

Chromosome number variation in the genus *Rubus* in the Czech Republic. IV.

Proměnlivost počtu chromozómů u rodu *Rubus* v České republice. IV.

Anna Krahulcová and Josef Holub

Institute of Botany, Academy of Sciences of the Czech Republic, CZ-252 43 Průhonice, Czech Republic

Krahulcová A. & Holub J. (1998): Chromosome number variation in the genus *Rubus* in the Czech Republic. IV. – Preslia, Praha, 70: 225–245.

Chromosome numbers are given for a further 21 species of the genus *Rubus* including principally representatives of the subgenus *Rubus* (16 species) with, in addition, representatives of the subgenus *Anoplobatus* (2 species), the subgenera *Idaeobatus* and *Cylactis* and the nothosubgenus *Idaeorubus* (one species each). Four ploidy levels were found in this collection of plants originating from 57 localities in Bohemia and Moravia: three diploids (outside of the subgenus *Rubus*), four triploids, twelve tetraploids, and, in addition, two species displaying two ploidy levels each (tetra- and pentaploid *R. guentheri*, tri- and tetraploid *R. xpseudidaeus*). First chromosome number reports are presented here for *R. barrandienicus* Holub et Palek ($2n = 21$), *R. perrobustus* Holub ($2n = 21$), *R. indusiatus* Focke ($2n = 28$), *R. geminatus* H. E. Weber ($2n = 28$), *R. orthostachyoides* H. E. Weber ($2n = 28$) and *R. amphimalacus* H. E. Weber ($2n = 28$). New cytotypes were found in an introduced *R. allegheniensis* Porter ($2n = 28$ here, $2n = 14, 21$ in the literature) and in two native species: *R. constrictus* P. J. Mueller et Lefèvre ($2n = 28$ here, $2n = 21$ in the literature) and *R. guentheri* Weihe ($2n = 35$ found only rarely here, $2n = 28, 42$ in the literature). The chromosome number of $2n = 28$ given here for *R. bertramii* G. Braun is likely to be the first report concerning plants of known native origin. The chromosome numbers found in the remaining 11 species correspond to literature data. In this contribution three species studied karyologically represent new species for the flora of the Czech Republic: *R. amphimalacus* H. E. Weber, *R. indusiatus* Focke and *R. orthostachyoides* H. E. Weber. *R. nessensis* subsp. *scissoides* H. E. Weber is mentioned as a further new taxon for the Czech Republic. *R. barrandienicus* Holub et Palek is given as a new plant for Germany (Bavaria) and *R. indusiatus* Focke for Austria (Lower Austria). For all species studied, brief data on their chorology and ecology are given.

Key words: Chromosome numbers, *Rubus*, distribution, Czech Republic

Introduction

The series of papers dealing with the karyology of the genus *Rubus* in the Czech Republic is here continued; this fourth contribution provides information about a group of 21 additional species. On the whole, 87 species are now included in this series. In addition to the remaining species known from the Czech Republic, the next contribution (in preparation) will discuss predominantly those species to be newly described in the near future. For the material and methods used here see previous papers (Krahulcová & Holub 1997, 1998a, b). Several species presented in this contribution belonging to the subgenera *Anoplobatus* (*R. odoratus*, *R. parviflorus*) and *Rubus*, subsection *Rubus* (*R. nessensis*, *R. allegheniensis*, *R. canadensis*, *R. barrandienicus*, *R. bertramii* and *R. divaricatus*), do not usually form rooting stem-tips. In addition, according to our experience, their stem cuttings take root only with difficulty. Therefore, to obtain the material suitable for karyological study, in most cases offsets from bushes were collected in the field and cultivated in the garden.

Results and discussion

Subgen. *Anoplobatus* (Focke) Focke

1. *Rubus odoratus* L.

 $2n = 14$ (Fig. 1a)

Linnaeus Sp. Pl., 494, 1753.

[Syn.: *Rubacer odoratus* (L.) Rydb.]

Localities:

1. C Bohemia; distr. Praha-západ [Prague-West]; Průhonice village, in the area of the castle park (in the part "Chotobuz"), 310 m a. s. l., 49°59'50"N, 14°33'50"E. Coll. A. Krahulcová and J. Holub 16. 10. 1995 (seeds) and 15. 4. 1996 (sprouting leaves).
2. E Bohemia; distr. Pardubice; Pardubice town, on wood margins along the road and cycle-path in the N part of the suburb of Rybitví - Stará Kolonie, 220 m a. s. l., 50°04'00"N, 15°42'20"E. Coll. J. Holub and A. Krahulcová 30. 9. 1997.

Only the diploid level ($2n = 14$) is known in this species (a total of 5 references are given in Thompson 1997). The chromosome counts recently published were made either on cultivated material of unknown origin (Thompson 1995), or on plants of native occurrence in Canada (Löve 1987, Wcisło 1987). Our data, concerning cultivated plants (loc. 1) and those representing a naturalized state (loc. 2), confirm the literature references mentioned above.

Rubus odoratus, originating from the eastern part of North America (East Canada and eastern part of United States), is cultivated as an ornamental plant in gardens and parks. In Europe it escapes from cultivation and here and there occurs as a naturalized plant. In the Czech Republic it is rarely naturalized in open and moist woods, wood glades and clearings at altitudes between 200–500 m a. s. l., often in the vicinity of castle parks (e. g. Průhonice). The second locality (loc. 2), situated between the towns of Pardubice and Lázně Bohdaneč, is given in the Flora of the Czech Republic (Holub 1995: 79) briefly as Semtín - Bohdaneč.

2. *Rubus parviflorus* Nutt.

 $2n = 14$

Nuttall Gen. North Amer. Pl. 1: 308, 1818.

[Syn.: *Rubus nutkanus* Moc. ex Ser.; *Rubacer parviflorus* (Nutt.) Rydb.]

Locality:

1. C Bohemia; distr. Praha-západ [Prague-West]; Průhonice village, at the southern border of the castle park close to the road between the villages of Průhonice and Dobřejovice, 320 m a. s. l., 49°59'30"N, 14°33'30"E. Coll. J. Holub and A. Krahulcová 31. 10. 1996.

The diploid level ($2n = 14$) was confirmed in this North American species (5 references in Thompson 1997). The same chromosome number was found e. g. in plants of native occurrence in Canada (Taylor & Mulligan 1968, Löve 1987); the other literary data are likely to be based on cultivated plants of unknown origin.

Rubus parviflorus originates in the western part of North America (Alaska – Mexico; eastwards from there discontinuously to the region of the Great Lakes). It is sometimes cultivated as an ornamental plant in parks and very occasionally escapes from cultivation and naturalizes, usually near to castle parks in shaded and moderately moist sites. In

Europe its naturalized occurrence is very rare, only one record exists for Central Europe – Kiel in Germany (Weber 1995).

Subgen. *Idaeobatus* Focke

Sect. *Idaeus* S. F. Gray

Ser. *Nivei* Focke

3. *Rubus cockburnianus* Hemsley

2n = 14 (Fig. 1b)

Hemsley, J. Linn. Soc. Bot., London, 29: 305, 1892.

Locality:

1. C Bohemia; distr. Praha-západ [Prague-West]; Průhonice village, the plant cultivated in the central part of the castle park on the right bank of Botič brook, 310 m a. s. l., 49°59'30"N, 14°33'30"E. Coll. A. Krahulcová and J. Holub 16. 4. 1998.

This Asian species, native in West and Central China, is occasionally cultivated as an ornamental plant in parks in other continents, especially for its conspicuous white waxy pruinose stems. Its diploid chromosome number (2n = 14) has already been reported both in wild plants from China (Thompson & Zhao 1993) and in cultivated material of unknown origin (Thompson 1995 and probably also two additional references in Thompson 1997, where it is given under the name of *R. girdaldianus* Focke ex Diels). Escapes from cultivation and naturalization of this species are not known.

Subgen. *Cylactis* (Rafin.) Focke

Ser. *Saxatiles* Focke

[Syn.: *Rubus* L. sect. *Boreales* E. H. L. Krause]

4. *Rubus saxatilis* L.

2n = 28

Linnaeus Sp. Pl., 494, 1753.

[Syn.: *Cylactis saxatilis* (L.) Á. Löve]

Localities:

1. W Bohemia; distr. Tachov; wood margin along the road on the SW slope of Lískový vrch hill (709.2 m), ca. 0.75 km NE of Přimda village, 690 m a. s. l., 49°40'50"N, 12°41'10"E. Coll. J. Holub and A. Krahulcová 4. 10. 1996.
2. NW Bohemia; distr. Louny; Džbán plateau; on the woodland edge 1 km E of "Zichovecká myslivna" game-keeper's lodge, 2.5 km SSE of Hříškov village, 425 m a. s. l., 50°16'20"N, 13°52'50"E. Coll. J. Holub and A. Krahulcová 12. 9. 1997.
3. S Bohemia; distr. Písek; in the valley in the wood on the right bank of the Lomnice river ca. 2.2 km ESE of Dolní Ostrovec village, near the bridge across the river, 380 m a. s. l., 49°24'50"N, 14°08'40"E. Coll. J. Holub and A. Krahulcová 23. 9. 1997.

