

Chromosome numbers in selected Angiosperms (1)

Chromosomové počty některých druhů krytosemenných rostlin (1)

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Somatic chromosome numbers are reported for 30 species belonging to the families *Caryophyllaceae* (4 spp.), *Rosaceae* (1 sp.), *Plumbaginaceae* (10 spp.), *Lamiaceae* (1 sp.) and *Campanulaceae* (14 spp.). The material examined came from localities in Austria, Czechoslovakia, Federal Republic of Germany, France, German Democratic Republic, Italy, Yugoslavia, Norway, Poland, Portugal, Sweden, Switzerland and U.S.S.R. Brief notes are added wherever appropriate or necessary.

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INTRODUCTION

The past three decades have seen a spectacular development of the cytological approach in plant taxonomy. Both authoritative cytotaxonomic monographs and innumerable chromosome number studies have appeared and it may seem futile to try, in Europe, to add anything to the information now available. Yet the importance of chromosome studies cannot be overemphasized, for cytological evidence may show the direction of evolutionary change and serve as a pointer for taxonomic reappraisal. It is only by repeated chromosome counting covering as much of the geographical area of a species as possible that the presence of polyploid or aneuploid series can be detected.

The present counts include both species in which much cytological work has been done and those which remain poorly known in this respect. The counts for *Armeria transmontana* (SAMP.) LAWRENCE and *Armeria vulgaris* WILLD. subsp. *serpentina* (GAUCKLER) HOLUB are believed to be the first counts reported for these taxa. Brief notes are added wherever appropriate or necessary. Some of the species or species groups listed will be discussed elsewhere in more detail.

MATERIAL AND METHODS

The chromosome counts are based on root-tip mitoses from young seedlings (pre-treatment with a saturated solution of 8-hydroxyquinoline or naphthalene, fixation in Carnoy or ethanol-glacial acetic acid, staining in lacto-propionic orceine). Unless otherwise stated, the material was collected by the author. In samples obtained through foreign botanical gardens, small lots of plants were raised in the experimental garden to check the taxonomic identity of the material. Voucher specimens will be deposited in PR.

RESULTS

Caryophyllaceae

Kohlruschia prolifera (L.) KUNTH

2n = 30

Czechoslovakia

S. Slovakia: S.W. slope of the Vysoká hill, near Šahy, 230 m.

Oberna behen (L.) IKONN.

Syn.: *Silene vulgaris* (MOENCH) GARCKE, *Silene cucubalus* WIBEL

2n = 24

Czechoslovakia

E. Bohemia: Mt. Králický Sněžník, mountain grassland in the summit area, near the source of the river Morava, 1400 m.

Steris viscaria (L.) RAFIN.

Syn.: *Lychnis viscaria* L., *Viscaria vulgaris* BERNH.

2n = 24

Czechoslovakia

N. Moravia: Nížký Jeseník Mts., Velký Roudný hill, near Roudno, meadow on the N.W. side, 670 m.

Lychnis coronaria (L.) DESR.

2n = 24

Czechoslovakia

S. Slovakia: open grazed places in the Bohúnka forest, near Nenince (district of Veľký Krtíš), 230 m.

Rosaceae

Sorbus sudetica (TAUSCH) FRITSCH

2n = 68

Czechoslovakia

N.E. Bohemia: Krkonoše Mts., Čertova zahrádka gorge, 1100 m.

This is the first count obtained for the species on material of known wild origin. LILJEFORS (1934) reported the same chromosome number for a cultivated shrub of unknown origin. For a discussion of taxonomy, geographical distribution and relationships of this hybridogeneous species, see KOVANDA (1965).

