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# Cytological investigations of some Greek plants

**Abstract**

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The chromosome numbers of 35 species from Greece are presented (Tab. 1). The numbers of *Rumex cristatus* ($2n = 80$) and *Stachys acutifolia* ($2n = 30$) were previously unknown. In *Achillea holosericea* ($2n = 4x = 36$) and *Onosma heterophyllum* ($2n = 2x = 14$, $2n = 3x = 21$) new ploidy levels are reported. The numbers of *Centaurea pindicola* ($2n = 40$), *Geranium asphodeloides* ($2n = 24$) and *Malabaila aurea* ($2n = 20$) differ (at least in part) from the indications in literature. The detailed karyotype of *Crepis rubra* is given.

## Introduction

Several excursions were made in the Balkan Peninsula during 1977-1989 to collect plant material for biosystematic investigations. The plants were cultivated in the garden of our institute, and vouchers are deposited in the herbarium ZT (abbreviation according to Holmgren & al. 1981). Some chromosome numbers of Greek plants have been published earlier (Baltisberger 1980, 1981, 1986, 1988a, 1989, Baltisberger & Aeschimann 1988, Baltisberger & Lenherr 1984a, Baltisberger & Huber 1987a, 1987b). The series is continued here with plants collected on an excursion by the author with U. Meili in 1987.

The nomenclature mostly corresponds with "Flora Europaea" (Tutin & al. 1964-1980). Families are in alphabetical order, genera in alphabetical order within families, and species in alphabetical order within genera. Comments to the chromosome numbers are made if the number of the respective taxon was not known or deviates from earlier indications (compilations see Tischler 1950, Fedorov 1974, Moore 1973, 1974, 1977, Goldblatt 1981, 1984, 1985, 1988, Van Loon 1987).

## Methods

All cytological investigations were performed on root tips. These were pretreated for 1/2 to 2 hours with colchicine (0.05%), fixed in ethanol : acetic acid (3 : 1) and stained and squashed in lacto-propionic orcein (Dyer 1963). For the determination of the chromosome number, 5-10 metaphases were counted out of each individual (for the number of individuals investigated see Tab. 1).

In *Crepis rubra* the karyotype was investigated in detail; 10 metaphases were measured. Based on the positions of the centromere, Levan & al. (1964) distinguish 4 groups of chromosomes which are characterized by the arm ratio (long arm/short arm):

Table 1. Alphabetical list of the investigated species. Collected material: K = detailed karytype given; L = living plants; S = seeds; * first record; Δ new ploidy level; + deviating from literature.

| Species | Herbarium specimen | Collected material | Individuals investigated | 2*n* |
|---|---|---|---|---|
| *Achillea holosericea* | 11867 | L | 3 | 36Δ |
| *Alyssum alyssoides* | 11216 | S | 11 | 32 |
| *Anthemis carpatica* | 11415 | L | 4 | 36 |
| *Anthoxanthum odoratum* | 11687 | L | 10 | 10 |
| *Aremonia agrimonioides* | 11399 | L | 3 | 42 |
| *Bellis perennis* | 11228 | S | 11 | 18 |
| *Centaurea pindicola* | 11381 | L | 4 | 40+ |
| *Crepis rubra* | 11673 | S | 11 | 10K |
| *Cynoglossum columnae* | 11675 | S | 11 | 24 |
| *Doronicum columnae* | 11301 | L | 6 | 60 |
| *Draba lasiocarpa* | 11313 | S | 7 | 16 |
| *Geranium asphodeloides* | 11392 | L | 3 | 24+ |
| *Geranium macrorrhizum* | 11411 | L | 3 | 46 |
| *Geranium pyrenaicum* | 11349 | S | 6 | 26 |
| *Geranium subcaulescens* | 11298 | L | 3 | 28 |
| | 11686 | L | 3 | 28 |
| *Geum coccineum* | 11681 | L | 3 | 42 |
| | 11872 | L | 4 | 42 |
| *Geum montanum* | 11417 | L | 3 | 42 |
| *Lagoecia cominoides* | 11290 | S | 12 | 16 |
| *Lamium garganicum* | 11870 | S | 11 | 18 |
| *Lamium montanum* | 11395 | L | 3 | 36 |
| *Malabaila aurea* | 11241 | S | 7 | 20+ |
| *Marrubium velutinum* | 11220 | L | 3 | 34 |
| *Medicago minima* | 11363 | S | 4 | 16 |
| *Nepeta nuda* | 11862 | L | 3 | 18 |
| *Onosma heterophyllum* | 11424 | L | 3 | 14Δ |
| | | L | 1 | 21Δ |
| *Prasium majus* | 11842 | S | 11 | 34 |
| *Ptilostemon chamaepeuce* | 11254 | S | 9 | 32 |
| *Rumex cristatus* | 11243 | S | 11 | 80* |
| *Rumex nebroides* | 11308 | L | 4 | 14 |
| | | L | 2 | 15 |
| *Rumex pulcher* | 11249 | S | 11 | 20 |
| *Salvia triloba* | 12028 | S | 3 | 14 |
| *Saxifraga bulbifera* | 11407 | L | 3 | 28 |
| *Smyrnium rotundifolium* | 11238 | S | 8 | 22 |
| *Stachys acutifolia* | 11244 | S | 11 | 30* |
| *Tremastelma palaestinum* | 11674 | S | 11 | 14 |
| | 11735 | S | 11 | 14 |