The tetraploid chromosome number of 2n = 28 was found in all plants examined. This is in agreement with all karyological data on *R. saxatilis*, published so far from different parts of its distribution area (total of 14 references in Thompson 1997). They refer e. g. to Germany (Scheerer 1939), Poland (Skalińska et al. 1978, Boratyńska 1997), Finland (Vaarama 1939), Norway (Engelskjön 1979), Great Britain (Heslop-Harrison 1953), Italy

(Löve & Löve 1982), Byelorussia (Dmitrieva & Parfenov 1985) and Russia – southern Siberia (Krogulevich & Rostovtseva 1984).

Rubus saxatilis is the only representative of the subgenus *Cylactis* in the flora of the Czech Republic. Its extensive distribution includes nearly the whole of Eurasia eastwards to Japan. In the West it transgresses by outlying occurrences to Iceland and southern Greenland. In the Czech Republic it is scattered and locally in decline. It is distributed here from the lowlands to the subalpine belt (max. 1450 m a. s. l. in the Giant Mts = Krkonoše Mts). *R. saxatilis* prefers basic, especially calcareous, bedrock. The map of its distribution in the Czech Republic was compiled by B. Slavík (Květena ČR 4: 25, 1995). It occurs as a rule in forest communities. In the Czech Republic *R. saxatilis* reproduces sexually only very poorly (e. g. compared with Slovakia). Recently several authors have studied this problem; according to Salonen (1994) growth and reproduction of this species depends upon the availability of light; according to Eriksson & Bremer (1993), its reproduction is related to the density of its patches in a given locality.

Subgen. *Rubus*

Sect. *Rubus*

Subsect. *Rubus*

[Syn.: *Rubus* L. sect. *Suberecti* Lindl.]

5. *Rubus nessensis* W. Hall subsp. *nessensis*

2n = 28

W. Hall, Trans. Roy. Soc. Edinburgh 3: 30, 1794.

[Syn.: *Rubus suberectus* G. Anderson ex Sm.]

Localities:

1. SW Bohemia; distr. Klatovy; in the wood 1 km ESE of Kroměždice village near the sand pit, ca. 4 km WNW of Plánice town, 530 m a. s. l., 49°24'10"N, 13°24'40"E. Coll. J. Holub and A. Krahulcová 14. 10. 1997.
2. NW Bohemia; distr. Louny; Džbán plateau; on the woodland edge 1 km E of "Zichovecká myslivna" game-keeper's lodge, 2.5 km SSE of Hříškov village, 425 m a. s. l., 50°16'20"N, 13°52'50"E. Coll. J. Holub and A. Krahulcová 12. 9. 1997.
3. NE Bohemia; distr. Trutnov; in the wood along the road near the crossing, ca. 1.5 km E of Horní Dehtov village, 400 m a. s. l., 50°25'30"N, 15°45'30"E. Coll. J. Holub and A. Krahulcová 16. 9. 1997.

The tetraploid chromosome number (2n = 28) revealed in all plants studied, corresponds to all eight literature references summarized in Thompson (1997). The data published previously concern plants e. g. from Sweden (Gustafsson 1943, Heslop-Harrison 1953), the Netherlands (Beijerinck 1956), Switzerland (Christen 1950 – the material under the name of *R. suberectus* G. Anderson), Poland (Boratyńska 1995a) and Byelorussia (Dmitrieva & Parfenov 1985). However, the subspecies *scissoides* H. E. Weber (Weber 1973) is not distinguished from subsp. *nessensis* in the literature sources mentioned above.

Rubus nessensis has a wide European distribution being situated in the temperate zone of Europe from the British Isles to the basin of the central Volga in Russia; the centre of its occurrence is Central Europe. Its distribution has a moderate Subatlantic character. The species is absent both from southern Europe and the Mediterranean area. *R. nessensis* occurs in nearly all the Czech Republic; it is missing only in warm lowlands devoid of woodlands and in higher mountain areas (at altitudes over 800–1000 m a. s. l.) as well as in

calcareous regions. Its occurrence is confined to oligotrophic sites. Most of its populations in the Czech Republic belong to the type subspecies studied here. The possibility of the occurrence of subsp. *scissoides* H. E. Weber (which is somewhat uncertain from a taxonomic viewpoint) in the Czech Republic was predicted by Holub (1995); it was found in 1994 as a new plant for this country in South Bohemia in several localities in the northern environs of the town of České Velenice. This occurrence is closely connected with that situated near Schrems in Lower Austria (see Weber 1995).

6. *Rubus allegheniensis* Porter

2n = 28 (Fig. 1c)

Porter, Bull. Torrey Bot. Club 23: 153, 1896.

Localities:

1. N Bohemia; distr. Děčín; Děčín town, in the abandoned orchard above the railway, ca. 150 m E of the suburb Prostřední Žleb, 150 m a. s. l., 50°48'10"N, 14°14'00"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.
2. N Bohemia; distr. Děčín; in the eastern part of Doubice village beside the road opposite the church, 390 m a. s. l., 50°53'30"N, 14°27'30"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.

Both diploid and triploid cytotypes (2n = 14 and 2n = 21) have been reported for this species (5 references on diploids and 5 references on triploids in Thompson 1997). The majority of chromosome counts published previously probably refer to cultivated plants. According to available literature, only two references can be related to diploids of native occurrence: from Canada, Nova Scotia (Aalders & Hall 1966) and from the United States (Einset & Pratt 1954), respectively. Contrary to literature data, we found the tetraploid chromosome number (2n = 28) in *R. allegheniensis* originating from both localities in northern Bohemia. This species, native in the eastern part of North America in the United States and Canada, was probably cultivated here during the period of the German settlement, which finished more than 50 years ago. We found a new tetraploid level in northern Bohemia in an introduced *R. allegheniensis*, which has escaped from former cultivation and naturalized there. A possibility exists that our plants do not represent a "pure" species; according to Thompson (1997), several tetraploid *allegheniensis*-type cultivars have been selected for human usage directly from wild populations, some of them being probably of hybrid origin.

Rubus allegheniensis was and is cultivated as a fruit plant; here and there it escapes from gardens and especially in North Bohemia it is naturalized beside ways, on wood margins and in woods. Its occurrence in North Bohemia is connected with its secondary occurrence in adjacent Saxony, where the species was found in several places as an escape from cultivation (Ranft 1995).

7. *Rubus canadensis* L.

2n = 21

Linnaeus Sp. Pl., 494, 1753.

Localities:

1. N Bohemia; distr. Děčín; Mikulášovice village, beside the path in the wood situated between the abandoned factory and the granite quarry, ca. 0.25 km from the north-western part of the village, 410 m a. s. l., 50°58'50"N, 14°21'10"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.
2. C Bohemia; distr. Praha-západ [Prague-West]; Průhonice village, in the central part of the castle park near the road between the villages of Průhonice and Dobřejovice, 310 m a. s. l., 49°59'30"N, 14°33'20"E. Coll. A. Krahulcová and J. Holub 16. 4. 1998.

This North American species is sporadically cultivated in Europe but its escape from cultivation has been recorded only rarely. We found the triploid chromosome number ($2n = 21$) both in plants of naturalized occurrence (loc. 1) and in those collected at places of earlier cultivation of this species (loc. 2). The literature data give two cytotypes, diploid and triploid; the latter seems to prevail in a significant part of its distribution area (Thompson 1997), being reported among others from 13 collection sites in Canada (Craig 1960). On the other hand, the diploids are known from two localities in the United States (Thompson 1995). Other references concern cultivated plants of unknown origin (the triploid cytotype – Thompson 1995, both cytotypes – Longley 1924).

Rubus canadensis is native in the eastern part of North America (especially in Canada); it is substantially less frequently cultivated as a fruit plant in comparison with *R. allegheniensis*. Therefore it only rarely escapes from cultivation and may be naturalized. In the Czech Republic its occurrence was formerly known only from the castle park in Průhonice (Holub 1995 – loc. 2), where its present occurrence is a relic of an earlier cultivation (ergasiolipophyte). The locality at Mikulášovice (leg. et det. J. Hadinec) corresponds by its character to a naturalized occurrence. This locality in North Bohemia is connected to the secondary occurrence of the species in Saxony, from where Ranft (1995) gives several localities, especially from the region of Upper Lusatia. The nearest locality there to the locality at Mikulášovice is Sohland, situated close to the border between Bohemia and Saxony; the distance between the two localities is only 9 km.

8. *Rubus barrandienicus* Holub et Palek

2n = 21 (Fig. 1d)

Holub et Palek, Folia Geobot. Phytotax. 26: 332, 1991.

Localities:

1. C Bohemia; the protected landscape area Křivoklátsko; distr. Rakovník; in the woodland on the upper part of Čepina hill (469.1 m), ca. 3 km NNW of Nezabudice village, 460 m a. s. l., 50°02'20"N, 13°48'40"E. Coll. J. Holub and A. Krahulcová 8. 9. 1997.
2. S Bohemia; distr. Prachatice; on the edge of Čarouše wood ca. 1.5 km NNE of Budkov settlement NE of Husinec village, 500 m a. s. l., 49°05'10"N, 14°01'10"E. Coll. J. Holub and A. Krahulcová 3. 10. 1996.
3. S Moravia; distr. Znojmo; Rakšice village near Moravský Krumlov town, along the path in the wood 0.8 km SW of the railway station, 300 m a. s. l., 49°00'30"N, 16°20'30"E. Coll. B. Trávníček and A. Krahulcová 18. 10. 1996.

This is the first report on the chromosome number of *R. barrandienicus*, described recently from Bohemia (Holub 1991); all plants examined proved to be triploid ($2n = 21$).