Plumbaginaceae

Armeria vulgaris WILLD. subsp. *vulgaris*

Syn.: *A. vulgaris* WILLD. subsp. *elongata* (HOFFM.) PETRI, *A. elongata* (HOFFM.) KOCH

2n = 18

Czechoslovakia

1. C. Bohemia: Prague-Bohnice, rocks of the Tříkrálka hill in the valley of the river Vltava, Algonkian schist, 210—230 m.
2. N. Bohemia: sands S.E. of Kleneč, near Roudnice nad Labem, 200—210 m.
3. S.E. Bohemia: dry grassland on the W. slope of the Čertova skála hill, near Hořepník, 520 m.
4. W. Slovakia: pine wood on sands S.E. of Lozorno, near Stupava, 190 m.

Poland

5. District of Wrocław: Konary, near Wołów. (Seed received from the Botanical Garden of the University, Wrocław.)
6. District of Wrocław: Osiek, near Środa. (Seed received from the Botanical Garden of the University, Wrocław.)

Sweden

7. Västermanland. (Seed received from the University Botanical Garden, Uppsala.)

Armeria vulgaris WILLD. subsp. *serpentina* (GAUCKLER) HOLUB
 $2n = 18$

Czechoslovakia

1. C. Bohemia: dry, light pine wood 1.5 km S.S.W. of Borovsko, near Vlašim, serpentine, 400—420 m.
2. S. Moravia: rocky slope in the valley of the river Jihlava, near Mohelno, serpentine, 300—340 m.
3. S. Moravia: short grassland N. of Jamolice, near Moravský Krumlov, serpentine, 360 m.

The serpentinicolous race of *Armeria vulgaris* WILLD. does not appear to have been counted previously but in view of the karyological uniformity of the genus, the present chromosome counts are not surprising. It has obviously arisen polytopically from local populations of subsp. *vulgaris* and is therefore not homogeneous from a taxonomic point of view. In Bohemian and Moravian serpentine, the stem is predominantly finely hairy but plants from N. Bavarian serpentine (the type locality of var. *serpentina* GAUCKLER) are described as having stems completely glabrous (see e.g. ROTHMALER 1976). The inclusion of subsp. *serpentina* in subsp. *Halleri*, proposed by PINTO DA SILVA (1972), appears inconsistent because the taxa are distinct in the characters of the involucre.

Armeria alpina WILLD.
 $2n = 18$

Austria

1. Carinthia: Karavanken, short mountain grassland above the Eisenkappler Hütte, 1600 m.
2. Styria: Raxalpe. (Seed received from the Technische Universität Dresden.)

France

3. Haute-Savoie. (Seed received from the Technische Universität Dresden.)

Italy

4. Alpes Graies, 2500 m. (Seed received from the Jardin Alpin, Champex.)
5. Dolomites. (Seed received from the Institut de Botanique de l'Université de Neuchâtel.)

Armeria scabra WILLD.

$2n = 18$

U.S.S.R.

Jakutsk. (Seed received from the University Botanical Garden, Uppsala.)

Armeria majellensis BOISS.

$2n = 18$

Italy

Gran Sasso. (Seed received from the Institut de Botanique de l'Université de Neuchâtel.)

Armeria plantaginea WILLD.

$2n = 18$

France

1. Hautes Alpes, 1400 m. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

2. Vicinity of Paris. (Seed received from the Laboratoire de Botanique, Grignon.)

3. Pyrénées Orientales. (Seed received from the Technische Universität Dresden.)

Italy

4. Alpes Graies, 1700 m. (Seed received from the Jardin Alpin, Champex.)

5. Piemont: Val d'Aosta, 2000 m. (Seed received from the Jardin Alpin, Champex.)

Armeria bupleuroides GREN. et GODR.

$2n = 18$

France

Alpes de Provence, 1700 m. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Armeria arenaria (PERS.) SCHULT.

$2n = 18$

France

Causse Noir, St. Jean de Balme, Montpellier de Vieux, 850 m. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Armeria ruscinonensis GIRARD

$2n = 18$

France

Pyrénées Orientales: Corniche Catalane, Port Vendres, Banyuls-sur-Mer. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Armeria transmontana (SAMP.) LAWRENCE

$2n = 18$

Portugal

Collected in the wild, precise locality not given. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

This seems to be the first count for the species, placing it at the same diploid level as other members of the genus.

