bălgari, 42°04'N, 27°42'E, damp places, 1977, *Markova L839* (SOM).

— Western Rhodopes, the locality Elidere, 42°50'N, 24°02'E, damp places, 1974, *Markova L346* (SOM).

— Pirin Mt, along the brooks, near the town Bansko, 41°50'N, 23°30'E, 1974, *Markova L344* (SOM).

— Vitosa Mt, above the village Bistrice, 42°33'N, 23°24'E, in a moist meadow, 1973, *Markova L302* (SOM).

248a. *Lycopus europaeus* L. — $2n = 24$ (Fig. 2K).

Bu: Strandža Mt, in the forest Reserve Silkosija, 42°04'N, 27°45'E, 1980, *Markova L1123* (SOM).

This is probably, the first karyological study of Bulgarian plants of this species. The number found by us, $2n = 2x = 22$, corresponds to the data reported by many authors (see Fedorov 1969, Moore 1969, 1977, Goldblatt 1984, 1988, Goldblatt & Johnson 1990, for references). Populations from four different floristic regions were studied, and four cytotypes and two chromosome numbers, $2n = 22$ and $2n = 24$, were found. The karyotype of population L839 includes $2n = 2x = 6m + 14sm + 2sm - SAT = 22$ chromosomes (Fig. 2H), that of population L346, $2n = 2x = 2m + 18sm + 2sm - SAT = 22$ (Fig. 2I), those of populations L344 and L302 (from different floristic regions), $2n = 2x = 2m + 18sm + 2st = 22$ (Fig. 2J), and that of population L1123, $2n = 2x + 2 = 10m + 10sm + 2sm - SAT + 2st = 24$ chromosomes (Fig. 2K). As the basic number of the genus *Lycopus* is $x = 11$ (Darlington & Wylie 1955, Löve & Löve 1961, 1974, Loon 1987) the chromosome number, $2n = 24$, found by us is probably an aneuploid.

249. *Melittis melissophyllum* subsp. *albida* (Guss.) P.W. Ball — $2n = 30+0-2B$ (Fig. 3A, B).

Bu: Balkan foothill region, among bushes around the village Vetrenici, 43°02'N, 25°27'E, shady places, 1976, *Markova L595a, b* (SOM).

The chromosome number established by us, of $2n = 2x = 30$, coincides with the data published for *Melittis melissophyllum* s.l. (Morton 1973, Bakšay 1958, Pogan & al. 1982) but not with the number $2n = 24$ reported by Strid & Franzén (1981). It seems to be the first karyological study of this species based on Bulgarian plants. Murin (in Majovsky & al. 1974) established in specimens from Slovakia (*M. melissophyllum* subsp. *carpatica* (Klokov) P. W. Ball) the presence of B chromosomes and reported $2n = 30 + 2 - 8B$. In specimens from Bulgaria we found 2B chromosomes (Fig. 3A). In one root tip some cells had the chromosome number $2n = 30 + 2B$ in parallel with other that had $2n = 60 + 4B$ (endopolyploidy, Fig. 3B).

250. *Mentha pulegium* L. — $2n = 18$ (Fig. 3C, D, E).

Bu: Southern Black Sea coast, around the village Sinemorec, 42°04'N, 27°56'E, damp places, 1977, *Markova L813* (SOM).

— Strandža Mt. the locality Vulgarski dol, near the village Kosti, 42°02'N, 27°45'E, damp places, 1980, *Markova L1118* (SOM).

— Southern Black Sea coast, around the town Carevo, 42°09'N, 27°49'E, damp grassy places, 1977, *Markova L811* (SOM).

250a. *Mentha pulegium* L. — $2n = 30$ (Fig. 3F).

Bu: Sredna gora Mt, the locality Buceto, Losenska planina, 42°33'N, 23°32'E, damp places, 1982, *Markova & Goranova L1310* (SOM).

The chromosome number $2n = 18$ is reported here for the first time. Some authors consider that the basic chromosome number of *Mentha pulegium* is $x = 5$ (Löve & Löve 1961, Majovsky & Murin 1987) and others that it is $x = 10$ (Darlington & Wylie 1955,

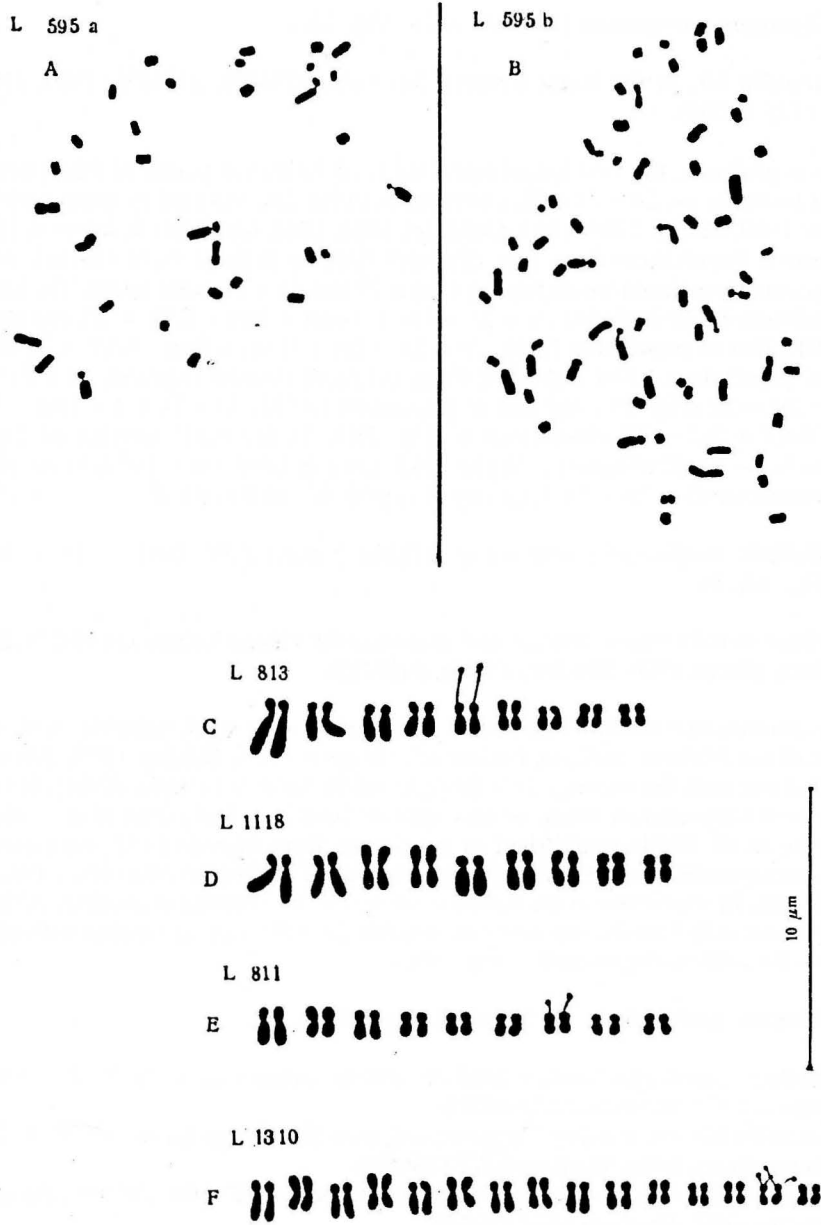


Fig. 3. Karyotypes of: A-B, *Melittis melissophyllum* subsp. *albida*: $2n = 30 + 2B$; and $2n = 60 + 4B$; C-F, karyograms of *Mentha pulegium*: $2n = 18$; and F, $2n = 30$.

Harley & Brighton 1977, Loon 1987). In our opinion the basic number of *M. pulegium* is $x = 5$, because a diploid chromosome number $2n = 10$ has been established for this taxon (see Fedorov 1969). That is why we assume that the chromosome number $2n = 18$, found by us in three populations, is probably an aneuploid. The karyotype of population L813 includes $2n = 4x - 2 = 6m + 8sm + 2sm - SAT + 2st = 18$ chromosomes (Fig. 3C); that of L1118, $2n = 4x - 2 = 4m + 14sm = 18$ (Fig. 3D), and that of L811, $2n = 4x - 2 = 2m + 2m - SAT + 14sm = 18$ (Fig. 3E). The chromosome number $2n = 30$ found by us in one population, L1310, confirms the counts of Morton (see Fedorov 1969). The karyotype consists of $2n = 6x = 10m + 18sm + 2sm - SAT = 30$ chromosomes (Fig. 3F). Apart from the chromosome numbers reported above ($2n = 18$ and $2n = 30$), the chromosome number $2n = 20$ has been established on Bulgarian populations as well (Markova & Ivanova 1971, Markova 1972, Harley & Brighton 1977).

251. *Sideritis lanata* L. — $2n = 30$ (Fig. 4A).

Bu: Struma valley, near the bridge on the river Struma in the village Levunovo, 40°28'N, 23°18'E, rocky slopes, 1991, *Evstatieva L1823* (SOM).

This is the first chromosome count for this species based on Bulgarian plants. The chromosome number $2n = 2x = 30$, as found, agrees with the report of Strid (1965). In the karyotype of the population L1823 submetacentric chromosomes predominate. The SAT-chromosome pair is a metacentric one.

252. *Sideritis montana* L. var. *montana* — $2n = 16$ (Fig. 4C, D).

Bu: Tundža hilly region, around the hut Strandža, 42°02'N, 26°58'E, open rocky places, 1985, *Markova & Goranova L1546* (SOM).
— Vitoša region, above the village Pančarevo, 42°36'N, 23°28'E, dry stony places, 1971, *Markova L100* (SOM).

The chromosome number $2n = 16$ confirms the previous count on a population from Bulgaria (Loon & Setten 1982) as well as the counts on plants from other regions (see Fedorov 1969, Goldblatt 1981, Strid & Franzén 1981). This chromosome number doesn't support the counts of $2n = 18$ and $2n = 32$ for *Sideritis montana* s.l. (see Goldblatt 1981, 1988, Moore 1973, for references). A karyotype analysis of 2 populations has been carried out by us. The karyotype of population L1546 includes $2n = 2x = 8m + 6sm + 2sm - SAT = 16$ chromosomes (Fig. 4C) and that of population L100, $2n = 2x = 14sm + 2sm - SAT = 16$ chromosomes (Fig. 4D).

253. *Sideritis montana* var. *comosa* Rochel — $2n = 16$ (Fig. 4E, F, G).

Bu: Znepole region, about village Paramun, 42°38'N, 22°59'E, stony places, 1971, *Markova L199* (SOM).
— Vitoša region, above the village Pančarevo, 42°36'N, 23°28'E, grassy places, 1971, *Markova L200* (SOM).
— North-Eastern Bulgaria, the locality Pamuk-kulak near the town Silistra, 44°05'N, 27°15'E, *Markova L389* (SOM).

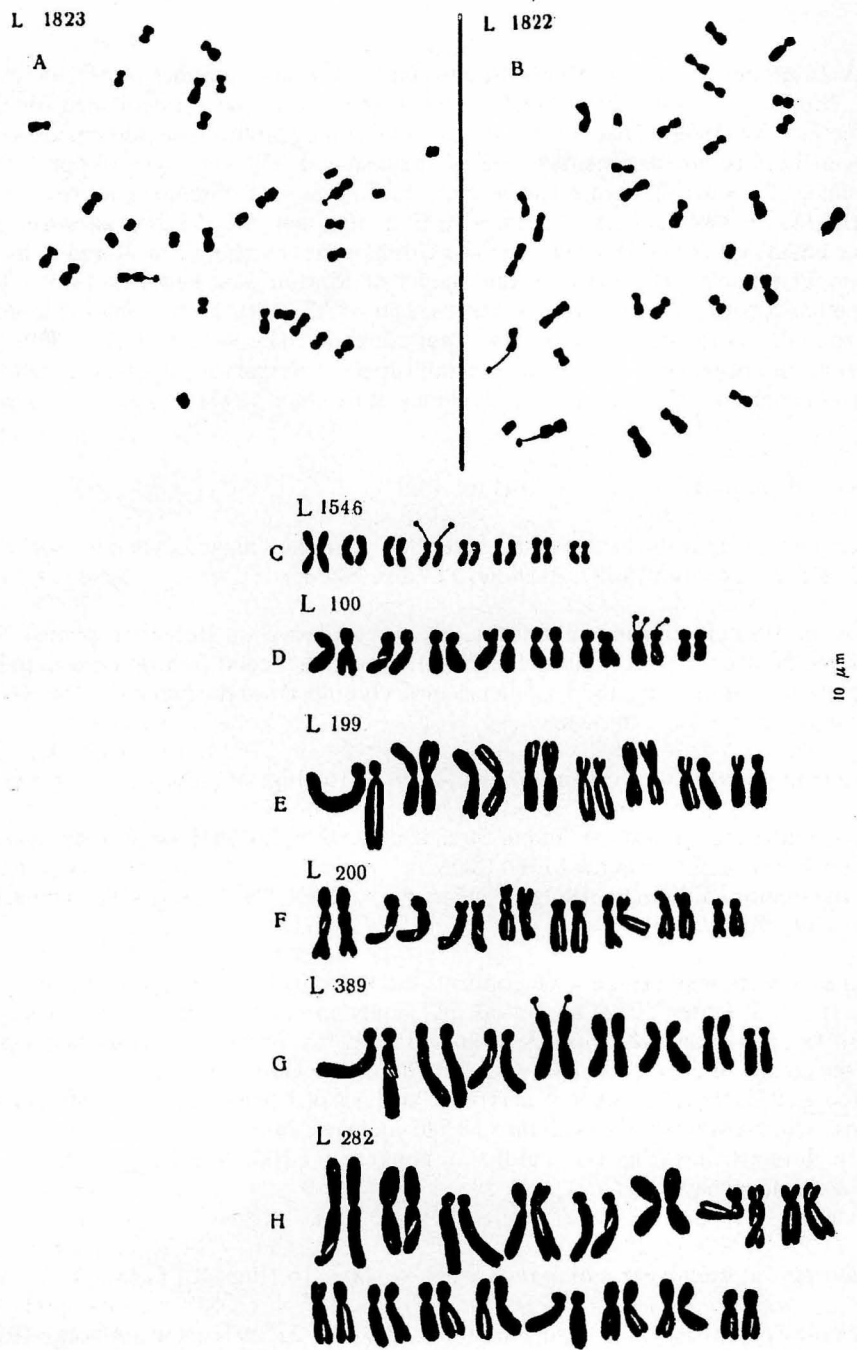


Fig. 4. Karyotypes (A-B) and karyograms (C-H) of: A, *Sideritis lanata*, $2n = 30$; B, *S. syriaca*, $2n = 32$; C-D, *S. montana* var. *montana*, $2n = 16$; E-H, *S. montana* var. *comosa*, $2n = 16$ and $2n = 32$.

253a. *Sideritis montana* var. *comosa* Rochel — $2n = 32$ (Fig. 4H).

Bu: Northern Black Sea coast, about the creative house BAS near the town Varna, 43°11'N, 27°50'E, grassy places, 1971, *Markova L282* (SOM).

The chromosome number $2n = 16$, established in three populations, coincides with the result that had been published for one of them, L199 (Markova & Thu 1974, sub *Sideritis montana* s.l.). Three cytotypes have been established. The karyotype of population L199 includes $2n = 2x = 6m + 6sm + 4st = 16$ chromosomes (Fig. 4E), that of L200, $2n = 2x = 12sm + 4st = 16$ (Fig. 4F), and that of L389, $2n = 2x = 6sm + 2sm - SAT + 8st = 16$ (Fig. 4G). In one population, L282, we found a tetraploid chromosome number, $2n = 32$. This chromosome number agrees with the report by González Aguilera & Fernández Peralta (1981 sub *S. montana* subsp. *montana*). The karyotype includes $2n = 4x = 2m + 24sm + 6st = 32$ chromosomes (Fig. 4H).

254. *Sideritis syriaca* L. — $2n = 32$ (Fig. 4B).

Bu: Strandža Mt, the locality Peikovo near the town Malko Tărnovo, 41°57'N, 27°30'E, on calcareous dry places, 1991, *Evstatieva L1822* (SOM).

This is, probably, the first chromosome count for this species based on Bulgarian plants. The chromosome number $2n = 32$ we found confirms the findings of Contandriopoulos (1978) and Glagoleva & Zemskova (1985, sub *Sideritis taurica*). In the karyotype of population L1822 ($2n = 4x = 32$) metacentric chromosomes prevail. The satellite chromosome pair is of a metacentric type, too. According to Glagoleva & Zemskova (l.c.) in the karyotype of plants from Crimea metacentric chromosomes are present, which is confirmed by our study. From a drawing made on a Greek population (Contandriopoulos, l.c.) it is possible to determine that in its karyotype predominant chromosome type is the submetacentric one. That karyotype is more specialized than the karyotype described by us.

255. *Thymus comptus* Friv. — $2n = 28 + 0 - 2B$ (Fig. 5A).

Bu: Pirin Mt, around the village Stara Kresna 41°52'N, 23°12'E, on stony and sandy places, 1983, *Markova & Anèev L1400* (SOM) — $2n = 28$.
— Thundža hilly region, near the town Topolovgrad, 42°02'N, 26°20'E, sandy places, 1983, *Markova & Goranova L1398* (SOM) — $2n = 28 + 2B$.

The chromosome number $2n = 28$ found in two Bulgarian populations does not correspond to the result of Jalas & Uotila (1976), $2n = 26$ and $2n = 52$, for plants from Greece. Markova (1983) published a chromosome number of $2n = 28$. The specimens from population L272 in fact belong to *Thymus striatus* var. *interruptus* Jalas (see Markova 1989a). The karyotypes from two populations of different floristic regions are very similar. The karyotype of populations L1400 and L1398 consist of $2n = 4x = 4m + 22sm + 2sm - SAT = 28$ chromosomes. In some roots from plants of population L1398 we observed 2B chromosomes.

256. *Thymus glabrescens* Willd. — $2n = 28$ (Fig. 5B).

Bu: Pirin Mt, above the town Bansko, 41°50'N, 23°30'E, open grassy places in the forests, 1984, *Markova L1506* (SOM).

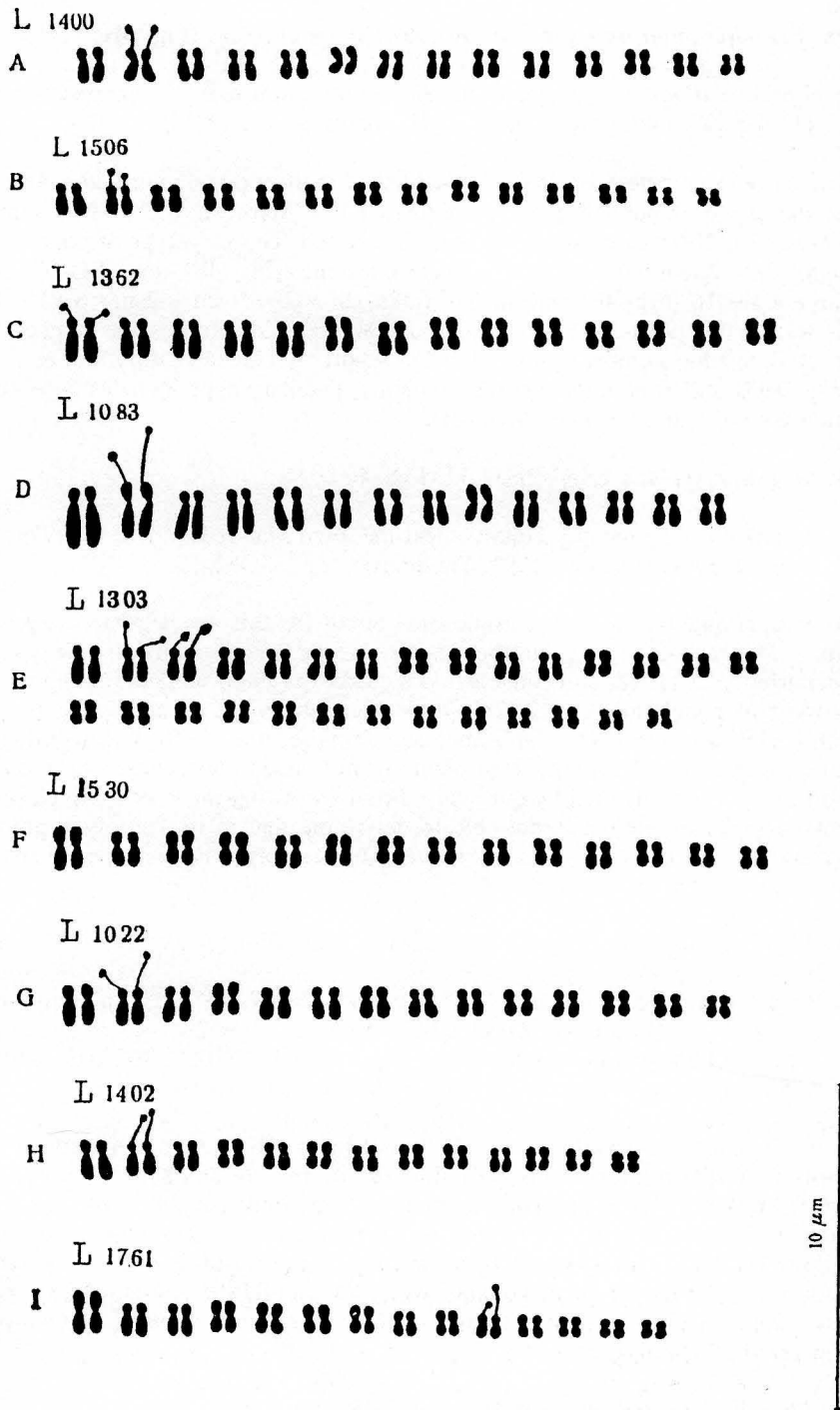


Fig. 5. Karyograms of: A, *Thymus comptus*, $2n = 28$; B, *T. glabrescens*, $2n = 28$; C-E, *T. jankae*, $2n = 28$ and $2n = 56$; F-H, *T. moesiacus*, $2n = 28$ and $2n = 26$; I, *T. perinicus*, $2n = 28$.