Rubus barrandienicus has been known only from Bohemia and Moravia; recently it was found also in Bavaria. It occurs most frequently in central Bohemia, where it occupies

an area of ca. 150×100 km with more than 100 known localities. For more precise geographical delimitation of its area in central Bohemia see Holub (1993: 107; 1995: 95). The first two localities of the karyologically studied material belong here, the first (loc. 1) being situated on the northern border and the second (loc. 2) on the southern border of its Bohemian distribution. In Moravia two outlying occurrences of *R. barrandienicus* are known; one in the surroundings of Moravský Krumlov (here loc. 3 belongs) and the second between Blansko and Černá Hora. In 1996 the species was found in north-eastern Bavaria by V. Žíla (det. J. Holub et V. Žíla). Information on this find is in preparation (Holub & Žíla). According to a letter information from Professor H. E. Weber, the Bavarian batologist R. Zanghe also found *R. barrandienicus* in Bavaria in 1997. The species represents a nemophilous ecoelement, occurring in rather open woods, on wood margins and in clearings, always on non-calcareous bedrocks and soils poor in bases. The most closely related species to *R. barrandienicus* is *R. sulcatus*, from which it differs by the poor stem armature, shape of basal leaflets, stamens shorter than gynoecia, white narrow petals and small fruits.

9. *Rubus bertramii* G. Braun

$2n = 28$ (Fig. 1e)

G. Braun Herb. Rub. Germ., 21, 1877.

Locality:

1. C Bohemia; distr. Kolín; on the woodland margin in the southern part of Jevany village, beside the road close to the eastern bank of Jevanský rybník pond, 410 m a. s. l., $49^{\circ}58'00''\text{N}$, $14^{\circ}48'40''\text{E}$. Coll. J. Holub and A. Krahulcová 25. 10. 1996.

The only reference to the tetraploid level found in *R. bertramii* was published by Harrison (in Maude 1939), but without any information about the origin of plants studied. Although this list of chromosome numbers includes British flowering plants, the karyological data published there often refer to material from continental Europe (Maude 1939). The plants from the locality in central Bohemia (loc. 1) were also tetraploid ($2n = 28$).

According to its total distribution, *R. bertramii* is a West-Central European species. Its occurrence is uneven and discontinuous from the British Isles to Central Europe, with a Subatlantic tendency. In the Czech Republic it reaches the eastern border of its occurrence in north-eastern Moravia. To the south-east it is known from Austria (Styria) and Slovenia. It seems that *R. bertramii* is a neglected species; at the same time it is frequently mistaken for some species of the group *Suberecti*, in the Czech Republic for *R. plicatus* and more frequently for *R. sulcatus*. A more detailed analysis of the taxonomy and chorology of *R. bertramii* was undertaken by Weber (1979). The species is insufficiently known to Czech batologists; while preparing the present contribution, a plant originating from South Bohemia (Lety at Orlík) and resembling *R. bertramii* was examined. However, its inclusion within that species was not confirmed by Professor H. E. Weber (karyological data found in this and similar cases will be given in the next contribution of this series as additional results). The greater part of the data on the occurrence of *R. bertramii* in the Czech Republic given in the Flora of the Czech Republic (Holub 1995; cf. also Holub 1993) is based on plants determined by Professor H. E. Weber. From an ecological point of view, *R. bertramii* is intermediate between *R. plicatus* and *R. sulcatus*; it occurs always on non-calcareous bedrocks.

10. *Rubus divaricatus* P. J. Mueller
P. J. Mueller, Flora 41: 130, 1858.

2n = 21 (Fig. 1f)

Localities:

1. C Bohemia; distr. Mělník; along the path in the wood ca. 0.6 km E of Zlosyň village, 200 m a. s. l., 50°16'50"N, 14°23'00"E. Coll. J. Holub and A. Krahulcová 12. 9. 1997.
2. C Bohemia; distr. Mělník; in the wood "Míkov" on the upper part of the hill ca. 1.6 km SW of Vavřinec village, 230 m a. s. l., 50°19'00"N, 14°32'20"E. Coll. J. Holub and A. Krahulcová 9. 9. 1997.
3. C Bohemia; distr. Mladá Boleslav; in the former military area "Milovice – Mladá", in the wood beside the crossing 2 km SW of Lipník village, 250 m a. s. l., 50°15'40"N, 14°53'40"E. Coll. J. Holub and A. Krahulcová 9. 9. 1997.

The same triploid level was found in this species (under the name of *R. nitidus* Weihe et Nees pro parte) by Gustafsson (1943) from Sweden, by Beijerinck (1956) from the Netherlands and by Heslop-Harrison (1953) from Great Britain. Recently, the triploid level was confirmed in *R. divaricatus* from three localities in southern Poland (Boratyńska 1997). An isolated case of the tetraploid chromosome number (2n = 28, the species under the name of *R. nitidus* auct., non Weihe et Nees) was published by Datta (1932) from Great Britain.

Rubus divaricatus is a West-Central European species with a distinct Subatlantic tendency and a discontinuous distribution. To the East it reaches central and south-western Poland and Bohemia; it is absent from Bavaria and Austria. A map of its distribution (state May 1992) is given by Weber (1995: 362) but its occurrence in the Czech Republic is not included there. Holub (1993) did not know this species with certainty from the Czech Republic where *R. divaricatus* is a very rare bramble; it occurs in several localities in the surroundings of Děčín (North Bohemia) and in the central Elbe river basin (central Bohemia). Isolated, single localities are known in the southern part of the Hřebený hill country (Dobříš – Hostomice), Zbraslav near Praha and at Slatiňany and Semteš in the Železné hory Mts. The occurrence of *R. divaricatus* in North Bohemia is connected with its more frequent occurrence in Saxony in the northern surroundings of Dresden and in Upper Lusatia. In the marginal localities of its distribution area, *R. divaricatus* is represented only by single bushes. All localities of the species in Bohemia were found only in the last period of an intensive botanical investigation of the Czech Republic. *R. divaricatus* occurs most frequently in sites with poor sandy soils.

11. *Rubus constrictus* P. J. Mueller et Lefèvre
P. J. Mueller et Lefèvre, Jahresber. Pollichia 16–17: 79, 1859.

2n = 28 (Fig. 1g)

Localities:

1. C Bohemia; distr. Kolín; clearing in woods in the valley NW of Kostelec nad Černými Lesy village, 345 m a. s. l., 50°00'10"N, 14°51'20"E. Coll. J. Holub 14. 10. 1995.
2. SW Moravia; distr. Třebíč; on the woodland edge beside the road between the villages of Kramolín and Mohelno, ca. 1.8 km ESE of Kramolín village, 430 m a. s. l., 49°07'40"N, 16°09'30"E. Coll. B. Trávníček and A. Krahulcová 18. 10. 1996.
3. S Moravia; distr. Brno-venkov [Brno-country district]; on the woodland edge beside the road between the villages of Hlína and Prštice near Ivančice town, ca. 1.5 km NE of Hlína village, 420 m a. s. l., 49°07'20"N, 16°26'40"E. Coll. B. Trávníček and A. Krahulcová 18. 10. 1996.
4. C Moravia; distr. Kroměříž; on the woodland edge close to the military installation 1.4 km NNE of Nětčice village, 300 m a. s. l., 49°15'40"N, 17°19'20"E. Coll. B. Trávníček 8. 10. 1996.

5. C Moravia; distr. Přerov; in the shrubby vegetation in an orchard 0.7 km NE of Dolní Újezd village, NW of Lipník nad Bečvou town, 320 m a. s. l., 49°33'10"N, 17°32'50"E. Coll. B. Trávníček 10. 10. 1996.
6. C Moravia; distr. Zlín; on the edge of the clearing in the wood of Paseky, ca. 1.5 km SSE of Paseky settlement near Bohuslavice u Zlína village, 370 m a. s. l., 49°49'10"N, 17°38'50"E. Coll. B. Trávníček and A. Krahulcová 17. 10. 1996.

The tetraploid chromosome number ($2n = 28$) was found in plants originating from all six localities in Bohemia and Moravia. The tetraploid *R. constrictus* is here presented for the first time. Only the triploid cytotype was known up to now in this species, namely from France, Austria – Styria (Gustafsson 1943) and from one locality in Poland (Boratyńska 1997). For this reason, the distribution of tetraploid and triploid cytotypes of *R. constrictus* needs a more detailed study.

Rubus constrictus is a South-Central European species with a wide and relatively discontinuous distribution area, which extends from Belgium and France in the West to South Poland (Upper Silesia), Slovakia and Romania in the East, and to the former Yugoslavia and northern Italy in the South. A record of a very eastern locality exists from West Ukraine – Lviv (cf. Focke 1902–1903). In the Czech Republic *R. constrictus* occurs both in Bohemia and Moravia; in Moravia it seems to be more frequent – the ratio of plants examined karyologically is 1: 5. The species occurs here scattered and usually as individual bushes only. Its distribution is confined to warmer areas at lower elevations, on neutral to slightly basic soils. By the latter feature it differs ecologically from nearly all Central European representatives of the group *Suberecti*.

Subsect. *Hiemales* E. H. L. Krause in Prahl

Ser. *Rhamnifolii* (Bab.) Focke

12. *Rubus perrobustus* Holub

$2n = 21$ (Fig. 2a)

Holub, Preslia 64: 128, 1993.

