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Autor: Baltisberger, Matthias
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Cytological investigations on some Albanian plant species

MATTHIAS BALTISBERGER

RÉSUMÉ

BALTISBERGER, M. (2002). Données cytologiques de quelques plantes albanaises. *Candollea* 56: 245-259. En anglais, résumés français et anglais.

Les nombres chromosomiques de 31 espèces d'Angiospermes (38 localités) d'Albanie sont présentés, dont ceux de 16 taxa mentionnés pour la première fois pour des plantes d'Albanie. Les karyotypes de quelques espèces (par exemple dans les genres *Achillea* et *Ranunculus*) sont discutés. Des aspects taxonomiques et phytogéographiques de certaines espèces sont commentés.

ABSTRACT

BALTISBERGER, M. (2002). Cytological investigations on some Albanian plant species. *Candollea* 56: 245-259. In English, French and English abstracts.

The chromosome numbers are reported for 31 species of Angiosperms (from 38 sites) from Albania, the numbers of 16 taxa are recorded for the first time from Albanian material. Karyotypes are discussed for several species (e.g. within genera *Achillea* and *Ranunculus*). Taxonomic and phyto-geographical aspects of some species are discussed.

KEY-WORDS: Albania – Angiosperms – Chromosome numbers – Karyotypes.

On botanical excursions as well as on visits for personal and humanitarian reasons, Albania was visited several times. On most of the visits (1982, 1989, 1991, 1993, 1994) plant material was sampled (living plants as well as seeds). Most of the collected plants were used for current biosystematic investigations, but some additional plants of special interest were sampled. The living or seedborn plants were cultivated in the greenhouse of the Geobotanical Institute, Zürich. Cytological investigations have been carried out. Most of the results have been published earlier (BALTISBERGER, 1984, 1987, 1988, 1991a, 1992, 1993; BALTISBERGER & BALTISBERGER, 1995; BALTISBERGER & LEUCHTMANN, 1991; BALTISBERGER & LIPPERT, 1987; BALTISBERGER & al., 1993), but some results remained unpublished for several reasons. They are presented here.

Families are arranged in alphabetical order, genera in alphabetical order within families, and species alphabetically within genera. Nomenclature usually follows "Flora Europaea". After the indications of the site (localisation of the respective site, see Fig. 1), altitude, date of sampling, number of herbarium specimen (in parenthesis specimen number of cultivated plants) are listed. Specimens are deposited in Z/ZT.

In some cases systematics and/or geographic distribution is discussed. The here published chromosome numbers are only discussed if they are of special interest (e.g. first record for Albanian plants or not corresponding with earlier counts). Literature was checked using FEDEROV (1974), VAN LOON (1987), as well as the series "Index to plant chromosome numbers"

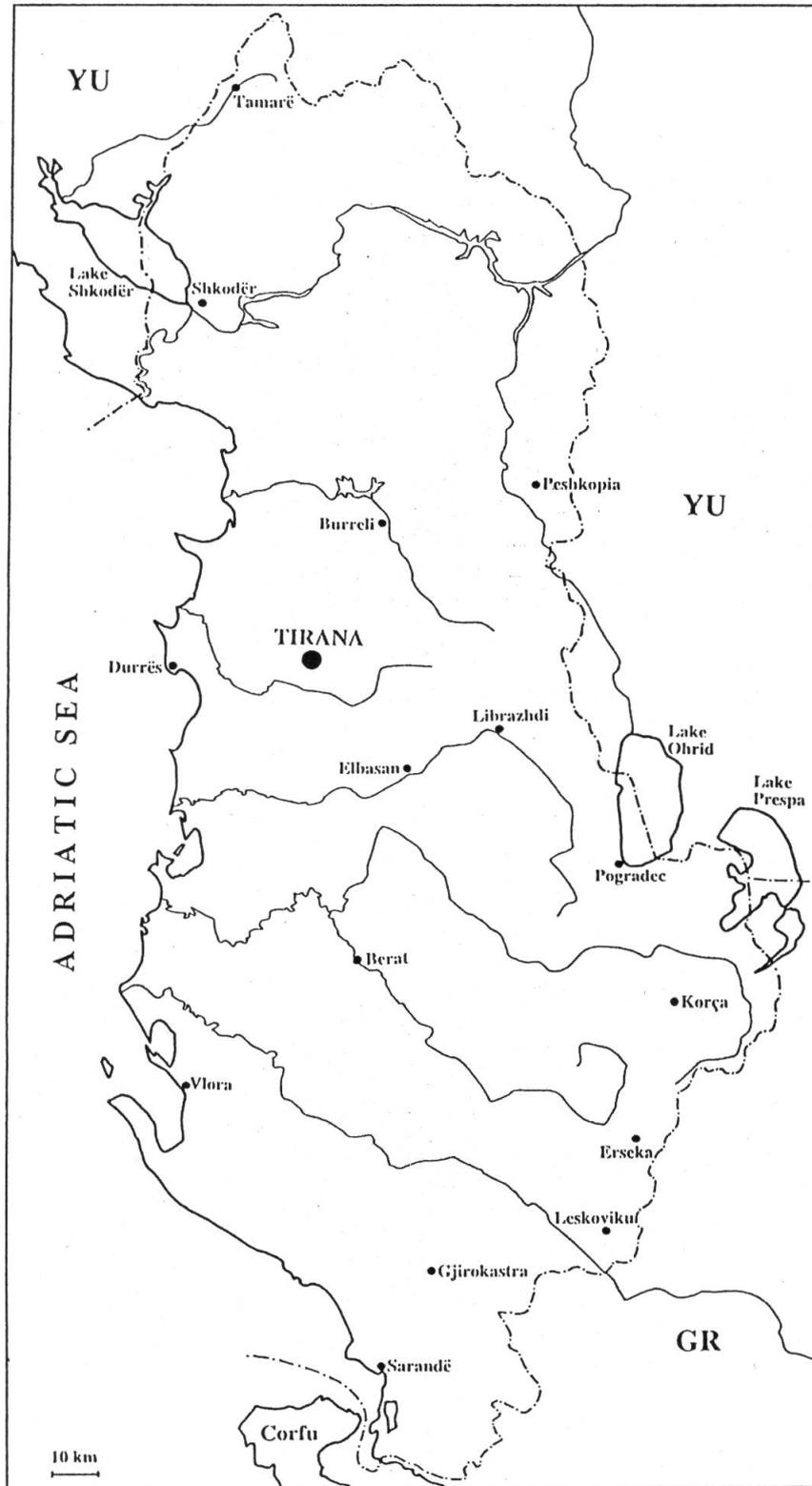


Fig. 1.— Map of Albania.

