

New localities of *Orthodontium lineare* SCHWAEGR. (Bryophyta) in Czechoslovakia

Nové nálezy *Orthodontium lineare* SCHWAEGR. (mechorosty) v Československu

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During the past few years *Orthodontium lineare* SCHWAEGR., an adventive moss recently reported from various parts of Western Europe, has been intensively spreading in Czechoslovakia. At present, eighteen localities, most of them in western and northern Bohemia, are known. Fourteen of them are described for the first time in this paper. All these localities correspond with the known SE. direction of spreading in western Europe. In Bohemia, *Orthodontium lineare* is most abundant in sandstone areas, colonizing a wide range of substrata such as rotten wood, raw humus, tree bases and bare sandstone. In non-sandstone localities, *Orthodontium lineare* is confined mostly to rotten wood and it occurs there in a very limited number. Judging from its present distribution, *Orthodontium lineare* will probably continue to spread.

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FUTSCHIG (1965) was the first to report *Orthodontium lineare* SCHWAEGR. (Bryales, Bryophyta) in Czechoslovakia. Later FUTSCHIG et KURKOVÁ (1977) described two localities in addition to the previously published one, but all these localities are in north-eastern Bohemia near Broumov. Fourteen new localities have recently been found in various parts of Bohemia and have thus opened new possibilities for studying its ecology and spreading.

Since this species had been recognized as an adventive (MEIJER 1951), many localities were discovered in western and central Europe such as Ireland, the United Kingdom, the Netherlands, Belgium, France, Luxembourg, Sweden, Denmark, the Federal Republic of Germany, the German Democratic Republic, Czechoslovakia and Poland (DE ZUTTERE et SCHUMACKER 1980, OCHYRA 1982). *Orthodontium lineare* seems to have a wideranging ecological amplitude (REIMERS 1954); moreover, changes in its ecology can be expected within its European distribution (BARKMAN 1962). This paper describes its new localities, with some data on descriptive ecology. It may serve as a record of its present distribution in Czechoslovakia.

LIST OF LOCALITIES

1. Prameny by Mariánské Lázně: in the light pine forest of Planý vrch — nature reserve, about 2 km SE of the village, altitude approx. 850 m above sea level (Pelc, 1979, cf. PELC 1981).
Geological substrate: serpentinite (data on geology after ZOUBEK 1964).