Localities:

1. SW Moravia; distr. Třebíč; on the woodland edge beside the road between the villages of Slavětice and Kramolín, ca. 1.5 km NE of Slavětice village, 410 m a. s. l., 49°06'50"N, 16°07'10"E. Coll. B. Trávníček and A. Krahulcová 18. 10. 1996.
2. C Moravia; distr. Olomouc; on the margin of the wood 0.8 km ESE of Tovčůvka village, 300 m a. s. l., 49°38'20"N, 17°20'00"E. Coll. B. Trávníček 3. 10. 1996.
3. C Moravia; distr. Kroměříž; along the road in the wood "Rasina" ca. 1.7 km E of the railway station Chropyně, 190 m a. s. l., 49°22'10"N, 17°23'10"E. Coll. B. Trávníček 15. 10. 1995.
4. S Moravia; distr. Uherské Hradiště; on the woodland edge beside the road between Březolupy village and Šarov settlement, ca. 1.8 km NNE of Březolupy village, 230 m a. s. l., 49°08'00"N, 17°35'50"E. Coll. B. Trávníček and A. Krahulcová 17. 10. 1996.

The chromosome number of *R. perrobustus*, described in recent years by J. Holub from the Czech Republic (Holub 1993), is given here for the first time. The plants collected from all localities mentioned above proved to be triploid ($2n = 21$).

Rubus perrobustus is a distinct species known till now only from the Czech Republic, where it occurs both in Bohemia and Moravia (in the latter more frequently, but the absence of karyologically studied plants from Bohemia does not correspond to the actual representation of *R. perrobustus* in the two areas). Its occurrence is rare and scattered and it

is usually represented by individual bushes only. It is distributed in lower elevations in warmer regions, where it occurs on the most fertile soils; it also tolerates calcareous or basic bedrocks. Recently several new localities have been found (compare those given by Holub 1995), e. g. an isolated marginal locality in South Bohemia near Strakonice. From a taxonomic point of view, *R. perrobustus* appears to be situated between subsect. *Rubus* and sect. *Rhamnifolii*. Holub (1993, 1995) included it in ser. *Rhamnifolii*; Weber (1995) classified it to subsect. *Rubus*. The triploid chromosome number given here indicates a certain justification for Weber's classification. The original classification is retained here for the present.

Ser. *Vestiti* (Focke) Focke

13. *Rubus pyramidalis* Kaltenb.

2n = 28 (Fig. 2b)

Kaltenbach Fl. Aachen. Beck., 245, 1845.

Locality:

1. C Bohemia; distr. Kutná Hora; beside the road in the wood "Jedlina" ca. 0.4 km NNW of Brandýs settlement, 4 km NW of Zruč n. Sázavou town, 450 m a. s. l., 49°46'00"N, 15°03'10"E. Coll. J. Holub and A. Krahulcová 30. 9. 1997.

The tetraploid chromosome number of $2n = 28$, found in *R. pyramidalis* from the locality in Bohemia, is in agreement with the majority of references given in the literature for this species (six references on this chromosome number in Thompson 1997). The tetraploid plants studied previously were collected in Scandinavia (Gustafsson 1943, $2n = 26-28$), the Netherlands (Beijerinck 1956) and Poland (Boratyńska 1995b). The same chromosome number is presented by Gustafsson (1943) for a plant cultivated in the Botanical Garden Lund and by Thompson (1995) for a cultivated hybrid (?) plant originating from Sweden. Heslop-Harrison (1953), who studied plants in Great Britain, gives two cytotypes for this species: tetraploid ($2n = 28$) and hexaploid ($2n = 42$), both having been found in var. *parvifolius* Frid. et Gelert; the taxonomy of these hexaploid plants should be revised.

Rubus pyramidalis is a West-Northwest-European species (for its distribution map see Weber 1995: 451) extending eastwards to Pomerania (to Leborg), the surroundings of Poznań and Silesia (Poland) and to Saxony. An isolated occurrence is located in Bavaria at Ingolstadt. The distribution of *R. pyramidalis* is characteristically Subatlantic, with an Atlantic-Subatlantic tendency. To the east, the number of localities is distinctly lower. In the Czech Republic *R. pyramidalis* is a very rare species, until recently known only from one locality in the basin of the central Sázava river in a small area of only a few quadrat meters. The locality was found by J. Holub in 1989 and the species still occurs here. It is an outlying occurrence, the nearest known localities of *R. pyramidalis* being formerly in Saxony (surroundings of Dresden, Upper Lusatia), but in 1997 the species was found at a second locality – Dolský Mlýn mill on the river Kamenice near the village of Mezná in the Lower Elbe sandstone area in North Bohemia. This occurrence is connected with that in neighbouring Saxony.

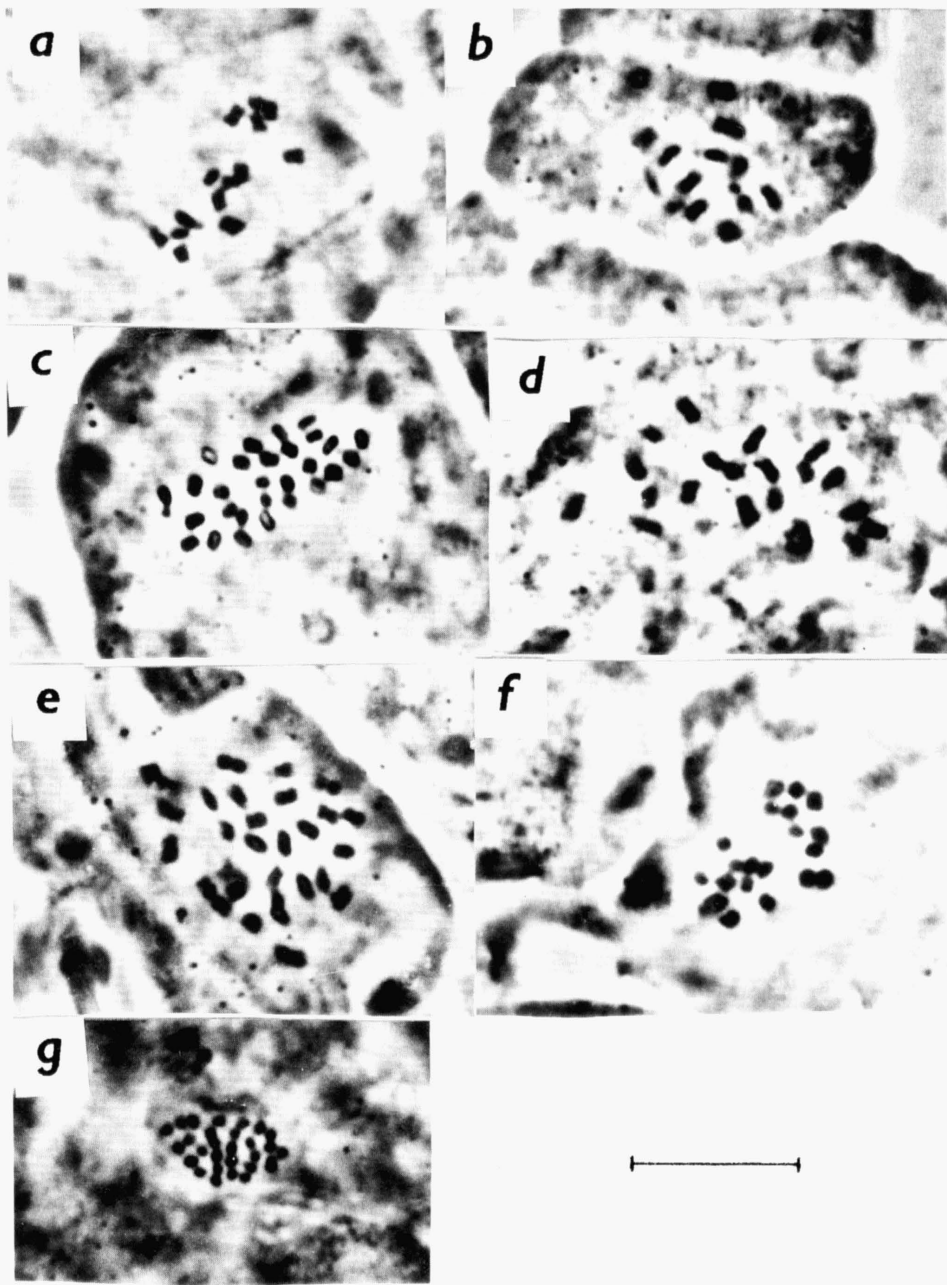


Fig. 1. – Somatic metaphases in seven species of the genus *Rubus*; – a: *Rubus odoratus* L., $2n = 14$ (loc. 2); b: *Rubus cockburnianus* Hemsley, $2n = 14$ (loc. 1); c: *Rubus allegheniensis* Porter, $2n = 28$ (loc. 1); d: *Rubus barrandienicus* Holub et Palek, $2n = 21$ (loc. 1); e: *Rubus bertramii* G. Braun, $2n = 28$ (loc. 1); f: *Rubus divaricatus* P. J. Mueller, $2n = 21$ (loc. 3); g: *Rubus constrictus* P. J. Mueller et Lefèvre, $2n = 28$ (loc. 5). [Scale bar = 10 μ m].