Armeria Girardii (BERNIS) LITARD.

$2n = 18$

France

Causses. (Seed received from the Laboratoire de Botanique, Grignon.)

Lamiaceae

Prunella grandiflora (L.) SCHOLLER

$2n = 28$

Czechoslovakia

N. Moravia, Hrubý Jeseník Mts.: rocky ledges in the Velká kotlina glacial cirque, graphitic phyllite, 1300 m.

The isolated occurrence of this thermophilous species in the Hrubý Jeseník Mts. has puzzled many botanists (see e.g. LAUS 1910, JENÍK 1961). The plants are conspicuously luxuriant but cytological examination has failed to reveal the presence of polyploidy. Further study is needed to determine whether they are in any way taxonomically distinct.

Campanulaceae

Campanula sibirica L. subsp. *sibirica*

$2n = 34$

Czechoslovakia

S. Moravia: Pouzdřanská step state nature reserve, near Pouzdřany, 250 m.

Campanula sibirica L. subsp. *divergentiformis* (JÁV.) DOMIN

$2n = 34$

Czechoslovakia

1. E. Slovakia: summit area of the Kurtova skala hill (799 m), near Margecany, limestone.
2. E. Slovakia: karst fields on top of the Zádielsky kameň hill, near Zádiel, limestone, 601 m.
3. E. Slovakia: Sokol hill, near Humenné, limestone, 405 m.

Only the diploid chromosome number, $2n = 34$, is definitely known in *Campanula sibirica* L. (see e.g. BAKSAY 1956, GADELLA 1964). The report of $2n = 102$ for cultivated material of unknown origin (SUGIURA 1942) has never been confirmed.

Campanula alpina JACQ.

$2n = 34$

Czechoslovakia

1. N. Slovakia, Vysoké Tatry Mts.: Velická dolina valley, 1800 m.
2. N. Slovakia, Západné Tatry Mts.: S.E. side of Mt. Tri kopy, 1900 m.
3. N. Slovakia, Nízke Tatry Mts.: summit area of Mt. Ďumbier, 2045 m.

The surprisingly few chromosome number reports available for *Campanula alpina* JACQ. are all from the Western Carpathians (SKALIŇSKA et al. 1959, GADELLA 1964, MJOVSKY et al. 1978). It would appear that it is an ancient diploid oreophyte with no obvious relationships to other $n = 17$ Campanulas, except perhaps *Campanula barbata* L.

Campanula barbata L.

$2n = 34$

Austria

1. Tyrol: tztaler Alpen, E. slope of Mt. Ramolkogen, near Obergurgl, gneiss, 2600 m.
2. Tyrol: mountain grassland in the Troyer Almtal valley, near St. Jakob, gneiss, 1900 m.
3. Styria: Stubalpe. (Seed received from the Botanical Garden of the University, Graz.)
4. Styria: Gesuse, Turracherhhe.¹⁾ (Seed received from the Alpengarten Belvedere, Vienna.)

Czechoslovakia

5. E. Bohemia: Mt. Krlicky Snžnk, mountain grassland in the summit area, near the source of the river Morava, 1400 m.
6. N. Moravia, Hruby Jesenk Mts.: mountain grassland near the Vřesov studnka chalet, 1290 m.
7. N. Moravia, Hruby Jesenk Mts.: Vhledy hill, near Ždrsky Potok, grassland on the N.E. side, 830 m.

France

8. Vicinity of Lautaret. (Seed received from the Institut Alpin du Lautaret.)

Federal Republic of Germany

9. Bavaria: mountain grassland near the Gotzenalm chalet, above the Knigssee lake, 1700 m.

Jugoslavia

10. Jesenica. (Seed received from the Botanical Garden, Hamburg.)

Switzerland

11. Collected in the Swiss Alps, precise locality not given. (Seed received from the Institut de Botanique de l'Universit Neuchtel.)