Table 1. – Alphabetical list of investigated species. * first record for Albanian material.				
Species	Voucher number	Collected material	Individuals investigated	2n
Achillea abrotanoides	12815	L	13	18
Achillea abrotanoides	12967	L	8	18
Achillea chrysocoma	12914	L	8	72
Achillea chrysocoma	12941	L	8	72
Achillea crithmifolia	12823	L	14	18
Achillea crithmifolia	12940	L	10	18
Achillea fraasii	12939	L	12	18
Achillea millefolium s.l.	12938	L	6	36
Achillea millefolium s.l.	13187	L	9	36
Alyssoides utriculata	13076	S	6	16*
Centaurea pindicola	12966	L	10	40*
Elymus pycnanthus	13079	S	4	42*
Jovibarba heuffelii	12937	L	4	38
Myosotis suaveolens	12960	L	9	24*
Nepeta sibthorpii	12958	L	9	16*
Omalotheca sylvatica	12942	L	4	56*
Onosma echioides	11944	S	9	14*
Onosma echioides	12526	S	9	14
Opopanax hispidus	13484	S	9	22*
Polygonatum odoratum	12951	L	11	20*
Potentilla aurea	13269	L	3	42*
Ranunculus montanus s.l.	12965	L	12	16
Ranunculus polyanthemoides	12950	L	5	16*
Ranunculus repens	12949	L	6	32
Ranunculus serbicus	12948	L	6	28
Salvia candidissima	13191	L	4	22*
Scabiosa crenata	12947	L	6	18
Scabiosa crenata	12969	L	4	18
Scrophularia canina	12961	L	7	26*
Scutellaria orientalis subsp. pinnatifida	12946	L	5	22*
Sideritis raeseri	12943	L	5	32
Silene parnassica	13106	L	4	24*
Stachys baldaccii	12953	L	5	34
Stachys germanica	12945	L	6	30
Staezelina uniflosculosa	12968	L	8	34
Teucrium chamaedrys	12944	L	8	62
Teucrium chamaedrys	12957	L	6	62
Thalictrum minus s.l.	12963	L	6	84*

(MOORE, 1973, 1974, 1977; GOLDBLATT, 1981, 1984, 1985, 1988; GOLDBLATT & JOHNSON, 1990, 1991, 1994, 1996, 1998, 2000). In some groups (e.g. *Achillea*, *Ranunculus*) karyotypes are discussed.

Methods

All cytological investigations were carried out on root tips. These were pretreated with colchicine (0.05%) for 1/2 to 2 hours, then 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, and at least 3 individuals were investigated of each species (or each site, respectively). The numbers of investigated individuals are indicated in Table 1.

Discussing karyotypes the terminology for chromosome morphology proposed by LEVAN & al. (1964) is used. The chromosomes are named according to the position of the centromers, which is expressed with the arm ratio, "long arm to short arm". The following terms are used:

metacentric	arm ratio	1.0-1.7
submetacentric	arm ratio	1.7-3.0
subtelocentric	arm ratio	3.0-7.0
acrocentric	arm ratio	more than 7.0
telocentric		only one arm

Boraginaceae

Myosotis suaveolens Waldst. & Kit. ($2n = 24$)

Calcareous scree, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1900-1950 m, 8.8.1994, *Baltisberger 12960* (*Baltisberger 13105*).

The group of *M. alpestris* consists of about 8 closely related species most of them occurring in the montane and alpine zones of the European mountains (GRAU & MERXMÜLLER, 1972). *Myosotis suaveolens* is one of the representatives of this group in the southern Balkan (STRID, 1991). Within the group 3 ploidy levels are known ($2n = 2x = 24$, $2n = 4x = 48$, $2n = 6x = 72$), but within *M. suaveolens* only diploid and tetraploid plants exist. The chromosome number is given for the first time for Albanian plants, with 24 chromosomes they are diploid.

Onosma echioides L. (= *O. dalmatica* Scheele; det. H. Teppner, Graz) ($2n = 14$; Fig. 2)

Rocky place in the gorge S of Raps, near the road from Shkodër to Tamarë, about 35 km N of Shkodër, district Shkodër, 400-450 m, 13.8.1989, (*Baltisberger 12526*). Rocky slope, SW-side of Mount Çikes, SSE of Vlora, district Vlora, 1300-1400 m, 9.8.1989, *Baltisberger 11944* (*Baltisberger 12381*).

The chromosome number of *O. echioides* is given for the first time for Albanian material. Within *Onosma* 2 types of chromosomes are recognized by TEPPNER (1971a), viz. long (named L) and short chromosomes (named K), which not only differ in shape but also in their behavior during the cell cycle. *Onosma echioides* has K chromosomes (also called chromosomes of the *O. echioides* type). As given in TEPPNER (1971b) the chromosomes of 1 pair with clearly unequal arms show satellites.



Fig. 2. – Somatic metaphase of *Onosma echioides* L. (Baltisberger 12526) ($2n = 14$).

Caryophyllaceae

Silene parnassica Boiss. & Spruner ($2n = 24$)

Calcareous scree, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1900-1950 m, 8.8.1994, (Baltisberger 13106).

Silene parnassica can be divided into several subspecies, the plants studied here belong to subsp. *parnassica*, which is rather widespread in mountains from Peloponnisos through the Pindhos range to S Albania (GREUTER, 1995, 1997). All plants investigated were infected with the smut *Microbotrium* sp. The chromosome number of *S. parnassica* is given for the first time for Albanian material.

Compositae

Achillea abrotanoides (Vis.) Vis. ($2n = 18$; Fig. 3)

Calcareous scree, Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 2000 m, 8.8.1994, Baltisberger 12967 (Baltisberger 13190). Scree SE of the summit of Mount Gramos, E of Erseka, district Kolonja, 2200-2250 m, 12.8.1993, Baltisberger 12815 (Baltisberger 12930).