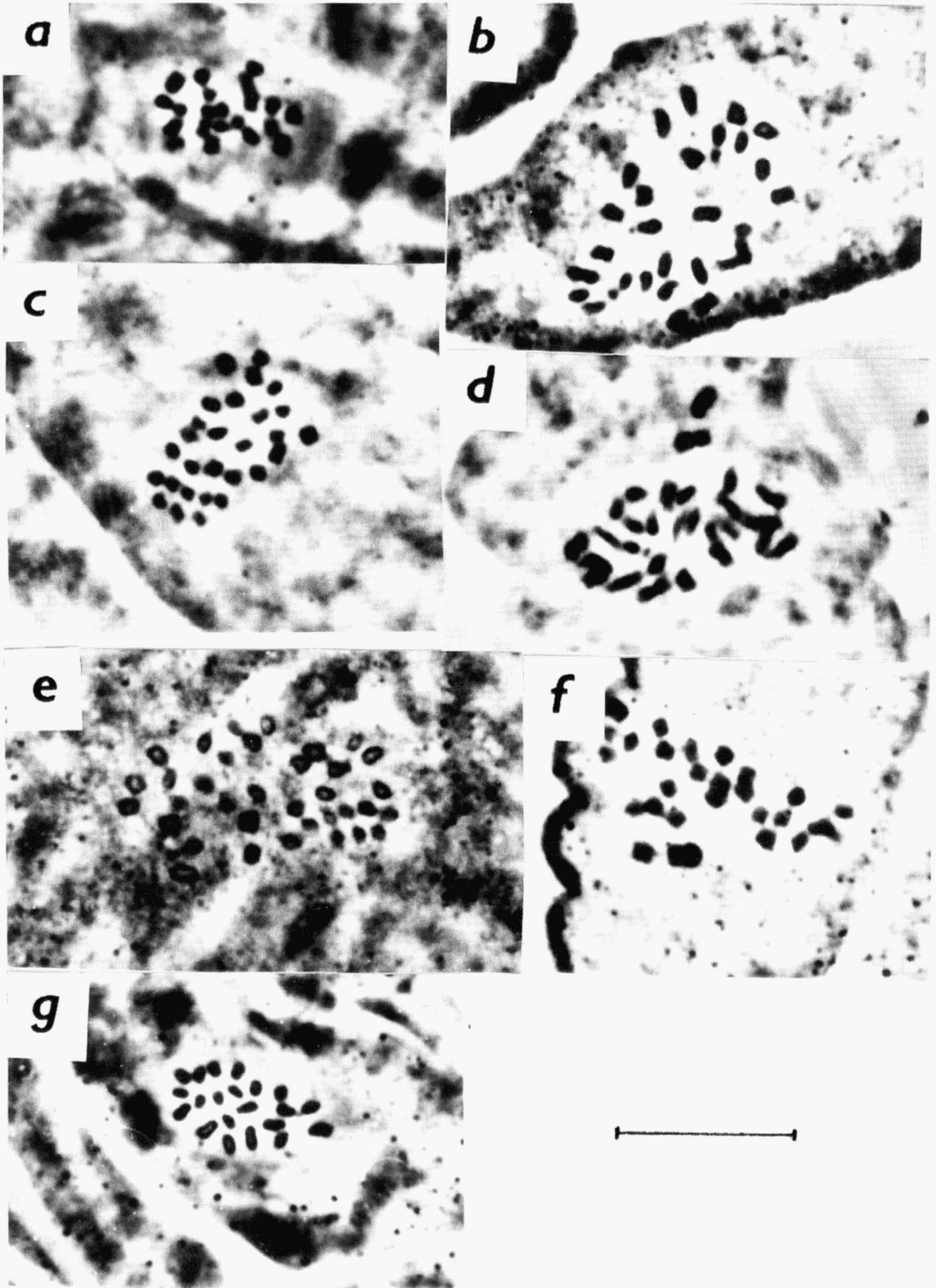


Fig. 2. – Somatic metaphases in six species of the genus *Rubus*: – a: *Rubus perrobustus* Holub, $2n = 21$ (loc. 1); b: *Rubus pyramidalis* Kaltenb., $2n = 28$ (loc. 1); c: *Rubus scaber* Weihe, $2n = 28$ (loc. 2); d: *Rubus guentheri* Weihe, $2n = 28$ (tetraploid cytotype, loc. 2); e: *Rubus guentheri* Weihe, $2n = 35$ (pentaploid cytotype, loc. 3); f: *Rubus amphimalacus* H. E. Weber, $2n = 28$ (loc. 1); g: *Rubus xpseudidaeus* (Weihe) Lej., $2n = 21$ (triploid cytotype, loc. 4). [Scale bar = 10 μm].

Ser. *Micantes* Sudre14. *Rubus geminatus* H. E. Weber

2n = 28

H. E. Weber, Ber. Bayer. Bot. Ges. 62: 152, 1991.

Localities:

1. N Bohemia; distr. Děčín; on the edge of "Tomášovský les" wood near the branch road to the parking place of "Tanečnice", 1.5 km SW of Mikulášovice village, 500 m a. s. l., 50°57'30"N, 14°20'00"E. Coll. J. Holub and A. Krahulcová 10. 10. 1996.
2. N Bohemia; distr. Děčín; Brtníky village ca. 7 km S of Šluknov town, on the woodland edge 0.4 km NW of the railway station, 470 m a. s. l., 50°57'20"N, 14°26'20"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.
3. N Bohemia; distr. Děčín; the protected area "Labské pískovce"; beside the road in the wood "Bludiště" ca 2.5 km SE of Růžová village, 330 m a. s. l., 50°49'20"N, 14°19'00"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.

The chromosome number in *R. geminatus* has not yet been established.

Rubus geminatus is a Central European species with its occurrence centered in the western part of Central Europe. Its distribution area extends from North Bavaria (Coburg) and Thuringia to Saxony (Upper Lusatia); from there it transgresses to North Bohemia. According to present knowledge it does not occur in adjacent areas of Poland. Five localities of *R. geminatus* are known in North Bohemia (see Holub 1995), in each of these localities the species is represented by only 1–2 bushes. The occurrence in the locality at Brtníky (loc. 2) is threatened by intensive grazing. The plants in the locality at Dolský Mlýn mill near Mezná village (Holub 1995: 144) are probably extinct. *R. geminatus* belongs to the very rare and seriously threatened brambles in the flora of the Czech Republic.

Ser. *Radula* (Focke) Focke15. *Rubus indusiatus* Focke

2n = 28

Focke Syn. Rub. Germ., 284, 1877.

Localities:

1. SW Bohemia; distr. Klatovy; wood margin E of Stará Lhota village (near Nýrsko village), 520 m a. s. l., 49°16'00" N, 13°09'10" E. Coll. J. Holub 18. 10. 1997.
2. SW Bohemia; distr. Klatovy; on the woodland edge along the road between the villages of Strážov and Blata, 540 m a. s. l., 49°18'10"N, 13°13'00"E. Coll. J. Holub and A. Krahulcová 4. 10. 1996.
3. SW Bohemia; distr. Klatovy; Klatovy, in the wood on Výhořice hill (525 m), 1.5 km SW of Luby village (now a part of Klatovy town), 485 m a. s. l., 49°21'50"N, 13°17'40"E. Coll. J. Holub 18. 10. 1997.

The chromosome number of this tetraploid species has not been previously established.

Rubus indusiatus is a new species to the flora of the Czech Republic found by J. Holub in the Český les Mts in 1995; at that time it was preliminarily treated as a species new to science as no similar bramble was included in accessible modern botanical literature. Later the herbarium material was determined by Professor H. E. Weber as *R. indusiatus* Focke, which is a neglected species, absent even in the treatment of Central European brambles by Weber (1995). In 1997 Weber restored the species to the literature (Weber 1997): in that contribution its presence in the Český les Mts (based on the collections of J. Holub) is also mentioned. Since 1995 J. Holub – and later V. Žíla – has studied the

distribution of this species in southwestern Bohemia, where *R. indusiatus* occurs $\pm$ continuously from the southern part of the Český les Mts to the northern foothills of the western part of the Šumava Mts, northwards to the line Domažlice – Klatovy – Horažďovice – Strakonice. An isolated locality occurs on the south-western margin of the Brdy Mts (Planiny; 1996 leg. J. Holub; 1997 leg. P. Havlíček). *R. indusiatus* was described by Focke from Bavaria, where it occurs from south-eastern Bavaria to the Bavarian Forest in the northern surroundings of Regensburg and Passau (here collected by V. Žila in 1997). From the Bavarian Forest it transgresses to south-western Bohemia. A new locality of *R. indusiatus* was found by V. Žila in 1997 in Lower Austria near Zwettl (det. J. Holub, rev. H. E. Weber); this find represents the most easterly known occurrence of the species and is a species new to Austria. *R. indusiatus* is a regional species with the centre of its distribution in Bavaria. Sometimes it may be difficult to distinguish this species from *R. epipsilos* classified in the same series *Radula*. However, the fine serrature of the terminal leaflet and usually tomentose (felted) leaves beneath are good distinguishing characters for determination of these two species.

Ser. *Pallidi* W. C. R. Watson

16. *Rubus scaber* Weihe

2n = 28 (Fig. 2c)

Weihe in Bluff et Fingerhuth Compend. Fl. Germ. 1: 683, 1825.

Localities:

1. N Bohemia; distr. Děčín; beside the hiking path in the woodland S of Nová Ves settlement, ca. 2.5 km NNW of Šluknov town, 350 m a. s. l., 51°01'20"N, 14°26'30"E. Coll. J. Holub and A. Krahulcová 10. 10. 1996.
2. NE Bohemia; distr. Jičín; beside the road in the woodland between the villages of Újezdec and Soběraz NE of Jičín town, ca. 0.7 km SSW of Újezdec village, 400 m a. s. l., 50°28'50"N, 15°25'00"E. Coll. J. Holub and A. Krahulcová 16. 9. 1997.