This is another old mountain diploid in the $n = 17$ group, with no variation in the chromosome number known (see GADELLA 1964). Its position in Fedorov's system of the genus (FEDOROV 1957) is uncertain. It might be referable to the subsection *Dasystigma* FED. were it not for its seeds which are round and wingless as in the majority of Campanulas, whereas those of *Campanula alpina* JACQ., the only member of the subsection *Dasystigma* FED., are typically flattened, with a distinct wing.

Campanula bononiensis L.

$2n = 34$

Czechoslovakia

- S. Moravia: Moravsky Krumlov, rocks near the St. Florin chapel, E. of the town, Permian conglomerate, 280 m.

¹⁾ These are two different locations in Styria. It is unclear in which of them the collection was made.

Campanula glomerata L. subsp. *glomerata*

$2n = 30$

Czechoslovakia

N. Moravia: Nizký Jeseník Mts., thickets on the Dubová hora hill, near Chabíčov, 540 m.

Campanula glomerata L. subsp. *farinosa* (ROCHEL) KIRSCHLEGER

$2n = 30$

Czechoslovakia

E. Moravia: Bílé Karpaty Mts., in xerothermous vegetation on the Čertoryje hill, S.E. of Kněždub, 443 m.

The same chromosome number has been reported for this taxon by GADELLA (1964) for plants from Hungary and for cultivated material from Moscow. MÁJOVSKÝ et al. (1970b, 1978) counted $2n = 30$ in plants from S. Slovakia. The specific status advocated by GADELLA (op. cit.) is disputable as the taxon intergrades freely with other subspecies of *Campanula glomerata* L. In the steppe region of the Bílé Karpaty Mts., where the present collection came from, there also occur plants transitional to subsp. *elliptica* (KIT. ex SCHULT.) O. SCHWARZ.

Campanula glomerata L. subsp. *elliptica* (KIT. ex SCHULT.) O. SCHWARZ

$2n = 30$

Czechoslovakia

1. C. Slovakia, Veľká Fatra Mts.: mountain meadow on Mt. Úplaz (1275 m), near Staré Hory.

No chromosome number seems to have been published explicitly for this taxon. It does appear certain, however, that some counts by GADELLA (1964) on material of *Campanula glomerata* L. from the Slovak Carpathians are, in fact, referable to subsp. *elliptica* (KIT. ex SCHULT.) O. SCHWARZ. Obviously, chromosome numbers are of little help in delimiting the subspecies, $2n = 30$ being the only definite number so far reported. Reports of $2n = 34$ and 68 (see e.g. FEDOROV 1969) are probably based on wrongly determined material.

Campanula rotundifolia L.

$2n = 68$

Poland

1. District of Wrocław: dry grassland N. of Skoroszów, 230 m.

2. District of Suwałki: grassy roadside N. of Grądy, near Orzysz, 120 m.

The tetraploid cytodeme ($2n = 68$) seems to be prevalent in the Polish *Campanula rotundifolia* L. (see BIELAWSKA 1964, 1968, 1971, 1972). Diploids ($2n = 34$) have so far been reported only from the vicinity of Karpacz in the northern foothills of the Krkonoše (Karkonosze) Mts. (see KOVANDA 1970a).

Campanula moravica (SPITZNER) KOVANDA subsp. *moravica*

$2n = 68$

Czechoslovakia

1. N. Slovakia, Liptovská kotlina basin: Vitáľišovec, near Liptovský Mikuláš, on road to Okoličné, 620 m.
2. N. Slovakia, Spišská kotlina basin: Sivá Brada, dry grassland on road to Spišské Podhradie, 490 m.
3. W. Slovakia: Lozorno, near Stupava, light pine wood on sands E. of the village, 190 m.