Achillea abrotanoides is a mountain species of the western Balkan Peninsula. All indications in literature give the same diploid number as found in the Albanian plants.

The karyotype consists of 14 metacentric and 4 submeta- to subtelocentric chromosomes, the latter with satellites. The same karyotype for *A. abrotanoides* has been published by BALTISBERGER (1993, here also further comments) and BALTISBERGER & BALTISBERGER (1995). Same karyotypes were also found in other species of the genus *Achillea* (partly on higher ploidy levels, and even in not related species; see the other species here or e.g. in BALTISBERGER, 1993).

Achillea chrysocoma Friv. ($2n = 72$; Fig. 3)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, Baltisberger 12941 (Baltisberger 13097). Slope, W-side of Mount Gramos, E of Erseka, district Kolonja, 1900 m, 12.8.1993, (Baltisberger 12914).

Achillea chrysocoma grows in the mountains of the southern Balkan Peninsula. Two ploidy levels are known viz. hexaploid ($2n = 6x = 54$) and octoploid ($2n = 8x = 72$). The hexaploid plants grow in the Mount Korab and the adjacent range Sar Planina (BALTISBERGER, 1992), while the octoploid plants come from Mount Thatë, S Albania (BALTISBERGER & BALTISBERGER, 1995). Mount Malingelos as well as Mount Gramos are situated in southern Albania, the

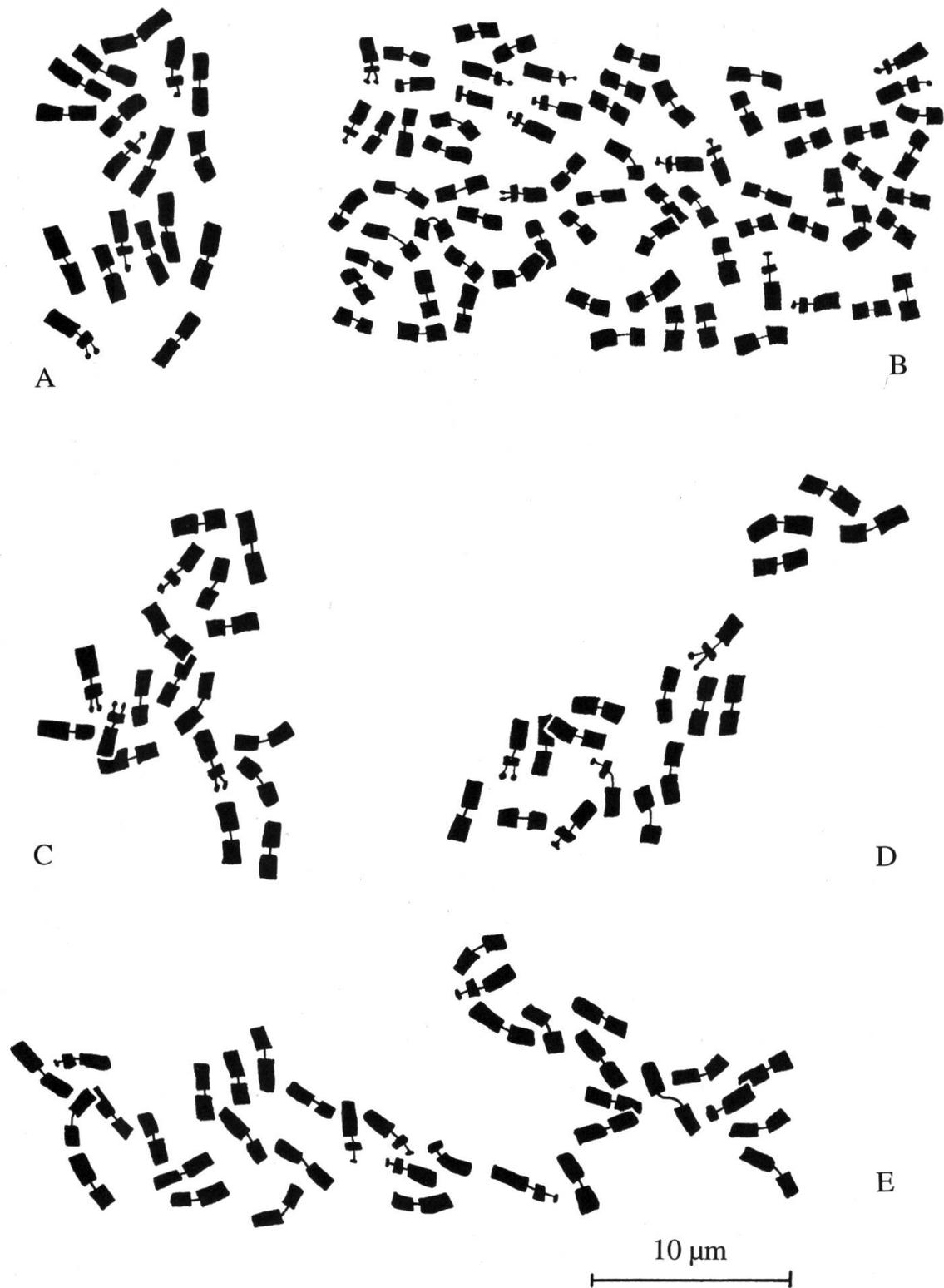


Fig. 3. – Somatic metaphases. **A**, *Achillea abrotanoides* (Vis.) Vis. (Baltisberger 12815) ($2n = 18$); **B**, *Achillea chrysocoma* Friv. (Baltisberger 12941) ($2n = 72$); **C**, *Achillea crithmifolia* Waldst. & Kit. (Baltisberger 12940) ($2n = 18$); **D**, *Achillea fraasii* Sch. Bip. ($2n = 18$); **E**, *Achillea millefolium* L. s. l. (Baltisberger 12938) ($2n = 36$).

here investigated plants from both mountains are octoploid. This corresponds with the indication from Mount Thatë. It seems that the geographical areas of the respective ploidy levels are separated, the hexaploid with a northern and the octoploid level with a southern area. Investigations on plants from further mountains will show if the distribution of the ploidy levels is really geographically separated or not.