| | |
|---|---|
| — metacentric (m) | arm ratio 1.0-1.7 |
| — submetacentric (sm) | arm ratio 1.7-3.0 |
| — subtelocentric (st) | arm ratio 3.0-7.0 |
| — acrocentric (t) | arm ratio more than 7.0 |

Chromosomes with about the same arm ratio should be combined in one group if the difference is not more than 10% in total length (Patau 1960, 1965) as was the practice in previous works (Baltisberger & Müller 1981, Baltisberger 1984, Müller & Baltisberger 1984, Baltisberger & al. 1990).

Pollen was investigated in *Achillea holosericea* and *Onosma heterophyllum*. Pollen grains were stained in carmine acetic acid. The pollen fertility (percentage of well developed pollen) was established for 100-200 grains per plant and the dimensions of 20 pollen grains per plant were noted.

## Results

*Boraginaceae*

***Cynoglossum columnae*** Ten. — $2n = 24$.

Dry, open vegetation in culture of *Prunus dulcis* (Miller) D. A. Webb, S of Manthirea, 15 km S of Tripolis, Peloponnisos, 750 m, 16.6.1987, (cult. nr. 11675).

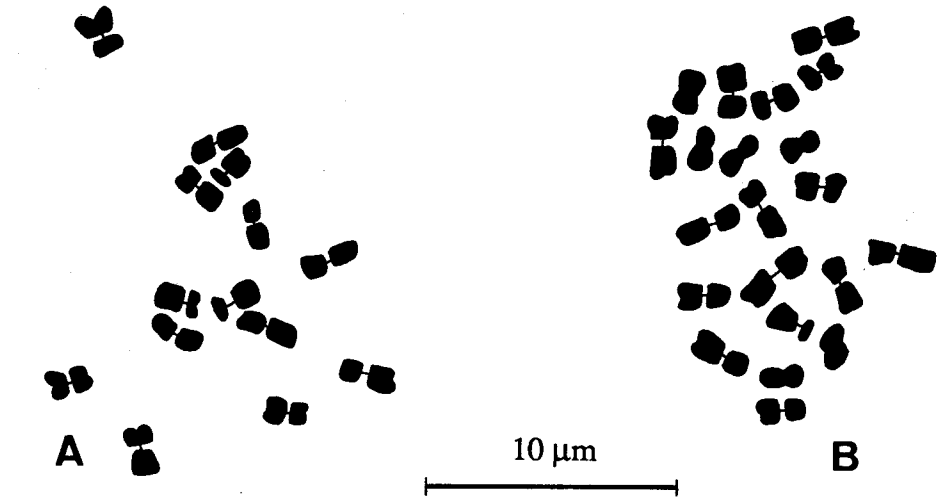
***Onosma heterophyllum*** Griseb. (det. H. Teppner, Graz). — $2n = 14, 21$ (Fig. 1)