The chromosome number found, $2n = 28$, agrees with that by Trela-Sawicka (1968) in material from Poland. A high degree of karyological variation has been found in this species: $2n = 28, 32, 56$ and 58 (ref. in Fedorov 1969, Moore 1970, 1972). The karyotype of population L1506 consists of $2n = 4x = 10m + 16sm + 2sm - SAT = 28$ chromosomes.

257. *Thymus jankae* Čelak. — $2n = 28$ (Fig. 5C, D).

Bu: Rila Mt, around the town Samokov, $42^{\circ}19'N, 23^{\circ}39'E$, grassy stony places, 1983, *Markova & Goranova L1362* (SOM).

— NE Bulgaria, around the town Madara, $43^{\circ}14'N, 27^{\circ}02'E$, grassy stony places, 1984, *Markova L1499* (SOM).

— Eastern Rhodopes, above the village Mezek, $41^{\circ}48'N, 25^{\circ}05'E$, 1980, *Markova L1083* (SOM).

257a. *Thymus jankae* Čelak. — $2n = 56$ (Fig. 5E).

Bu: Rila Mt, between the hut Mussala and Borovec, $42^{\circ}13'N, 23^{\circ}37'E$, rocky places, 1982, *Markova & Goranova L1303* (SOM).

The chromosome number $2n = 28$, from three populations, coincides with the result published for population L1083 (Markova 1989b). Two cytotypes have been established. The karyotype of populations L1362 and L1499 (plants from different floristic regions) includes $2n = 4x = 18m + 8sm + 2sm - SAT = 28$ chromosomes (Fig. 5C), and that of population L1083, $2n = 4x = 2m + 20sm + 2sm - SAT + 4st = 28$ chromosomes (Fig. 5D). The chromosome number $2n = 56$ was established by Markova (1983, sub *Thymus praecox* subsp. *skorpilii* (Vel.) Jalas = *T. jankae*, see Markova 1989a). The karyotype of the population L1303 consists of $2n = 8x = 28m + 24sm + 4sm - SAT = 56$ chromosomes (Fig. 5E).

258. *Thymus moesiacus* Vel. — $2n = 28$ (Fig. 5F, G).

Bu: Pirin Mt, near the hut Banderica, $41^{\circ}47'N, 23^{\circ}28'E$, open rocky places in the forest under the hut, 1984, *Markova L1530* (SOM).

— West frontier Mts, above the village Gărljano, $42^{\circ}14'N, 22^{\circ}37'E$, rocky places, 1979, *Markova L1022* (SOM).

258a. *Thymus moesiacus* Vel. — $2n = 26$ (Fig. 5H).

Bu: Struma valley, in the locality Kartaleca near the village Kulata, $41^{\circ}22'N, 23^{\circ}22'E$, dry grassy places, 1983, *Markova & Ančev L1402* (SOM).

There are two varieties of *Thymus moesiacus* in the Bulgarian flora, *T. moesiacus* var. *moesiacus* and *T. moesiacus* var. *malyi* (Ronn.) Markova (Markova 1989a). The present investigations are on the typical variety. The first count of the chromosome number of this taxon was carried out by Markova (1989b). Populations from three different floristic regions were studied. Two of them were tetraploid and one aneuploid ($x = 7$). The karyotype of population L1530 comprises $2n = 2x = 18m + 10sm = 28$ chromosomes (Fig. 5F); that of population L1022, $2n = 4x = 4m + 22sm + 2sm - SAT = 28$ (Fig. 5G); and that of population L1402, $2n = 4x - 2 = 14m + 10sm + 2sm - SAT = 26$ chromosomes (Fig. 5H).

259. *Thymus perinicus* (Vel.) Jalas — $2n = 28$ (Fig. 5I).

Bu: Pirin Mt, locality Kabata over the hut Vihren, 41°43'N, 23°27'E, on calcareous rocky slopes, 1988, *Markova L1761* (SOM).

This Bulgarian endemic has a limited distribution on Mt Pirin above 1970 m. The chromosome number $2n = 28$ is reported here for the first time. The karyotype consists of $2n = 4x = 20m + 6sm + 2sm - SAT = 28$ chromosomes.

260. *Thymus pannonicus* All. var. *pannonicus* — $2n = 28$ (Fig. 6A).

Bu: Ljulin Mt, around the village Klisura, 42°42'N, 23°11'E, dry grassy places, 1982, *Markova L1265* (SOM).

The chromosome number $2n = 4x = 28$ for *Thymus pannonicus* (incl. *T. kosteleckyanus* and *T. marschallianus*), established on a Bulgarian population (Markova 1983), is the same as had been found previously by Jalas & Pohjo (1965), Jalas & Keleva (1967), Trela-Sawicka (1970, 1972) and Gadella & Kliphuis (1972). The karyotype from population L1265 consists of $2n = 4x = 6m + 20sm + 2sm - SAT = 28$ chromosomes.

260a. *Thymus pannonicus* var. *latifolius* (Bess.) Jalas — $2n = 28$ (Fig. 6B, C).

Bu: Struma valley, in the locality Kartaleca near village Kulata, 41°22'N, 23°22'E, stony places, 1983, *Markova & Ančev L1401* (SOM).

— Belasica Mt, between the village Kamena and the village Samoilovo, 41°22'N, 23°07'E, grassy places, 1983, *Markova & Ančev L1421* (SOM).

The chromosome number $2n = 28$ we found is presumably the first count for this taxon. The karyotype of the population L1401 consists of $2n = 4x = 6m + 2m - SAT + 20sm = 28$ chromosomes (Fig. 6B), and that of population L1421, $2n = 4x = 6m + 16sm + 6sm - SAT = 28$ chromosomes (Fig. 6C). The chromosome number $2n = 5x = 35$ was reported for a Bulgarian population (Markova 1983).

261. *Thymus sibthorpii* Benth. var. *sibthorpii* — $2n = 28$ (Fig. 6D, E).

Bu: Vitoša Mt, around the village Bosnjak, 42°28'N, 23°13'E, dry stony places, 1985, *Markova & Goranova L1572* (SOM).

— Struma valley, above the railway station Pirin, 41°43'N, 23°12'E, open stony places in *Juniperus excelsa* community, 1983, *Markova & Ančev L1425* (SOM).

The chromosome number $2n = 28$ for *Thymus sibthorpii* s.l. was reported for the first time for Bulgarian plants by Jalas & Uotila (1976). In some individuals from this population two B-chromosomes were also reported. The chromosome number $2n = 28$, established by us, coincides with the count of Jalas & Uotila (l.c.) and with that reported by Strid & Franzén (1981) on plants from Mt Olympus. The karyotype of population L1572 consists of $2n = 4x = 16m + 12sm = 28$ chromosomes (Fig. 6D), and that of L1425, $2n = 4x = 12m + 14sm + 2sm - SAT = 28$ (Fig. 6E). Markova (1989b) reported $2n = 28 + 2B$ from a population from Mt Belasica.

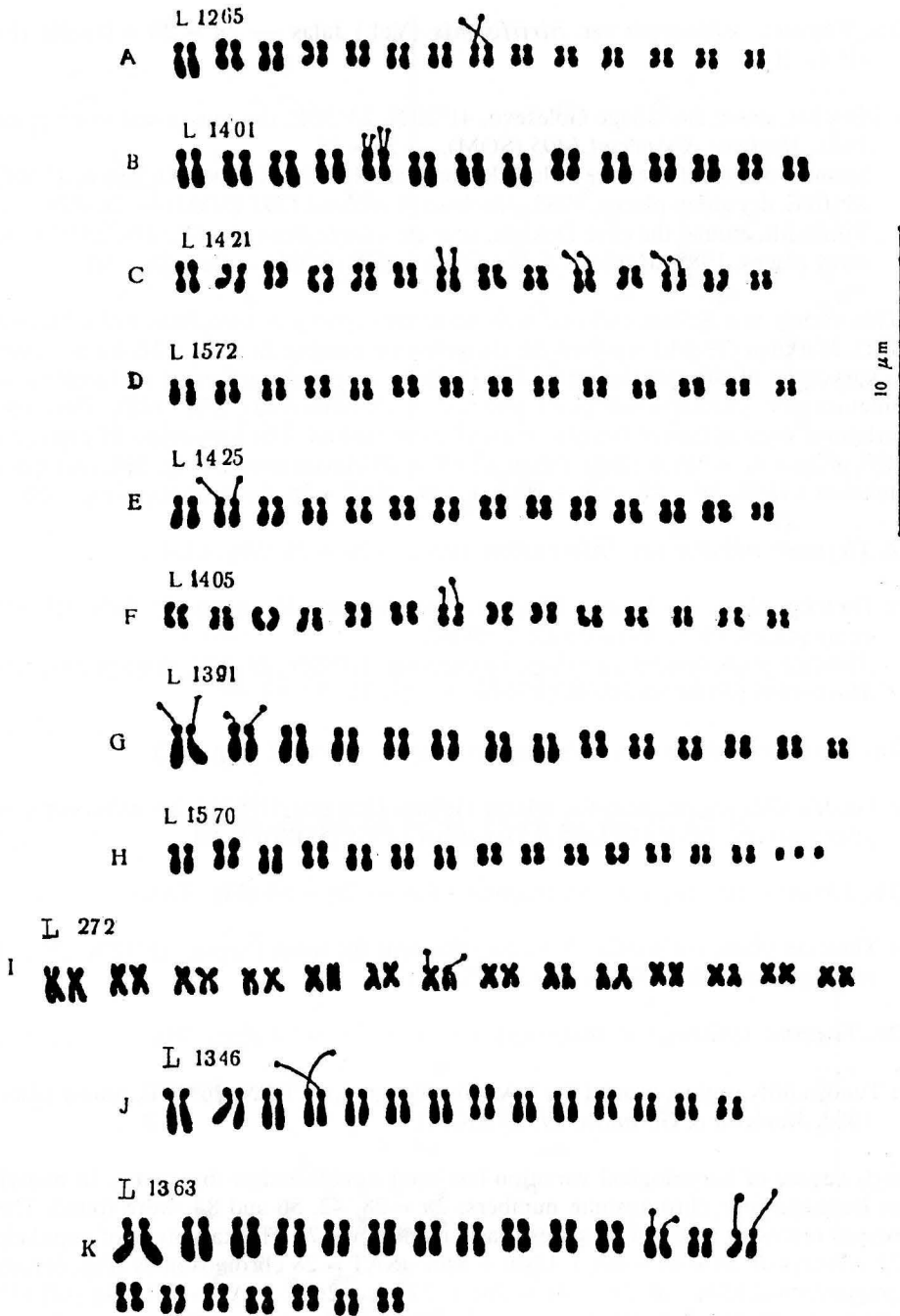


Fig. 6. Karyograms of: A, *Thymus pannonicus* var. *pannonicus*, 2n = 28; B-C, *T. pannonicus* var. *latifolius*, 2n = 28; D-E, *T. sibthorpii* var. *sibthorpii*, 2n = 28; F-H, *T. sibthorpii* var. *hirtiformis*, 2n = 28 + 0 - 3B; I-K, *T. striatus* var. *interruptus*, 2n = 28 and 2n = 42.

261a. *Thymus sibthorpii* var. *hirtiformis* (Vel.) Jalas — $2n = 28 + 0 - 3B$ (Fig. 6F, G, H).

- Bu:** Pirin Mt, above the village Goleševo, 41°23'N, 23°36'E, dry grassy and stony places, 1983, *Markova & Ančev L1405* (SOM). — $2n = 28$.
 — Struma valley, between the village Krupnik and locality Kresnensko hance, 41°48'N, 23°10'E, dry stony places, 1983, *Markova & Ančev L1391* (SOM) — $2n = 28$.
 — Vitoša Mt, around the cave Duklata, near the village Bosnjak, 42°28'N, 23°13'E, dry stony places, 1985, *Markova & Goranova L1570* (SOM) — $2n = 28 + 3B$.

This variety is a Balkan endemic with numerous synonyms (see Jalas 1974, Markova 1989a). Markova (1989b) reported the chromosome number $2n = 28 + 2B$ for this taxon. The karyotype of the population L1570 includes an equal number of metacentric and submetacentric chromosome pairs and 2-3 B-chromosomes (Fig. 6H). Two other populations from different floristic regions were studied. The karyotype of population L1405 is $2n = 4x = 8m + 18sm + 2sm - SAT = 28$ chromosomes (Fig. 6F), and that of population L1391, $2n = 4x = 6m + 18sm + 4sm - SAT = 28$ chromosomes (Fig. 6G).

262. *Thymus striatus* var. *interruptus* Jalas — $2n = 28$ (Fig. 6I, J).

- Bu:** Thracian plain, the locality Oludere, near the town Harmanli, 41°56'N, 25°50'E, stony places, 1971, *Markova L272* (SOM).
 — Thracian plain, around the village Uzundzovo, 41°58'N, 25°38'E, stony places, 1983, *Markova & Goranova L1346* (SOM).

262a. *Thymus striatus* var. *interruptus* Jalas — $2n = 42$ (Fig. 6K).

- Bu:** Tundža hilly region, near the village Goljam Dervent, 41°57'N, 26°43'E, stony and grassy places, 1983, *Markova & Goranova L1363* (SOM).

262b. *Thymus striatus* var. *interruptus* Jalas — $2n = 56$ (Fig. 7A).

- Bu:** Thracian plain, the locality Suchata reka near the town Čirpan, 42°12'N, 25°16'E, stony places, 1982, *Markova L1251* (SOM).

262c. *Thymus striatus* var. *interruptus* Jalas — $2n = 84$ (Fig. 7B).

- Bu:** Tundža hilly region, around the town Topolovgrad, 42°02'N, 26°20'E, grassy places, 1983, *Markova & Goranova L1370* (SOM).

A high degree of karyological variation has been established in this taxon. In material from Bulgaria four chromosome numbers, $2n = 28, 42, 56$ and 84 , were found. Their cytotypes represent a polyploid series (basic number $x = 7$). The karyotype of population L272 consists of $2n = 4x = 8m + 18sm + 2sm - SAT = 28$ chromosomes (Fig. 6I), that of population L1346, of $2n = 4x = 2m + 24sm + 2sm - SAT = 28$ (Fig. 6J). The chromosome number $2n = 42$ was established through the study of the same population, L1363 (Markova 1989b). The karyotype consists of $2n = 6x = 14m + 24sm + 4sm - SAT = 42$ chromosomes (Fig. 6K). To our knowledge the chromosome numbers $2n = 56$ and $2n = 84$ are given here for the first time. In the karyotype of population L1251, $2n = 8x = 56$, metacentric chromosomes predominate. In this karyotype there are 3 SAT-chromosome pairs of the submetacentric type (Fig. 7A). In the karyotype of L1370, $2n =$

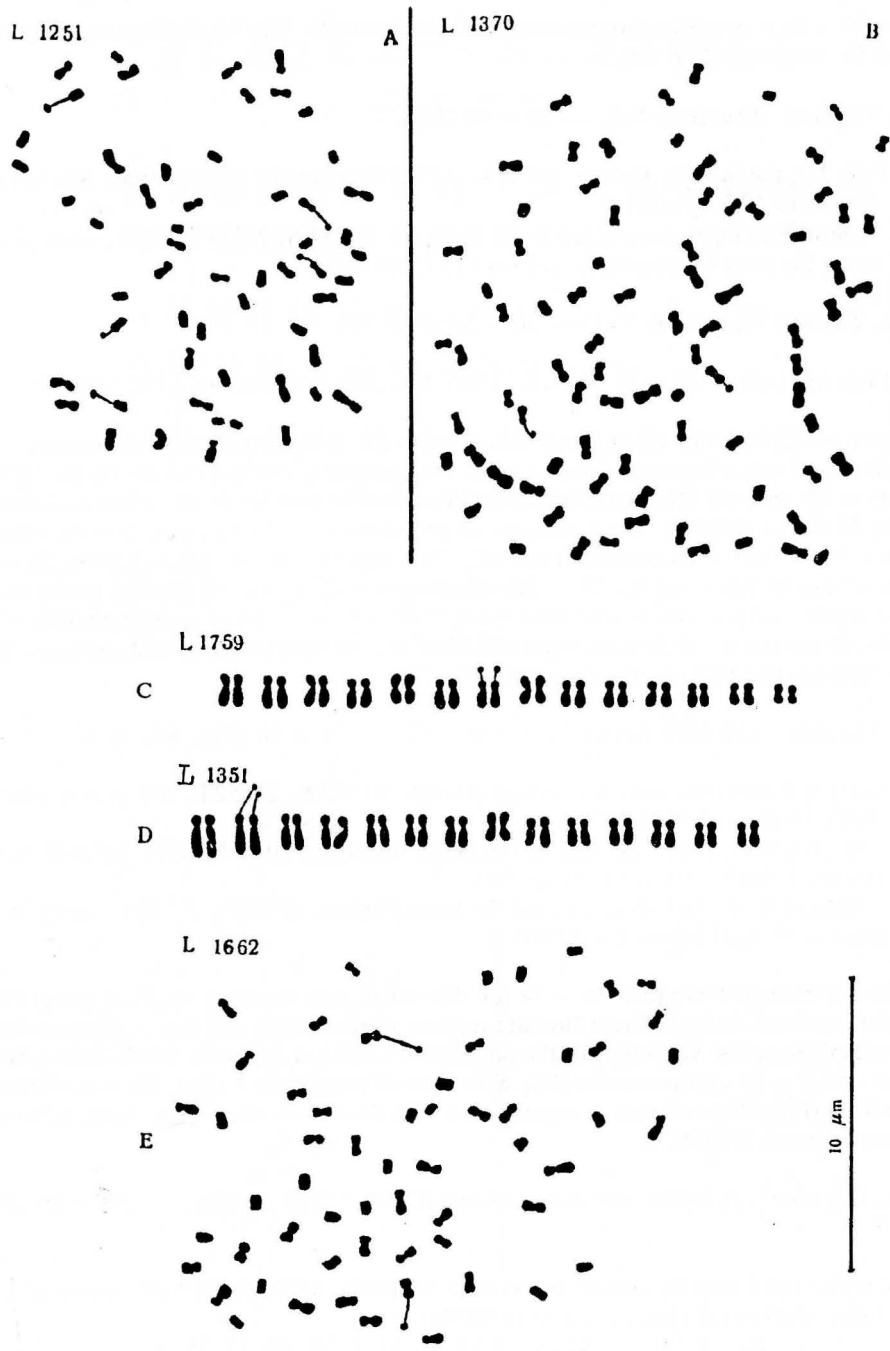


Fig. 7. Karyotypes (A-B and E) and karyograms (C-D) of: A-B, *Thymus striatus* var. *interruptus*: A, $2n = 56$; B, $2n = 84$; C-D, *T. thracicus*, $2n = 28$ and E, $2n = 58$.

$12x = 84$, submetacentric chromosome pairs predominate. The SAT-chromosome pair is submetacentric, too (Fig. 7B).

263. *Thymus thracicus* Vel. — $2n = 28$ (Fig. 7C, D).

Bu: Pirin Mt, the locality Kabata, $41^{\circ}43'N$, $23^{\circ}27'E$, dry rocky places, 1988, Markova & Goranova L1759 (SOM).

— Central Rhodopes, around the town Bačkovo, $41^{\circ}54'N$, $24^{\circ}52'E$, 1983, stony places along the river Čepelarska, Markova L1351 (SOM).

263a. *Thymus thracicus* Vel. — $2n = 58$ (Fig. 7E).

Bu: Pirin Mt, bellow the peak Todorka, 1986, Markova & Goranova L1662 (SOM).

There are 2 varieties of *Thymus thracicus* in the Bulgarian flora: *T. thracicus* var. *thracicus* and var. *alsarensis* (Ronn.) Jalas. The present investigations are on the typical variety of the species. The first count of the chromosome number of this taxon was carried out by Markova (1989b). The karyotype of population L1759 includes $2n = 4x = 6m + 20sm + 2sm - SAT = 28$ chromosomes (Fig. 7C), and that of population L1351, $2n = 4x = 2m + 22sm + 2sm - SAT + 2st = 28$ chromosomes (Fig. 7D). According to the result of the present study, the chromosome number $2n = 8x + 2 = 58$ is an aneuploid ($x = 7$). All the chromosomes of the karyotype of L1662 are probably of the m-and sm-types. The SAT-chromosome pair is submetacentric (Fig. 7E).

264. *Thymus zygoides* Griseb. var. *zygoides* — $2n = 56$ (Fig. 8A, B, C).

Bu: Eastern Rhodopes, over the village Mezek, $41^{\circ}52'N$, $24^{\circ}52'E$, dry grassy places, 1980, Markova L1043 (SOM).

— Thracian plain, above the village Trivodici, Bessapara hills, $42^{\circ}07'N$, $24^{\circ}26'E$, rocky places, 1981, Markova L1161 (SOM).

— Southern Black Sea coast, around the town Carevo, $42^{\circ}09'N$, $27^{\circ}49'E$, sandy stony places, 1977, Markova L807 (SOM).