The plants from both localities studied proved to be tetraploid (2n = 28). This confirms the up to now sporadic literature data on this species, refering to plants from Great Britain (Heslop-Harrison 1953) and to plants of unknown origin (Fabergé in Maude 1939).

Rubus scaber has a wide area of distribution extending from the British Isles to North Bohemia; the distribution area is discontinuous and is divided into three parts – the British Isles (Ireland and England), north-western Westphalia and Saxony with a transgression into the Czech Republic and south-western Poland. Its occurrence has a distinct Subatlantic tendency. In the Czech Republic it occurs with certainty only in the northern half of Bohemia, where it is known principally from the surroundings of Šluknov. The locality loc. 1 belongs here, and is at present the only known site in this area; the species is clearly declining here. Literature sources include further reliable data from this area e. g. at Jiříkov, Mikulášovice, Vilémov – Dolní Poustevny and Hřensko (see Weber 1995). The occurrence of *R. scaber* in this region is related to its occurrence in Upper Lusatia (Ranft 1995). A further (more distant) locality is loc. 2, which is given in the literature as Bradlecká Lhota (Holub 1993, 1995; Weber 1995). Here only two plants of the species occurred at the time of revision of the locality in 1997. The locality Heřmanův Městec in the Železné hory Mts calls for a revision. *R. scaber* occurs only as scattered individuals and does not form extensive patches. It is a nemophilous ecoelement, though it occurs on wood

margins, wood-fences etc. It belongs to the critically threatened species in the flora of the Czech Republic on the basis of the very small number of individuals in the country.

Ser. *Glandulosi* (Wimmer et Grab.) Focke

17. *Rubus guentheri* Weihe 2n = 28, 35 (Fig. 2d, e)
Weihe in Bluff et Fingerhuth Compend. Fl. Germ. 1: 697, 1825.

Localities:

1. N Bohemia; distr. Liberec; beside the road on the N slope of the hill (521.9), ca. 2.5 km SW of Jindřichovice pod Smrkem village, 490 m a. s. l., 50°57'00"N, 15°13'10"E. Coll. J. Holub and A. Krahulcová 11. 10. 1996. 2n = 28.
2. C Bohemia; distr. Mělník; on the woodland edge N of Chloumek village, ca. 3 km NNE of Mělník town, 260 m a. s. l., 50°22'30"N, 14°30'30"E. Coll. J. Holub and A. Krahulcová 29. 10. 1996. 2n = 28.
3. NW Bohemia; distr. Jičín; Markvartice village near Sobotka town, along the path on the woodland edge 0.75 km N of the village, 380 m a. s. l., 50°26'30"N, 15°11'50"E. Coll. J. Holub and A. Krahulcová 16. 9. 1997. 2n = 28, 35 (both cytotypes found in one population).

The tetraploid cytotype (2n = 28) prevails in *R. guentheri* in the area studied, whereas the pentaploid (2n = 35) was found only rarely (loc. 2). The plants collected in loc. 2 were carefully determined in order to ensure that they were not confused with the pentaploid *R. pedemontanus*, particularly with respect to the important character distinguishing *R. guentheri* from *R. pedemontanus* Pinkwart (stamens shorter than gynoeceia). The only data on chromosome numbers of *R. guentheri* have been published by Boratyńska (1996) from Poland, where the tetraploid cytotype prevails (3 localities, 2n = 28), beside the only hexaploid plant, found in one locality in Polish Silesia (2n = 42). According to Boratyńska (1996), both cytotypes from Poland resemble each other morphologically. Our finding of the pentaploid level (2n = 35) in *R. guentheri* is new for this species. The distribution of cytotypes and their morphology need a more detailed study.

Rubus guentheri is a Central European species with its distribution area extending from Bavaria (Fichtelgebirge Mts; the Bavarian Forest is also cited in the literature for this species) through Saxony (especially in the Ore Mountains), North Bohemia and Silesia to the margin of the Carpathians in Moravia (Beskydy Mts). An isolated occurrence is reported from Tirol (it requires a taxonomic revision). In Bohemia it is known from the Ore Mountains and Sudeten Mts; its occurrence in southwestern Bohemia requires revision. In Moravia it occurs in the Beskydy Mts; it has to be established, whether *R. guentheri* occurs in the East Sudeten Mts or not. The species is usually cited as a mountain plant, but in Saxony it is known from the colline belt and in the northern half of Bohemia it is known also from lower altitudes. *R. guentheri* is a typically nemophilous ecoelement.

Sect. *Corylifolii* Lindl.

Ser. *Sepincola* (Weihe ex Focke) E. H. L. Krause

18. *Rubus orthostachyoides* H. E. Weber 2n = 28
H. E. Weber Rubi Westfal., 390, 1986 ["orthostachoides"]

Localities:

1. S Bohemia; distr. Strakonice; beside the hiking path on the E slope of Zámek hill, 1 km NW of Neměčice village, ca. 4.5 km NNW of Volyně town, 490 m a. s. l., 49°12'10"N, 13°52'30"E. Coll. J. Holub and A. Krahulcová 23. 9. 1997. (The chromosome count from one well-spread metaphase only).
2. S Bohemia; distr. Strakonice; along the road at the bridge across the Volyňka river, on the NE periphery of Neměčice village, ca. 3.5 km N of Volyně town, 430 m a. s. l., 49°11'50"N, 13°53'10"E. Coll. J. Holub and A. Krahulcová 23. 9. 1997.
3. S Bohemia; distr. Písek; beside the road between Písek town and Záhoví village, at the sharp bend along the branch road to an abandoned stone pit, ca. 2.5 km NE of the centre of Písek town, 470 m a. s. l., 49°19'30"N, 14°10'40"E. Coll. J. Holub and A. Krahulcová 2. 10. 1996.

This is the first published information about the chromosome number in *R. orthostachyoides*. The plants from all localities studied were tetraploid ($2n = 28$).

Rubus orthostachyoides is a Central European species with its occurrence centred in the western part of Central Europe. It is confined almost entirely to Germany; its distribution area extends there from Rhineland, northern Westphalia and north-eastern Lower Saxony to Bavaria southwards to North Tirol and Württemberg, northwards to Magdeburg and Halle. Though the species is easily characterized by its features (very felted leaves on both sides; typical shape of the terminal leaflet; wrinkled upper side of the leaves), it was distinguished only recently by Weber in 1986. *R. orthostachyoides* is a typically thamnophilous ecoelement. It is reported here as a new plant for the Czech Republic found in 1994 by J. Holub and P. Havlíček in the surroundings of Písek (loc. 3) and later by V. Žíla near Volyně (loc. 1, 2). Two further localities were found in 1998 between the towns of Blatná and Horažďovice (leg. J. Holub, A. Krahulcová and V. Žíla). The plant considered by J. Holub originally as a species new to science was later determined as *R. orthostachyoides* by Professor H. E. Weber, the author of its description, in 1995. The occurrence of this species in the Czech Republic is isolated and represents the easternmost outlying group of localities of the whole distribution area of *R. orthostachyoides*. The nearest locality to its occurrence in Bohemia is in north-eastern Bavaria – ca. 120 km distant (see Schönfelder & Bresinsky 1990: 249, M 674).

Ser. *Subsilvatici* (Focke) Focke

19. *Rubus nemorosus* Hayne et Willd.

$2n = 28$

Hayne et Willdenow in Willdenow Berlin. Baumzucht, ed. 2, 411, 1811.

[Syn.: *Rubus balfourianus* Bloxam ex Bab.]

Localities:

1. C Bohemia; distr. Kolín; beside the road in the woodland 0.6 km W of Lhotky village, ca. 6 km SSW of Kouřim town, 390 m a. s. l., 49°57'10"N, 14°56'50"E. Coll. J. Holub and A. Krahulcová 25. 10. 1996.
2. C Bohemia; distr. Kolín; in woods NE of Kolín town, E of Zálábí (part of Kolín town), 200 m a. s. l., 50°02'10"N, 15°14'00"E. Coll. J. Holub 11. 11. 1995.

The same tetraploid chromosome number is given in most of the literature sources referring to *R. nemorosus*. According to them, the tetraploid plants were found in Germany – Bremen (Iwatsubo et al. 1995) and in Poland (Boratyńska 1997). However, two cytotypes – tetraploid ($2n = 28$) and pentaploid ($2n = 35$) – are given for this species under the name of *R. balfourianus* from Great Britain by Heslop-Harrison (1953).

Rubus nemorosus is a species with a wide distribution; it occurs in West Europe and in the western part of Central Europe. It belongs to the group of Euro-Atlantic-Subatlantic plants. Its distribution extends from Denmark, Great Britain and North France to north-western Germany (Rügen), south-western Poland in Silesia (to Katowice), Saxony and Bavaria (here an isolated occurrence). In the Czech Republic it is known from northern and central parts of Bohemia. The distribution map of this species is given by Weber (1995: 558; state May 1992), in which two localities are given for Bohemia according to collections by J. Holub; in the text three localities are mentioned from there. Holub (1995) gives 6 localities, to which in 1997 a further three localities were added from the eastern part of the basin of the central Elbe river. The species is similarly a rare plant in neighbouring Saxony, where it was discovered recently (Ranft 1995). The localities in Bohemia represent the south-easternmost occurrence of the species. It is a thamnophilous ecoelement, occurring in scrub, woodland margins (rarely in open woods), along ways, in open areas often in moderately subruderal sites.