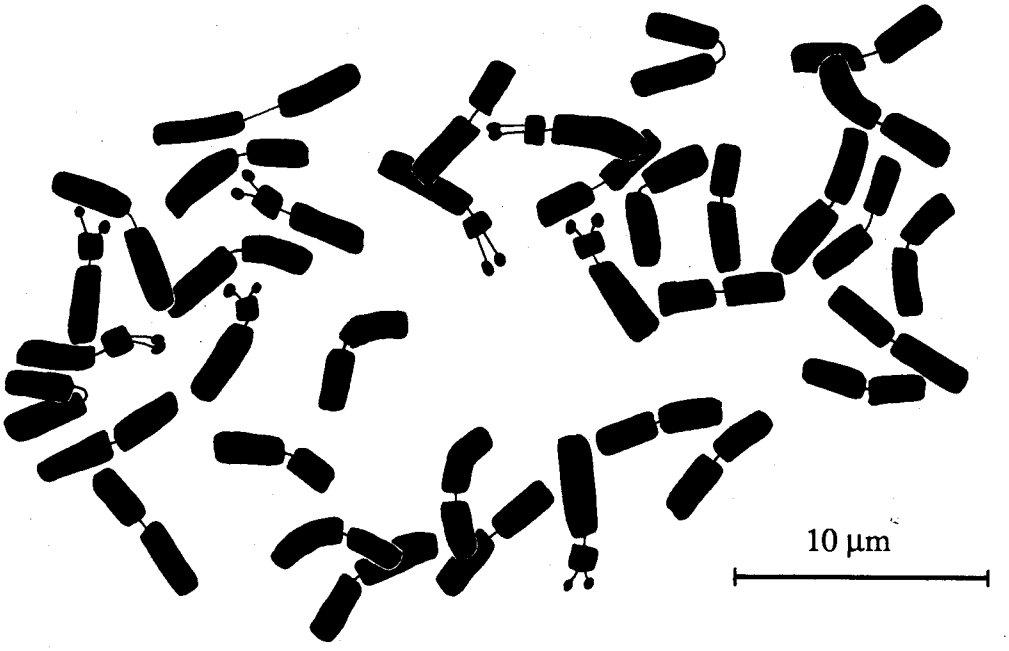
Roadside on the road to Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa, 900 m, 25.6.1987, nr. 11424 [cult. nr. 11691 ($2n = 14$), 11692 ($2n = 21$)].

Three of the four plants investigated showed $2n = 2x = 14$ chromosomes, and one plant was triploid with $2n = 21$ chromosomes. In one (and only one) root tip of a diploid plant all metaphases had $2n = 28$ chromosomes whereas the other root tips of the same plant always showed $2n = 14$ chromosomes. Endomitosis, as observed here, is not rare in *Onosma* (Teppner in lit.).

The chromosome numbers of *O. heterophyllum* indicated in literature are not homogenous: Grau (1971), Strid (1971), Markova & Ivanova (in Löve 1973) and Strid & Franzén (in Löve 1983) give $2n = 26$, whereas Teppner (1971) found $2n = 26$ and $2n = 28$, and Baltisberger (1988b) indicates $2n = 27$ chromosomes (one hypotetraploid plant from Albania). As Teppner communicated (in lit.) diploid ($2n = 14$) and tetraploid ($2n = 28$) races exist in *O. heterophyllum* but the diploid number has not been published till now.

Pollen fertility was investigated. 7 plants from the natural site (nr. 11424) as well as the 3 diploid plants in culture (nr. 11691) had a pollen fertility of nearly 100%. The triploid plant (nr. 11692) showed more than 90 % well developed pollen grains. It seems that unpair ploidy level ($3x$) or aneuploidy (Baltisberger 1988b) have no effect on the formation of the pollen in *Onosma*. But whether or not these well developed pollen grains in aneuploid and triploid plants are really fertile cannot be said.




Figs. 1-2. **1:** Somatic metaphase of *Onosma heterophyllum*. **A**: diploid with $2n = 14$. **B:** triploid with $2n = 21$; **2:** Somatic metaphase of *Achillea holosericea*.

*Compositae*

***Achillea holosericea*** Sibth. & Sm. — $2n = 36$ (Fig. 2)

NNE side of Mount Karava, 30 km W of Karditsa, 1900-2000 m, 20.6.1987, (cult. nr. 11867).

In literature only the diploid chromosome number $2n = 18$ is indicated (Contandriopoulos & Martin 1967, Strid & Franzén in Löve 1981, Baltisberger 1984). But the 3 plants from Karava showed $2n = 4x = 36$ chromosomes. This is the first record of tetraploid *A. holosericea*. The karyotype of the tetraploid plants consists of 28 metacentric and 8 submetacentric to subtelocentric chromosomes, the latter with satellites. This corresponds (except for the ploidy level) with the karyotype of diploid *A. holosericea* (Baltisberger 1984). Here, too, the pollen was investigated. The 3 tetraploid plants showed a pollen fertility of about 43%. The diameter of the pollen was 30 µm with a deviation of $s = \pm 3.17$. Additionally, as a comparison between tetraploid plants and diploids, 3 diploid plants from Mali i Snoit, E of Tirana, Albania (nr. 82/1617, cult. nr. 83/1003, Baltisberger & Lenherr 1984b, Baltisberger & Lippert 1987) were investigated. They had more than 95% well developed pollen grains. The diameter of the pollen of these diploid plants was 24.2 µm, and there was less variation in the pollen size ($s = \pm 1.60$). Similar results were obtained in *Ranunculus kuepferi* Greuter & Burdet by Küpfer (1974) and Huber (1984, 1988). Diploid plants of *R. kuepferi* had a fertility of 80-100% while the tetraploids showed less than 50% well developed pollen grains. The diameter of the pollen in diploids was about 28 µm, in tetraploids 32-38 µm (Huber 1988). The increase of pollen diameter from diploid to tetraploid plants in *R. kuepferi* is in about the same range (14-36%) as in *A. holosericea* (24%). The great variation in size and the low fertility within tetraploids indicate that meiosis may be irregular and chromosome contents may vary within individual pollen grains. Based on the 3 tetraploid plants the following can be said about morphology: the leaves of tetraploids are less divided, the cauline leaves are larger and the capitula somewhat bigger than in diploids. But it seems that there is no significant difference in morphological characters between diploid and tetraploid *A. holosericea*.