The chromosome number $2n = 56$ for this taxon was reported by Markova (1983). Populations from three different floristic regions were studied, and three cytotypes have been established. The karyotype of the population L1043 includes $2n = 8x = 36m + 16sm + 4sm - SAT = 56$ chromosomes (Fig. 8A); that of population L1161, $2n = 8x = 22m + 34sm = 56$ (Fig. 8B); and that of population L807, $2n = 8x = 18m + 2m - SAT + 36sm = 56$ chromosomes (Fig. 8C).

264a. *Thymus zygoides* var. *lycaonicus* (Celak.) Stoj. & Stef. — $2n = 60$ (Fig. 8D).

Bu: Tundza hilly region, around the village Strandža, $42^{\circ}02'N$, $26^{\circ}58'E$, stony places, 1985, Markova & Goranova L1553 (SOM).

264b. *Thymus zygoides* var. *lycaonicus* (Celak.) Stoj. & Stef. — $2n = 62$ (Fig. 8E).

Bu: Thracian plain, by the village Slavjanovo, $41^{\circ}47'N$, $25^{\circ}47'E$, sunny rocky places, 1976, Markova L636 (SOM).

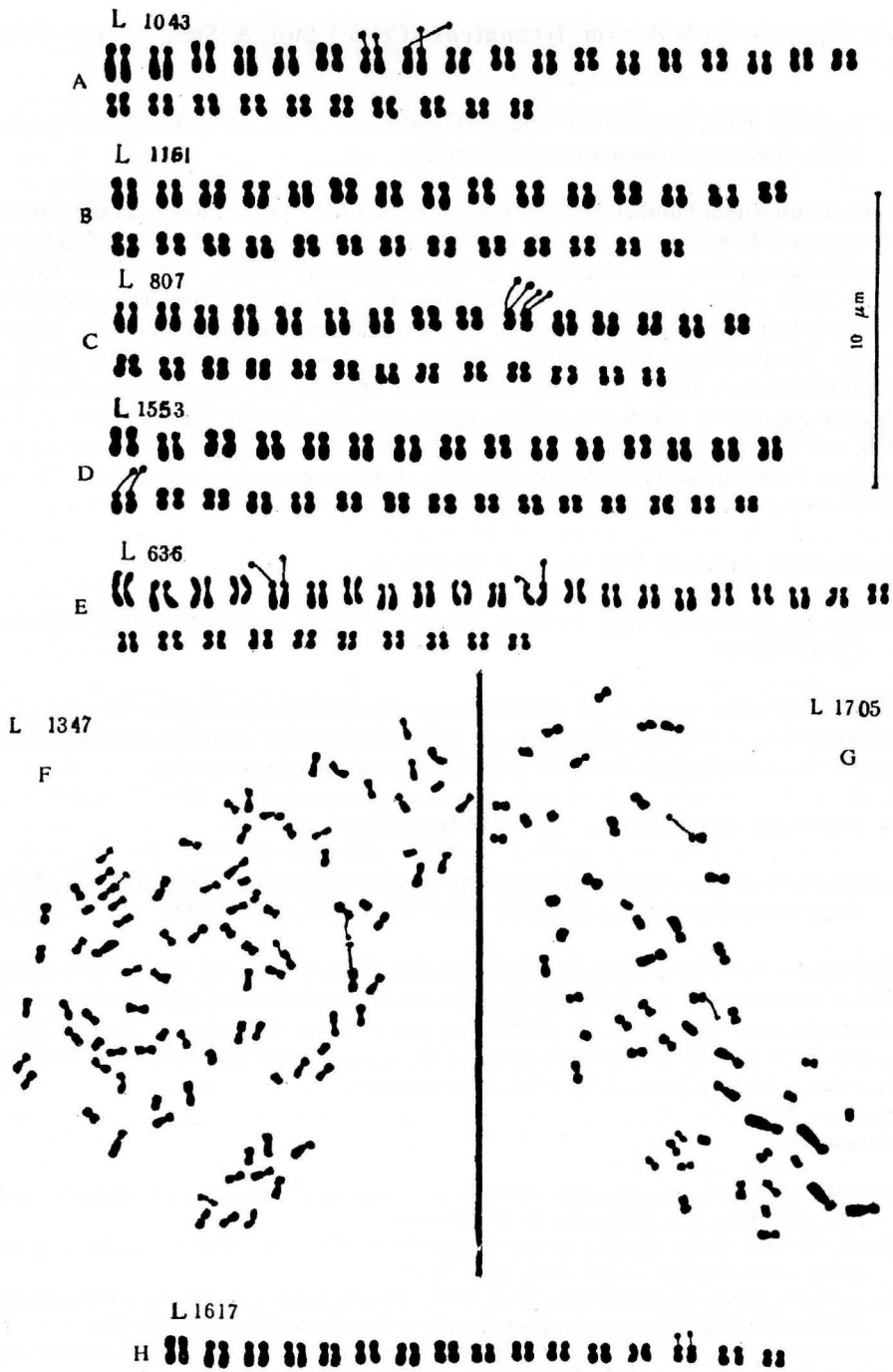


Fig. 8. Karyograms (A-E and H) and karyotypes (F-G) of: A-C, *Thymus zygioides* var. *zygioides*, $2n = 56$; D-F, *T. zygioides* var. *lycaonicus*, $2n = 60$, $2n = 62$ and $2n = 90$; G, *T. vandasii*, $2n = 54$; H *Ziziphora capitata*, $2n = 32$.

264c. *Thymus zygioides* var. *lycaonicus* (Celak.) Stoj. & Stef. — $2n = 90$ (Fig. 8F).

Bu: Thracian plain, around the village Bălgarin, 41°53'N, 25°57'E, dry stony places, 1983, *Markova & Goranova L1347* (SOM).

The chromosome number $2n = 60$ was published for a population from the Rhodopes by Markova (1989b). In a population from Tundža hilly region we have counted the same chromosome number. The karyotype of this population, L1553, consists of $2n = 4x = 28sm + 30sm + 2sm - SAT = 60$ chromosomes (Fig. 8D). The chromosome number $2n = 62$ was published by Markova (1989b). This chromosome number is probably aneuploid ($x = 15$). The karyotype L636 consists of $2n = 4x + 2 = 22m + 34sm + 4sm - SAT + 2st = 62$ chromosomes (Fig. 8E). The chromosome number $2n = 6x = 90$, established in a Bulgarian population (Markova 1989b), agrees with the number found by Jalas & Uotila (1976, sub *Thymus longedentatus* sensu Jalas 1982) on two Turkish populations. In the karyotype from population L1347, metacentric chromosome pairs predominate. The SAT-chromosome pair is also metacentric (Fig. 8F).

265. *Thymus vandasii* Vel. — $2n = 54$ (Fig. 8G).

Bu: Pirin Mt, around the peak Todorka, 41°43'N, 23°28'E, rocky places, 1987, *Goranova L1705* (SOM).

According to the result of the present study, the chromosome number $2n = 8x - 2 = 54$ is aneuploid ($x = 7$). The karyotype of population L1705 consists predominantly of metacentric chromosomes. The SAT-chromosome pair is submetacentric.

266. *Ziziphora capitata* L. — $2n = 32$ (Fig. 8H).

Bu: Eastern Rhodopes, along the river Arda near the town Momčilgrad, 41°28'N, 25°24'E, sandy stony places along the river, 1986, *Markova L1617* (SOM).

The plants from the Bulgarian population L1617 have $2n = 32$, which does not agree with the number $2n = 16$, found by Čuksanova & Kaplanbekova (1971) on plants from Turkmenija, and Šopova & al. (1983) on plants from Macedonia. This is the first chromosome count for this species based on Bulgarian plants. The karyotype includes $2n = 4x = 8m + 22sm + 2sm - SAT = 32$ chromosomes.

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Reports (267-284) by Sven Snogerup

267. *Bupleurum baldense* Turra — $2n = 16$.

- Ga:** Finistère S.: Le Guilvinec, maritime sands, 1963, *Snogerup cult.* 8601, 8611, seeds from Laboratoire de Recherches sur les Plantes Fourragères, Rouen.
 — Falcon, Nice, 1963, *Snogerup cult.* 8603 (LD), seeds from Université de Neuchâtel.

268. *Bupleurum fruticosum* L. — $2n = 14$.

- Ga:** Hérault: Saint Paul, 1963, *Snogerup cult.* 8608 (LD), seeds from Laboratoire de Recherches sur les Plantes Fourragères, Rouen.
 — Pyrénées-Orientales: Gorges de Galamuis, 600 m, 1963, *Snogerup cult.* 8664, seeds from Jardin botanique de Toulouse.

269. *Bupleurum praealtum* L. — $2n = 16$.

- FJu:** Istria, Babadag, 1963, *Snogerup cult.* 8638 (LD), seeds coll. Boscain, Micle & Bodocan.
It: Friuli, 1963, *Snogerup cult.* 8647 (LD), seeds from Giardino botanico di Udine.

270. *Bupleurum lancifolium* Hornem. — $2n = 16$.

Gr: Dodekanisa, Astipalea: Vathi, the eastern side of the bay, hard limestone, fields, 36°37'N, 26°25'E, 31 May 1960, *Runemark & Nordenstam 15149* (LD).

271. *Bupleurum odontites* L. — $2n = 16$.

Gr: Euboea boreali-occidentalis, in ditione pagi Palaeochora, in olivetis, 38°41'N, 22°53'E, 29 Jun 1958, *Rechinger 19408* (LD).

272. *Bupleurum rotundifolium* L. — $2n = 16$.

Ga: Corcelles les Monts, 1963, *Snogerup cult. 8639* (LD), seeds from Jardin Botanique de Dijon.

273. *Bupleurum semicompositum* L. — $2n = 16$.

Cr: Sitia, the island N of Dragonada, 35°22'N, 26°10'E, 4 Jul 1960, *Runemark & Nordenstam 16577* (LD).

Gr: Kikladhes, Sikinos: Kalogeros, 36°37'N, 25°03'E, 24 May 1960, *Runemark & Nordenstam 14756* (LD).

— Kikladhes, Anidros: 36°37'N, 25°41'E, 27 May 1960, *Runemark & Nordenstam 14820* (LD).

— Kikladhes, Ano Koufounisi: garigue, 36°56'N, 25°36'E, 10 Jun 1960, *Runemark & Nordenstam 15667* (LD).

— Kikladhes, Ano Koufounisi: the E part, 36°56'N, 25°36'E, 10 Jun 1960, *Runemark & Nordenstam 15724* (LD).

— Kikladhes, Keros: Skaglia W of Keros, 0-20 m, 36°23'N, 25°39'E, 10 Jun 1960, *Runemark & Nordenstam 15755* (LD).

— Kikladhes, Christiania: the N island, 0-200 m, 36°15'N, 25°12'E, 29 Jun 1960, *Runemark & Nordenstam 16458* (LD).

— Dodekanisa, Pontikoutha: 0-300 m, 13 May 1960, *Runemark & Nordenstam 13924* (LD).

— Dodekanisa, Astipalea: E of Panormos, Doma promontory, 0-75 m, hard limestone, 36°36'N, 26°17'E, 30 May 1960, *Runemark & Nordenstam 15063* (LD).

— Dodekanisa, Astipalea: Kounoupia, the S part, near the shore, hard limestone, 36°32'N, 26°28'E, 1 Jun 1960, *Runemark & Nordenstam 15233* (LD).

— Dodekanisa, Astipalea: Kiriaki, hard limestone, 36°33'N, 26°24'E, 4 Jun 1960, *Runemark & Nordenstam 15463* (LD).

274. *Bupleurum trichopodum* Boiss. & Spruner — $2n = 16$.

Gr: Sterea Ellas, Fokidos: Delphi, 38°28'N, 22°30'E, 30 May 1962, *Snogerup s. n.* (LD).

— Sterea Ellas, Attica: Porto Rafti, 1.5-2 km W of Ag. Nikolaos, 100-150 m, 37°53'N, 24°01'E, 30 May 1963, *Snogerup 20321* (LD).

— Kikladhes, Iraklia: between the harbour and Spilea Cove, 0-100 m, 36°50'N, 25°28'E, 7 May 1960, *Runemark & Nordenstam 13281* (LD).

— Kikladhes, Sirina: the NW promontory, N slopes, 36°21'N, 26°40'E, 14 May 1960, *Runemark & Nordenstam 14222* (LD).

- Kikladhes, Sikinos: the W-promontory W of Kara, 36°37'N, 25°04'E, 24 May 1960, *Runemark & Nordenstam 14775* (LD).
- Kikladhes, Anafi: Kalamos, S slopes, 0-400 m, 36°21'N, 25°21'E, 28 May 1960, *Runemark & Nordenstam 14878* (LD).
- Kikladhes, Anafi: Mt. Vigla, 400-584 m, 36°22'N 25°46'E, 29 May 1960, *Runemark & Nordenstam 15004* (LD).
- E Aegean Islands, Ikaria: the pass W of Mt. Melissa, 700-900 m, siliceous rock, 37°33'N, 26°02'E, 20 Jun 1960, *Runemark & Nordenstam 16352* (LD).
- Peloponnisos: 0.5 km S of Xilokerisa, hard calcareous rock, 350 m, 37°53'N, 22°56'E, 4 Jun 1963, *Snogerup 20406* (LD).
- Peloponnisos, Korinthos: 2-3 km NE of Loutraki, 500-600 m, pine forest, 37°57'N, 22°58'E, 5 Jun 1963, *Snogerup 20452* (LD).

275. *Bupleurum veronense* Turra — $2n = 16$.

It: Friuli, 1963, *Snogerup cult. 8635* (LD), seeds from Giardino botanico di Udine.

276. *Hermodactylis tuberosus* (L.) Mill. — $2n = 20$.

Gr: Kikladhes, Andros: 2-3 km SW of the town of Andros, NW-facing slope, 100-300 m, 37°50'N, 24°55'E, 4 Mar 1969, *Snogerup & Bothmer 38455* (LD).

277. *Asphodeline liburnica* (Scop.) Rchb. — $2n = 28$.

Gr: Euboea: the valley 1.5-3 km NW of Platanistos, 200-450 m, 38°02'N, 24°30'E, 11 Apr 1971, *Snogerup & Gustafsson 42254* (LD).

278. *Crocus cancellatus* Herb. — $2n = 16$.

Gr: N Sporades, Skiros: the island of Skiropoula, the N side, 0-300 m, 38°51'N, 24°22'E, 18 Mar 1969, *Snogerup & Bothmer 39163* (LD).

279. *Crocus laevigatus* Bory & Chaub. — $2n = 26$.

- Gr:** Kikladhes, Andros: 3.5 km SSW of the town of Andros, 500-650 m, NW-N-facing slope, 37°49'N, 24°55'E, 4 Mar 1969, *Snogerup & Bothmer 38474* (LD).
- Kikladhes, Andros: on the ridge 1-2 km ESE of Vourkoti, 350-500 m, 37°51'N, 24°54'E, 5 Mar 1969, *Snogerup & Bothmer 38494* (LD).
- Kikladhes, Andros: in the small valley NNW of Mainites, 300 m, 37°50'N, 24°53'E, 6 Mar 1969, *Snogerup & Bothmer 38587-B* (LD).
- Kikladhes, Andros: 2.5 km NE of Akra Apothikes, 300 m, 37°47'N, 24°52'E, 7 Mar 1969, *Snogerup & Bothmer 38651* (LD).
- Kikladhes, Andros: on the ridge NE of Arni, 500-650 m, 37°52'N, 24°51'E, 10 Mar 1969, *Snogerup & Bothmer 38829-B* (LD).
- Kikladhes, Andros: Mt. Ag. Saranda, near the top, 37°56'N, 24°47'E, 11 Mar 1969, *Snogerup & Bothmer 38911-B* (LD).

280. *Lolium perenne* L. — $2n = 14$.

Gr: N Sporades, Skiros: the islet of Exo Diavati 38°47'N, 24°31'E, 26 Jul 1960, *Runemark & Nordenstam 16838* (LD).

- Kikladhes, Folegandros: SE point (Pelagia), 36°36'N, 24°57'E, 23 May 1960, *Runemark & Nordenstam 14629* (LD).
- Kikladhes, Kato Koufonisi: limestone, garigue, 0-100 m. 36°55'N, 25°34'E, 11 Jun 1960, *Runemark & Nordenstam 15811* (LD).
- Kikladhes, Schinoussa: NE part, sandy shore, 36°53'N, 25°32'E, 12 Jun 1960, *Runemark & Nordenstam 16002* (LD).
- Kikladhes, Mikonos: Ormos Ornos peninsula, base poor rock and soft limestone cliffs, 37°25'N, 25°19'E, 17 Jun 1960, *Runemark & Nordenstam 16036* (LD).
- Kikladhes, Christiania: N island, volcanic soil, garigue, 36°15'N, 25°12'E, 29 Jun 1960, *Runemark & Nordenstam 16442* (LD).
- Kikladhes, Kimolos: between the town and Mt. 1068. 36°48'N, 24°34' 16 Jun 1967, *Runemark & Bentzer 29562* (LD).
- Kikladhes, Thira: The island of Thirasia, between Manolas and the peak area, 36°26'N, 25°21'E, 27 Jun 1967, *Runemark & Bentzer 30356* (LD).
- Kikladhes, Antiparos: the N-island in the sound of Antiparos, 37°03'N, 25°06'E, 3 Jul 1967, *Runemark & Bentzer 30842* (LD).
- Kikladhes, Andros: Opiso Meria, 200-300 m, 37°45'N, 24°56'E, 17 May 1968, *Snogerup & Bothmer 31993* (LD).
- Dodekanisa, Astipalea: E of Panormos, the promontory of Doma, hard limestone, cliffs, 0-75 m, 36°36'N, 26°17'E, 30 May 1960, *Runemark & Nordenstam 15036* (LD).
- Dodekanisa, Astipalea: Baia della Sabbia, sandy shore, 36°36'N, 26°18'E, 30 May 1960, *Runemark & Nordenstam 15085* (LD).

281. *Lolium perenne* L. — $2n = 14 + 0 - 2B$.

- Gr:** Kikladhes, Milos: S of Akr. Roma, in a valley, 36°42'N, 24°32'E, 17 Jun 1967, *Runemark & Bentzer 29671* (LD).

282. *Lolium rigidum* Gaud. subsp. *lepturoides* (Boiss.) Senn. & Maur. — $2n = 14$.

- Cr:** Sitia: Dri (Drises), 35°09'N, 26°07'E, 12 May 1962, *Runemark & al. 17066* (LD).
- Gr:** Kikladhes, Naxos: At Chrysostomos and Aggidia, siliceous rock, 37°06'N, 25°24'E, 3 May 1960, *Runemark & Nordenstam 13060* (LD).
- Kikladhes, Iraklia: between the harbour and Spilea Cove, 0-100 m, 36°50'N, 25°28'E, 7 May 1960, *Runemark & Nordenstam 13297* (LD).
 - Kikladhes, Ano Koufonisi: soft limestone, garigue, 36°57'N, 25°36'E, 10 Jun 1960, *Runemark & Nordenstam 15709* (LD).
 - Kikladhes, Mikonos: Terchana Pt, in sand, 37°26'N, 25°24'E, 19 Jun 1960, *Runemark & Nordenstam 16267* (LD).
 - Kikladhes, Serifos: Koutalas, 37°08'N, 24°27'E, 24 Apr 1967, *Runemark & Bentzer 27963* (LD).
 - Kikladhes, Antiparos: at the town, 37°02'N, 25°05'E, 17 May 1967, *Runemark & Bentzer 28866* (LD).
 - Kikladhes, Naxos: the N island outside Akr. Pardenos, 37°02'N, 25°22'E, 2 Jul 1967, *Runemark & Bentzer 30738* (LD).
 - Kikladhes, Andros: the island of Megalo S of Gavriion, 37°51'N, 24°45'E, 12 May 1968, *Snogerup & Bothmer 31149* (LD).
 - Kikladhes, Andros: the islet of Gaidharos, S of Gavriion, 37°51'N, 24°44'E, 12 May 1968, *Snogerup & Bothmer 31286* (LD).

- Kikladhes, Andros: at the river S of the town of Andros, 0-10 m, 37°50'N, 24°56'E, 23 May 1968, *Snogerup & Bothmer 32986* (LD).
- E Aegean Islands, Ikaria: the pass W of Mt. Melissa, siliceous rock, garigue, 37°33'N, 26°02'E, 20 Jun 1960, *Runemark & Nordenstam 16313* (LD).

283. *Lolium temulentum* L. — $2n = 14$.

- Gr:** Kikladhes, Anafi: the central part of the island, limestone, schist, garigue, 200-400 m, 36°22'N, 25°46'E, 29 May 1960, *Runemark & Nordenstam 14989* (LD).
- Dodekanisa, Astipalea: E of Panormos, the promontory of Doma, hard limestone, cliffs, 0-75 m, 36°36'N, 26°17'E, 30 May 1960, *Runemark & Nordenstam 15037* (LD).

284. *Primula acaulis* (L.) L. subsp. *acaulis* — $2n = 22$.

- Gr:** Kikladhes, Andros: valley 1.5-2 km NE of Vourkoti, 250-300 m, 37°52'N, 24°54'E, 16 May 1968, *Snogerup & Bothmer 31920* (LD).

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Reports (285-293) by M. Stoeva

285. *Papaver degenii* (Urum. & Jáv.) Kuzm. — $2n = 14$ (Fig.1).

- Bu:** Pirin mountain, Vihren summit, 41°45'N, 23°25'E, in rocky clefts, 2850 m, *Stoeva S663* (SOM).

Distributed in Bulgaria (Pirin mountain) and Italy. Included in *The Red Data Book of PR Bulgaria*. The chromosome number found confirms the result obtained by Andreev (1981) for another Pirin population of the same species localized in the Bajuvi dupki reserve. The karyotype consists of $2n = 10\text{ sm} + 2\text{ ac} + 2\text{ ac-SAT} = 14$. The karyotype is described here for the first time.