Campanula moravica (SPITZNER) KOVANDA subsp. *xylorrhiza* (O. SCHWARZ) KOVANDA
 $2n = 102$

Czechoslovakia

1. N. Moravia: Grygov near Olomouc, disused quarry 1 km S.E. of the village, limestone, 210 m.
2. N. Moravia: Grygov near Olomouc, "U bílých hlin" state nature reserve, in steppe vegetation on road to Krémaň, limestone, 220 m.
3. S.E. Moravia: Stříbrnické Paseky near Uherské Hradiště, woodland margin N. of the village, 390 m.
4. W. Slovakia: Malé Karpaty Mts., valley N.W. of Biela hora hill, near Buková, dolomite, 340 m.

The incidence of the two cytodesmes of *Campanula moravica* (SPITZNER) KOVANDA has been discussed in a previous study (KOVANDA 1970a, b). They have been shown to be only slightly differentiated in terms of morphology but largely allopatric in their geographical distribution, occupying mostly separate sites within the area of the species. The additional chromosome counts reported above establish important range extensions for both the tetraploid subsp. *moravica* and the hexaploid subsp. *xylorrhiza* (O. SCHWARZ) KOVANDA. In Moravia, the latter has so far been known with certainty only from the Kamenný kopec and Hády hills near Brno. The two localities on the limestone outcrop near Olomouc now become its northernmost recorded outposts.

The thickness of the rhizome proved rather unsatisfactory in distinguishing hexaploids from the tetraploids. The size of the pollen grains is more reliable as a taxonomic marker but for a safe identification, a chromosome count is necessary.

Campanula persicifolia L.
 $2n = 16$

Austria

1. Carinthia: Karavanken, Mt. Piskernik, near Eisenkappel, 900 m.

Czechoslovakia

2. N. Bohemia: České středohoří Mts., thickets on top of the Hradiště hill (545 m), near Hlíná.
3. C. Bohemia: Chlum hill, between Ondřejov and Hradové Střimelice, 450 m.
4. C. Bohemia: thickets on the Strážník hill (524 m), S. of Krásná Hora nad Vltavou.
5. S. Bohemia: dam of the Schorálý rybník pond, E. of Pluhův Ždár (district of Jindřichův Hradec), 490 m.
6. N. Moravia: grassy roadside S.W. of Pítárné, near Osoblaha, 320 m.
7. S. Moravia: Vranov nad Dyjí, valley of the river Dyje below the dam, 360 m.
8. W. Slovakia: Malé Karpaty Mts., woodland margin on road to Raštín hill, S.E. of Sološnica, 280 m.
9. W. Slovakia: Strážovská hornatina Mts., mountain meadow on top of Mt. Strážov, 1214 m.
10. C. Slovakia: Veľká Fatra Mts., Mt. Ostrá, near Blatnica, mountain meadow on road from the Konská dolina valley, 1100 m.