***Anthemis carpatica*** Willd. — $2n = 36$

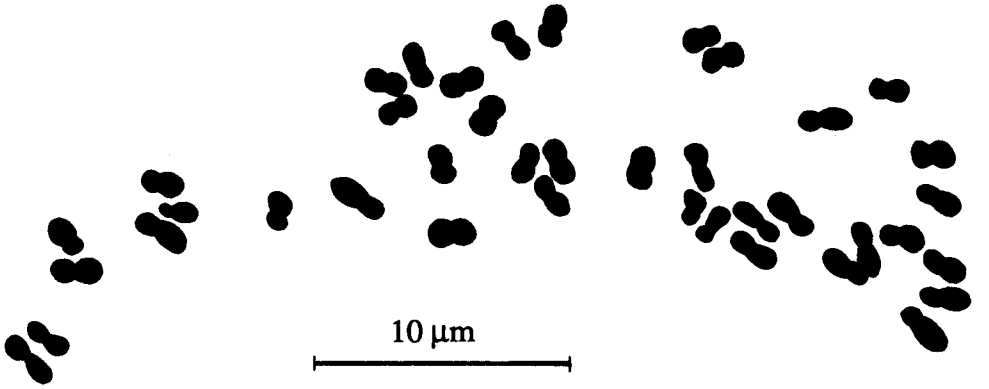
Alpine meadow, SE side of Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa, 2100 m, 25.6.1987, nr. 11415 (cult. nr. 11688).

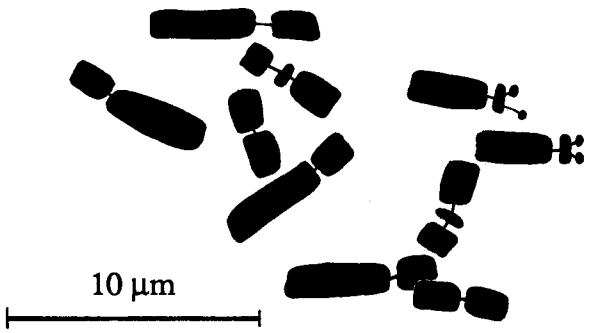
***Bellis perennis*** L. — $2n = 18$

Roadside, W side of Mount Tsoumerka, 40 km SE of Ioannina, 1000 m, 15.6.1987, nr. 11228 (cult. nr. 11669).

***Centaurea pindicola*** (Griseb.) Griseb. ex Boiss. (det. G. Wagenitz, Göttingen). — $2n = 40$ (Fig. 3)

Rocky place near Refuge A, E side of Mount Olympus 2000 m, 23.6.1987, nr.




Figs. 3-4. **3:** Somatic metaphase of *Centaurea pindicola;* **4:** Somatic metaphase of *Crepis rubra.*

11381.

All plants investigated showed $2n = 40$ chromosomes. The only indication in literature (Strid & Franzén in Löve 1981) gives $2n$ = ca. 44. *C. pindicola* belongs to *C.* subg. *Cyanus* (Miller) Hayek (Dostál 1976).

Within this subgenus different chromosome numbers are known: $2n = 20, 22, 24, 44$. In *C.* subg. *Cyanus* two systematically difficult complexes exist with different basic chromosome numbers: *C. triumfetti* All. s.l. with $2n = 22, 44$ (see Van Loon 1987) and *C. napulifera* Rochel s.l. with $2n = 20$ (*C. napulifera*: Strid & Andersson 1985; *C. tuberosa* Vis.: Siljak-Yakovlev in Löve 1985). In view of the two different chromosome numbers indicated for *C. pindicola* ($2n = 40$ resp. ca. 44) it cannot be said whether this species is more closely related to *C. napulifera* s.l. (with the basic chromosome number $x = 10$) or *C. triumfetti* s.l. (with $x = 11$).

***Crepis rubra*** L. — $2n = 10$ (Figs. 4, 5)

Dry open vegetation in culture of *Prunus dulcis* (Miller) D. A. Webb, S of Manthirea, 15 km S of Tripolis, Peloponnisos, 750 m, 16.6.1987, (cult. nr. 11673).