286. *Carex cespitosa* L. — $2n = 78$ (Fig. 2).

- Bu:** Tundža hilly region, between the villages Alexandrovo and Manolovo, 42°35'N, 25°05'E, damp meadows, 420 m, *Stoeva S1264* (SOM).

The result, $2n = 78$, is in agreement with a count of Faulkner (1972) from Denmark. At the same time this author reported $2n = 79$ from Sweden. The chromosome number $2n = 80$ was reported by Heilborn (1924) and Davies (1956) for the same species.

287. *Carex curta* Good. — $2n = 56$ (Fig. 3).

- Bu:** Rila mountain, Sara Gjol locality, 42°13'N, 23°36'E, wet grassy habitats, 1950 m, *Stoeva S1445* (SOM).

The result obtained ($2n = 56$) is in agreement with most earlier reports for this taxon (see Löve & Löve 1966, 1981, Fedorov 1969, Moore 1973, 1977, Majovsky 1974,

Pogan & al. 1982, Pogan & Weislo 1983, Goldblatt 1984, Goldblatt & Johnson 1991, Dmitrieva 1985, Agapova & al. 1990). Two other chromosome numbers were also reported for the same species: $2n = 54$ (Fedorov 1969) and $2n = 62$ (Agapova & al. 1990).

288. *Carex distans* L. — $2n = 74$ (Fig. 4).

Bu: Danube plain, near by Černilica marsh on the land of the village Dekov, 43°36'N, 25°07'E, damp habitats, 50-100 m, *Stoeva S759* (SOM).
— Black sea coast, near Ravda village, 42°41'N, 27°41'E, damp habitats, to 50 m, *Stoeva S1589* (SOM).

The chromosome number $2n = 74$ has been previously reported by several authors (see Fedorov 1969, Löve & Kjellqvist 1973, Strid & Franzén 1981, Goldblatt & Johnson 1990, Agapova & al. 1990). Dietrich (1972) reported $n = 36$ for the same species.

289 *Carex elata* All. — $2n = 74, 76$ (Fig. 5).

Bu: Sofia region, Kazičhene marsh, 42°39'N, 23°28'E, at shallow water, 550m, *Stoeva S1314* (SOM).

This species was recorded for the first time in Bulgaria. The chromosome number $2n = 74$ predominates in the studied population. It confirms the result of Davies (1956); $2n = 76$ was found only in two plants, although according to Faulkner (1972) it was dominant in Great Britain, the Netherlands, Denmark and Sweden; $2n = 75, 77$ and $2n = 78$ were also reported for the same species (seen Faulkner, 1972).

290. *Carex extensa* Good. — $2n = 60$ (Fig. 6).

Bu: Black sea coast (northern), Šabla town, 43°35'N, 28°34'E, between dunes near by Šabla marsh, to 50 m, *Stoeva S1600* (SOM).
— Black sea coast (southern), to south of Burgas, 42°27'N, 28°34'E, salt marsh habitats, to 50 m, *Stoeva S1565* (SOM).

This species was recorded for the first time in the northern Black Sea coast. The observed chromosome number is in good agreement with counts from elsewhere (Fedorov 1969, Dietrich 1972, Labadie 1976, Queiros 1980, Goldblatt 1985).

291. *Carex nigra* (L.) Reichard — $2n = 84$ (Fig. 7).

Bu: Vitosa mountain, the plateau between Aleko Rest House and Ušite summit, 42°35'N, 23°19'E, swamp peatery, 1850 m, *Stoeva S438* (SOM).

The result obtained $2n = 84$ is in agreement with most reports (see Fedorov 1969, Faulkner 1972, Dietrich 1972, Cayouette & Morisset 1986, Standley 1987). Some other chromosome numbers were also reported for the same species: $2n = 80$ (Dmitrieva 1985), $2n = 82$ (see Fedorov 1969), $2n = 83$ (Faulkner 1972, Cayouette & Morisset 1986), $2n = 85$ (Faulkner 1972, Cayouette & Morisset 1986, Standley 1987) and $2n = 50-52$ (see Fedorov 1969).



Figs.1-9. 1, Karyogram of *Papaver degenii* (Urum. & Jáv.) Kuzm., $2n = 14$; Karyotypes of *Carex*: 2, *C. cespitosa* L., $2n = 78$; 3, *C. curta* Good., $2n = 56$; 4, *C. distans* L., $2n = 74$; 5, *C. elata* All., $2n = 74$; Karyotypes of *Carex*: 6, *C. extensa* Good., $2n = 60$; 7, *C. nigra* (L.) Reichard, $2n = 84$; 8, *C. rupestris* All., $2n = 48$; 9, *C. vesicaria* L., $2n = 74$.

292. *Carex rupestris* All. — $2n = 48$ (Fig. 8).

Bu: Pirin mountain, between Golemia Kazan locality and Vihren summit, 42°48'N, 23°26'E, dry marmorean rocky and stony places, 2600 m, *Stoeva S1371* (SOM).

The species is included in *The Red Data Book of PR Bulgaria*. The obtained result differs from the two chromosome numbers reported previously: $2n = 50$ (see Fedorov 1969, Moore 1973, Majovsky 1978, Petrovsky & Zukova 1978, Agapova & al. 1990, Goldblatt & Johnson 1990) and $2n = 52$ (Moore 1973, Löve & Löve 1981).

293. *Carex vesicaria* L. — $2n = 74$ (Fig. 9).

Bu: Rhodopes mountains (western), Smoljanski ezera locality, 41°36'N, 24°40'E, marsh habitats behind the hotel-restaurant "Ezerata", 1150 m, *Stoeva S1340* (SOM).

The chromosome number found is in agreement with some counts (see Löve & Ritchie 1966, Fedorov 1969). However, other chromosome numbers were also reported: $2n = 70$ (Goldblatt & Johnson 1990), $2n = 82$ (Fedorov 1969, Löve & Löve 1981), $2n = 86$ (Dietrich 1972, Löve & Löve 1974), $2n = 88$ (Goldblatt & Johnson 1990).

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Reports (294-312) by Christoph Oberprieler & Robert Vogt

294. *Allium willeanum* Holmboe — $2n = 16$ (Fig. 1).

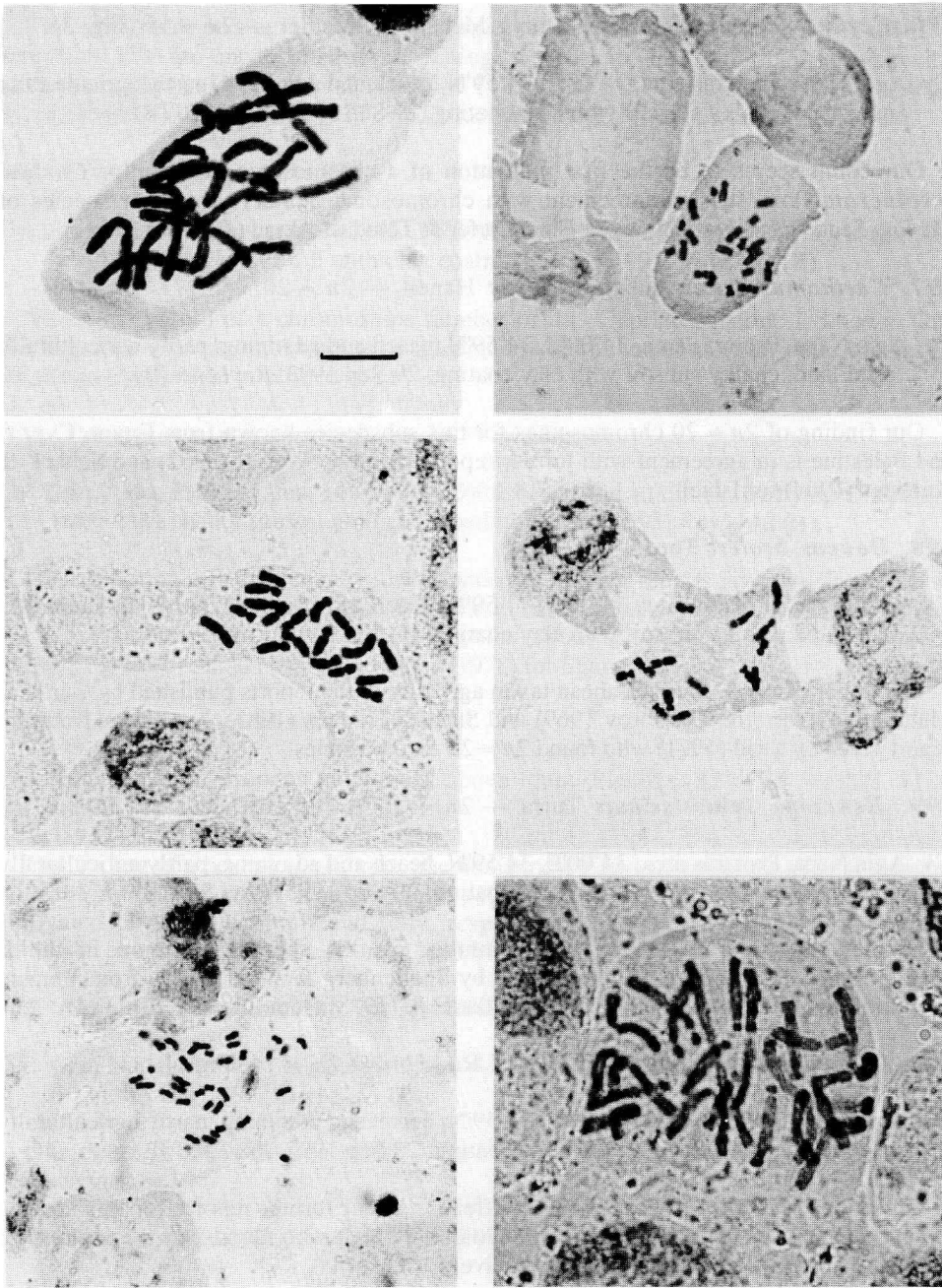
Cy: Paphos, Petra tou Romiou, 22 km E Paphos, 32°38'E, 34°40'N, 200 m, limestone cliffs, macchia with *Pistacia*, *Thymus*, and *Cistus*, 04 Oct 1993, Royl 529 (B).

Our count of $2n = 16$ agrees with that reported by Miceli & Garbari (1989) for this Cyprian endemic.

295. *Asparagus stipularis* Forsskål — $2n = 20$ (Fig. 2).

Cy: Agia Napa, Cap Greko, 34°04'E, 34°58'N, macchia with *Juniperus phoenicea*, *Thymus*, and *Limonium*, 20 m, limestone, 28 Sep 1993, Royl 512 (B).

Our report of $2n = 20$ chromosomes is in agreement with indications from the W and C Mediterranean region given by Reese (1957), Bozzini (1959), Ruiz Rejón (1978) and Brullo & al. (1979), and with reports from the Canary Islands given by Bramwell & al. (1976), Borgen (1970), and Ramos Martínez (1989). The only deviating report comes from the E Mediterranean region and was given by El-Sadek & Ashour (1972) who found $n = 8$ chromosomes in plants of Egyptian origin.



Figs. 1-6. Metaphases of root-tip mitoses. **1:** *Allium willeianum*, $2n = 16$; **2:** *Asparagus stipularis*, $2n = 20$; **3:** *Carlina involucrata* subsp. *cypria*, $2n = 18$; **4:** *Glaucium corniculatum*, $2n = 14$; **5:** *Onopordum cyprium*, $2n = 34$; **6:** *Pancreatium maritimum*, $2n = 22$. - Scale: 10 μm

296. *Carlina involucrata* subsp. *cyprica* Meusel & Kästner — $2n = 18$ (Fig. 3).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 540 (B).

Our count seems to be the first indication of a chromosome number for *Carlina involucrata* Poir. It is in agreement with chromosome numbers for other species of *Carlina* Sect. *Corymbosae* given by Ehrendorfer & Tohidast-Akrad (1990).

297. *Carthamus tenuis* subsp. *foliosus* Hanelt — $2n = 20$.

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 546 (B).

Our finding of $2n = 20$ chromosomes for this subspecies known from Egypt, Cyprus and Palestine is in agreement with former reports given by Waisel (1962) and Schank & Knowles (1964) for Israel.

298. *Daucus broteri* Ten. — $2n = 20$.

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 538 (B).

Our count of this E Mediterranean taxon agrees with the reports published by Gardé & Malheiros-Gardé (from Fedorov 1969) and Strid & Franzén (1981), but differs from the report given by Strid (1971) who found $2n = 22$ chromosomes.

299. *Echinops spinosissimus* Turra — $2n = 28$.

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 519 (B).

Former reports of a chromosome number of this species common in the E Mediterranean region have been published by Spellenberg & Ward (1988) from Yemen, Montmollin (1986) from Crete, and Ferrarella & al. (1978) from Italy.

300. *Glaucium corniculatum* (L.) J. H. Rudolph — $2n = 14$ (Fig. 4).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 541 (B).

Our count of $2n = 14$ chromosomes differs from all former reports for this species given by Queirós (1980) and Amin (from Goldblatt 1984) who found $2n = 12$ in plants of Portuguese and Egyptian provenance, respectively.

301. *Onobrychis crista-galli* (L.) Lam. — $2n = 32$.

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 543 (B).

This first count of a tetraploid chromosome number for *Onobrychis crista-galli* is in agreement with the unpublished result of Vogt & Aparicio (1995). Formerly this species has been studied in Uzbekistan (Baykabilov 1977), Iraq (Al-Mayah & Al-Shehbaz 1977), Syria (Kliphuis & Barkoudah 1977), and Israel (Heyn 1962) with the result of $2n = 16$.

302. *Onopordum cyprium* Eig — $2n = 34$ (Fig. 5).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royl 542* (B).

No former record of a chromosome number of this Cyprian endemic is known. Our finding of $2n = 34$ chromosomes is in agreement with the indications for other species of the genus *Onopordum* published so far.

303. *Pancratium maritimum* L. — $2n = 22$ (Fig. 6).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royl 548* (B).

Our indication is in agreement with chromosome number reports given by Fernandes & Queirós (1971b) and Fernandes (1933) for Portugal, Bhattacharya & al. (1971) for Libya, Bartolo & al. (1978) for Italy, Contandriopoulos (1962) for Corsica and Pastor & Valdés (1986), Valdés-Bermejo (1980), and Oliva (1978) for Spain.

304. *Platanus orientalis* L. — $2n = 42$.

Cy: Kommandaria, Troodos mountains, above Plano Plantres, 32°52'E, 34°53'N, 1180 m, 30 Sep 1993, *Royl 517* (B).

Our finding of a hexaploid chromosome number for *Platanus orientalis* is in agreement with the reports given by Koul & Gohil (1973) and Pizzolongo (1958) who studied cultivated plants in Kashmir and Italy, respectively. A diploid number ($n = 7$) from cultivated plants is reported by Arora (1961) from the Darjeeling region, India.

305. *Rhamnus oleoides* subsp. *graeca* (Boiss. & Reuter) Holmboe — $2n = 24$.

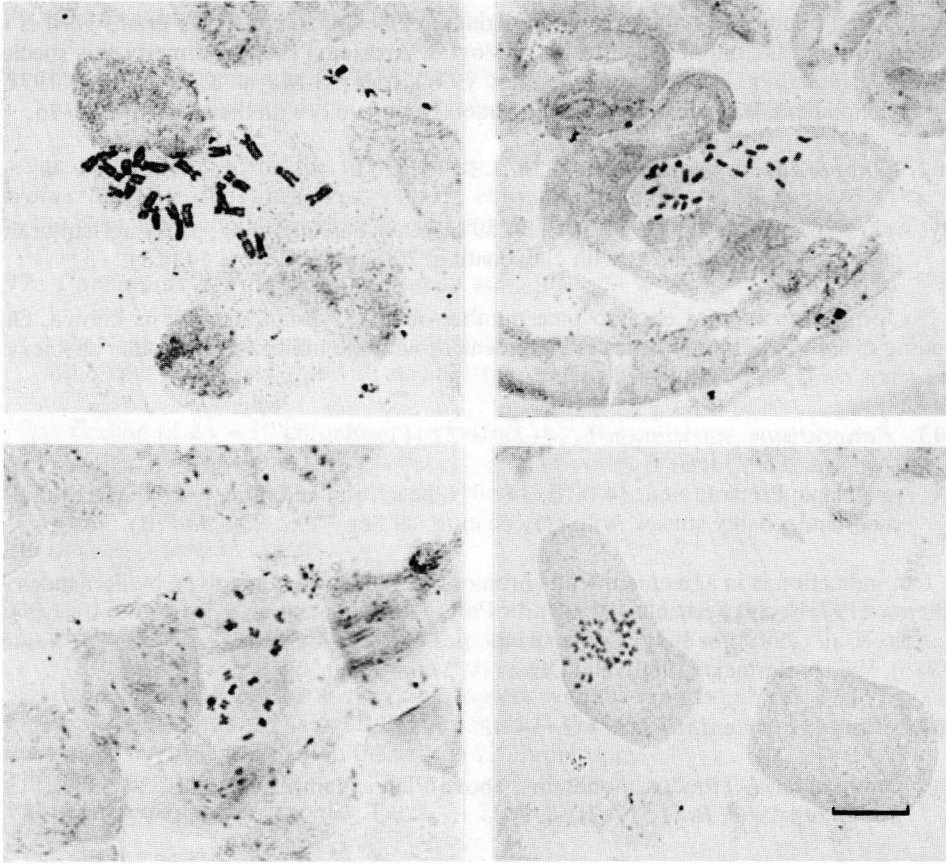
Cy: Agia Napa, Protaras Area, Agia Elias, 34°02'E, 35°01'N, limestone cliffs, macchia, 90 m, 07 Oct 1993, *Royl 526* (B).

Our count is the first report of a chromosome number for this widespread E Mediterranean taxon.

306. *Salsola kali* L. — $2n = 36$.

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royl 518* (B).

In the Mediterranean area this taxon has been previously studied by Waisel (1962) in Israel, Queirós (1975, *Salsola kali* subsp. *tragus* (L.) Nyman) in Portugal, and Lago Canzobre (1989) in Spain with the corresponding result of $2n = 36$ or $n = 18$ chromosomes.



Figs. 7-10. Metaphases of root-tip mitoses. **7:** *Scolymus hispanicus*, $2n = 20$; **8:** *Teucrium micropodioides*, $2n = 26$; **9:** *Trifolium tomentosum*, $2n = 16$; **10:** *Verbascum levanticum*, $2n = (44)$. - Scale: 10 μ m

307. *Scolymus hispanicus* L. — $2n = 20$ (Fig. 7).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 533 (B).

Our count is the first report of a chromosome number based on plant material from Cyprus, confirming former studies of Mejías (1986) from Spain, Kuzmanov & Georgieva (1980) from Bulgaria, Fernandes & Queirós (1971a) from Portugal, Montmollin (1986) from Crete, and Brullo & al. (1978) from Sicily.

308. *Teucrium micropodioides* Rouy — $2n = 26$ (Fig. 8).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 536 (B).

This is the first report of a chromosome number for this Cyprian endemic.

309. *Trifolium tomentosum* L. — $2n = 16$ (Fig. 9).

Cy: Agia Napa, Protaras area, 34°00'E, 34°59'N, beach and adjoining, partly agriculturally used land, chalky subsoil with clay coating, 29 Sep 1993, *Royle* 532 (B).

Plants of Cyprian origin have been studied previously by Slavík & al. (1993).

310. *Urginea maritima* (L.) Baker — $2n = 40$.

Cy: Agia Napa, Cap Greko, 34°04'E, 34°58'N, macchia with *Juniperus phoenicea*, *Thymus*, and *Limonium*, 20 m, limestone, 28 Sep 1993, *Royle* 514 (B).

According to many previous studies *Urginea maritima* is represented by a polyploid series ($2n = 20, 30, 40, 50, 60$) with the basic chromosome number $x = 10$. Comprehensive discussions can be found in Ruiz Rejón & al. (1978) and Bartolo & al. (1984).

311. *Verbascum levanticum* I.K. Ferguson — $2n = 44$ (Fig. 10).

Cy: Agia Napa, Protaras Area, Agia Elias, 34°02'E, 35°01'N, limestone cliffs, macchia, 90 m, 07 Oct 1993, *Royle* 549 (B).

This species has been studied cytologically for the first time.

312. *Zygophyllum album* L. fil. — $2n = 18$.

Cy: Agia Napa, Cap Greko, 34°04'E, 34°58'N, macchia with *Juniperus phoenicea*, *Thymus*, and *Limonium*, 20 m, limestone, 28 Sep 1993, *Royle* 513 (B).

This is the first record of a chromosome number from Cyprus for this species. Previous counts on material from Libya (Bhattacharya & al. 1971) and Egypt (Eid 1970) also yielded $2n = 18$ chromosomes.

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Reports (313-366) by Ilija V. Čheshmedziev

313. *Alisma lanceolatum* With. — $2n = 26$.

- Bu:** Thracian plain, near the village Manole, Plovdiv district, 42°12'N, 24°57'E, in the river, 160 m, 21 Jun 1992, Čheshmedziev 716 (Plovdiv = Pl).
- Thracian plain, Plovdiv, the locality Ostrova, 42°09'N, 42°42'E, side of the river Marica, 160 m, 20 Jul 1992, Čheshmedziev 722 (Pl).
- Sofia region, railway station Vladaja, 42°40'N, 23°12'E, marshy place, 700 m, 05 Jul 1992, N. Dodunchev 713 (Pl).