The karyotype of the octoploid *A. chrysocoma* shows 56 metacentric and 16 submeta- to subtelocentric chromosomes, the latter with satellites (not always all satellites visible; comment see above under *A. abrotanoides*).

Achillea crithmifolia Waldst. & Kit. ($2n = 18$; Fig. 3)

Rocky slope, W-side of Mount Thatë, NE of the village Bletas, ESE of Pogradec, district Pogradec, 1400-1500 m, 16.8.1993, *Baltisberger 12823* (*Baltisberger 12920*). Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12940* (*Baltisberger 13096*).

Achillea crithmifolia occurs in E Europe, southwards to Greece and Turkey-in-Europe. Two ploidy levels exist, $2n = 2x = 18$ and $2n = 4x = 36$ (compilation see BALTISBERGER, 1994), the plants of both Albanian sites are diploid with 18 chromosomes.

The karyotype with 14 metacentric and 4 submeta- to subtelocentric satellited chromosomes corresponds with that of other sites of *A. crithmifolia* (BALTISBERGER, 1994; BALTISBERGER & BALTISBERGER, 1995) and also with that of other species of *Achillea* (comment see above under *A. abrotanoides*).

Achillea fraasii Sch. Bip. ($2n = 18$; Fig. 3)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12939* (*Baltisberger 13095*).

Achillea fraasii is a species of the western part of the Balkan Peninsula. Diploid as well as tetraploid plants exist (compilation see BALTISBERGER & BALTISBERGER, 1995). The plants from Mount Malingelos are diploid.

Fourteen chromosomes are metacentric, and 4 chromosomes are submeta- to subtelocentric with satellites. Thus the karyotype corresponds to that of *A. fraasii* of other sites (BALTISBERGER, 1993; BALTISBERGER & BALTISBERGER, 1995) and to that of other species of *Achillea* (comment see above under *A. abrotanoides*).

Achillea millefolium L. s. l. ($2n = 36$; Fig. 3)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12938* (*Baltisberger 13397*, *Baltisberger 13506*). Slope, W-side of Mount Gramos, E of Erseka, district Kolonja, 1900 m, 12.8.1993, (*Baltisberger 13187*).

Achillea millefolium s. l. is a taxonomically very difficult polyploid complex occurring throughout most of Europe, W Asia and N America. The knowledge about delimitations and relationships of the taxa from southern Europe and W Asia is incomplete. Hybridization and introgression is frequent in this complex, often making identification difficult (FRANZEN, 1991). The plants of both S Albanian sites are tetraploid, said to be typical (but not only) for *A. collina* J. Becker ex Reichenb.

The karyotype consists of 28 metacentric and 8 submeta- to subtelocentric chromosomes, the latter with satellites (not always all satellites visible; comment see above under *A. abrotanoides*).

Centaurea pindicola Griseb. ($2n = 40$)

Calcareous scree, Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 2000 m, 8.8.1994, *Baltisberger 12966* (*Baltisberger 13108*).

Centaurea pindicola occurs in mountains of SW Balkan Peninsula. Two different chromosome numbers are given in literature, STRID & FRANZEN (1981) with $2n = c.44$, and BALTISBERGER (1991b) with $2n = 40$, both investigating plants from Mount Olimbos. The chromosome number of *C. pindicola* is given for the first time for Albanian material. The number corresponds with one of the indications in literature (comment see BALTISBERGER, 1991b).

Omalotheca sylvatica (L.) Sch. Bip. & F. W. Schultz (= *Gnaphalium sylvaticum* L.) ($2n = 56$)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12942* (*Baltisberger 13000*).

The chromosome number of *O. sylvatica* is given for the first time for Albanian material.

Stachelina uniflosculosa Sibth. & Sm. ($2n = 34$)

Slope near the village Gjerbës, E-side of Mount Tomor, ESE of Berat, district Skrapar, 1100 m, 8.8.1994, *Baltisberger 12968* (*Baltisberger 13111*).

Crassulaceae

Jovibarba heuffelii (Schott) A. Löve & D. Löve ($2n = 38$)

Rocky places on the summit W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1800-1823 m, 3.8.1994, *Baltisberger 12937* (*Baltisberger 13129*).

Cruciferae

Alyssoides utriculata (L.) Medik. ($2n = 16$)

Rocks in the gorge of the river Cem, on the road from Shkodër to Tamarë, district Shkodër, 700 m, 13.8.1989, (*Baltisberger 13076*).

The chromosome number of *A. utriculata* is given for the first time for Albanian material.

Dipsacaceae

Scabiosa crenata Cyr. ($2n = 18$)

Slope near the village Gjerbës, E-side of Mount Tomor, ESE of Berat, district Skrapar, 1100 m, 8.8.1994, *Baltisberger 12969* (*Baltisberger 13110*). Scree on the path from Drenovë to

Bostovec, W-side of Mount Morava, SE of Korça, district Korça, 1200 m, 4.8.1994, *Baltisberger 12947* (*Baltisberger 13099*).

Scabiosa crenata belongs to a group with 2 Asiatic and 3 Mediterranean species, all with $2n = 18$ chromosomes (VERLAQUE, 1986). *Scabiosa crenata* itself is divided into 3 subspecies (DAMBOLDT & al., 1981), the plants from Albania belong to subsp. *crenata*.

Gramineae

Elymus pycnanthus (Godr.) Melderis (= *Agropyron litorale* Dumort.) ($2n = 42$)

Sand dunes, coast of Golem SE of Durrës, district Durrës, 0-2 m, 15.8.1989, (*Baltisberger 13079*).

The chromosome number of *E. pycnanthus* is given for the first time for Albanian material.

Labiatae

Nepeta sibthorpii Benth. ($2n = 16$)

Slope, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1750 m, 8.8.1994, *Baltisberger 12958* (*Baltisberger 13103*).