The chromosome number of $2n = 2x = 10$ corresponds with most of the indications in literature. The karyotype consists of 2 pairs of large submetacentric, 1 pair of medium sized telocentric, 1 pair of small metacentric and 1 pair of small subtelocentric chromosomes (Fig. 5, Tab. 2).

The telocentric chromosomes bear small satellites, the subtelocentric chromosomes have satellites which are much larger than the short arms of the chromosomes. A similar karyotype and idiogram for *C. rubra* is given by Ferrer & Lacadena (1977), but they indicate satellites only for the subtelocentric chromosomes.

*C. rubra*, along with *C. alpina* L. and *C. foetida* L., belongs to *C.* sect. *Barkhausia* (Moench) Gaudin (Sell 1976). All species of this section have the same chromosome number $2n = 10$ (Babcock 1947, Sell 1976) but the karyotypes are different. *C. foetida* has the chromosome formula $2n = 2x = 10 = 4m + 4sm + 2st^{sat}$ [Bartolo & al. 1978, Brullo & al. 1979, Baltisberger (unpublished)]. A somewhat different karyotype ($2m + 6sm + 2st^{sat}$) is indicated by Nazarova (1968). The formula of *C. rubra* is $2n = 2x = 10 = 2m + 4sm + 2st^{sat} + 2t^{sat}$. The karyotype of *C. alpina* is not known in detail.

*Table 2. Chromosome values (in µm) measured in 10 metaphase plates of Crepis rubra.*

| Chromosome number | Long arm | | Short arm | | Satellities | | Arm ratio | Chromosome group |
|---|---|---|---|---|---|---|---|---|
| | x | s | x | s | x | s | | |
| 1-4 | 3.80 | 0.23 | 1.54 | 0.13 | — | | 2.47 | sm |
| 5+6 | 2.92 | 0.15 | 0.39 | 0.08 | + | | 7.49 | t |
| 7+8 | 1.67 | 0.13 | 1.50 | 0.11 | — | | 1.11 | m |
| 9+10 | 1.66 | 0.11 | 0.36 | 0.08 | 1.01 | 0.10 | 4.61 | st |

***Doronicum columnae*** Ten. — $2n = 60$

Summit area of Mount Karava, 30 km W of Karditsa, 2150-2184 m, 20.6.1987, nr. 11301 (cult. nr. 11676).

***Ptilostemon chamaepeuce*** (L.) Less. — $2n = 32$

Rocky places, peninsula of Monemvasia, 65 km SE of Sparta, Peloponnisos, 20-50 m, 17.6.1987, nr. 11254.

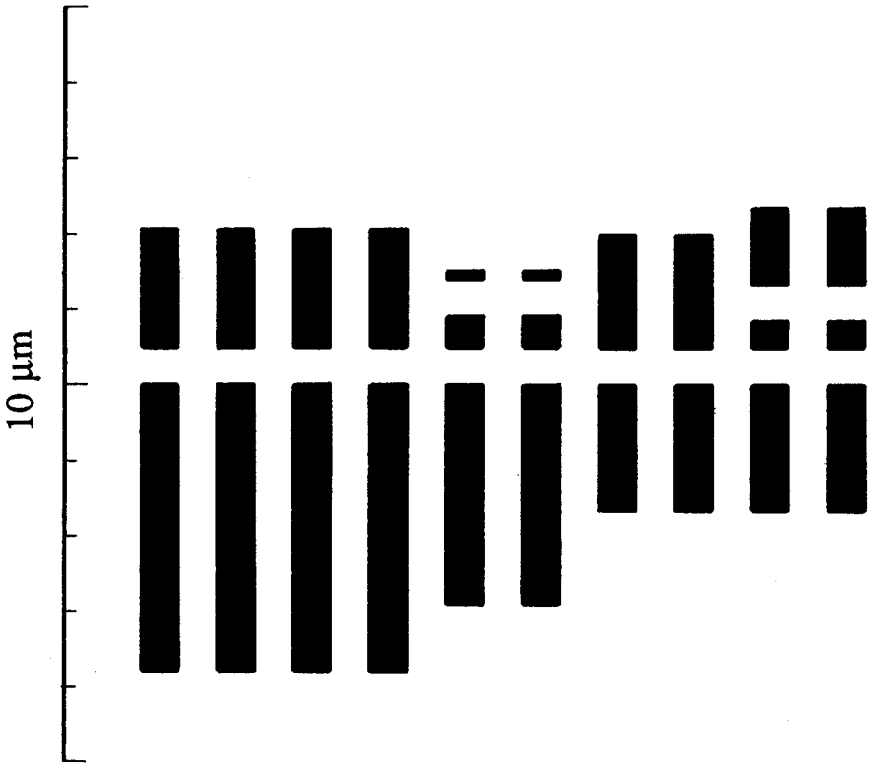



Fig. 5. Idiogram of *Crepis rubra*.