Our study agrees with one of the chromosome numbers published for this species $2n = 14, 26, 27, 28$ (see Fedorov 1969: 17, Goldblatt 1981: 31, Moore 1982: 290).

314. *Alisma plantago-aquatica* L. — $2n = 14$.

- Bu:** Thracian plain, near the village Manole, Plovdiv district, 42°12'N, 24°57'E, in the river, 160 m, 28 Jun 1992, Čheshmedziev 714 (Pl).
- Thracian plain, on the land of the village Vinica, Parvomaj region, 42°07'N, 25°08'E, side of the river Marica, 144 m, 04 Jul 1992, Čheshmedziev 715 (Pl).
- Thracian plain, Plovdiv, the locality Ostrova, 42°09'N, 24°42'E, side of the river Marica, 160 m, 20 Jul 1992, Čheshmedziev 721 (Pl).
- Eastern Stara Planina Mt., the locality Poda, Varna district, 42°59'N, 27°48'E, wet place, 20 m, 28 Jun 1983, Čheshmedziev 475 (Pl).

Our report confirms one of the following chromosome numbers published in the literature: $2n = 12, 14, 16, 24, 28$ (see Fedorov 1969: 17, Goldblatt 1981: 31, 1984: 33, 1988: 22, Takhtajan 1990: 12).

315. *Allium webbii* G. C. Clementi (= *A. flavum* var. *minus* Boiss.) — $2n = 24 + 0-3B$.

Bu: Pirin Mt., Orelek summit, 41°34'N, 23°28'E, on rocks, 2099 m, 07 Sep 1987, Česhmedziev 645 (Pl) — $2n = 3x = 24$.

Gr: Slavjanka (Ali-botush) Mt., 4 km S of village Paril behind border line on Greek territory, 41°22'N, 23°40'E, on grassed rocky place, 1850 m, 05 Sep 1980, Česhmedziev 382 (Pl) — $2n = 3x = 24 + 3B$.

The chromosome number $2n = 24$ has previously been published by Ved Brat (1965), for plant material from Oxford Botanical Garden. Triploid with B-chromosomes is given here for the first time. B-chromosomes in diploids are also known (Česhmedziev, 1975, 1977).

316. *Amaranthus albus* L. — $2n = 32$.

Bu: Thracian plain, Plovdiv, 42°09'N, 24°42'E, ruderal, 160 m, 12 Sep 1982, Česhmedziev 464 (Pl).

The present count is in agreement with one of the counts already published for this species, $2n = 32, 34$ (see Fedorov 1969: 19, Takhtajan 1990: 43).

317. *Amaranthus blitoides* S. Watson — $2n = 32$.

Bu: Thracian plain, Plovdiv, 42°09'N, 24°42'E, ruderal, 160 m, 10 Sep 1984, Česhmedziev 467 (Pl).

The chromosome number $2n = 32$ confirms earlier indications (see Goldblatt 1981: 3, Takhtajan 1990: 43).

318. *Amaranthus hybridus* L. — $2n = 32$.

Bu: Thracian plain, Plovdiv, 42°09'N, 24°42'E, ruderal, 160 m, 12 Sep 1982, Česhmedziev 473 (Pl).

The chromosome number $2n = 32$ confirms literature data (see Fedorov 1969: 19). For this taxon is $2n = 34$ also known (see Goldblatt 1985: 34).

319. *Asparagus officinalis* L. — $2n = 20$.

Bu: Thracian plain, the locality Ostrova near Plovdiv, 42°09'N, 24°42'E, among shrubs, 160 m, 14 May 1992, Česhmedziev 696 (Pl).

319a. *Asparagus officinalis* L. — $2n = 40$.

Bu: Tundža hilly region, near monastery Sveta Troitza near village Ustrem, Topolovgrad region, 41°59'N, 26°18'E, rocky place among scrub, 400 m, 25 Jun 1993, Česhmedziev 723 (Pl).

The chromosome number $2n = 20$ confirms earlier literature reports by many authors (see Fedorov 1969: 384, Moore 1982: 305). The chromosome number $2n = 40$ agrees with earlier data by Davies & Willis (1959) and other authors (see Fedorov 1969: 384, Takhtajan 1990: 99).

320. *Asparagus tenuifolius* Lam. — $2n = 20$.

- Bu:** Thracian plain, near village Zlatosel, Plovdiv district, 42°25'N, 25°02'E, in wood, 320 m, 06 May 1992, Česhmedziev 690 (Pl).
 — Thracian plain, 10 km W of Cirpan, 42°11'N, 25°14'E, in forest by the side of the road, 175 m, 08 Aug 1992, Česhmedziev 711 (Pl).

This chromosome number agrees with data published earlier by Osaka (1938), Bozzini (1959), and Takhtajan (1990).

321. *Bryonia alba* L. — $2n = 20$.

- Bu:** Struma valley, near railway station P. Javorov, 41°44'N, 23°12'E, scrub, 220 m, 12 Sep 1978, Česhmedziev 278 (Pl).

This chromosome number $2n = 20$ agrees with previous literature data (see Fedorov 1969: 242, Takhtajan 1990: 324).

322. *Butomus umbellatus* L. — $2n = 26$.

- Bu:** Thracian plain, near the village Belosem, Plovdiv district, 42°12'N, 25°03'E, marshy places, 142 m, 20 Jul 1992, Česhmedziev 705 (Pl).

The present count confirms one of the published chromosome numbers ($2n = 16, 24, 26, 28, 30, 40, 42$) given for this species by various authors (see Fedorov 1969: 181, Mehra & Pandita 1978: 388, Moore 1982: 290, Goldblatt 1988: 275, Takhtajan 1990: 275, for references).

323. *Calystegia soldanella* Roemer & Schultes — $2n = 22$.

- Bu:** Southern Black Sea coast, Ahtopol, 42°06'N, 27°31'E, sandy shore, 1-2 m, 13 Aug 1976, Česhmedziev 333 (Pl).

This chromosome number $2n = 22$ confirms previous counts (see Fedorov 1969: 323, Moore 1982: 174, Goldblatt 1984: 147, Takhtajan 1990: 321).

324. *Cicer arietinum* L. — $2n = 14$.

- Bu:** Thracian plain, Plovdiv, 42°09'N, 24°42'E, cultivated, 160 m, 31 May 1980, Česhmedziev 362 (Pl).

Our report confirms one of the chromosome numbers published for this species ($2n = 14, 16, 24, 32, 33$) (see Fedorov 1969: 291, Takhtajan 1990: 373, Goldblatt & Johnson 1990: 85).

325 *Circaea lutetiana* L. — $2n = 22$.

Bu: Thracian plain, the locality Ostrova near Plovdiv, 42°09'N, 24°42'E, in a wood, 160 m, 07 Jul 1992, Česhmedziev 378 (Pl).

The count $2n = 22$ agrees with earliest reports for this species (see Fedorov 1969: 447, Moore 1980: 138).

326. *Colchicum autumnale* L. — $2n = 34$.

Bu: Central Stara Planina Mt., between village Taza and rest-house Taza, Kazanlak region, 42°02'N, 25°04'E, marshy grassland, 1147 m, 15 Oct 1972, Česhmedziev 390 (Pl).

The chromosome number $2n = 34$ is new for this species. The count of $2n = 36$ agrees with earlier report from Ukraine (see Takhtajan 1990: 314). The diploid chromosome number $2n = 38$ was reported by Popova and Cheshmedziev (1978).

327. *Colchicum turcicum* Janka — $2n = 54$.

Bu: Tundža hilly region, wood reserve, Tupcija near Elhovo, 42°11'N, 26°34'E, glade, 120 m, 12 Sep 1980, Česhmedziev 302 (Pl).

This is a new somatic chromosome number for *Colchicum turcicum*. Kücükler (1984) reported $2n = 52$.

328. *Cornus sanguinea* L. — $2n = 22$.

Bu: Central Rhodopes Mts., the locality Korudere near Assenovgrad, 41°53'N, 24°52'E, scrub, 350 m, 01 Jul 1992, Česhmedziev 700 (Pl).

The result obtained ($2n = 22$) is in agreement with earlier reports (see Fedorov 1969: 236, Goldblatt 1984: 149).

329. *Datura stramonium* L. — $2n = 24$.

Bu: Thracian plain, near railway station Hadžievo, Pazardžik region, 42°09'N, 24°27'E, weedy places, 170 m, 01 Sep 1980, Česhmedziev 343 (Pl).

The chromosome number ($2n = 24$) agrees with previous counts (see Fedorov 1969: 687).

330. *Elodea canadensis* Michx — $2n = 48$.

Bu: Thracian plain, the locality Martvicata near village Popovica, Plovdiv district, 42°09'N, 52°03'E, in channels, 140 m, 10 Oct 1982, Česhmedziev 459 (Pl).

This report confirms one of the published chromosome numbers ($2n = 24, 48$) (see Fedorov 1969: 342, Moore 1982: 290).

331. *Erodium ciconium* f. *albiflorum* Gennari — $2n = 18$.

Bu: Tundža hilly region, between locality Karabalkan and Aitos, 42°42'N, 27°11'E, grassland by the side of railway line, 200 m, 09 Jun 1975, *Česhmedziev* 273 (PI).

Two different chromosome numbers exist in *Erodium ciconium*: 18, 20 (see Fedorov 1969: 331, Takhtajan 1990: 430). Our count of $2n = 18$ chromosomes agrees with the first of their numbers.

332. *Ferulago sylvatica* (Besser) Rechb. — $2n = 22$.

Bu: Tundža hilly region, Jambolski Bakadžik, 42°36'N, 26°41'E, marshy grassland, 480 m, 04 Jun 1976, *Česhmedziev* 200 (PI).

The chromosome number $2n = 22$ agrees with the earlier chromosome counts (see Goldblatt 1984: 41, Takhtajan 1990: 73).

333. *Frangula alnus* Miller — $2n = 20$.

Bu: Thracian plain, the localit Ostrova near Plovdiv, 42°09'N, 24°42'E, in a wood, 160 m, 11 Sep 1982, *Česhmedziev* 381 (PI).

For this species $2n = 20, 22, 26$ are known (see Fedorov 1969: 617). The present count agrees with the chromosome number 20.

334. *Geum coccineum* Sm. x *G. rivale* L. — $2n = 42$.

Bu: Ossovska Planina Mt., near rest-house Osogovo, 42°11'N, 22°37'E, grassland, 1640 m, 26 Jun 1974, *Česhmedziev* 210 (PI).

— Pirin Mt., between Bansko and the rest-house Banderica, 41°48'N, 23°28'E, wood glade, 1200 m, 10 Jul 1974, *Česhmedziev* 187 (PI).

Our count is the first for this hybrid. Its parents have the same chromosome number (Česhmedziev 1976).

335. *Gratiola officinalis* L. — $2n = 32$.

Bu: Thracian plain, near border at village Mesek, district Svilengrad, 41°44'N, 26°06'E, wet meadow, 200 m, 05 Jun 1992, *Česhmedziev* 704 (PI).

The chromosome number confirms previous indications (see Fedorov 1979: 674). This count has not been reported for Bulgaria so far.

336. *Herniaria glabra* L. — $2n = 36$.

Bu: Tundža hilly region, Jambolski Bakadžik, 42°36'N, 26°41'E, dry sand places, 400 m, 24 Sep 1982, *Česhmedziev* 471 (PI).

This report confirms one of the published chromosome numbers ($2n = 18, 36$) (see Fedorov 1969: 208, Celebioglu & Favarger 1993: 327). Our report confirms the second of them.

337. *Herniaria hirsuta* L. — $2n = 18 + 2B$.

Bu: Tundža hilly region, Jambolski Bakadžik, 42°36'N, 26°41'E, dry sandy places, 400 m, 24 Sep 1982, Čheshmedziev 468 (Pl).

The chromosome number $2n = 18$ does not agree with the previous counts of $2n = 36$ (see Fedorov 1969: 208, Celebioglu & Favarger 1993: 327). B-chromosomes are not known so far for this species.

338. *Humulus lupulus* L. — $2n = 20$.

Bu: Thracian plain, the locality Ostrova near Plovdiv, 42°09'N, 24°42'E, scrub on riverside of Marica, 160 m, 29 May 1992, Čheshmedziev 689 (Pl).

The somatic chromosome number $2n = 20$ agrees with the observations of various authors (see Fedorov 1969: 435, Takhtajan 1990: 280).

339. *Impatiens balfourii* Hook. fil. — $2n = 14$.

Bu: Thracian plain, Assenovgrad, 42°01'N, 24°52'E, ornamental, 230 m, 22 Oct 1978, Čheshmedziev 283 (Pl).

Our chromosome number confirms earlier records (see Fedorov 1969: 149, etc.).

340. *Impatiens balsamina* L. — $2n = 14$.

Bu: Thracian plain, Plovdiv, 42°09'N, 24°42'E, decorative, 160 m, 08 Jul 1979, Čheshmedziev 280 (Pl).

This chromosome number coincides with earlier reports (see Fedorov 1969: 149), but is distinct from many other counts (see Goldblatt 1981: 143, 1985: 60, 1988: 67).

341. *Impatiens glandulifera* Royle — $2n = 18$.

Bu: Central Rhodopes Mts., Čepelare, 41°44'N, 24°42'E, wet places, 1150 m, 20 Aug 1978, Čheshmedziev 282 (Pl).

The present study confirms one of the published chromosome numbers ($2n = 18$ and 20) for this species (see Fedorov 1969: 149, Moore 1982: 125).

342. *Impatiens noli-tangere* L. — $2n = 20$.

Bu: Rila Mt., mountain resort Borovec, 42°15'N, 23°37'E, in woods, 1410 m, 13 Aug 1980, Čheshmedziev 351 (Pl).

In literature three different chromosome numbers for this species are known: $2n = 12$, 20, 40 (see Fedorov 1969: 149, Takhtajan 1990: 228). Our study confirms the most often cited chromosome number, $2n = 20$.

343. *Lavatera thuringiaca* L. — $2n = 44$.

Bu: Thracian plain, the locality Ostrova near Plovdiv, 42°09'N, 24°42'E, roadside in a wood, 160 m, 07 Aug 1976, *Česhmedziev* 239 (Pl).

The observed chromosome number, $2n = 44$, is in agreement with earlier counts (see Fedorov 1969: 625, Takhtajan 1990: 504).

344. *Lonicera nigra* L. — $2n = 18$.

Bu: Rila Mt., mountain resort Borovec, 42°15'N, 23°37'E, in wood, 1410 m, 18 Aug 1978, *Česhmedziev* 375 (Pl).

The chromosome number $2n = 18$ agrees with the indications of previous studies (see Fedorov 1969: 197, Moore 1982: 218, Goldblatt 1984: 133).

345. *Lonicera xylosteum* L. — $2n = 18$.

Bu: Rila Mt., mountain resort Borovec, 42°15'N, 23°37'E, in woods, 1410 m, 13 Aug 1980, *Česhmedziev* 305 (Pl).

— Pirin Mt., rest-house Demjanica, 41°44'N, 23°28'E, in woods 1985 m, 23 Sep 1981, *Česhmedziev* 446 (Pl).

— Central Rhodopes Mts., rest-house Besovo, Assenovgrad region, 41°52'N, 24°52'E, in woods, 1216 m, 15 May 1992, *Česhmedziev* 686 (Pl).

The observed chromosome number is in agreement with earlier reports (see Fedorov 1969: 198, Takhtajan 1990: 281).

346. *Oenanthe pimpinelloides* L. — $2n = 22$.

Bu: Strandža Mt., near village Brodilovo, Burgas district, 42°07'N, 27°52'E, grassland, 200 m, 25 Jul 1976, *Česhmedziev* 303 (Pl).

Our count of $2n = 22$ is in agreement with former data, published by various authors (see Fedorov 1969: 41, Goldblatt 1984: 43, Takhtajan 1990: 80).

347. *Parietaria officinalis* L. — $2n = 14$.

Bu: Thracian plain, the locality Ostrova near Plovdiv, 42°09'N, 24°42'E, in a wood, 160 m, 05 Jul 1992, *Česhmedziev* 703 (Pl).

The chromosome number $2n = 14$ agrees with earlier records (see Fedorov 1969: 712).

348. *Periploca graeca* L. — $2n = 22$.

Bu: Eastern Strara planina Mt., the locality Poda near village Staro Orjahovo, Varna district, 42°59'N, 27°48'E, wet wood, 20 m, 21 Sep 1982, *Česhmedziev* 472 (Pl).

For *Periploca graeca*, $2n = 22$ and 24 were published by earlier authors. Our study confirms the first chromosome number (see Fedorov 1969: 60, Moore 1982: 167).

349. *Pimpinella peregrina* L. — $2n = 18$.

Bu: Northern Black Sea coast, rest-house Černomorec, Varna district, 43°10'N, 27°57'E, grassland, 30 m, 12 Dec 1981, Česhmedziev 448 (Pl).

Our report confirms one of the chromosome numbers published for this species ($2n = 16, 18, 20$) (see Fedorov 1969: 43, Goldblatt 1981: 53, Tahktajan 1990: 86).

350. *Plantago arenaria* Waldst. & Kit. — $2n = 24$.

Bu: Thracian plain, Plovdiv, 42°09'N, 24°42'E, ruderal, 160 m, 27 Sep 1978, Česhmedziev 325 (Pl).

— Thracian plain, Plovdiv, 42°09'N, 24°42'E, sandy place near the Fruit-Growing Research Institute, 160 m, 31 Jul 1974, Česhmedziev 321 (Pl).

The count $2n = 24$ is new for *Plantago arenaria*. $2n = 12$ was mentioned for Bulgarian plants (Kozuharov & Petrova 1974).

351. *Plantago coronopus* L. — $2n = 20$.

Bu: Southern Black Sea coast, on the land of Ahtopol, 42°06'N, 27°31'E, dry sandy places, 20-40 m, 15 Aug 1974, Česhmedziev 324 (Pl).

For *Plantago coronopus* $2n = 10, 10 + 0 - 1B, 11, 20, 30$ and 31 , are known in the literature (see Fedorov 1969: 489, Labadie 1976: 639, Moore 1982: 216). Kozuharov & Petrova (1974) counted $2n = 10$ on plants from Bulgaria. Our chromosome number is the second one for the country.

352. *Plantago media* Willd. — $2n = 12$.

Bu: Pirin Mt., near Bansko, 41°54'N, 23°30'E, grassland, 936 m, 10 Jul 1974, Česhmedziev 319 (Pl).

For *Plantago media* $2n = 12$ and 24 were reported (see Fedorov 1969: 490, Goldblatt 1981: 360, Moore 1982: 217). Kozuharov & Petrova (1974) counted $2n = 24$ from Bulgaria. The present report is the first mention of $2n = 12$ from this country.

353. *Ranunculus montanus* Willd. — $2n = 16$.

Bu: Central Rhodopes Mts., mountain resort Pamporovo, 41°40'N, 24°42'E, grassland, 1669 m, 07 May 1976, Česhmedziev 509 (Pl).

The present count agrees with one of the chromosome numbers already published ($2n = 16, 24, 32$) (see Fedorov 1969: 611).

354. *Ranunculus repens* L. — $2n = 32$.

Bu: Thracian plain, Plovdiv on the land of Marica Institute of Vegetable Crops 42°09'N, 24°45'E, wet grassland, 160 m, 21 May 1991, Česhmedziev 687 (Pl).

Several chromosome numbers are given in literature, viz., $2n = 12, 16, 24, 32, 48$ (see Fedorov 1969: 612, 613, Goldblatt 1984: 329, 1988: 190). Kuzmanov & Kozuharov (1969) reported from Bulgaria only $2n = 16$.

355. *Ranunculus sardous* Crantz — $2n = 16$.

Bu: Northern Black Sea coast, near village Conevo, Varna district, $43^{\circ}02'N, 27^{\circ}27'E$, wet places, 155 m, 01 Nov 1982, Česhmedziev 460 (Pl).

Our study confirms one of the published chromosomes numbers ($2n = 16, 18, (32), 47, 48$) (see Fedorov 1969: 613).

356. *Rapistrum rugosum* (L.) All. — $2n = 16$.

Bu: Eastern Rhodopes Mts., on the land of Ivajlovgrad, $41^{\circ}31'N, 26^{\circ}07'E$, in fields, 316 m, 23 Jul 1982, Delipavlov 495 (Pl).

The chromosome number $2n = 16$ is in agreement with the literature data (see Fedorov 1969: 176, Moore 1982: 72).

357. *Ribes alpinum* L. — $2n = 16$.

Bu: Rila Mt., mountain resort Borovec, $42^{\circ}15'N, 23^{\circ}37'E$, roadside in a wood, 1410 m, 13 Aug 1980, Česhmedziev 376 (Pl).

This chromosome number, $2n = 16$, agrees with previous counts (see Fedorov 1969: 339, Moore 1982: 80).

358. *Rubia tinctorum* L. — $2n = 22$.

Bu: Southern Black Sea coast, near Ahtopol, $42^{\circ}06'N, 27^{\circ}31'E$, coastal rocks, 20 m, 12 Aug 1977, Česhmedziev 349 (Pl).

This chromosome number is in agreement with previous counts (see Fedorov 1969: 652).

359. *Saponaria officinalis* L. — $2n = 28$.

Bu: Central Rhodopes Mts., Assenova crepost near Assenovgrad, $41^{\circ}53'N, 24^{\circ}52'E$, scrub and grassland, 350 m, 15 May 1976, Česhmedziev 237 (Pl).

Our count of $2n = 28$ agrees with previous literature data (see Fedorov 1969: 212, Tahktajan 1990: 295, etc.).

360. *Scilla autumnalis* L. — $2n = 28$.