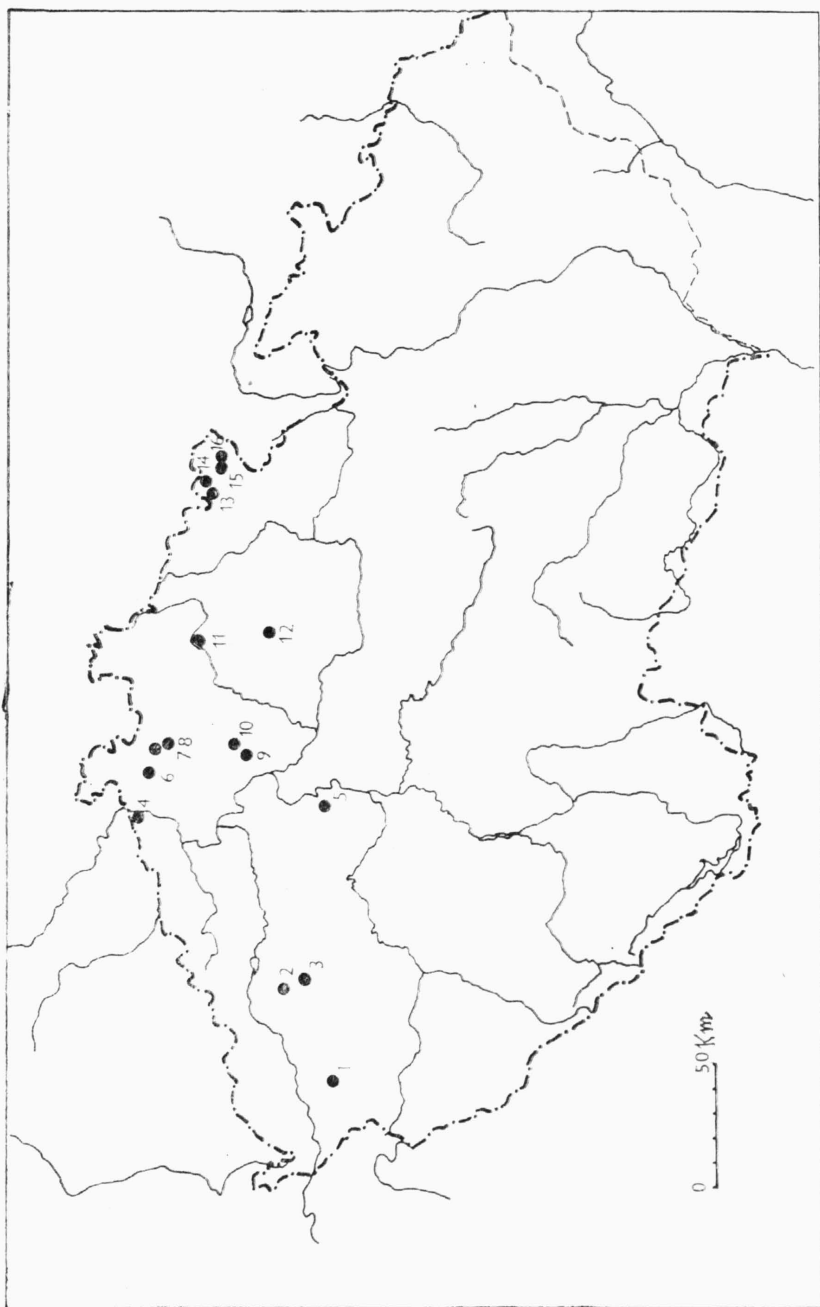


Fig. 1. — The recent distribution of *Orthodontium lineare* in Bohemia. Numbers on the map refer to those in the text.

Site: an area 200 cm² on a small rotten pine stump (crumbling wood); very fertile, often with surrounding protonema.

2. Sedlec by Kadaňský Rohozec: the western slope of the hill (524.5 m) called Maštovský les SE of the village, altitude approx. 500 m above sea level (Herben, 1981).

Geological substrate: autometamorphed leucite.

Site: rotten crumbling spruce stump, two cushions covering a combined area of about 3 cm²; frequently fertile with conspicuous protonema around the cushions.

3. Podbořany: Dubová hora SW of the town, in an open young oak forest at the verge of a small valley about 200 m from the forest border, altitude approx. 480 m above sea level (Herben, 1980).

Geological substrate: olivinic basalt of Pohradická hora.

Site: side of a rotten and crumbling pine stump, overgrowing both wood and bark; area covered about 100 cm², frequently fruiting.

4. Dolní Žleb: base of a rock formation on the border of a valley, about 500 m westward from the railway station, altitude approx. 300 m above sea level (Zittová, 1981).

Geological substrate: sandstone (Lower Cretaceous).

Site: soil at the bases of boulders and among roots, in moderately shaded and moist places; it occurs in an area about 50 × 100 m, with cushions often 30 cm in diameter, thick and mostly fruiting.

5. Okoř by Praha: border of a deciduous forest near the village, about 300 m above sea level.

Geological substrate: an Algonkian slate.

Site: roots of a fallen spruce tree, voucher specimen (in herb. J. Váňa) is about 5 cm², fertile. This specimen was collected by L. Miňovská (for a pioneer competition) and misidentified as *Funaria hygrometrica*, but not confirmed on re-examination of the locality (1981).

6. Kamenický Šenov: in the forest on the SE slope of Šenovský vrch, 1.2 km SW of Horní Pysk, alt. approx. 550 m above sea level (Pujmanová, 1982).

Geological substrate: basalt.

Site: a single cushion on a rotten pine stump, with capsules.

7. Radvanec u Nového Boru: near Rabenstein-sandstone formation (Havraní skály), 1.4 km NNE of the village, approx. 450 m above sea level (Pujmanová, 1982).

Geological substrate: sandstone (Turonian).

Site: on rocks, or on raw humus at the bases of trees; frequent in an area of 10 × 10 m, often with capsules.

8. Sloup: at the base of a sandstone formation, in the pine forest 1.5 km SE of the village, altitude approx. 450 m above sea level (Pujmanová and Herben, 1982).

Geological substrate: sandstone (Turonian).