The group of *N. sibthorpii* is a taxonomically difficult group of several closely related species of the southern Balkan Peninsula. Although a recent treatment (mainly of the Greek taxa) was done by BADEN (1987) it is still insufficiently known. The plants of Mount Tomor have a patent to somewhat deflexed indumentum with hairs up to 1 mm, the outermost bracteoles are rather narrow (mostly less than 1 mm) with a distinct scarious margin, the calyx is rather short (up to 6 mm) with short teeth (up to 2.5 mm). With these characters the plants do not match with any of the taxa within the concept of BADEN (1987), being most close to *N. sibthorpii* subsp. *sibthorpii* (called *N. argolica* Bory & Chaub. subsp. *argolica* in BADEN, 1991a). The chromosome number of *N. sibthorpii* is given for the first time for Albanian material. Nevertheless, the plants show the same chromosome number as all taxa of the group.

Salvia candidissima Vahl ($2n = 22$)

Slope near the village Gollomboç at lake Prespa, NNE of Korça, district Korça, 860-900 m, 11.8.1993, (*Baltisberger 13191*).

The chromosome number of *S. candidissima* is given for the first time for Albanian material.

Scutellaria orientalis subsp. *pinnatifida* J. R. Edm. ($2n = 22$)

Gravel in the surroundings of the mines, between Drenovë and Bostovec, W-side of Mount Morava, SE of Korça, district Korça, 1200 m, 4.8.1994, *Baltisberger 12946* (*Baltisberger 13188*).

Scutellaria orientalis is a very variable complex extending from Spain and NW Africa to China. It can be divided into several subspecies, but morphological intermediates exist (EDMONDSON, 1980, 1982). The plants from Albania belong to subsp. *pinnatifida*, one of the widespread taxa. The chromosome number of *S. orientalis* is given for the first time for Albanian material.

Sideritis raeseri Boiss. & Heldr. ($2n = 32$)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12943* (*Baltisberger 13272*).

Sideritis raeseri belongs to section *Empedoclia* (Raf.) Benth. Following the treatment by PAPANICOLAOU & KOKKINI (1982) the plants from Albania are *S. raeseri* subsp. *raeseri*. The taxa of the section *Empedoclia* are widely used for making "mountain tea" (BADEN, 1991b). The section is taxonomically difficult, but nevertheless cytologically homogenous, all taxa with $2n = 32$ chromosomes.

Stachys baldaccii (Maly) Hand.-Mazz. ($2n = 34$)

Stony slope near the bridge across the river Shkumbin near Librazhdi, on the road from Elbasan to Librazhdi, district Librazhdi, 200 m, 7.8.1994, *Baltisberger 12953* (*Baltisberger 13109*).

Stachys baldaccii belongs to the rather difficult group of *S. recta*. Representatives of the group occur in central and southern Europe (LENHERR, 1983), the centre of diversity is in the Balkan Peninsula. *Stachys baldaccii* grows in Bosnia-Herzegovina, Montenegro and northern Albania (LENHERR, 1983). Similar plants occur outside this area: S Italy (BALTISBERGER, 1990), S Pindhos (Greece; BADEN, 1991c), and probably elsewhere. The plants from S Albania investigated here are located between the N Albanian and the Greek sites. All members of the *S. recta* group show the same chromosome number of $2n = 34$.

Stachys germanica L. ($2n = 30$)

Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12945* (*Baltisberger 13271*).

The group of *S. germanica* comprises in Europe about 10 species, and it belongs to the section *Eriostomum* (Hoffmanns. & Link) Dumort. (BALL, 1972). The section is well characterized within the genus, and cytologically uniform, all taxa with $2n = 30$ chromosomes. But within the group of *S. germanica* the taxonomy is very difficult, and many intermediates are known.

Teucrium chamaedrys L. ($2n = 62$)

Slope, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1750 m, 8.8.1994, *Baltisberger 12957* (*Baltisberger 13104*). Meadow, SE of the mountain W of Mount Malingelos, Rungajë, N of Stratobërda, NW of Erseka, district Kolonja/Korça, 1650-1750 m, 3.8.1994, *Baltisberger 12944* (*Baltisberger 13098*).

Liliaceae

Polygonatum odoratum (Mill.) Druce (= *P. officinale* All.) ($2n = 20$; Fig. 4)

Forest, Bostovec, ESE of Drenovë, W-side of Mount Morava, SE of Korça, district Korça, 1350 m, 4.8.1994, *Baltisberger 12951* (*Baltisberger 13270*).

The chromosome number of *P. odoratum* is given for the first time for Albanian material. The karyotype consists of 14 metacentric chromosomes, 2 of them with a secondary constriction within the longer arm; 3 pairs are submetacentric. Similar karyotypes are given in SUOMALAINEN (1947), THERMAN-SUOMALAINEN (1949), THERMAN (1953), and

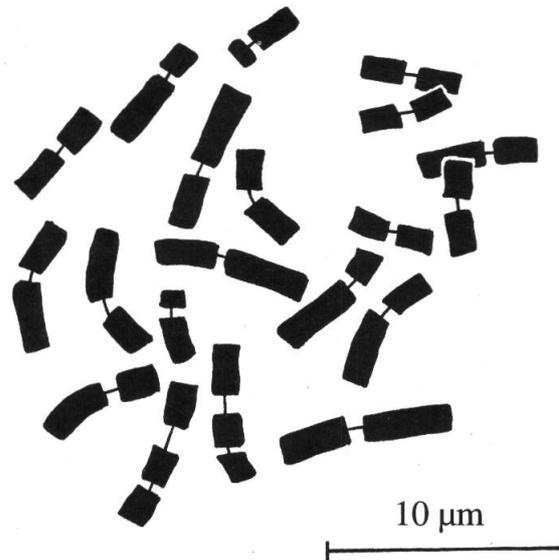


Fig. 4. – Somatic metaphase of *Polygonatum odoratum* (Mill.) Druce ($2n = 20$).

NOWAKOWSKA & ZEGLICKA (1972) but they additionally found another pair of chromosomes with a secondary constriction which could not be detected within the Albanian material.

Ranunculaceae

Ranunculus montanus Willd. s. l. ($2n = 16$; Fig. 5)

Calcareous scree, Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 2000 m, 8.8.1994, *Baltisberger 12965* (*Baltisberger 13107*).