*Cruciferae*

***Alyssum alyssoides*** (L.) L. (= *A. calycinum* L.). — $2n = 32$

W side of Mount Tsoumerka, 40 km SE of Ioannina, 1400-1600 m, 15.6.1987, nr. 11216 (cult. nr. 11723).

***Draba lasiocarpa*** Rochel. — $2n = 16$

NNE side of Mount Karava, 30 km W of Karditsa, 1900-2000 m, 20.6.1987, nr. 11313 (cult. nr. 11868).

*Dipsacaceae*

***Tremastelma palaestinum*** (L.) Janchen. — $2n = 14$

Dry, open vegetation in culture of *Prunus dulcis* (Miller) D. A. Webb, S of Manthirea, 15 km S of Tripolis, Peloponnisos, 750 m, 16.6.1987, (cult. nr. 11674). Roadside NE of Gythion, 35 km SSE of Sparta, Peloponnisos, 20 m, 17.6.1987, (cult. nr. 11735).

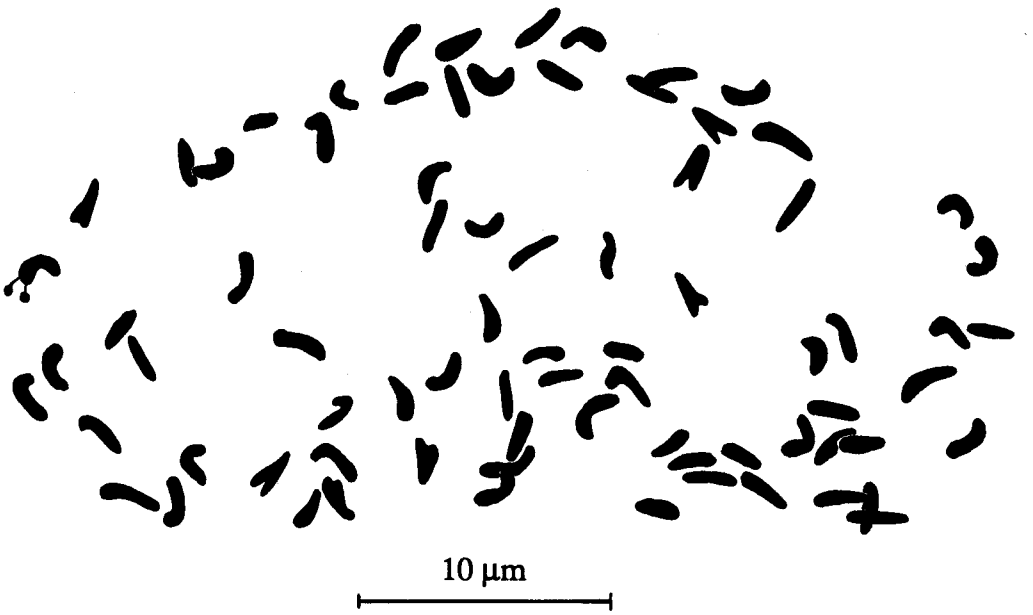
All plants examined from both localities had $2n = 2x = 14$ chromosomes. However, life strategy and behaviour of plants from the two populations in the greenhouse were quite different. For this study plants were kept in the same chamber of the greenhouse in all stages (from seed to adult plant). The seeds were sown in September 1987. They germinated within the following 4 weeks, and then the seedlings formed leaf rosettes. The plants grown from seeds from Manthiera remained in this stage and did not flower until the next summer (1988), as with typical biennials. The plants had stems up to 30 cm long with the few lateral branches rising above the central stem, and with mostly 5 capitula. The plants of seeds from Gythion did not remain in the rosette stage, but flowered immediately between January and March 1988 and behaved like true annuals. Those plants were much larger (up to 1 m) with numerous lateral branches not rising above the central stem, and with a greater number of capitula (9-25).

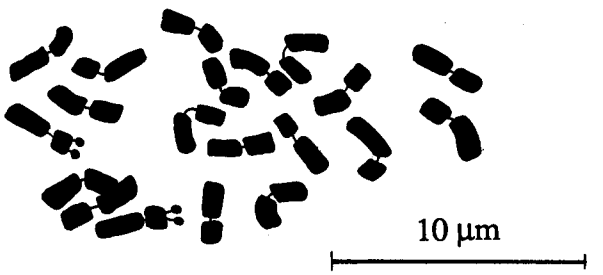
The differences found between plants from the two sites in the greenhouse correspond with the specific ecology in their native habitats. In Manthiera the canopy was not closed (probably because of the poor, very stony soil), and most co-occuring plants were not higher than 30 cm. Therefore enough room and light is available for the rosettes of *Tremastelma* to survive until flowering the following year (biennial). In Gythion, however, the lush vegetation was nearly closed, and many plants of other species reached a size of 1 m or more. Under these conditions rosettes of *Tremastelma* could not survive. Plants are forced to grow up immediately as high as the co-occuring species to be able to flower and produce seeds (annual). This obvious ecological adaptation of plants from the two sites may be the first step towards an evolutionary separation into different races (and further on, different species).