Site: at the bases of trees, on rocks and soil; common in an area about 10 × 30 m, frequently fruiting.

9. Kokořín: at the base of a sandstone formation, in the pine forest in the

eastern part of the Kokořínský důl, approx. 1.5 km NE of the village, altitude approx. 240 m above sea level (Herben, 1982).

Geological substrate: sandstone (Turonian).

Site: at the base of trees, sometimes on the soil; scattered occurrences in an area of 500×500 m, mostly with capsules.

10. Horní Houska: at the verge of a way in the pine forest, approximately 500 m SE of the village (Herben, 1982).

Geological substrate: sandstone (Turonian).

Site: bare soil, a single cushion, fruiting.

11. Malá Skála: the pine forest in north-eastern and western parts of Suché skály — sandstone formation, about 1.5 km NWW of the railway station, altitude approx. 430 m above sea level (Zittová, 1981).

Geological substrate: sandstone (Upper Cretaceous).

Site: raw humus at the bases of trees and boulders, or on rocks in moderately shaded places; occurs in an area of about 200×10 m, forming deep cushions, often with capsules.

12. Jičín, Prachovské skály: in pine forests surrounding Císařská chodba — valley, approx. 1 km westwards from Prachov, altitude 350—400 m above sea level (Herben, 1982).

Geological substrate: sandstone (Coniacian)

Site: rocks, bases of trees, soil, quite frequent in an area of 1 km².

13. Janovice u Trutnova: in a spruce forest W of the village, altitude approx. 600 m above sea level (PILOUS 1982 in litt.).

Geological substrate: calcareous clay (Lower Turonian).

Site: raw humus at the bases of trees.

14. The group of localities given by FUTSCHIG (1965) and FUTSCHIG et KURKOVÁ (1977).

15. Teplice nad Metují: eastern slope of the hill Ostaš, altitude approx. 670 m above sea level (Zittová, 1981).

Geological substrate: sandstone (Upper Cretaceous).

Site: sandstone boulder in a light area, one cushion about 10 cm in diameter, fertile.

16. Broumov, Broumovské stěny: in the light pine forest ca. 500 m SW of the hill Supí hnízdo (NE of Police nad Metují), alt. approx. 650 m above sea level (Herben, 1982).

Geological substrate: sandstone (Lower Turonian).

Site: the base of a small sandstone formation, abundant in an area of 5 m², often with capsules.

Voucher specimens are deposited in the herbarium of the National Museum in Průhonice — PR (localities Nos. 3, 4, 5, 11, 15), and in the private herbaria of J. Váňa (Nos. 1, 5), Z. Pilous (No. 13), L. Pujmanová (Nos. 6, 7) and the second author (Nos. 1, 2, 3, 9, 11, 12, 16).

So far, the existing localities form an arc in western and northern Bohemia and correspond well with both the prevailing wind direction in Bohemia (cf. VESELÝ 1958) and the north-west direction of the spreading of this moss in Europe (MUHLE 1970, FUTSCHIG 1965).

The macroclimate of the described localities differs considerably. FUTSCHIG et KURKOVÁ (1977) assume that in central Europe the moss occurs predominantly at high altitudes and in areas with high air humidity. This assumption does not unequivocally agree with our observations; the localities in the vicinity of Kadaňský Rohozec and Podbořany (No. 2, 3) border on the most arid region of Czechoslovakia. However, its frequent occurrence in sandstone formations supports the hypothesis that it grows and spreads more effectively in humid conditions. The range of altitudes is also large, i.e. from 300 to 850 m above sea level.

The present pattern of distribution of *Orthodontium lineare* in Czechoslovakia suggests that sandstone areas are much more favourable for its spreading than other geological substrata. In the sandstone areas, *Orthodontium lineare* grows and proliferates on all types of substrate mentioned by FUTSCHIG et KURKOVÁ (1977), i.e. on tree bases, rotten wood, raw humus and bare sandstone. In the remaining localities (Nos. 1, 2, 3, 6), isolated cushions of the moss are confined to a very small area, the only colonized substratum being rotten wood. Similar differences in its spread are reported from Belgium by DE ZUTTERE et SCHUMACKER (1980). At present, we cannot decide whether the spectrum of colonized substrata is attributable to differences in microclimate or geological substratum. The range of substrata, however, stimulates its spreading by reducing the insular character of available sites. This is important for its reproduction by relatively large gemmae (MEIJER 1951).