The group of *R. montanus* comprises about 25 diploid or tetraploid species (HESS & al., 1977) and is taxonomically difficult, especially within the Balkans (LANDOLT, oral communication). The here investigated Albanian plants from Mount Tomor show achenes as *R. carinthiacus* Hoppe, but the cauline and especially the basal leaves do not match with this taxon (LANDOLT, oral communication). They are diploid (as e.g. *R. carinthiacus*). The karyotype consists of 6 metacentric, 6 submetacentric, 2 subtelocentric and 2 satellited subtelo- to acrocentric chromosomes, which corresponds with karyotypes given in literature for different taxa of the *R. montanus* group (compilation see BALTISBERGER, 1984).

Ranunculus polyanthemoides Boreau ($2n = 16$; Fig. 5)

Forest, Bostovec, ESE of Drenovë, W-side of Mount Morava, SE of Korça, district Korça, 1350 m, 4.8.1994, *Baltisberger 12950* (*Baltisberger 13102*).

Ranunculus polyanthemoides belongs to the group of *R. polyanthemus* L., all taxa being diploid with 16 chromosomes. The chromosome number of *R. polyanthemoides* is given for the first time for Albanian material. The karyotype consists of 1 pair of large and 2 pairs of medium sized metacentric chromosomes, 3 pairs of subtelocentric chromosomes, and 2 pairs of chromosomes with satellites, 1 pair subtelocentric and the other telocentric. The same karyotype is given by BALTISBERGER (1980).

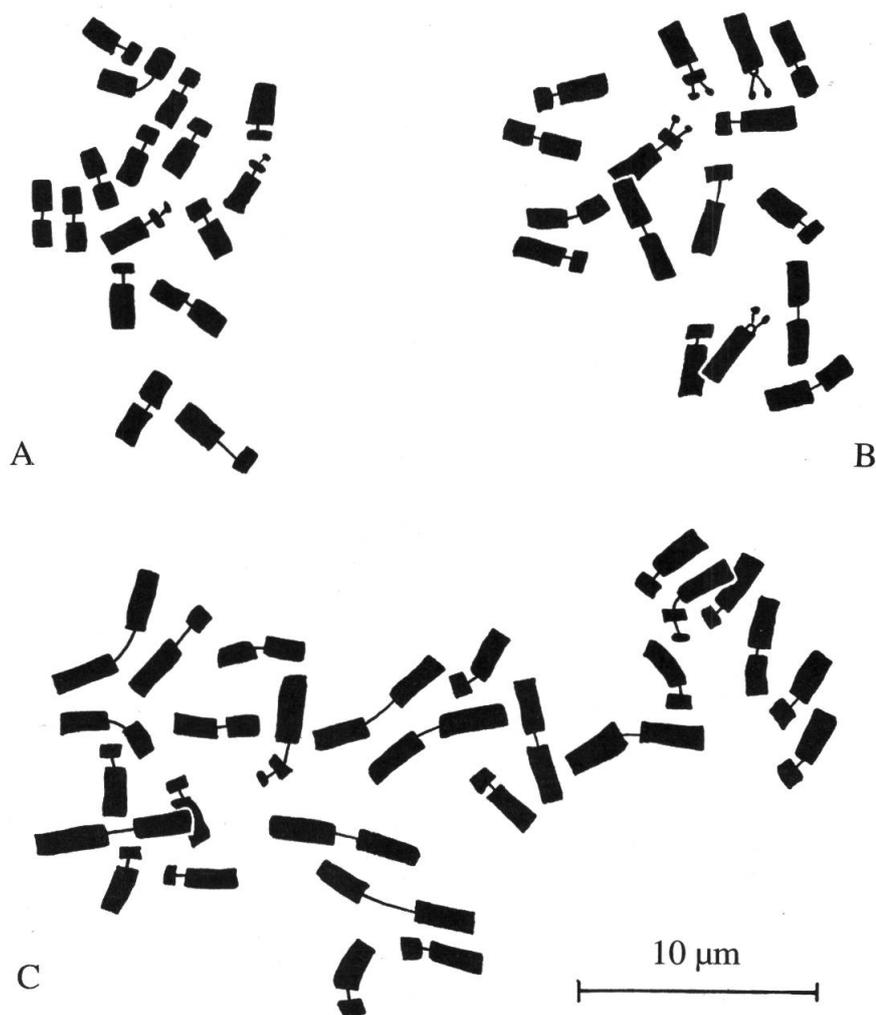


Fig. 5. – Somatic metaphases. **A**, *Ranunculus montanus* Willd. s. l. ($2n = 16$); **B**, *Ranunculus polyanthemoides* Boreau ($2n = 16$); **C**, *Ranunculus serbicus* Vis. ($2n = 28$).

***Ranunculus repens* L. ($2n = 32$)**

Forest, Bostovec, ESE of Drenovë, W-side of Mount Morava, SE of Korça, district Korça, 1350 m, 4.8.1994, *Baltisberger 12949* (*Baltisberger 13101*).

***Ranunculus serbicus* Vis. ($2n = 28$; Fig. 5)**

Forest, Bostovec, ESE of Drenovë, W-side of Mount Morava, SE of Korça, district Korça, 1350 m, 4.8.1994, *Baltisberger 12948* (*Baltisberger 13100*).

Ranunculus serbicus belongs to the group of *R. acris* L. which is characterized by the basic chromosome number $x = 7$ (most other taxa of *Ranunculus* show a basic number $x = 8$). *Ranunculus serbicus* is tetraploid with a karyotype of 8 large and 4 medium sized metacentric and 16 submeta- to subtelocentric chromosomes. Only 2 of the latter bear satellites, which suggests that *R. serbicus* might be an allotetraploid taxon. Similar karyotypes are given in literature (compilation see BALTISBERGER & BALTISBERGER, 1995).

***Thalictrum minus* L. s. l. ($2n = 84$)**

Calcareous scree, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1900-1950 m, 8.8.1994, *Baltisberger 12963*.

Thalictrum minus s. l. is a polyploid complex with ploidy levels from diploid ($2n = 2x = 14$) to dodecaploid ($2n = 12x = 84$; STRID, 1986a). The complex is taxonomically difficult (TUTIN & AKEROYD, 1993). The plants from Mount Tomor do not well match with one of the taxa out of this group. They are probably close to *T. foetidum* L., but this taxon is not indicated from Albania so far (HAYEK, 1927; JALAS & SUOMINEN, 1989), and all indications for *T. foetidum* in literature give the diploid chromosome number while the Albanian plants are dodecaploid. This is the first chromosome number of any *Thalictrum* given from Albanian material.