11. C. Slovakia: Štiavnické pohorie Mts., light deciduous woodland in the summit area of Mt. Sitno (1009 m).

12. C. Slovakia: Slovenské rudohorie Mts., Mt. Tlstý Javor, near Čierny Balog, 1068 m.

13. C. Slovakia: Slovenské rudohorie Mts., dry mountain grassland on Mt. Trsteník, near Švermovo, 1390 m.

14. C. Slovakia: Slovenské rudohorie Mts., grassy roadside on the N.W. side of Mt. Vlčie diery, near Stratená, 890 m.

15. C. Slovakia: Slovenské rudohorie Mts., Mt. Prislop, on road to Mt. Kilhov (formerly Kilbo), near Rejdová, 1050 m.

16. N. Slovakia: Západné Tatry Mts., Mt. Sokol, light woodland on road to Mt. Babky, 1150 m.

France

17. Tramayes (Saône-et-Loire). (Seed received from the Jardin Botanique, Dijon.)

Switzerland

18. Valais, 700 m. (Seed received from the Jardin Alpin, Champex.)

This is a species with an amazing ecological amplitude, occurring, in Czechoslovakia alone, from the xerothermous plant communities of the lowlands (orders *Quercetalia pubescentis* and *Prunetalia*) to subalpine tall herb communities (order *Adenostyletalia*). It is most surprising to find therefore that karyological differentiation is nil, $2n = 16$ being the only chromosome number reported to date for plants of wild origin (see e.g. GADELLA 1964, FEDOROV 1969, MÁJOVSKÝ et al. 1970a, 1978). The tetraploid chromosome number, $2n = 32$, has only been counted once, in the ornamental "Telham Beauty" (see GAIRDNER 1926). Morphological differentiation is likewise poor, and no distinct infraspecific taxa can be recognized. The indumentum of the ovary is almost useless as a taxonomic character.

Campanula patula L.

$2n = 20$

Czechoslovakia

1. N. Bohemia: road junction N. of Ráj, near Ústěk, 290 m.

2. E. Bohemia: Orlické hory Mts., grassy roadside below the Hraničný vrch hill, near Petrovičky, 680 m.

3. S. Bohemia: small forest meadow just N.W. of the Chválkov railway station (district of Pelhřimov), 660 m.

4. W. Moravia: Studenec near Třebíč, on road to Zelená Hospoda, 450 m.

5. N. Slovakia: Západné Beskydy Mts., Kohucari near Oravská Polhora, on path to Piľsko, 820 m.

6. E. Slovakia: Slovenský raj, on road from the Glac chalet to Hrabušice, 990 m.

Poland

7. District of Kraków: Puszcza Niepołomska Forest, 3 km N. of Damianice, 220 m.

8. District of Suwałki: woodland margin N. of Grądy, near Orzysz, 120 m.

9. District of Suwałki: light woodland S.W. of Kulinowo, near Mikołajki, 110 m.

10. District of Suwałki: dry grassland at Iznota, near Mikołajki, 110 m.

11. District of Opole: waste land S. of Jarnołtów, near Nysa, 310 m.

12. Tatra Mts.: meadow in the lower part of the Dolina Kościeliska valley, near Brama Kantaka rocks, 940 m.

Campanula patula L., even excluding *Campanula abietina* GRISEB. et SCHENK, is known to contain two cytomes, diploid ($2n = 20$) and tetraploid ($2n = 40$), the morphology and geographical distribution of which are still poorly understood. GADELLA (1964), who was the first to note the presence of tetraploids (in Austrian and Yugoslavian material), found it

impossible to distinguish them from the diploids on the basis of their morphology. HAUSER (1975) and LEUTE (1978), working on Swiss and Austrian material, respectively, however, succeeded in detecting a number of distinguishing characters (shape and size of corolla, length and dentation of the calyx teeth) which they claim to be reasonably constant. Tetraploids have also been reported from Bulgaria (LOON et SETTEN in LÖVE 1982) but few chromosome counts are available from the other parts of the distribution range of the species. Because a preliminary morphological survey of *Campanula patula* L. in Czechoslovakia gave a somewhat confusing picture, it was decided to make a detailed cytotaxonomic and cytogeographical study of the species. This is now in progress and the above counts are preliminary to the main study.

Campanula carpatica JACQ.

$2n = 34$

Czechoslovakia

1. E. Slovakia: Branisko Mts., Malinková dolina valley, near Vyšný Slavkov, limestone, 680 m.
2. E. Slovakia: Slovenský raj, rocks in the valley of Veľká Biela Voda, near Hrabušice, limestone, 690 m.
3. E. Slovakia: Slovenský kras, rocks in the Zádielska dolina valley, limestone, 280 m.