Bu: Struma Valley, near the railway station Pirin, $41^{\circ}44'N, 23^{\circ}12'E$, sandy places, 200 m, 03 Oct 1981, Česhmedziev 396 (Pl).

For this species, $2n = 12, 14, 21, 24, 28, 41, 42$ and a varying number of B-chromosomes were published (see Fedorov 1969: 405, Goldblatt 1984: 235, 1985: 124, 1988: 140, Tahktajan 1990: 443). Popova (1972) reported $2n = 14$ from Bulgaria.

361. *Scrophularia nodosa* L. — $2n = 36$.

Bu: Eastern Stara Planina Mt., between village Rudnik and rest-house Marin tepe, Varna district, $42^{\circ}56'N, 27^{\circ}44'E$, on glade, 300 m, 30 Oct 1982, Česhmedziev 498 (Pl).

Our count agrees with one of the two chromosome numbers which are given in the literature ($2n = 18, 36$) (see Fedorov 1969: 680, Moore 1982: 202).

362. *Sternbergia colchiciflora* Waldst. & Kit. — $2n = 21$.

Bu: Tundža hilly region, on the land of village Knjazevo, Elhovo region, $42^{\circ}07'N, 26^{\circ}30'E$, in scrub, 130 m, 25 Sep 1975, Česhmedziev 443 (Pl).

For this species the chromosome numbers $2n = 18, 19, 20, 26$ were published (see Fedorov 1969: 28, Moore 1982: 306, Kuzmanov 1993: 23). The number $2n = 21$ was not known up to now.

363. *Syringa vulgaris* L. — $2n = 44$.

Bu: Central Stara Planina Mt., near the rest-house Hubavec, Karlovo region, $42^{\circ}42'N, 24^{\circ}54'E$, on rocky slope, 900 m, 15 Oct 1976, Česhmedziev 393 (Pl).

For this species, $2n = 44, 46, 46-48$ were published (see Fedorov 1969: 447). Ančev (1993) reported $2n = 46$ from Bulgaria. Our count, $2n = 44$, is the second chromosome number for *Syringa vulgaris* from the country.

364. *Urtica dioica* L. — $2n = 48$.

Bu: Thracian plain, near Plovdiv, $42^{\circ}09'N, 24^{\circ}42'E$, weedy places, 160 m, 03 Jul 1992, Česhmedziev 702 (Pl).

Four chromosome numbers are known for this species, viz., $2n = 26, 32, 48, 52$ (see Fedorov 1969: 712, Goldblatt 1988: 213, Moore 1982: 13). This confirms $2n = 48$.

365. *Viburnum lantana* L. — $2n = 18$.

Bu: Znepole region, Golo Bardo Mt., $42^{\circ}36'N, 23^{\circ}01'E$, in woods, 900 m, 26 May 1981, Česhmedziev 383 (Pl).

The chromosome number $2n = 18$ agrees with previous literature data (see Fedorov 1969: 199, Goldblatt 1981: 173).

366. *Viburnum opulus* L. — $2n = 18$.

Bu: Riža Mt., mountain resort Borovec, $42^{\circ}15'N, 23^{\circ}37'E$, in wood, 1410 m, 12 Sep 1980, Česhmedziev 444 (Pl).

This finding of $2n = 18$ is in agreement with earlier records (see Fedorov 1969: 199, Goldblatt 1981: 173).

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Rapports (367-370) de María del Carmen García-Herran*

367. *Luzula desvauxii* Kunth — $2n = 12$ (Fig. 1a).

Hs: Santander, Pico de Tres Mares, 43°03'N, 4°23'W, flore alpine, rochers, 2050 m, 30 Jul 1991, *García-Herran & al.* (NEU 364654) (Fig. 1a).

— Andorre, Arinsal, l'Est. des Truites, 42°35'N, 1°27'E, flore alpine, bord de ruisseau, 2500 m, 24 Aug 1992, *García-Herran & al.* (NEU 364653).

La valence chromosomique que nous avons trouvée concorde avec celle qui fut déterminée dans les Alpes (Alpes bavaroises et Styrie) par Nordenskiöld (1951), et dans les Vosges par Lambert & Giesi (1967). Cette espèce est donc diploïde dans toute son aire de distribution.

368. *Luzula lutea* (All.) DC. — $2n = 12$.

He: Tessin, Passo del San Gottardo, 46°33'34"N, 8°34'00"S, pelouse alpine, 2100 m, 11 Sep 1992, *García-Herran & al.* (NEU 075815).

— Grisons, Flüelapass, 46°45'26"N, 9°56'21"S, pelouse alpine, 2200 m, 13 Sep 1992, *García-Herran & al.* (NEU 075816).

Le nombre chromosomique diploïde, $2n = 12$, a été déterminé sur du matériel provenant des Pyrénées (Küpfer 1974), ainsi qu'à partir de graines du Botanical Gardens of Gothenburg (Nordenskiöld 1951) et des jardins botaniques des universités de Leicester, Vienne et Oxford (Barlow & Nevin 1976). Lambert & Giesi (1967) ont observé le même résultat sur du matériel dont la provenance n'est pas mentionnée.

369. *Luzula spicata* (L.) DC. s.l. — $n = 6$, $2n = 12$ (Fig. 1b).

He: Vaud, La Dôle, 46°26'14"N, 6°06'29"E, pâturage subalpin, 1440 m, 6 Sep 1992, *García-Herran & al.* (NEU 075817).

Cette population s'est révélée diploïde. D'autres populations appartenant à l'espèce collective *Luzula spicata* ont montré la même valence chromosomique: Nordenskiöld (1951) sur du matériel provenant de Hohe Tauern en Autriche, Michalska (1953) à partir de matériel des Tatra, Quézel (1957) au Maroc et Favarger (1965) sur des individus provenant d'Anzeindaz et de l'alpage de Gauthier en Suisse.

369a. *Luzula spicata* (L.) DC. s.l. — $2n = 14$ (Fig. 1c).

Bu: Sofia, Monte Musala, 42°22'N, 23°37'E, pelouse rocailleuse subalpine, 2370 m, 18 Jul 1993, *Küpfer & Felber*, n° de culture à Neuchâtel 93.868.

* Projet financé par une bourse du Gouvernement Basque (subside n° BFI89.056 AK).

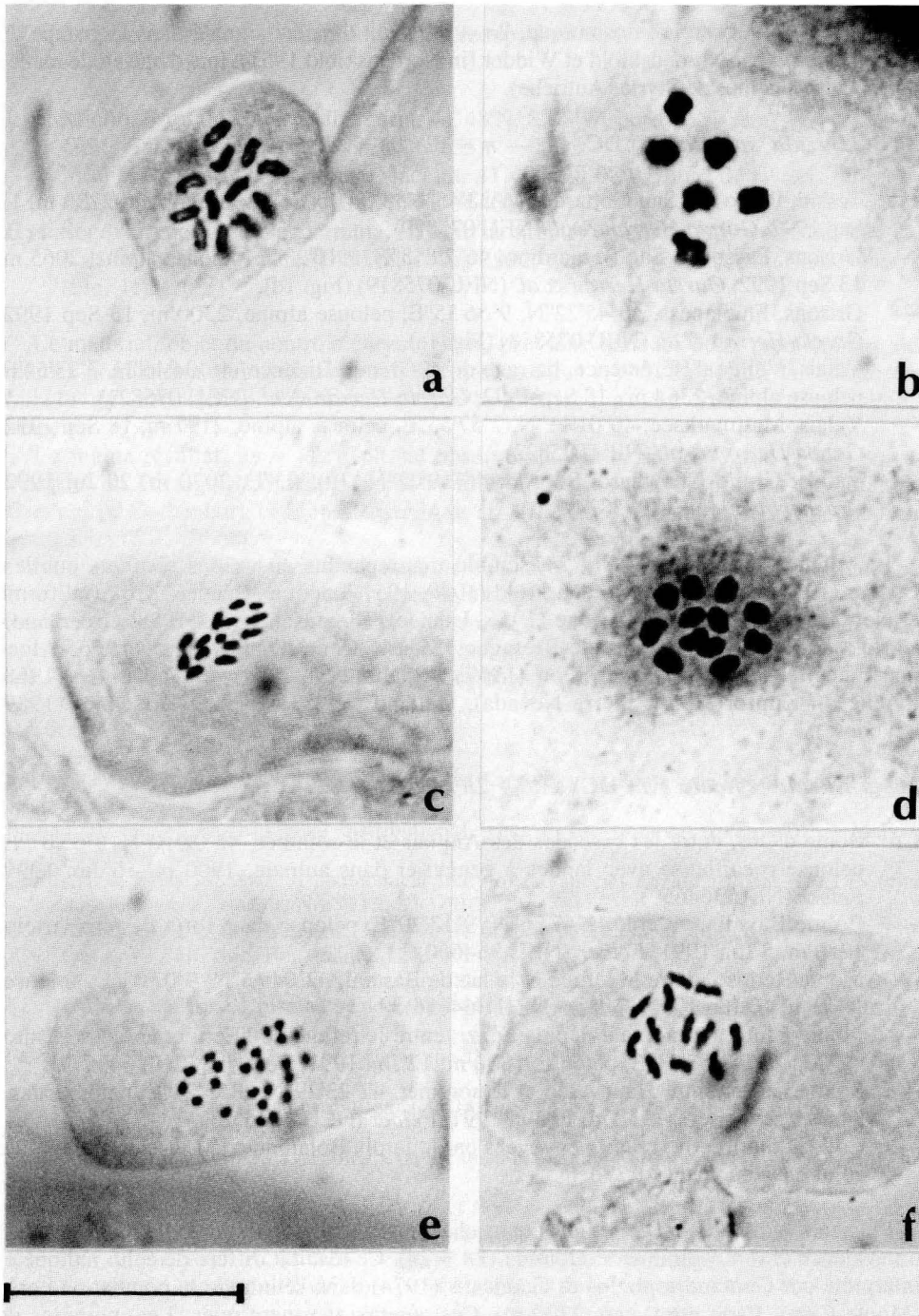


Fig. 1. Métaphases somatiques (a, c, e, f) et métaphases I (b,d) de *Luzula*. - a, *L. desvauxii*, $2n = 12$; b, *L. spicata*, $n = 6$; c, *L. spicata*, $2n = 14$; d, *L. spicata*, $n = 12$; e, *L. spicata*, $2n = 24$; f, *L. sylvatica* subsp. *henriquesii*, $2n = 12$. - Echelle = 10 μm .

Le même nombre chromosomique, $2n = 14$, avait déjà été signalé dans le groupe du *Luzula spicata* par Nordenskiöld et Widder (in Nordenskiöld 1951), lors d'une étude menée dans quatre localités de Styrie (Autriche).

369b. *Luzula spicata* (L.) DC. s.l. — $n = 12$, $2n = 24$ (Fig. 1d, e).

- He:** Tessin, Passo del San Gottardo, 46°33'45"N, 8°34'00"E, pelouse alpine, 2200 m, 11 Sep 1992, *García-Herran & al.* (NEU 075820).
 — Grisons, Passo del San Bernardino, 46°29'58"N, 9°10'29"E, pelouse alpine, 2065 m, 13 Sep 1992, *García-Herran & al.* (NEU 075819) (Fig. 1d).
 — Grisons, Flüelapass, 46°45'22"N, 9°56'35"E, pelouse alpine, 2300 m, 13 Sep 1992, *García-Herran & al.* (NEU 075818) (Fig. 1e).
 — Valais, Vallée d'Hérémence, barrage de la Grande Dixence, 46°04'46"N, 7°23'54"E, pelouse alpine, 2364 m., 18 Sep 1992, *García-Herran & al.* (NEU 075821).
 — Valais, Mattmarksee, 46°01'11"N, 7°57'55"E, pelouse alpine, 2197 m, 18 Sep 1992, *García-Herran & al.* (NEU 075822).
 — Valais, Grand Chavalard, Sorgno, 46°10'02"N, 7°05'03"E, 2070 m, 20 Jul 1992, *Kraehenbuehl* (NEU 075824).

La valence tétraploïde, $2n = 24$, semble très répandue au vu des résultats publiés: Böcher (1938, Groenland), Nordenskiöld (1949, 1951, Laponie, Suède, Tyrol, Californie et New Hampshire), Löve & Löve (1956, Islande), Jörgensen & al. (1958, Groenland), Chrték & Křísa (1962, Grande-Bretagne, Massif Central), Favarger (1965, Alpes maritimes), Knaben & Engenskjön (1967, Scandinavie), Favarger & Küpfer (1968, Pyrénées), Küpfer (1974, Sierra Nevada), Galland (1988, Atlas) et Kirschner (1989, Krkonoše).

369c. *Luzula spicata* (L.) DC. s.l. — $2n = 24$.

- Co:** Monte d'Oro, entre les cascades des Anglais et le sommet, 42°08'10"N, 9°05'07"E, pelouse rocailleuse avec landes à genévrier dans aulnaie, 1900 m, 16 Jun 1991, *Felber* (NEU 364659).
 — Col de Bavella, au col, 41°47'36"N, 9°13'29"E, pelouse dans forêt de pins laricio, 1220 m, 5 Jun 1991, *Felber* (NEU 364660).
 — Monte Renoso, entre le refuge et le lac de Bastani, 42°04'16"N, 9°07'05"E, pelouse, 1830 m, 10 Jun 1991, *Felber* (NEU 364656).
 — Monte Cinto, en montant depuis Lozzi, entre le refuge de l'Ecru et le lac de Cinto, 42°22'17"N, 8°57'24"E, pelouse, 1800 m, 12 Jun 1991, *Felber* (NEU 364657).
 — Monte Cinto, entre Haut Asco et le sommet, 42°23'29"N, 8°55'24"E, pelouse dans lande à genévriers, 1530 m, 15 Jun 1991, *Felber* (NEU 364658).
 — Col de Saint Pierre, graines envoyées par le Jardin Botanique de Liège n° 1848, n° de culture à Neuchâtel 91.270.

Plusieurs individus ont été étudiés dans chacune des six populations. Ils montrent tous une valence chromosomique tétraploïde ($2n = 24$). Ce résultat diffère de celui indiqué et interprété par Contandriopoulos & Gamisans (1974) dans l'étude de la population corse (Monte Cinto, flanc nord, vers 2200 m). Ces auteurs affirment que: "Les individus de Corse que nous avons étudiés étaient tous caractérisés par un nombre chromosomique de $2n = 36$, donc un nombre tétraploïde".

370. *Luzula sylvatica* (Hudson) Gaudin subsp. *henriquesii* (Degen) P. Silva — $2n = 12$ (Fig. 1f).

Lu: Minho, Srra. do Gerês, Albergaria, 41°48'N, 8°08'W, bord de rivière, 760 m, 6 Aug 1991, *García-Herran & al.* (NEU 364655).

— Minho, Srra. do Gerês, Ponte Maceira, 41°48'N, 8°08'W, bord de rivière, 750 m, 7 Aug 1991, *García-Herran & al.* (NEU 364661).

Hs: Segovia, Sierra de Guadarrama, en train de monter au col de Navacerrada, 40°48'N, 4°01'W, bord de rivière, 1400 m, 8 Aug 1992, *García-Herran & al.* (NEU 364662) (Fig. 1f).

Le matériel, objet du contrôle caryologique, provient, dans les deux premiers cas, des mêmes populations qui avaient permis à Pinto da Silva (1950) de définir la sous-espèce *Luzula sylvatica* subsp. *henriquesii*, dont la localité type est: Srra. do Gerês, Ponte Maceira.

Le même résultat, $2n = 12$, avait été observé par Malheiros & Gardé (1947) sur du matériel du Portugal (Lindoso), Nordenskiöld (1951) à partir de graines du Botanical Gardens of Gothenburg et Elena-Rosselló & al. (1987) qui ont analysé deux populations espagnoles (Salamanca).

La population d'Albergaria avait déjà été analysée, du point de vue caryologique, par Fernandes (1950b). Fernandes avait cependant obtenu un résultat différent, $2n = c. 84$, et il tira la conclusion que ce nombre chromosomique résulte de l'action combinée de la polyploïdie et de la fragmentation. Nous avons analysé plusieurs individus appartenant à cette population et tous ont donné une valence chromosomique diploïde, $2n = 12$.

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Reports (371) of François Felber & Dessislava Savova** .

371. *Hordeum murinum* L. subsp. *murinum* — $2n = 28$.

- He:** Graubünden, Domat/Ems, Plarena, 46°50'21"N, 9°28'43"E, 580 m, 15 Jul 1993, Gauteaub & al. (NEU 075787/NEU 075788).
- Graubünden, Domat/Ems, Vegnader, 46°50'3"N, 9°28'42"E, 600 m, 15 Jul 1993, Gauteaub & al. (NEU 075785/NEU 075786).
- Graubünden, Jenins, Eichholz, 46°59'47"N, 9°32'57"E, 520 m, 16 Jul 1993, Gauteaub & al. (NEU 075783/NEU 075784).
- Graubünden, Jenins, in the village, 47°00'3"N, 9°33'37"E, 630 m, 16 Jul 1993, Gauteaub & al. (NEU 075780/NEU 075779).
- Graubünden, Maienfeld, Müllager, 46°59'53"N, 9°32'48"E, 540 m, 16 Jul 1993, Gauteaub & al. (NEU 075782/NEU 075781).
- Schaffhausen, Buch, Unterwisn, 47°43'2"N, 8°47'33"E, edge of the road, 420 m, 7 Jul 1993, Felber & al. (NEU 075797/NEU 075798).
- Thurgau, Uesslingen, Aelikerberg, 47°35'5"N, 8°49'21"E, edge of a vineyard, 380 m, 7 Jul 1993, Felber & al. (NEU 075795/NEU 075796).
- Valais, Leuk, Brentjong, 46°19'14"N, 7°39'4"E, close to a field cultivated with barley, 950 m, 13 Jul 1993, Gauteaub & al. (NEU 075789/NEU 075790).
- Vaud, Arnex, in the village, at the edge of an orchard 46°41'40"N, 6°31'5"E, 540 m, 2 Jul 1993, Felber & al. (NEU 075805/NEU 075806).
- Vaud, Bonvillars, la Fuselle, 46°50'7"N, 6°39'52"E, pasture, 250 m, 29 Jun 1993, Felber & al. (NEU 075813/NEU 075814).

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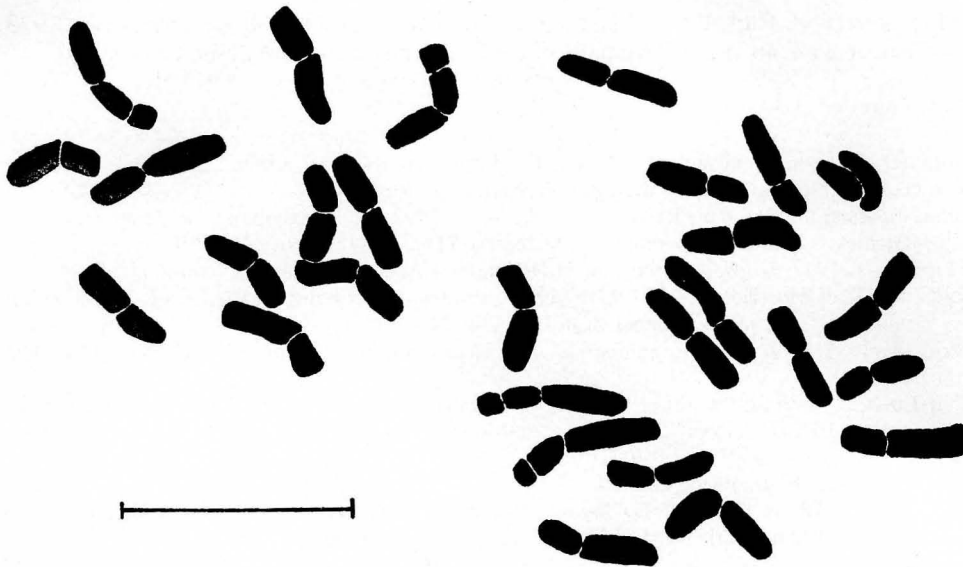


Fig.1 . *Hordeum murinum* subsp. *murinum*, $2n = 28$; somatic metaphase from germinating seeds sampled in Zürich, Wasterkingen. - Scale bar = 10 μm .

- Vaud, between Champagne and Fiez, sur Biolex, 46°50'0"N, 6°39'5"E, meadow between the road and a field cultivated with *H. vulgare*, 480 m, 29-30 Jun 1993, *Felber & al.* (NEU 075811/NEU 075812).
- Vaud, Champagne, edge of village, between a vineyard and a mown meadow, 46°49'54"N, 6°39'20"E, 450 m, 9 Jul 1993, *Gauteaub & al.* (NEU 075793/NEU 075794).
- Vaud, Ferreyres, 46°39'34"N, 6°29'1"E, pasture in the vicinity of a field cultivated with *H. vulgare*, 560 m, 2 Jul 1993, *Felber & al.* (NEU 075809/NEU 075810).
- Vaud, Ferreyres, in the village, 46°39'39"N, 6°29'15"E, 560 m, 2 Jul 1993, *Felber & al.* (NEU 075807/NEU 075808).
- Vaud, Grandson, en Bru, 46°49'33"N, 6°40'15"E, between the road and a field cultivated with barley, 450 m, 11 Jul 1993, *Gauteaub & Gauteaub* (NEU 075791/NEU 075792).
- Zürich, Ellikon am Rhein (D. Andelfingen), in the village, 47°36'8"N, 8°36'17"E, edge of the road, 350 m, 7 Jul 1993, *Felber & al.* (NEU 075801/NEU 075802).
- Zürich, Truttikon, (D. Andelfingen), in the village, 47°37'47"N, 8°43'46"E, edge of the road, 480 m, 7 Jul 1993, *Felber & al.* (NEU 075799/NEU 075800).
- Zürich, Wasterkingen, (D. Bülach), close to the village, 47°35'24"N, 8°28'14"E, edge of the road, close to field cultivated with barley, 390 m, 6 Jul 1993, *Felber & al.* (NEU 075803/NEU 075804).