Rosaceae***Potentilla aurea* L. ($2n = 42$)**

Stony slope, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1750 m, 8.8.1994, (*Baltisberger 13269*).

Potentilla aurea s. l. is a polyploid complex with ploidy levels up to $2n = 10x = 70$ (STRID, 1986b). The chromosome number of *P. aurea* is given for the first time for Albanian material. The plants from Mount Tomor are hexaploid with $2n = 6x = 42$ chromosomes.

Scrophulariaceae***Scrophularia canina* L. ($2n = 26$)**

Calcareous scree, E-side of Mount Tomor, above the village Gjerbës, ESE of Berat, district Skrapar, 1900-1950 m, 8.8.1994, *Baltisberger 12961* (*Baltisberger 13189*).

The chromosome number of *S. canina* is given for the first time for Albanian material.

Umbelliferae***Opopanax hispidus* (Friv.) Griseb. ($2n = 22$)**

Ancient Butrint, S of Sarandë, district Sarandë, 0-30 m, 7.8.1989, (*Baltisberger 13484*).

The chromosome number of *O. hispidus* is given for the first time for Albanian material.

REFERENCES

- BADEN, C. (1987). Biosystematic studies in the *Nepeta sibthorpii* group (Lamiaceae) in Greece. *Opera Bot.* 93: 1-54.
- BADEN, C. (1991a). *Nepeta* L. In: STRID, A. & K. TAN (eds.), *Mountain flora of Greece 2*: 108-120. Edinburgh University Press.
- BADEN, C. (1991b). *Sideritis* L. In: STRID, A. & K. TAN (eds.), *Mountain flora of Greece 2*: 84-91. Edinburgh University Press.
- BADEN, C. (1991c). *Stachys* L. In: STRID, A. & K. TAN (eds.), *Mountain flora of Greece 2*: 97-107. Edinburgh University Press.
- BALL, P. W. (1972). *Stachys* L. In: TUTIN, T. G. & al. (eds.), *Flora Europaea 3*: 151-157. Cambridge University Press.

- BALTISBERGER, M. (1980). Die Artengruppe des *Ranunculus polyanthemos* L. in Europa. *Ber. Schweiz. Bot. Ges.* 90: 143-188.
- BALTISBERGER, M. (1984). Zytologische Untersuchungen an einigen Pflanzen aus Albanien. *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 51: 63-77.
- BALTISBERGER, M. (1987). Chromosomenzahlen einiger Pflanzen aus Albanien. *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 53: 47-63.
- BALTISBERGER, M. (1988). Chromosomenzahlen einiger Pflanzen aus Albanien. II. *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 54: 42-50.
- BALTISBERGER, M. (1990). Zytologische Untersuchungen an einigen Arten aus Italien. *Arch. Bot. Ital.* 66: 153-165.
- BALTISBERGER, M. (1991a). Chromosomenzahlen einiger Labiaten aus Albanien. *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 57: 165-181.
- BALTISBERGER, M. (1991b). Cytological investigations of some Greek plants. *Fl. Medit.* 1: 157-173.
- BALTISBERGER, M. (1992). Botanische Notizen und zytologische Untersuchungen an einigen Pflanzen (insbesondere aus den Gattungen *Ranunculus* und *Achillea*) aus dem albanisch-jugoslawischen Grenzgebiet (Korab, Sar Planina). *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 58: 192-211.
- BALTISBERGER, M. (1993). Zytologische Untersuchungen an Compositen aus Albanien. *Candollea* 48: 437-448.
- BALTISBERGER, M. (1994). Chromosome numbers in some species from Greece. *Bot. Chron.* 11: 15-29.
- BALTISBERGER, M. & E. BALTISBERGER (1995). Cytological data of Albanian plants. *Candollea* 50: 457-493.
- BALTISBERGER, M. & A. LEUCHTMANN (1991). Investigations on some Gramineae from Albania and Greece. *Ber. Geobot. Inst. ETH, Stiftung Rübel, Zürich* 57: 182-192.
- BALTISBERGER, M. & W. LIPPERT (1987). Compositen aus Albanien. *Candollea* 42: 679-691.
- BALTISBERGER, M., A. MULLAJ & V. TARTARI (1993). Mediterranean chromosome number reports 3 (185-203). *Fl. Medit.* 3: 348-353.
- DAMBOLDT, J., G. GRAUMANN, D. PHITOS & V. MELZHEIMER (1981). Beiträge zur Flora Ionica. VII. Der Formenkreis von *Scabiosa crenata* (Dipsacaceae). *Phyton* 21: 85-102.
- DYER, A. F. (1963). The use of lacto-propionic orcein in rapid squash methods for chromosome preparations. *Stain Techn.* 38: 85-90.
- EDMONDSON, J. R. (1980). *Scutellaria* L. In: DAVIS, P. H. (ed.), Materials for a flora of Turkey XXXVII: Labiatae, Plumbaginaceae, Plantaginaceae. *Notes Roy. Bot. Gard. Edinburgh* 38: 23-64.
- EDMONDSON, J. R. (1982). *Scutellaria* L. In: DAVIS, P. H. & al. (eds.), *Flora of Turkey* 7: 78-100. Edinburgh University Press.
- FEDEROV, A. (1974). *Chromosome numbers of flowering plants*. Koeltz.
- FRANZEN, R. (1991). *Achillea* L. In: STRID, A. & K. TAN (eds.), *Mountain flora of Greece* 2: 431-450. Edinburgh University Press.
- GOLDBLATT, P. (1981). Index to plant chromosome numbers 1975-1978. *Monogr. Syst. Bot. Missouri Bot. Gard.* 5: 1-533.
- GOLDBLATT, P. (1984). Index to plant chromosome numbers 1979-1981. *Monogr. Syst. Bot. Missouri Bot. Gard.* 8: 1-427.
- GOLDBLATT, P. (1985). Index to plant chromosome numbers 1982-1983. *Monogr. Syst. Bot. Missouri Bot. Gard.* 13: 1-224.
- GOLDBLATT, P. (1988). Index to plant chromosome numbers 1984-1985. *Monogr. Syst. Bot. Missouri Bot. Gard.* 23: 1-264.
- GOLDBLATT, P. & D. E. JOHNSON (1990). Index to plant chromosome numbers 1986-1987. *Monogr. Syst. Bot. Missouri Bot. Gard.* 30: 1-243.
- GOLDBLATT, P. & D. E. JOHNSON (1991). Index to plant chromosome numbers 1988-1989. *Monogr. Syst. Bot. Missouri Bot. Gard.* 40: 1-238.
- GOLDBLATT, P. & D. E. JOHNSON (1994). Index to plant chromosome numbers 1990-1991. *Monogr. Syst. Bot. Missouri Bot. Gard.* 51: 1-267.
- GOLDBLATT, P. & D. E. JOHNSON (1996). Index to plant chromosome numbers 1992-1993. *Monogr. Syst. Bot. Missouri Bot. Gard.* 58: 1-276.
- GOLDBLATT, P. & D. E. JOHNSON (1998). Index to plant chromosome numbers 1994-1995. *Monogr. Syst. Bot. Missouri Bot. Gard.* 69: 1-208.