This Carpathian palaeoendemic has been counted by a number of authors (e.g. SUGIURA 1938, 1942, GADELLA 1964) and found to be invariably diploid, with $2n = 34$. The only discordant report of $2n = 32$ for cultivated material of unknown origin (KOLLER in DARLINGTON et JANAKI-AMMAL 1945) is obviously in error. The species is quite isolated in the system of the genus, being aberrant in all the proposed subdivisions. This perhaps led FEDOROV (1957) to place it in the monotypic subsection *Rotula* FED.

Jasione montana L.

$2n = 12$

Czechoslovakia

1. N. Bohemia: sands S.E. of Kleneč, near Roudnice nad Labem, 200—210 m.
2. N. Bohemia: Kokofinský důl valley, grassy roadside near Vojtěchov, 260 m.
3. C. Bohemia: slope of the Strážník hill (524 m), S. of Krásná Hora nad Vltavou.
4. S. Bohemia: grassy roadside S. of the Pod Oustupky hill, near Březina (district of Jindřichův Hradec), 590 m.
5. S. Bohemia: Mostečná, on road to Deštná (district of Jindřichův Hradec), 1 km N.E. of the village, 560 m.
6. S.W. Bohemia: short grassland on the E. side of the Svatobor hill, near Sušice, 540 m.
7. S.W. Moravia: Týn near Třebíč, valley of a brook N.E. of the village, 440 m.

France

8. Morbihan: Etel, Ile de Quiberon, on maritime dunes. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Norway

9. Rogaland, Sokndal: Eia. (Seed received from the University Botanical Garden, Oslo.)

Poland

10. District of Opole: light pine woodland S. of Kup, 170 m.

11. District of Suwalki: light woodland 2 km S.E. of Karlowo, near Mikolajki, 110 m.
12. District of Suwalki: sand dune on W. coast of the Beldany lake, 110 m.

A cytotaxonomic study of *Jasione montana* L. has been published (KOVANDA 1968) demonstrating that despite the wide range of morphological variation, the species is diploid throughout its extensive geographical area. This contention is supported by the present supplementary counts. The material from France belongs to the maritime race (var. *litoralis* FRIES) for which a deviating chromosome number, $2n = 14$, has been published (WULF 1937). This number could not be confirmed on the material studied, however.

Jasione laevis LAM.

Syn.: *Jasione perennis* VILL. ex LAM.

$2n = 60$

France

Lozère: Mt. Lozère, 1450 m. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Three different chromosome numbers, $2n = 12$, $2n = 24$ and $2n = 60$, have been published for *Jasione laevis* LAM. (see ROSÉN 1931, SUGIURA 1942, PODLECH et DAMBOLDT 1963, KUPFER et FAVARGER 1967), suggesting that a polyploid series is present. Plants from Mt. Lozère proved decaploid, with $2n = 60$. Further study is required to determine whether the interposed ploidy levels, hexaploid ($2n = 36$) and octoploid ($2n = 48$), are also present.

Jasione humilis (PERS.) LOISEL.

$2n = 36$

France

Pyrénées Orientales, Massif du Carlit, Formiguères, Font Romen, Lac des Bouillouses, 2300 m. (Seed received from the Station Nationale d'Essais de Semences, Versailles.)

Phyteuma betonicifolium VILL.

$2n = 24$

Austria

1. Tyrol: Ötztaler Alpen, E. side of Mt. Ramolkogen, near Obergurgl, gneiss, 2600 m.
2. Tyrol: mountain grassland in the Troyer Almtal valley, near St. Jakob, gneiss, 1900 m.

Switzerland

3. Valais. (Seed received from the Jardin botanique de Genève.)

These counts corroborate POLATSCHKE's (1966) report for plants from the Stubai Alpen, Tyrol (for a review, see also CONTANDRIOPOULOS 1962). The species is an endemic of the Alps, extending eastwards to the Pinzgau, Pustertal and Valsugana (see HEGI, MERXMÜLLER et REISIGL 1977). Thus the collection from the Troyer Almtal comes from the eastern margin of the range.