This taxon is widely spread in Northern and Western Europe, from the Atlantic to W Asia. It does not usually reach the Mediterranean region (Bothmer & al. 1991). Our counts are the first reported for this species from Switzerland. The finding of $2n=28$ chromosomes is in agreement with former reports, performed on plants from other regions in Europe

(Morrison 1958, Rajhathy & Morrison 1962, Strid 1971, Van Loon & de Jong 1978, Linde-Laursen & al. 1992). Two pairs of SAT-chromosomes were observed (Fig. 1).

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Rapports (372-376) de C. Reynaud, R. Verlaque et G. Bonin

372. *Pituranthos tortuosus* (Coss.) Maire — $2n = 22$ (Fig. 1).

Tn: entre Feriana et El Kasserine, 35°04'N, 8°41'E, pelouse très dégradée, semi-aride, c. 600 m, 15 Juin 1990, *Bonin* (MARS 92-19).

Le genre *Pituranthos* (*Apiaceae*) renferme une douzaine d'espèces endémiques réparties dans les déserts chauds d'Afrique (Sahara et Afrique du Sud) et du sud-ouest de l'Asie. L'étude d'une population tunisienne de *P. tortuosus* (endémique des steppes africaines nord-orientales: Tunisie, Libye, Egypte), nous a permis de confirmer le nombre chromosomique de $2n = 22$, précédemment établi par Bhattacharya & al. (1971) en Libye (près de Tripoli). Cette espèce se caractérise par un caryotype symétrique, avec des chromosomes souvent métacentriques de 1,2 à 2 μ m.

373. *Pituranthos chloranthus* subsp. *intermedius* Maire — $2n = 22$ et $2n = 33$ (Fig. 2a, b).

Tn: entre Feriana et El Kasserine, 35°04'N, 8°41'E, pelouse très dégradée, semi-aride, c. 600 m, 15 Juin 1990, *Bonin* (MARS 92-20).

Cette espèce très polymorphe d'Afrique du Nord croît dans les rocailles et les pâturages désertiques du Sahara septentrional, du Maroc à la Tripolitaine. Les germinations de graines obtenues à partir d'une même population tunisienne ont produit deux types de plantules: les unes normales et diploïdes à $2n = 22$, les autres plus ou moins vrillées et triploïdes à $2n = 33$. Ces deux races présentent des caryotypes assez analogues et très différenciés, avec des chromosomes de formes et de tailles très variables: 1,6 à 3,7 μ m (fort distincts de ceux de *Pituranthos tortuosus*). Le premier nombre chromosomique diploïde confirme celui publié antérieurement par Constance & al. (1976) sur des plantes d'Algérie près de Beni-Abbès. Par contre, la formation du caryotype triploïde à $2n = 33$, inédit et unique dans le genre, peut s'expliquer par plusieurs hypothèses dont la

confirmation nécessite une étude plus approfondie (recherches en cours). *P. chloranthus* est peut-être une espèce en voie d'autopolyploïdisation par l'intervention de diplogamètes au sein d'une même population diploïde. Il peut s'agir aussi d'une hybridation à l'intérieur de l'espèce, si une de ses deux sous-espèces, non encore dénombrée, est déjà tétraploïde. Cependant, un croisement inter-spécifique semble exclu, puisque la seule espèce tétraploïde recensée dans ce genre est *P. battandieri* à $2n = 44$ (Constance & al. 1976; Elalaoui Faris 1989), du Sahara oranais et marocain, absente de Tunisie où vivent trois espèces diploïdes: *P. scoparius* (Coss. & Dur.) Benth. & Hook. fil., *P. tortuosus* (Coss.) Maire et *P. chloranthus* (Coss. & Dur.) Benth. & Hook. fil. (Pottier-Alapetite 1979).

374. *Calendula arvensis* L. s. str. — $2n = 44$ (Fig. 3).

Tn: entre Feriana et El Kasserine, 35°04'N, 8°41'E, pelouse très dégradée, semi-aride, c. 600 m, 15 Juin 1990, *Bonin* (MARS 92-17).

Nous avons déterminé en Tunisie un nombre chromosomique de $2n = 44$ chez cette espèce eury-méditerranéenne très polymorphe, des champs et lieux incultes (introduite dans diverses régions du monde). Ce résultat confirme la douzaine de comptages antérieurs réalisés en Europe, en Inde et en Amérique du Nord. Si quelques variations aneuploïdes ont été signalées: $2n = 42$ en Espagne (Löve & Kjellqvist 1974), aux Canaries (Borgen 1974) et $n = 23$ en France (Languedoc: Rashid 1974), par contre le nombre diploïde de $2n = 18$ du Maroc (Humphries & al. 1978) reste énigmatique (détermination erronée?). Dans le genre *Calendula*, taxonomiquement très complexe, $2n = 44$ semble caractériser le seul *C. arvensis* s. str. En fait, les taxons apparentés (souvent inclus dans cette espèce au sens large) possèdent des nombres chromosomiques différents: *C. bicolor* Rafin. et *C. stellata* Cav. à $2n = 14$, *C. tripterocarpa* Rupr. et *C. aegyptiaca* Pers. à $2n = 30$ (14, 28, 54). Le nombre de base de ce groupe (aneu)polyploïde pourrait être $x = 7$.

375. *Carlina involucrata* Poir. — $2n = 18$ (Fig. 4).

Tn: entre Feriana et El Kasserine, 35°04'N, 8°41'E, pelouse très dégradée, semi-aride, c. 600 m, 15 Juin 1990, *Bonin* (MARS 92-18).

Nous avons trouvé en Tunisie un nombre chromosomique diploïde inédit de $2n = 18$ pour cette espèce sud-méditerranéenne (de l'Algérie à la Syrie) des broussailles et des pâturages. *Carlina involucrata* possède des chromosomes très longs (4,4 à 7,3 μm), méta-à submétacentriques. Au sein du genre *Carlina*, entièrement diploïde à $2n = (18) 20$, le nombre 18 s'avère tout à fait minoritaire. En fait, il caractérise uniquement le complexe sténo-méditerranéen très polymorphe de *C. corymbosa* L. (compté en Europe par Fernandes & Queiros 1971; Bartolo & al. 1978) auquel se rattache *C. involucrata*. D'ailleurs, les taxons apparentés à ce groupe présentent tous ce même nombre chromosomique: *C. corymbosa* subsp. *curetum* (Halácsy) Rech. fil. (Crète: Montmollin 1986), *C. sitiensis* Rech. fil. (Crète: Meusel & al. 1984) et *S. sicula* Ten. (Sicile: Brullo & al. 1977).

376. *Rhanterium suaveolens* Desf. subsp. *suaveolens* - $2n = 12$ (Fig. 5).

Tn: entre Feriana et El Kasserine, 35°04'N, 8°41'E, pelouse très dégradée, semi-aride, c. 600 m, 15 Juin 1990, *Bonin* (MARS 92-15).



Fig. 1-5. Métaphases de méristèmes radiculaires. - 1, *Pituranthos tortuosus*, 2n = 22; 2a, *Pituranthos chloranthus*, 2n = 22; 2b, *Pituranthos chloranthus*, 2n = 33; 3, *Calendula arvensis*, 2n = 44; 4, *Carlina involucreta*, 2n = 18; 5, *Rhanterium suaveolens* subsp. *suaveolens*, 2n = 12.

Le petit genre *Rhanterium* (*Asteraceae*) comprend deux espèces principales: *R. epapposum* Oliver endémique du Baloutchistan (Pakistan) et *R. suaveolens* s. l. endémique des pâturages désertiques du Sahara septentrional en Afrique du Nord. Ce dernier complexe très polymorphe regroupe selon Quézel & Santa (1963) trois taxons assez distincts (souvent érigés au rang d'espèce) et plus ou moins sympatriques:

- subsp. *adpressum* (Coss. & Dur.) Quézel & Santa: commun (N du Sahara: Maroc, Algérie);
- subsp. *intermedium* (Pomel) Quézel & Santa: rare (N du Sahara algérien: Mزاب);
- subsp. *suaveolens*: assez rare (N-E du Sahara: Algérie, Tunisie et Tripolitaine) et morphologiquement voisin du précédent.

Nous avons établi un nombre chromosomique inédit de $2n = 12$ dans les méristèmes radiculaires d'une population tunisienne de *Rhanterium suaveolens* subsp. *suaveolens* (chromosomes de 2,4 à 4,5 μm , caryotype asymétrique et très différencié). La seule étude caryologique antérieure du genre indique pour le subsp. *adpressum* un nombre haploïde de $n = 12$ (Reese 1957: Ouest de l'Algérie, près de Beni-Abbès). *R. suaveolens* s. l. correspond donc à un complexe polyploïde (nombre de base: $x = 6$) dans lequel les races semblent assez distinctes. Les diploïdes (subsp. *suaveolens*), assez rares et plus orientaux, présentent de petits capitules (4-5 mm de diamètre) et des bractées involucrelles à acumen récurvé, tandis que les tétraploïdes (subsp. *adpressum*), très communs et occidentaux, possèdent des capitules plus gros (7 mm) et des bractées de l'involucre dressées obtuses.

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Reports (377-386) by Theophanis Constantinidis & Georgia Kamari

377. *Aristolochia rotunda* L. subsp. *insularis* (Nardi & Arrig.) Gamisans (= *A. insularis* Nardi & Arrig.) — $2n = 12$ (Fig. 1).

Gr: Ionian islands, nomos Zakynthou, Strofades islets, Islet Stramfani, 37°15'N, 21°00'E, around the monastery of Panagia, c. 10 m, 12 Apr 1991, *Constantinidis 1147* (ATHU).

Our count of $2n = 12$ chromosomes is in agreement with the reports given from Sardinia (Italy) by Nardi (1984) as *Aristolochia insularis*, and from Mt. Olimbos (Greece) by Strid & Franzén (1981) as *A. rotunda* s.l. As far as we know this is the first presentation of the taxon's karyotype (Fig. 1).

Aristolochia rotunda subsp. *insularis* shows a disjunct distribution west of Italy (Corsica, Sardinia, Capraia) and also in Greece (several localities, Nardi 1991). The only previously confirmed occurrence of subsp. *insularis* in the Ionian islands was, according to Nardi (1991), on Kefallinia.

378. *Carum multiflorum* (Sm.) Boiss. — $2n = 20$ (Fig. 4).

Gr: Sterea Ellas, nomos Attikis, Mt. Kitheron, N of Villia village, 38°10'N, 23°19'E, calcareous rocks, c. 700 m, 13 Jun 1993, *Constantinidis 3898* (UPA).

A widespread species distributed in Italy, Greece, and Anatolia. Its occurrence in Cyprus is questionable (Meikle 1977). Our count of $2n = 20$ chromosomes confirms previous records from Greece given by Engstrand (1970) from Arkadia, Peloponnisos, and Strid & Andersson (1985) from Mt. Agrapha, S Pindos.

The karyotype of *Carum multiflorum* includes $2n = 2x = 6m + 2m\text{-SAT} + 2sm\text{-SAT} + 8sm \pm 2st = 20$ chromosomes, the size of which is found to be about 2 μm . It is also noticeable that only the one of the sm-SAT chromosomes usually has a very large double satellite on its short arm (Fig. 4). The satellites of the m-SAT chromosomes are small and not always visible.

379. *Centaurea affinis* subsp. *laconiae* Prodán (= *C. affinis* subsp. *peloponnesiaca* (Halácsy) Dostál) — $2n = 18 + 0\text{-}2B$ (Fig. 2).

Gr: Sterea Ellas, nomos Fthiotidos, Mt. Kallidromon, the Gioza summit, 38°44'N, 22°33'E, calcareous slopes in open *Abies* forest, 1300-1399 m, 26 Jul 1992, *Constantinidis 2741* (UPA).

Our counts of $2n = 18$ chromosomes (Fig. 2) confirm previous counts given by Georgiadis (1980, 1983) based on material from Peloponnisos. Gamal-Eldin & Wagenitz (1991) also refer (Persson, unpubl.) to the chromosome number $2n = 36$ in material from Mts. Chelmos and Erimanthos, which however could belong to *Centaurea affinis* subsp. *affinis* according to Georgiadis (1980). The number $2n = 44$ of *Centaurea affinis* s.l. given by Baden (1983) in material from Mt. Taigetos is unusual and needs confirmation.

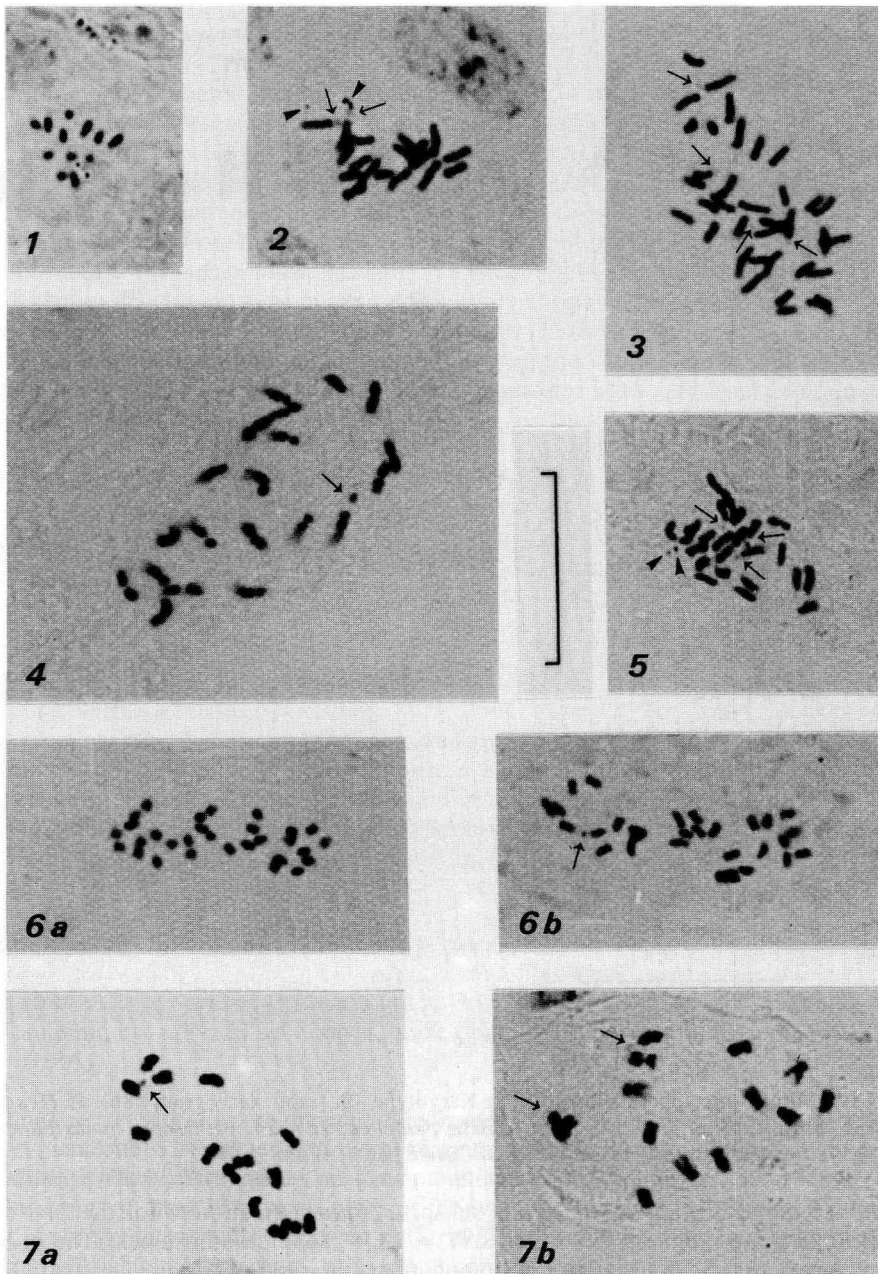


Fig. 1-7. Mitotic metaphase karyotypes of: 1, *Aristolochia rotunda* subsp. *insularis*, $2n = 12$; 2, *Centaurea affinis* subsp. *laconiae*, $2n = 18 + 0-2B$; 3, *Centaurea pseudocadmea*, $2n = 36$; 4, *Carum multiflorum*, $2n = 20$; 5, *Rindera graeca*, $2n = 24 + 0-2B$; 6a, b, *Dianthus serratifolius* subsp. *serratifolius*, $2n = 30$; 7a, b, *Iberis odorata*, $2n = 14$. Arrows indicate SAT-chromosomes and arrowheads B-chromosomes. - Scale bar = 10 μm .

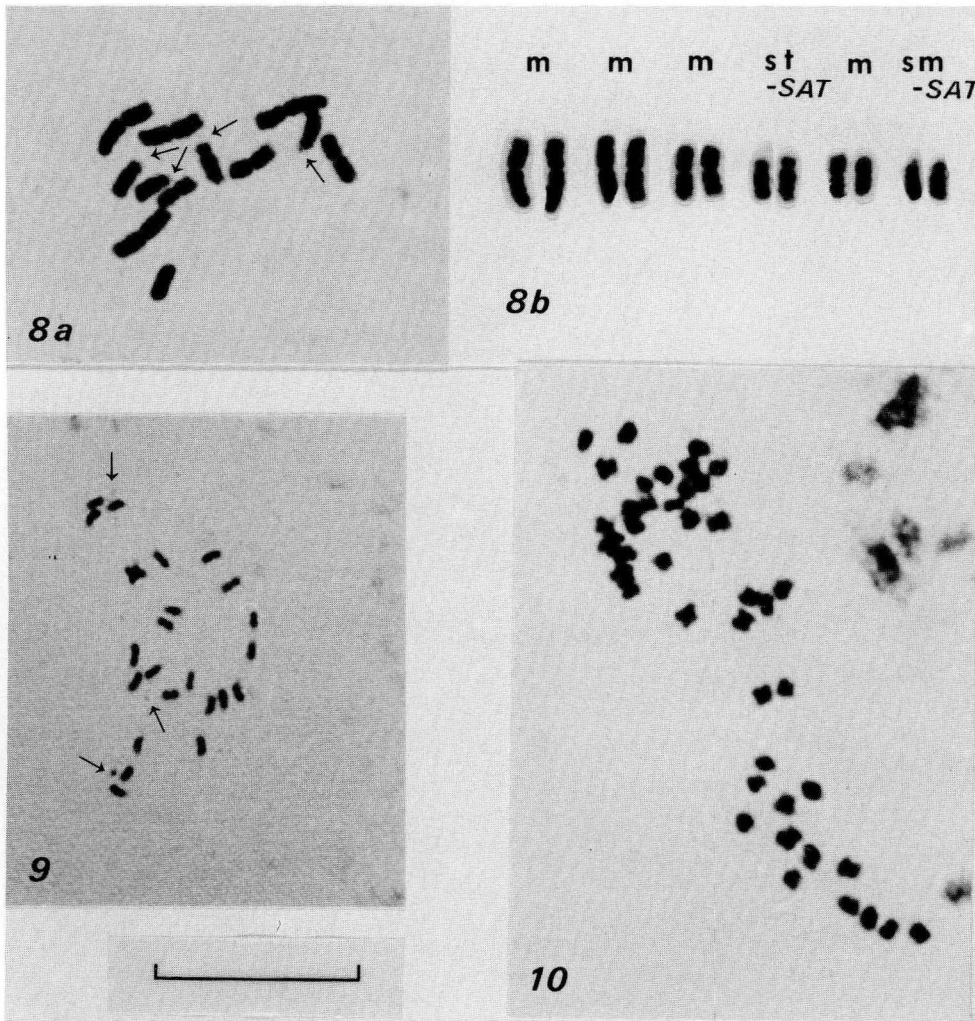


Fig. 8-10. Mitotic metaphase plates of: 8, Karyotype (8a) and karyogram (8b) of *Hesperis laciniata* subsp. *secundiflora*, $2n = 12$; 9, *Silene pentelica*, $2n = 24$; 10, *Orchis quadripunctata*, $2n = 42$. Arrows indicate SAT-chromosomes. - Scale bar = 10 μm .

The karyotype of *Centaurea affinis* subsp. *laconiae*, given here for the first time, includes $2n = 2x = 8m + 6sm + 4st\text{-SAT} = 18 + 0\text{-}2\text{B}$ chromosomes. The st-SAT chromosomes are the longest in the complement, their satellites are very small and usually only three of them are visible. In the karyotype two B-chromosomes often occur; one being very small while the second is longer with a constriction at its middle (Fig. 2).

Centaurea affinis subsp. *laconiae* is endemic to Greece, distributed on most mountains of Peloponnisos on some of which, it seems to coexist with subsp. *affinis*, having $2n = 36$ chromosomes (Georgiadis 1983, Gamal-Eldin & Wagenitz 1991). The occurrence of *C. affinis* subsp. *laconiae* on Mt. Kallidromon confirms the distribution of this subspecies in Sterea Ellas, in agreement with a note made by Gamal-Eldin & Wagenitz (1991) that "some collections from Parnassos approach ssp. *laconiae*".

380. *Centaurea pseudocadmea* Wagenitz — $2n = 36$ (Fig. 3).

Gr: Sterea Ellas, nomos Attikis, Mt. Kitheron, N of Villia village, 38°10'N, 23°19'E, calcareous slopes, 600-800 m, 13 Jun 1993, *Constantinidis 3894* (UPA).