*Geraniaceae*

***Geranium asphodeloides*** Burm. fil. (confirm. P. F. Yeo, Cambridge). — $2n = 24$

Wet place in *Pinus* wood S of Kataphygion, Pieria Ori, 30 km E of Kozani, 1500 m, 24.6.1987, nr. 11392 (cult. nr. 11680).The chromosome number of $2n = 24$ corresponds with the indications of Van Loon & Oudemans (in Löve 1982) and Van Loon (1984) but other numbers have also been communicated (see Yeo 1984): $2n = 26$ (Guittonneau 1975), $2n = 28$ (Warburg 1938) and $2n = 30$ (Strid & Franzén in Löve 1981).




Figs. 6-7. 6: Somatic metaphase of *Stachys acutifolia*; 7: Somatic metaphase of *Rumex cristatus*.

***Geranium macrorrhizum*** L. (confirm. P. F. Yeo, Cambridge). — $2n = 46$

Wet roadside in open wood, on the road from Kataphygion to Velvendos, Pieria Ori, 30 km E of Kozani, 1250 m, 24.6.1987, nr. 11411 (cult. nr. 11871).

***Geranium pyrenaicum*** Burm. fil. (confirm. P. F. Yeo, Cambridge). — $2n = 26$

Open wood near Kastanea, 40 km WNW of Trikala, 800 m, 22.6.1987, nr. 11349 (cult. nr. 11677).

***Geranium subcaulescens*** L'Hér. [= *G. cinereum* Cav. subsp. *subcaulescens* (L'Hér. ex DC.) Hayek]. — $2n = 28$

Summit area of Mount Karava, 30 km W of Karditsa, 2150-2184 m, 20.6.1987, nr. 11298 (cult. nr. 11732). (conf. P. F. Yeo, Cambridge)
Alpine meadow, SE side of Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa; 2100 m; 25.6.1987; (cult. nr. 11686).

*Gramineae*

***Anthoxanthum odoratum*** L. — $2n = 10$

Alpine meadow, SE side of Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa, 2000 m, 25.6.1987, (cult. nr. 11687).

*Labiatae*

***Lamium garganicum*** L. — $2n = 18$

Open wood near Kastanea, 40 km WNW of Trikala, 800 m, 22.6.1987, (cult. nr. 11870).

***Lamium montanum*** Pers. [= *Lamiastrum galeobdolon* (L.) Ehrend. & Polatschek subsp. *montanum* (Pers.) Ehrend. & Polatschek]. — $2n = 36$

Open wood S of Kataphygion, Pieria Ori, 30 km E of Kozani, 1500 m, 24.6.1987, nr. 11395.

***Marrubium velutinum*** Sibth. & Sm. — $2n = 34$

W side of Mount Tsoumerka, 40 km SE of Ioannina, 1400-1600 m, 15.6.1987, nr. 11220 (cult. nr. 11694).

***Nepeta nuda*** L. — $2n = 18$

NE side of Mount Karava, 30 km W of Karditsa, 1950-2000 m, 20.6.1987, (cult. nr. 11862).

***Prasium majus*** L. — $2n = 34$

Rocky place near Gythion, 35 km SSE of Sparta, Peloponnisos, 20 m, 17.6.1987, (cult. nr. 11842).

***Salvia triloba*** L. fil. — $2n = 14$

Rocky place near Gythion, 35 km SSE of Sparta, Peloponnisos, 20 m, 17.6.1987, (cult. nr. 12028).

***Stachys acutifolia*** Bory & Chaub. — $2n = 30$ (Fig. 6)

Dry, open vegetation in culture of *Prunus dulcis* (Miller) D.A. Webb, S of Manthirea, 15 km S of Tripolis, Peloponnisos; 750 m; 16.6.1987; nr. 11244 (cult. nr. 11672 & 11861).

*S. acutifolia* is related to *S. germanica* L. s.l. (Ball 1972). The chromosome number of *S. acutifolia* was not known up to now. With its 30 chromosomes it corresponds with the indications for all other species of this group.

*Papilionaceae*

***Medicago minima*** (L.) Bartal. — $2n = 16$

Open wood near Kastanea, 40 km WNW of Trikala, 700 m, 22.6.1987, nr. 11363 (cult. nr. 11654).