By its base number, $n = 12$, *Phyteuma betonicifolium* VILL. fits into the dysploid series $x = 10 \rightarrow 11 \rightarrow 12 \rightarrow 13 \rightarrow 14$ known to be present in the

genus *Phyteuma*, as does *Phyteuma Zahlbruckneri* VEST, its East Alpine counterpart. The series is not consistent with the evolutionary tree proposed by the monographer SCHULZ (1904), however. Polyploidy is not known to occur in the genus *Phyteuma* (see FAVARGER 1953, CONTANDRIOPOULOS 1962, OCHLEWSKA 1965, POLATSCHEK 1966, KOVANDA 1981).

SOUHRN

Podávají se chromosomové počty 30 druhů krytosemenných rostlin. Z čeledi *Caryophyllaceae* byly studovány druhy *Kohtrauschia prolifera* (L.) KUNTH ($2n = 30$), *Oberna behen* (L.) IKONN. ($2n = 24$), *Steris viscaria* (L.) RAFIN. ($2n = 24$) a *Lychnis coronaria* (L.) DESR. ($2n = 24$), z čeledi *Rosaceae* *Sorbus sudetica* (TAUSCH) FRITSCH ($2n = 68$), z čeledi *Plumbaginaceae* *Armeria vulgaris* WILLD. subsp. *vulgaris* ($2n = 18$), *A. vulgaris* WILLD. subsp. *serpentinii* (GAUCKLER) HOLUB ($2n = 18$), *A. alpina* WILLD. ($2n = 18$), *A. scabra* WILLD. ($2n = 18$), *A. majellensis* BOISS. ($2n = 18$), *A. plantaginea* WILLD. ($2n = 18$), *A. bupleuroides* GREIN. et GODR. ($2n = 18$), *A. arenaria* (PERS.) SCHULT. ($2n = 18$), *A. rusciniensis* GIRARD ($2n = 18$), *A. transmontana* (SAMP.) LAWRENCE ($2n = 18$) a *A. Girardii* (BERNIS) LITARD. ($2n = 18$), z čeledi *Lamiaceae* *Prunella grandiflora* (L.) SCHOLLER ($2n = 28$), z čeledi *Campanulaceae* *Campanula sibirica* L. subsp. *sibirica* ($2n = 34$), *C. sibirica* L. subsp. *divergentiformis* (JÁV.) DOMIN ($2n = 34$), *C. alpina* JACQ. ($2n = 34$), *C. barbata* L. ($2n = 34$), *C. bononiensis* L. ($2n = 34$), *C. glomerata* L. subsp. *glomerata* ($2n = 30$), *C. glomerata* L. subsp. *farinosa* (ROCHEL) KIRSCHLEGER ($2n = 30$), *C. glomerata* L. subsp. *elliptica* (KIT. ex SCHULT.) O. SCHWARZ ($2n = 30$), *C. rotundifolia* L. ($2n = 68$), *C. moravica* (SPITZNER) KOVANDA subsp. *moravica* ($2n = 68$), *C. moravica* (SPITZNER) KOVANDA subsp. *xylorrhiza* (O. SCHWARZ) KOVANDA ($2n = 102$), *C. persicifolia* L. ($2n = 16$), *C. patula* L. ($2n = 20$), *C. carpatica* JACQ. ($2n = 34$), *Jasione montana* L. ($2n = 12$), *J. laevis* LAM. ($2n = 60$), *J. humilis* (PERS.) LOISEL. ($2n = 36$) a *Phyteuma betonicifolium* VILL. ($2n = 24$). Studovaný materiál pocházel z nalezišť v Československu, Francii, Itálii, NDR, NSR, Norsku, Polsku, Portugalsku, Rakousku, SSSR, Švédsku a Sýčcarsku. U některých druhů jsou připojeny stručné poznámky ke karyologii, taxonomii a geografickému rozšíření.

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