Ser. *Subcanescentes* H. E. Weber

20. *Rubus amphimalacus* H. E. Weber

2n = 28 (Fig. 2f)

H. E. Weber, Ber. Bayer. Bot. Ges. 60: 13, 1989.

Localities:

1. N Bohemia; distr. Děčín; on the NE periphery of Huntířov village, along the road in the direction of Stará Oleška village, 340 m a. s. l., 50°47'40"N, 14°18'30"E. Coll. J. Holub and A. Krahulcová 24. 10. 1997.
2. N Bohemia; distr. Děčín; in the wood beside the road between the villages of Huntířov and Markvartice, ca. 2 km E of Huntířov village, 340 m a. s. l., 50°47'20"N, 14°20'00"E. Coll. J. Holub and A. Krahulcová 10. 10. 1996.

The chromosome number of this species, described recently by Weber (1989) from Germany – Bavaria, has not been known hitherto. The plants from both localities in North Bohemia proved to be tetraploid (2n = 28). Weber (1989) assumes that this species originated as a product of hybridization between *R. caesius* L. and *R. canescens* DC. (syn. *R. tomentosus* Borkh.).

Rubus amphimalacus – a recently described species – is a species new to the flora of the Czech Republic, found by J. Holub in 1994 in two localities, from which the samples for karyological study were collected (loc. 1, 2). No other locality for the species has been found since that time. *R. amphimalacus* is a species with a wide distribution area, extending from Lotharingia, the Saar and Rhine-Palatinate to North Bavaria – Rhön (vidi – J. H.), Coburg and Frankenwald, southwards to Würzburg. Its occurrence in Bohemia is isolated, ca. 230 km distant from the nearest occurrence of the species in Frankenwald. The species is a thamnophilous ecoelement (though it may occur also in woods – loc. 2). With regard to the character of its general distribution, it seems to be a relatively thermophilous plant. It occurs mostly on margins of scrub or woodlands. *R. amphimalacus* is a characteristic species and can be distinguished by its leaves which are composed of three leaflets, the terminal leaflet is rhombic-obovate, and the leaves are velvety soft on both sides (see the specific epithet). The species is very distinct and was neglected for a long time, as is true of many other representatives of sect. *Corylifolii*.

Nothosubgen. *×Idaeorubus* Holub

21. *Rubus ×pseudidaeus* (Weihe) Lej. 2n = 21, 28 (Fig. 2g)
 (Weihe) Lejeune Rev. Fl. Spa, 102, 1825 ["pseudoidaeus"].

Localities:

1. W Bohemia; distr. Tachov; beside the road leading to abandoned pits situated 1.5 km W of Zadní Chodov village, 560 m a. s. l., 49°53'50"N, 12°38'10"E. Coll. J. Holub and A. Krahulcová 4. 10. 1996. Nothovar. *pseudocaesius* (Weihe) Holub, 2n = 21.
2. W Bohemia; distr. Domažlice; beside the road along the north-western bank of the pond situated on the south-western periphery of Železná village (Eisendorf in German), ca. 0.3 km E of the Czech – Germany border, 510 m a. s. l., 49°35'00"N, 12°34'50"E. Coll. J. Holub and A. Krahulcová 4. 10. 1996. Nothovar. *pseudocaesius* (Weihe) Holub, 2n = 21.
3. S Bohemia; distr. Prachatic; beside the road 1 km N of Krtely village between the towns of Vodňany and Netolice, 500 m a. s. l., 49°05'20"N, 14°10'30"E. Coll. J. Holub and A. Krahulcová 3. 10. 1996. Nothovar. *pseudidaeus*, 2n = 21.
4. S Bohemia; distr. Písek; on the woodland edge above the road on the SSE slope of Chlum hill (551.2 m) ca. 1.5 km W of Velká village, 500 m a. s. l., 49°27'00"N, 14°15'40"E. Coll. J. Holub and A. Krahulcová 23. 9. 1997. Nothovar. *pseudocaesius* (Weihe) Holub, 2n = 21.
5. S Bohemia; distr. Písek; beside the road leading from Dražič village to Vranov settlement on the SW periphery of Dražič village, 0.5 km from the chapel, 465 m a. s. l., 49°18'10"N, 14°22'40"E. Coll. P. Havlíček 12. 10. 1997. Nothovar. *pseudocaesius* (Weihe) Holub, 2n = 21.
6. E Bohemia; distr. Ústí nad Orlicí; in the valley of the river Tichá Orlice, N of Hrádek village, between the towns of Ústí nad Orlicí and Brandýs nad Orlicí, 330 m a. s. l., 49°59'00"N, 16°20'20"E. Coll. J. Holub 5. 10. 1997. Nothovar. *pseudocaesius* (Weihe) Holub, 2n = 21.
7. C Moravia; distr. Prostějov; in the scrub surrounding the quarry 0.8 km WSW of Koberžice village, 240 m a. s. l., 49°22'10"N, 17°06'20"E. Coll. B. Trávníček and A. Krahulcová 16. 10. 1996. Nothovar. *pseudidaeus*, 2n = 28.

The triploid chromosome number of $2n = 21$ prevails in our material (plants from 6 localities), the tetraploid level ($2n = 28$) was found in one plant collected in Moravia (loc. 7) only. Both morphotypes of *R. ×pseudidaeus* (nothovar. *pseudidaeus* versus nothovar. *pseudocaesius*) appear not to be distinguishable by their ploidy level. While the triploids in our collection seem to be entirely sterile, the only tetraploid plant showed some traces of fertility, producing one drupelet with two fully developed seeds after open pollination. Unfortunately, we did not succeed in forcing the seeds to germinate (in general, the seeds of blackberries require special treatment to achieve a satisfactory percentage of germination – e. g. Peacock & Hummer 1996).

Rubus ×pseudidaeus is a hybrid of the parental combination *R. caesius* × *R. idaeus*, i. e. of species belonging to various subgenera of *Rubus*. It occurs perhaps in the whole area of the overlapping distribution of the two parental species. The greatest attention has been paid to this hybrid in West and Central Europe, from where therefore many of its localities are known. In the Czech Republic it has only a scattered occurrence but it may be, that it is overlooked. Usually sterile plants occur in this country, but the plants manifest high powers of vegetative reproduction. These plants always belong to the triploid cytotype. Fertile plants (and in this case the fruits are very poor) are a great rarity in this country. The second author (J. H.) has only once during the last 20 years seen such a poorly fertile plant of this hybrid in the Czech Republic. In the literature isolated data on plants with higher ploidy level than that found here are mentioned, i. e. $2n = 35$ and $2n = 42$ (Weber 1995).

Acknowledgements

We would like to express our thanks to Professor Dr. Dr. H. E. Weber (Vechta and Bramsche) who determined and revised several species: of the critical ones *R. bertramii*; of the neglected species *R. indusiatus* and of the new species described by him *R. amphimalacus* and *R. orthostachyoides*. Our thanks belong also to Dr. B. Trávníček (Olomouc) for the collection and determination of brambles from Moravian localities, especially of *R. constrictus* and *R. perrobustus*, to Mgr. P. Havlíček (Praha) for supplying material of *R. xpseudidaeus* from South Bohemia and to J. Hadinec for his information on the occurrence of *R. canadensis* in North Bohemia. We are also grateful to Mgr. J. Chrtěk jun. and I. Ostrý (Průhonice), to Dr. V. Žila (Strakonice), Mgr. T. Kučera (Praha and Třeboň), Doc. Dr. Pavel Kovář, CSc. (Praha), and J. Hadinec (Praha) for their technical assistance and company in the field. Our thanks belong also to Dr. John R. Cross for language revision of this paper. This study was supported by the Grant Agency of the Academy of Sciences of the Czech Republic (project no. A6005506).

Souhrn

Tento čtvrtý příspěvek z plánované série prací o karyologii zástupců rodu *Rubus* v České republice obsahuje informace o 21 druzích naší ostružiníkové flóry. Karyologické údaje jsou tak zveřejněny nyní celkem pro 87 našich druhů. V této práci uvedené druhy pocházejí z 57 lokalit v Čechách a na Moravě. Většina z nich náleží do podrodu *Rubus* (16 druhů), 2 do podrodu *Anoplobatus*, a po jednom druhu do podrodů *Idaeobatus* a *Cylactis* a do hybridního podrodu *Idaeorubus*. V souboru druhů zde uvedeném se vyskytly čtyři ploidní úrovně s převažující tetraploidií (12 druhů), dále byly nalezeny čtyři triploidní druhy a tři druhy diploidní (tyto posledně zmíněné všechny ze skupin mimo podrod *Rubus*). Jsou zde prezentovány i dva druhy karyologicky polymorfní: *R. guentheri* Weihe (normálně tetraploidní a vzácně pentaploidní cytotyp) a *R. xpseudidaeus* (Weihe) Lej. (normálně triploidní a vzácně tetraploidní cytotyp).

Chromozómové počty jsou zde poprvé uvedeny pro dva triploidní druhy ($2n = 21$) – *Rubus barrandienicus* Holub et Palek a *R. perrobustus* Holub a dále pro čtyři tetraploidní druhy ($2n = 28$) – *R. indusiatus* Focke, *R. geminatus* H. E. Weber, *R. orthostachyoides* H. E. Weber a *R. amphimalacus* H. E. Weber. Většina těchto druhů byla popsána během posledních 12 let; *R. indusiatus* pak byl nejnověji přijat po dlouhé době znovu jako taxonomicky oprávněný druh.