Centaurea pseudocadmea is a steno-endemic species restricted to Mt. Kitheron. Wagenitz (1971) described it based on quite old collections dated from and prior to 1930, and distinguished it from the related *C. cadmea* Boiss., occurring in Anatolia. We recently rediscovered *C. pseudocadmea*, growing in a small population on the southern slopes of Mt. Kitheron. Its chromosome number and karyotype (Fig. 3), presented here for the first time, consist of $2n = 4x = 36$ chromosomes. There are among them six SAT-chromosomes, four of which are the longest acrocentric within the karyotype, while the other two are small and submetacentric. The chromosome sizes vary from 2 to 1 μm .

381. *Rindera graeca* (A. DC.) Boiss. & Heldr. (= *Cynoglossum graecum* (A. DC.) Greuter & Burdet) — $2n = 24 + 0-2B$ (Fig. 5).

Gr: Sterea Ellas, nomos Attikis/Viotias, Mt. Kitheron, W of the refuge, 38°11'N, 23°16'E, clearings of *Abies cephalonica* forest, 1200 m, 13 Jun 1990, *Constantinidis 3890* (UPA).

A distinct endemic species reported from several mountains of Peloponnisos, Sterea Ellas and Northern Pindos (Gustavsson 1978, Strid 1991).

Our counts of $2n = 24$ chromosomes confirm a previous count from Mt. Vardousia (Gustavsson 1978). The karyotype of *Rindera graeca*, presented here for the first time (Fig. 5), consists of $2n = 2x = 24 + 0-2B$ chromosomes which are very small, c. 1.8-0.8 μm . Among them four SAT-chromosomes (2st-SAT + 2m-SAT) are included; the satellites are small and usually three of them are visible (Fig. 5).

382. *Dianthus serratifolius* Sm. subsp. *serratifolius* — $2n = 30$ (Fig. 6a, b).

Gr: Sterea Ellas, nomos Attikis/Viotias, Mt. Kitheron, close to the Profitis Ilias summit, 38°11'N, 23°15'E, open, grazed places, 1300-1400 m, *Constantinidis 2694* (UPA).

Dianthus serratifolius, an endemic Greek species, has been split into two subspecies. The typical one is restricted to several mountains of Attiki, while subsp. *abbreviatus* (Heldr. ex Halácsy) Strid occurs on some mountains of Peloponnisos (Strid 1986).

Our count of $2n = 30$ chromosomes of the typical subspecies, given here for the first time, is in agreement with that given by Strid (1986) for subsp. *abbreviatus* in material from Mt. Taigetos. The karyotype of subsp. *serratifolius* (Fig. 6a, b) consists of $2n = 30$ very small (c. 1 μm) chromosomes, most of which are metacentric while the rest are submetacentric. A submetacentric chromosome pair has heteromorphous satellites, one being distinctly larger than the other, and always visible (Fig. 6b).

383. *Hesperis laciniata* subsp. *secundiflora* (Boiss. & Spruner) Breistr. — $2n = 12$ (Fig. 8a, b).

Gr: Sterea Ellas, nomos Attikis, Mt. Yerania, c. 1 km WSW of the Goura source, 38°01'N, 23°08'E, rocky slopes in *Abies cephalonica* forest, 1100 m, 31 Mar 1994, *Constantinidis* 4396 (UPA).

Hesperis laciniata subsp. *secundiflora* is an endemic subspecies distributed mainly in S Greece. Its chromosome number, $2n = 12$ (given here for the first time for subsp. *secundiflora*), confirms the number $2n = 12$ reported for *H. laciniata* s.l. from Bulgaria (Ančev & Peneva 1984). The number $2n = 14$ has also been given by Dvořák (1966) for *H. glutinosa* (= *H. laciniata*) in material from former Yugoslavia. Both chromosome numbers ($2n = 12, 14$) seem to occur in the genus *Hesperis* (Fedorov 1969).

The karyotype (Fig. 8a) and the karyogram (Fig. 8b) of *Hesperis laciniata* subsp. *secundiflora*, given here for the first time, include $2n = 2x = 8m \pm 2sm\text{-SAT} + 2st\text{-SAT} = 12$ chromosomes varying in size from 3.6 to 1.9 μm . Each metacentric chromosome usually has a secondary constriction in about the middle of its shorter arm. The shorter pair of the SAT-chromosomes is \pm submetacentric. The satellites are very small but always visible.

384. *Iberis odorata* L. (= *I. acutiloba* Bertol.) — $2n = 14$ (Fig. 7a, b).

Gr: Sterea Ellas, nomos Attikis, foothills of Mt. Yerania, NW of Megara, 38°01'N, 23°16'E, open places with low phrygana, c. 280 m, 13 Apr 1994, *Constantinidis* 4397 (UPA).

Iberis odorata, an East Mediterranean element, occurs in Europe only in Greece and European Turkey, and is also reported as introduced in Belgium (Pinto da Silva & Franco 1993).

Our counts of $2n = 14$ chromosomes confirm previous records from elsewhere (Fedorov 1969). The karyotype, given here for the first time from Greece (Fig. 7a, b), includes $2n = 2x = 6m + 6sm + 2sm\text{-SAT} = 14$ chromosomes, the size of which ranges from c. 1.5 to 1 μm . The satellites are heteromorphic in size, and always visible.

385. *Orchis quadripunctata* Cyr. ex Ten. — $2n = 42$ (Fig. 10).

Gr: Sterea Ellas, nomos Attikis, Mt. Pateras, close to the border of Mt. Makron, 38°07'N, 23°18'E, among bushes of *Quercus coccifera* and *Arbutus andrachne*, c. 850 m, 14 Apr 1994 *Constantinidis* 4398 (UPA).

Orchis quadripunctata is distributed from Italy through the Balkan Peninsula eastwards to Anatolia and Cyprus. It is widespread in Greece, especially in the southern parts.

The chromosome number $2n = 42$ confirms previous counts from Italy (Corrias 1983) and former Yugoslavia (Garaj & al. 1981). The karyotype (Fig. 10) of *Orchis quadripunctata* given for the first time from Greece, is similar to that given by Corrias (1983) from Italy. It consists of $2n = 42$ chromosomes, most of which are metacentric while the rest are submetacentric, with sizes ranging from 1.5 to 1 μm . One submetacentric chromosome pair has a small satellite which is not always visible.

386. *Silene pentelica* Boiss. — $2n = 24$ (Fig. 9).

Gr: Sterea Ellas, nomos Evvias, Island Evvia, between the villages Kapsouri and Thymi, 38°05'N, 24°33'E, shady stream bank, 250-350 m, 06 Jun 1993, *Constantinidis* 3803 (UPA).

Silene pentelica is an endemic species distributed mainly in Attiki and Evvia but also reported by Rechinger (1943) from the island of Ikaria (as *S. sedoides* Poir. var. *pentelica* (Boiss.) Rohrb.).

The chromosome number $2n = 24$ and the karyotype are presented here for the first time. Out of the 24 chromosomes, 14 are metacentric while the rest are submetacentric. All are very small, with sizes ranging from 1.3 to 1 μm . Two metacentric chromosome pairs have satellites. One satellite is larger and always visible (Fig. 9).

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Reports (387-393) by Carlo Del Prete & Paola Miceli*

387. *Lathyrus annuus* L. — $2n = 14$ (Fig. 1, 1a).

Sa: Sirai, Sulcis (Carbonia, Cagliari province), 39°11'N, 08°26'E, 13 May 1987, *B. Madeddu & C. Del Prete* (CAG) s.n.

The chromosome number $2n = 14$ is the same as given by many authors (Darlington & Wylie 1955; Fedorov 1969; Ornduff 1969; Moore 1973; Goldblatt 1981, 1984, 1988) for plants from different countries.

388. *Lotus edulis* L. — $2n = 14$ (Fig. 2, 2a).

Sa: Barbusi (Carbonia, Cagliari province) 39°13'N, 08°27'E, 27 May 1987, *B. Madeddu & C. Del Prete* (CAG) s.n.

The chromosome number $2n = 14$ confirms the data cited in the literature for plants from different localities (Fedorov 1969; Darlington & Wylie 1955; Moore 1972, 1973, 1977; Goldblatt 1981, 1984).

389. *Pisum sativum* L. subsp. *elatius* (Bieb.) Asch. & Graebn. — $2n = 14$ (Fig. 3, 3a).

Sa: Place named Sa Domu de is Pillius (Nuxis, Cagliari province) 39°10'N, 08°46'E, 13 May 1987, - *B. Madeddu & C. Del Prete* (CAG) s.n.

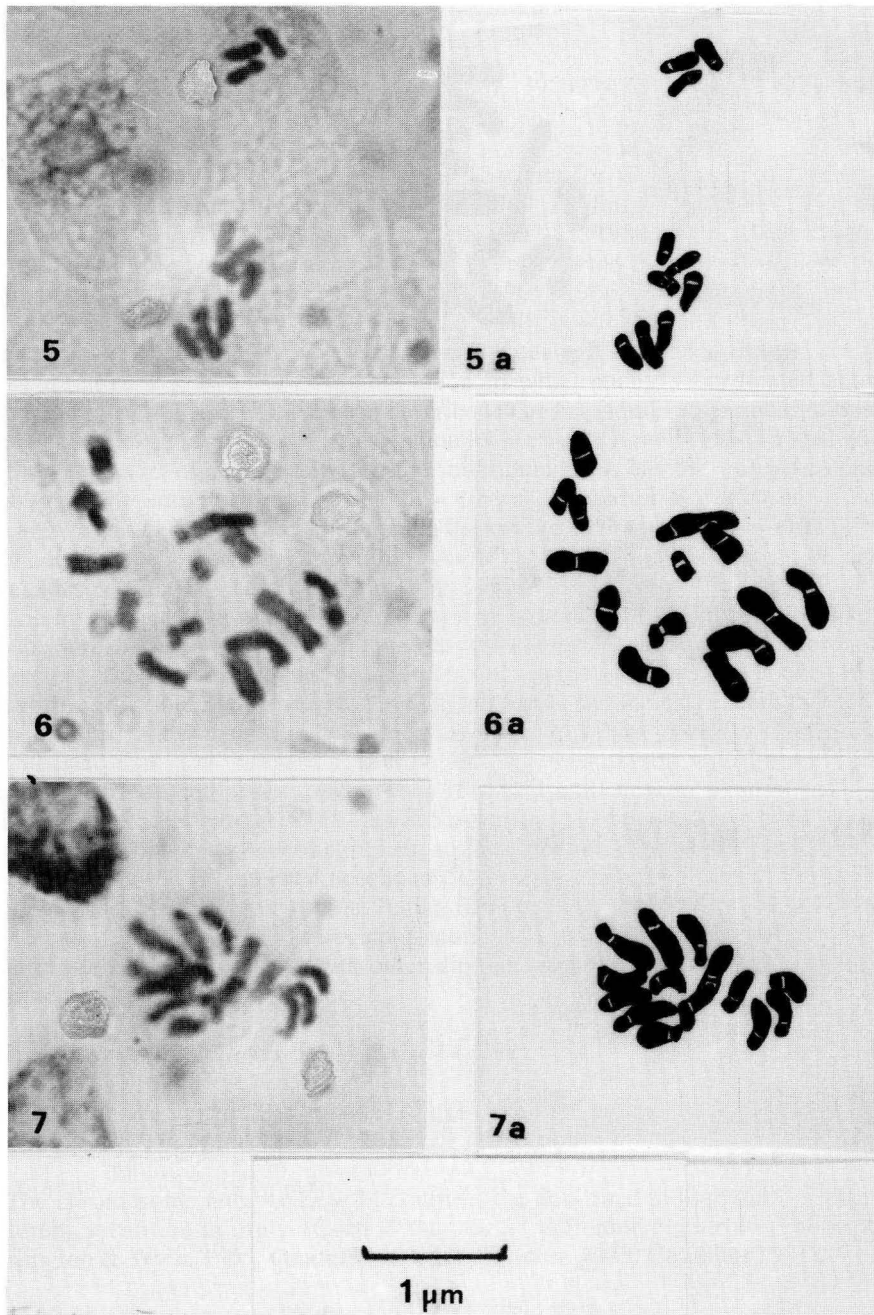
The chromosome number $2n = 14$ confirms the data cited in literature for plants from different localities: $2n = 14$ (Fedorov 1969; Darlington & Wylie 1955; Goldblatt 1981, 1985, 1988; Goldblatt & Johnson 1990). Marks & Davies (1979) also list plants with different ploidy levels ($2n = 14, 28, 56, 84, 98, 112, 224$).

390. *Astragalus hamosus* L. — $2n = 14$ (Fig. 4, 4a).

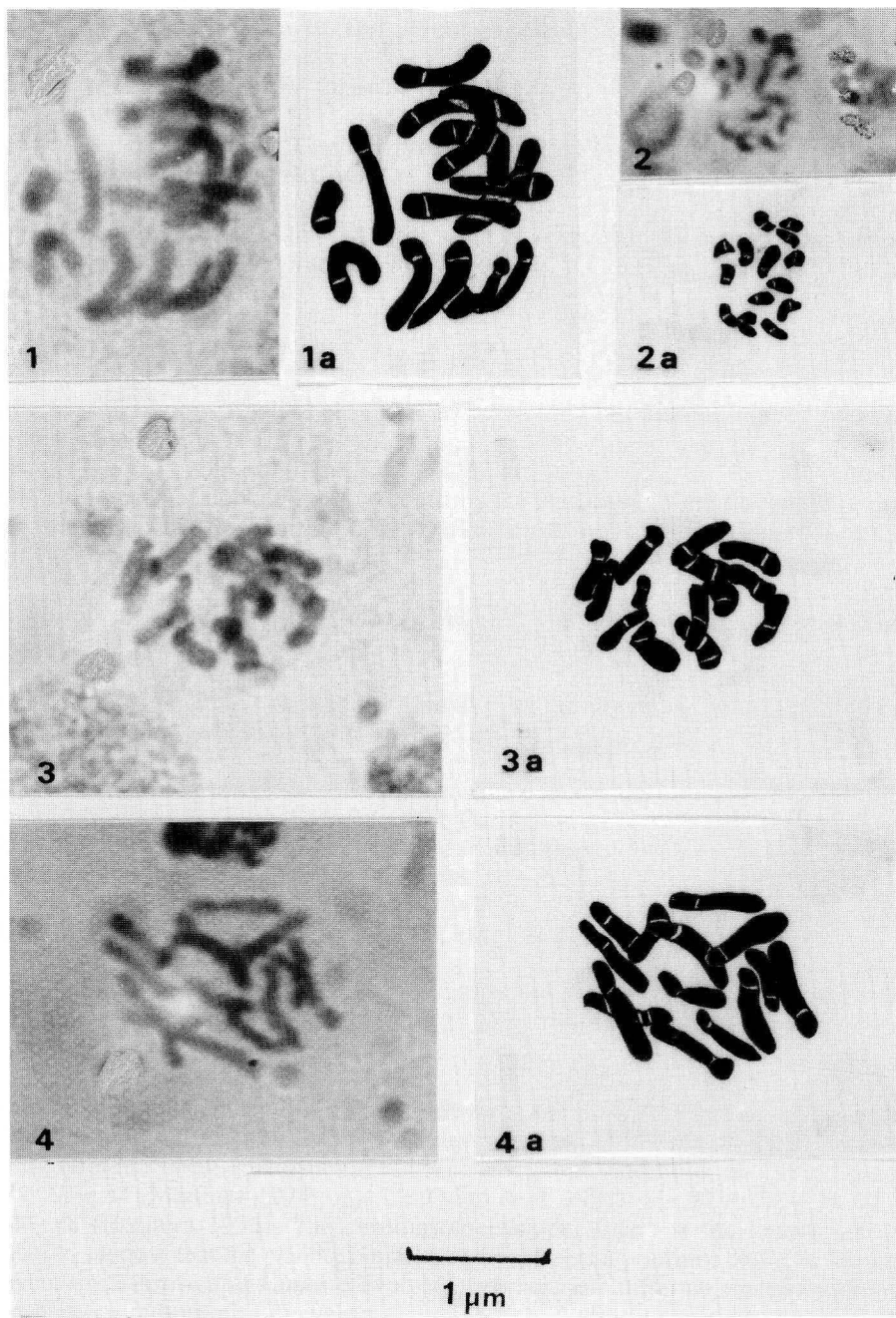
Sa: Barega (Iglesias, Cagliari province) in cultivated fields along the Road Carbonia - Villa Massargia, 39°15'N, 08°32'E - 31 May 1987, *B. Madeddu & C. Del Prete* (CAG) s. n.

The chromosome number $2n = 14$ was unknown until now. Previous records were $2n = 32+2b$ (Chuxanova 1967); $2n = 48$ (Fernandes & Santos 1971; Löve & Kjellquist 1974); $2n = 32$ (Borgen 1974; Kuzmanov & Georgieva 1976; Colombo & al. 1983; Dalgaard 1987); $2n = 44$ (Martinez 1974); $n = 22$ (Gohil & al. 1981); $n = 22$ & $2n = 24, 32, 40, 44, 46, 48$ (Horjales 1976). The chromosome number found is the lowest yet. It is possible to suppose that the plants examined here represent a primitive and relic Sardinian cytotype, while *Astragalus hamosus* evolved elsewhere into different chromosomic races with a higher ploidy level.

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Figs. 1-4. Karyotype photographs and drawings of **1, 1a**, *Lathyrus annuus*, $2n = 14$; **2, 2a**, *Lotus edulis*, $2n = 14$; **3, 3a**, *Pisum sativum* subsp. *elatius*, $2n = 14$; **4, 4a**, *Astragalus hamosus*, $2n = 14$.



Figs 5-7. Karyotype photographs and drawings of 5, 5a, *Vicia sativa s. l.*, $2n = 10$; 6, 6a, *Lathyrus articulatus*, $2n = 14$; 7, 7a, *Vicia atropurpureus*, $2n = 14$. Scale bar = 10 μm .

391. *Vicia sativa* L. s. l. — $2n = 10$ (Fig. 5, 5a).

Sa: S. Giovanni Suergiu (Cagliari province), 39°09'N, 8°31'E, 22 May 1987, B. Madeddu & C. Del Prete (CAG) s.n.

Most of previous countings report $2n = 12$ either for *Vicia sativa* s. l. or *V. sativa* subsp. *nigra* (Reichenb.) Arcangeli (Fedorov 1969; Darlington & Wylie 1955; Ornduff 1968; Moore 1970, 1972, 1973, 1977; Goldblatt 1981, 1984, 1985, 1988; Goldblatt & Johnson 1990), but different numbers have been reported by several authors: $2n = 10$ (Yamamoto 1959); $2n = 10-12$ (Yamamoto 1961, 1966, Fernandes & Santos 1971, Dahlgren & al. 1971); $2n = 12-14$ (Coutinho 1940); $n = 7$ (Sinha & Prasad 1973); $2n = 14$ (Kawakami 1930); $2n = 12-24-48$ (Tatuno & Kodama 1965); $2n = 18$ (Murin 1978).

Vicia sativa s. l. is a very variable taxon in which many subordinated entities, at different taxonomic levels, have been described. The taxonomic assessment of this group is questionable. Cytosystematic investigation by Mettin & Hanelt (1964) traced the broad outline of the relationships between the individual taxa, but did not give conclusive evidence. The chromosome number $2n = 10$ was known for *V. sativa* but is not very frequent. It has been generally attributed to the species in the wide sense or, as previously explained, to subsp. *cordata* (Wulfen) Aschers & Graebner (Dahlgren & al. 1971, Fernandes & Santos 1971, Yamamoto 1959, 1961, 1966).

The investigated specimens could perhaps be considered as belonging to *Vicia sativa* subsp. *macrocarpa*, even if they are distinguishable by some feeble morphological characters. The most evident are the legumes that appear to be strongly hooked like those of subsp. *sativa*, but not compressed among the seeds, and the calyx teeth that are longer than the tube and subequal among themselves as in subsp. *cordata*. It is possible to hypothesize that in *V. sativa* s. l., a west Mediterranean taxon with $2n = 10$ has to be further discriminated. $2n = 10$ has been recorded until now in plants from Morocco (Yamamoto 1959), Portugal (Fernandes & Santos 1971) and the Balearic Islands (Dahlgren & al. 1971), but the above-mentioned authors do not give any information on the morphology of the investigated specimens. Our taxon should be related to the group of spontaneous taxa represented in the Italian flora by *Vicia sativa* subsp. *cordata* with its low level of ploidy, its morphological features and its geographical distribution. While awaiting further comparisons with other diploids with $2n = 10$, it can provisionally be interpreted as a primitive cytodeme.

392. *Lathyrus articulatus* L. — $2n = 14$ (Fig. 6, 6a).

Sa: Sulcis, place called "Rio fundus" (Nuxis, Cagliari province), 39°10'N, 08°46'E, 13 May 1987, B. Madeddu & C. Del Prete (CAG) s.n.

The chromosome number $2n = 14$ confirms the data cited in literature for plants from different localities in Italy (Corti 1931), or in different countries (Fedorov 1969; Darlington & Wylie 1955; Ornduff 1968, 1969; Moore 1973; Goldblatt 1981).

393. *Vicia atropurpurea* Desf. — $2n = 14$ (Fig. 7, 7a).

Sa: Nuxis (Carbonia, Cagliari province), 39°10'N, 08°46'E, 26 May 1987, B. Madeddu & C. Del Prete (CAG) s.n.

The chromosome number $2n = 14$ confirms the literature data for plants from different localities (Fedorov 1969; Darlington & Wylie 1955; Ornduff 1969; Moore 1973, 1977; Goldblatt 1985).

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