- GOLDBLATT, P. & D. E. JOHNSON (2000). Index to plant chromosome numbers 1996-1997. *Monogr. Syst. Bot. Missouri Bot. Gard.* 81: 1-188.
- GRAU, J. & H. MERXMÜLLER (1972). *Myosotis L.* In: TUTIN, T. G. & al. (eds.), *Flora Europaea* 3: 111-117. Cambridge University Press.
- GREUTER, W. (1995). Studies in Greek Caryophylloideae: *Agrostemma*, *Silene*, and *Vaccaria*. *Willdenowia* 25: 105-142.
- GREUTER, W. (1997). *Silene L.* In: STRID, A. & K. TAN (eds.), *Flora Hellenica* 1: 239-323. Koeltz Scientific Books.
- HAYEK, A. (1927). *Prodromus Florae Peninsulae Balcanicae. Repert. Spec. Nov. Regni Veg. Beih.* 30(1): 1-1193.
- HESS, H. E., E. LANDOLT & R. HIRZEL (1977). *Flora der Schweiz. Band 2: Nymphaeaceae bis Primulaceae. 2., durchgesehene Aufl.* Birkhäuser Verlag.
- JALAS, J. & J. SUOMINEN (1989). *Atlas Florae Europaeae. 8. Nymphaeaceae to Ranunculaceae.* Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo.
- LENHERR, A. (1983). *Biosystematische und chemotaxonomische Untersuchungen in der Artengruppe Stachys recta L.* Diss. ETH Nr. 7453, Zürich.
- LEVAN, A., K. FREDGA & A. A. SANDBERG (1964). Nomenclature for centromeric position on chromosomes. *Hereditas* 52: 201-220.
- MOORE, R. J. (1973). Index to plant chromosome numbers 1967-1971. *Regnum Veg.* 90: 1-539.
- MOORE, R. J. (1974). Index to plant chromosome numbers 1972. *Regnum Veg.* 91: 1-108.
- MOORE, R. J. (1977). Index to plant chromosome numbers 1973/74. *Regnum Veg.* 96: 1-257.
- NOWAKOWSKA, T. & B. ZEGLICKA (1972). Karyological studies in *Polygonatum* Mill. I. Karyotype analysis of *P. multiflorum* (L.) All. and *P. odoratum* (Mill.) Druce. *Acta Biol. Cracov., Ser. Bot.* 15: 77-86.
- PAPANICOLAOU, K. & S. KOKKINI (1982). A taxonomic revision of *Sideritis L.* section *Empedoclia* (Rafin.) Bentham (Labiatae) in Greece. In: MARGARIS, N., A. KOEDAM & D. VOKOU (eds.), *Aromatic plants: basic and applied aspects*: 101-128. Martinus Nijhoff Publishers.
- STRID, A. (1986a). *Thalictrum L.* In: STRID, A. (ed.), *Mountain flora of Greece* 1: 228-230. Cambridge University Press.
- STRID, A. (1986b). *Potentilla L.* In: STRID, A. (ed.), *Mountain flora of Greece* 1: 405-415. Cambridge University Press.
- STRID, A. (1991). *Myosotis L.* In: STRID, A. & K. TAN (eds.), *Mountain flora of Greece* 2: 47-57. Edinburgh University Press.
- STRID, A. & R. FRANZEN (1981). Chromosome numbers. In: LÖVE, A. (ed.), *Chromosome number reports LXXIII. Taxon* 30: 829-861.
- SUOMALAINEN, E. (1947). On the cytology of the genus *Polygonatum* group *Alternifolia*. *Ann. Acad. Sci. Fenn., Ser. A* 13: 1-65.
- TEPPNER, H. (1971a). Cytosystematische Studien an *Onosma* (Boraginaceae). Die Formenkreise von *O. echioides*, *O. helveticum* und *O. arenarium*. *Ber. Deutsch. Bot. Ges.* 84: 691-696.
- TEPPNER, H. (1971b). Cytosystematik, bimodale Chromosomensätze und permanente Anorthoploidie bei *Onosma* (Boraginaceae). *Österr. Bot. Z.* 119: 196-233.
- THERMAN, E. (1953). Chromosome evolution in the genus *Polygonatum*. *Hereditas* 39: 277-288.
- THERMAN-SUOMALAINEN, E. (1949). Investigations on secondary constrictions in *Polygonatum*. *Hereditas* 35: 86-108.
- TUTIN, T. G. & J. R. AKEROYD (1993). *Thalictrum L.* In: TUTIN, T. G. & al. (eds.), *Flora Europaea* 1 (second edition): 290-292. Cambridge University Press.
- VAN LOON, J. C. (1987). *A cytotaxonomical atlas of the Balkan flora.* J. Cramer.
- VERLAQUE, R. (1986). Etude biosystématique et phylogénétique des Dipsacaceae. V. – Tribu des Scabioseae (phylum N° 4) et conclusion. *Rev. Cytol. Biol. Végét. Bot.* 9: 97-176.