Nové cytotypy (ploidní úrovně) byly zjištěny u dvou druhů (oba tetraploidní, $2n = 28$) – *Rubus allegheniensis* Porter a *R. constrictus* P. J. Mueller et Lefèvre – a dále pentaploidní úroveň ($2n = 35$) u normálně tetraploidního *R. guentheri* Weihe. *Rubus allegheniensis*, původně severoamerický druh, byl nalezen na dvou lokalitách v severních Čechách jako zdomácnělý pozůstatek dřívější kultury. V literatuře byl dosud u tohoto druhu uváděn pouze diploidní a triploidní cytotyp. Nelze však vyloučit, že námi prezentovaný tetraploid může být zplnělý hybridní kultivar; u některých takových dříve pěstovaných typů je tetraploidie v literatuře zmíněna. Dosud publikovaná karyologická data o *R. constrictus*, vztahující se k území Francie, Rakouska (Štýrsko) a jižního Polska, uvádějí pouze triploidní cytotyp ($2n = 21$). Námi zjištěný tetraploid (1 lokalita v Čechách, 5 lokalit na Moravě) naznačuje variabilitu v ploidní úrovni tohoto druhu, která bude vyžadovat podrobnější studium. Ve studovaném materiálu *R. guentheri* převažoval tetraploidní cytotyp, což odpovídá i literárním údajům. Vzácně byl námi nalezen pentaploidní cytotyp společně s tetraploidem na jedné lokalitě na Jičínsku. Obdobný nález je v literatuře uváděn z Polska, kde byla mezi převládajícími tetraploidy zjištěna jedna hexaploidní rostlina *R. guentheri* ($2n = 42$). Vzácné cytotypy tohoto druhu zatím nelze podle morfologických znaků odlišit od běžné ze vyskytujícího tetraploidu. Zmíněná karyologická proměnlivost *R. guentheri* zřejmě souvisí s celkovou diverzitou v sérii *Glandulosa*, spojenou s vyšší mírou sexuality v této skupině v porovnání s ostatními taxonomickými skupinami podrodu *Rubus*.

Zde uvedená tetraploidie u *R. bertramii* G. Braun ($2n = 28$) je pravděpodobně prvním karyologickým údajem o tomto druhu, vztahujícím se k rostlinám známého původu. Chromozómové počty stanovené pro ostatních 11 druhů uvedených v tomto příspěvku potvrzují literární údaje vztahující se k těmto druhům z jiných oblastí jejich výskytu.

V tomto příspěvku jsou karyologicky zpracovány 3 druhy ostružiníků, které představují nové druhy květeny České republiky. Jsou to *R. indusiatus* Focke (jihozápadní Čechy) ze sekce *Rubus*, ser. *Radula* a dva zástupci sekce *Corylifolii* – *R. amphimalacus* H. E. Weber (severní Čechy) a *R. orthostachyoides* H. E. Weber (jižní Čechy). Podrobnější informace o těchto druzích budou sděleny na jiném místě. Chorologická a ekologická charakteristika je krátce zmíněna pro všechny zde probírané druhy; z údajů vztahujících se k jejich rozšíření v nových oblastech v zahraničí je nutno upozornit podle sběrů V. Žily na nález *R. barrandienicus* Holub et Palek v Bavorsku jako nové rostliny pro celé Německo, a *R. indusiatus* Focke v Dolních Rakousích jako nové rostliny pro Rakousko. Příspěvek také uvádí výskyt dalšího nového ostružiníku pro území ČR – *R. nessensis* W. Hall subsp. *scissoides* H. E. Weber (jižní Čechy), dále zdomácnělý výskyt druhu *R. canadensis* L. (severní Čechy) a druhou lokalitu *R. pyramidalis* Kaltenb. v ČR (severní Čechy).

References

- Aalders L. E. & Hall I. V. (1966): A cytotaxonomic survey of the native blackberries of Nova Scotia. – *Canad. J. Genet. Cytol.*, Ottawa, 8: 528–532.
- Beijerinck W. (1956): *Rubi* Neerlandici. – *Verh. Konink. Nederl. Akad. Wetensch., Afd. Natuurk., Tweede Reeks*, Amsterdam, 51: 1–156.
- Boratyńska K. (1995a): Chromosome numbers of Polish brambles (*Rubus*, *Rosaceae*). – *Willdenowia*, Berlin, 25: 267–271.
- Boratyńska K. (1995b): Chromosome numbers of Polish brambles (*Rubus* L., *Rosaceae*). III. – *Arboretum Kórnickie*, Poznań, 40: 5–9.
- Boratyńska K. (1996): Chromosome numbers of Polish brambles (*Rubus* L., *Rosaceae*). IV. – *Ibid.*, 41: 55–58.
- Boratyńska K. (1997): Chromosome numbers of Polish brambles (*Rubus* L., *Rosaceae*). V. – *Ibid.*, 42: 101–110.
- Christen H. R. (1950): Untersuchungen über die Embryologie pseudogamer und sexueller *Rubus*arten. – *Ber. Schweiz. Bot. Ges.*, Bern, 60: 153–198.
- Craig D. L. (1960): Studies on the cytology and the breeding behaviour of *Rubus canadensis* L. – *Canad. J. Genet. Cytol.*, Ottawa, 2: 96–102.
- Datta S. (1932): Some chromosome numbers in British species of *Rubus*. – *Mem. Proc. Manchester Lit. Soc.* 76: 85–89. [N. v., cit. sec. Thompson 1997].
- Dmitrieva S. A. & Parfenov V. I. (1985): Karyjalagičnaja charaktaristika nekatorych vidov karysnych raslin flory Belarusi. [Karyological characterization of some species of vascular plants of the flora of Byelorussia.] – *Izv. Akad. Nauk Belorussk. SSR, Ser. Biol. Nauk*, Minsk, 1986/6: 3–8.
- Einset J. & Pratt Ch. (1954): Hybrids between blackberries and red raspberries. – *Proc. Amer. Soc. Hort. Sci.*, Geneva, 63: 257–261.
- Engelskjön T. (1979): Chromosome numbers of vascular plants in Norway, including Svalbard. – *Opera Bot.*, Lund, 52: 1–38.
- Eriksson O. & Bremer B. (1993): Genet dynamics of the clonal plant *Rubus saxatilis*. – *J. Ecol.*, Oxford, 84: 533–542.
- Focke W. O. (1902–1903): 9. *Rubus*. – In: Ascherson P. & Graebner P., *Synopsis der mitteleuropäischen Flora* 6/1: 440–648, Leipzig.
- Gustafsson A. (1943): The genesis of the European blackberry flora. – *Acta Univ. Lund.*, ser. 2., 39: 3–199.
- Heslop-Harrison Y. (1953): Cytological studies in the genus *Rubus* L. I. Chromosome numbers in the British *Rubus* flora. – *New Phytol.*, London, 52: 22–39.
- Holub J. (1991): Eight new *Rubus* species described from [the] Czech Republic. – *Folia Geobot. Phytotax.*, Praha, 26: 331–340.
- Holub J. (1993): A preliminary checklist of *Rubus* species occurring in the Czech Republic. – *Preslia*, Praha, 64 (1992): 97–132.
- Holub J. (1995): 4. *Rubus* L. – ostružiník (maliník, moruška, ostružinec, ostružiníček). – In: Slavík B. (ed.), *Květena České republiky* 4: 54–206, Praha.
- Iwatsubo Y., Naruhashi N. & Weber H. E. (1995): Chromosome numbers of European blackberries (*Rubus* subg. *Rubus*, *Rosaceae*). – *Pl. Syst. Evol.*, Wien etc., 198: 143–149.
- Krahulcová A. & Holub J. (1997): Chromosome number variation in the genus *Rubus* in the Czech Republic. I. – *Preslia*, Praha, 68 (1996): 241–255.
- Krahulcová A. & Holub J. (1998a): Chromosome number variation in the genus *Rubus* in the Czech Republic. II. – *Ibid.*, 69 (1997): 289–310.
- Krahulcová A. & Holub J. (1998b): Chromosome number variation in the genus *Rubus* in the Czech Republic. III. – *Ibid.*, 70: 33–50.
- Krogulevich R. J. & Rostovtseva T. S. (ed.) (1984): Chromosomnye čísla cvetkovych rastenij Sibiri i Dalnego Vostoka. [Chromosome numbers of Angiosperms from Siberia and Far East.] – *Nauka*, Novosibirsk.
- Longley A. E. (1924): Cytological studies in the genus *Rubus*. – *Amer. J. Bot.*, Lancaster, 11: 249–282.
- Löve Á. (1987): Chromosome Reports XCVI. – *Taxon*, Utrecht, 36: 660.
- Löve Á. & Löve D. (1982): IOPB chromosome number reports LXXVI. – *Taxon*, Utrecht, 31: 583–587.
- Maude P. F. (1939): The Merton catalogue. A list of the chromosome numerals of species of British flowering plants. – *New Phytol.*, London, 38: 1–31.
- Peacock D. N. & Hummer K. E. (1996): Pregermination studies with liquid nitrogen and sulphuric acid on several *Rubus* species. – *Hortscience*, St. Joseph, 31: 238–239.
- Ranft M. (1995): Die Gattung *Rubus* L. in Sachsen. – *Abhandl. Ber. Naturkundemus. Görlitz* 68 (6): 1–44.