*Polygonaceae*

***Rumex cristatus*** DC. (= *R. graecus* Boiss. & Heldr.). — $2n = 80$ (Fig. 7)

Roadside near Kalanos, on the road from Patras to Kalavrita, Erimanthos Oros, Peloponnisos, 650 m, 16.6.1987, nr. 11243.

The chromosome number of *R. cristatus* was unknown up to now. *R. cristatus* is closely related to *R. kerneri* Borbas and *R. olympicus* Boiss. (Rechinger 1933, Akeroyd 1986). With its chromosome number of $2n = 80$, *R. cristatus* corresponds with the indications for these two related species (for *R. kerneri* see Van Loon 1987; *R. olympicus*

see Baltisberger 1990).

***Rumex nebroides*** Campd. (= *R. gussonei* Arcangeli see Rechinger 1971). — female $2n = 14$, male $2n = 15$

NE side of Mount Karava, 30 km W of Karditsa, 1950-2000 m, 20.6.1987, nr. 11308 (cult. nr. 11720).

In the recently published "Mountain Flora of Greece" (Strid 1986) the name *R. nebroides* is used instead of the name *R. gussonei* as in "Flora Europaea".

***Rumex pulcher*** L. — $2n = 20$

Dry, open vegetation in culture of *Prunus dulcis* (Miller) D. A. Webb, S of Manthirea, 15 km S of Tripolis, Peloponnisos, 750 m, 16.6.1987, nr. 11249.

*Rosaceae*

***Aremonia agrimonioides*** (L.) DC. — $2n = 42$

Open wood S of Kataphygion, Pieria Ori, 30 km E of Kozani, 1500 m, 24.6.1987, nr. 11399 (cult. nr. 11682).

***Geum coccineum*** Sibth. & Sm. — $2n = 42$

Wet place in *Pinus* wood S of Kataphygion, Pieria Ori, 30 km E of Kozani, 1500 m, 24.6.1987, (cult. nr. 11681).
Wet place, SE side of Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa, 1850 m, 25.6.1987, (cult. nr. 11872).

***Geum montanum*** L. — $2n = 42$

Alpine meadow, SE side of Mount Kajmakcalan, Voras Oros, 25 km NW of Edhessa, 2220 m, 25.6.1987, nr. 11417 (cult. nr. 11689).

*G. montanum* has its main distribution in the Alps (Gajewski 1968). Only a few stations are known in the northernmost part of Greece (Persson 1986), one of them is Mount Kajmakcalan (Strid 1978).

*Saxifragaceae*

***Saxifraga bulbifera*** L. — $2n = 28$

Open place in *Pinus* wood S of Kataphygion, Pieria Ori, 30 km E of Kozani, 1500

m, 24.6.1987, nr. 11407 (cult. nr. 11684).

*Umbelliferae*

***Lagoecia cuminoides*** L. — $2n = 16$

Rocky place, S side of Ori Lidorikiou, near the road from Amfissa to Lidorikion, 650-700 m, 19.6.1987, nr. 11290 (cult. nr. 11651).

***Malabaila aurea*** (Sibth. & Sm.) Boiss. — $2n = 20$ (Fig. 8)

Roadside near Kalanos, on the road from Patras to Kalavrita, Erimanthos Oros, Peloponnisos, 650 m, 16.6.1987, nr. 11241 (cult. nr. 11724).

The chromosome number of $2n = 20$ does not correspond with the indications in literature where $2n = 22$ is given [Moore in Tutin 1968 (see Moore 1982), Van Loon & Snelders in Löve 1979].

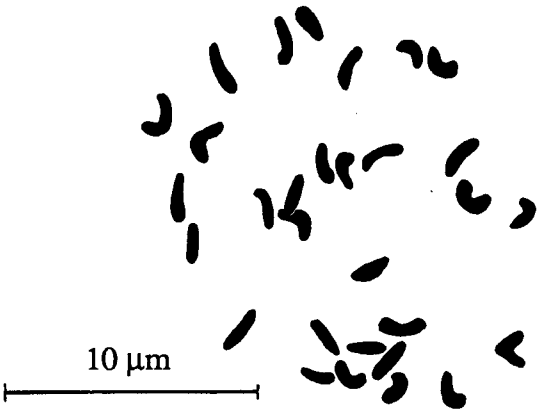



Fig. 8. Somatic metaphase of *Malabaila aurea*.

***Smyrnium rotundifolium*** Miller. — $2n = 22$

Roadside near Kalanos, on the road from Patras to Kalavrita, Erimanthos Oros, Peloponnisos, 650 m, 16.6.1987, nr. 11238 (cult. nr. 11860).

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