It would be premature at this stage to attempt an evaluation of its relations to other bryophyte species, the more so as the extensive study by HEDEMÄS (1981) did not produce unequivocal results. In other than sandstone areas *Orthodontium lineare* grows together with *Pohlia nutans*, *Dicranum scoparium*, *Dicranella heteromalla*, *Plagiothecium* spp. The small size of colonized areas and abundance of free space does not suggest competition with other species. In sandstone areas, the composition of the surrounding bryophyte community depends on the type of substratum. On soil, it usually grows with the above mentioned species; on sandstone walls, it occurs together with species common to this ecotope (*Tetraphis pellucida*, *Lepidozia reptans*, *Calypogeia integristipula*); on drier boulders it usually grows within a community of various lichens of the genus *Cladonia* (*C. digitata*, *C. polydactyla*).

At present, *Orthodontium lineare* cannot be regarded as a rare species of the Czechoslovak bryoflora. Moreover, a lot of areas which seem favourable for its growth (both ecologically and geographically, e.g. in northern Bohemia) suggest the possibility of its further spreading.

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SOUHRN

Orthodontium lineare SCHWAEGR., adventivní druh evropské bryoflóry, byl v poslední době uváděn z řady míst v západní a střední Evropě. V současné době je znám z Irska, Velké Británie, Nizozemí, Belgie, Francie, Lucemburska, Švédska, Dánska, Spolkové republiky Německa,

Německé demokratické republiky, Československa a Polska. V Československu bylo of roku 1977, kdy byly známy 3 lokality, objeveno různými sběrateli dalších čtrnáct, převážně v západních a severních Čechách. Jejich rozložení dobře odpovídá dosud popisovanému směru šíření v Ev. opé směrem na jihovýchod. V Československu je tento druh nejčastější v pískovcových oblastech kde se chová nejplastičtěji a kolonisuje různé substráty, např. surový humus, shnilé dřevo i pískovcové kameny. Na ostatních lokalitách je omezen hlavně na shnilé dřevo a všeobecně je daleko vzácnější. V současné době *Orthodontium lineare* již nelze považovat za vzácný druh, zvláště s ohledem na malou intenzitu bryologického průzkumu. Navíc podle dosavadních znalostí jeho ekologie ze západní Evropy lze očekávat jeho další šíření, zejména v Čechách.

REFERENCES

- AGSTERIBBE E. (1962): Verbreiding van *Orthodontium lineare*. — Buxbaumia, Amsterdam, 16 : 28—29.
- BARKMAN J. J. (1962): Over de uitbreiding en oecologie van *Orthodontium lineare*. — Buxbaumia, Amsterdam, 16 : 68—75.
- DeZUTTERE PH. et R. SCHUMACKER (1980): L'extension d'*Orthodontium lineare* Schwaegr. subsp. lineare en Belgique et au Grand-Duché de Luxembourg. — Dumortiera, Liège, 14—15 : 15—22.
- FUTSCHIG J. (1965): Neue und bemerkenswerte Fundorte von *Orthodontium germanicum* F. et K. Koppe in Hessen. — Jahresber. Wetterau., Hanau, 117—118 : 65—69.
- FUTSCHIG J. et J. KURKOVÁ (1977): *Orthodontium lineare*, eine für das Gebiet der Tschechoslowakei neue Laubmoosart und -gattung. — Preslia, Praha, 49 : 129—133.
- HEDEMÁS L. (1981): *Orthodontium lineare* — en mossa på frammarsch. — Svensk Bot. Tidskr., Stockholm, 75 : 157—161.
- MEIJER W. (1951): The recent distribution and methods of propagation of *Orthodontium lineare* Schwaegr. — Rev. Bryol. Lichénol., Paris, 20 : 108—111.
- MUHLE H. (1970): Zur Ausbreitung von *Orthodontium lineare* Schwaegr.: *Orthodontium* in Schwarzwald. — Herzogia, Lehre, 2 : 107—112.
- OCHYRA R. (1982): *Orthodontium lineare* Schwaegr. — A new species and genus in the moss flora of Poland. — Bryol. Beitr., Duisburg, 1 : 23—36.
- PELC M. (1981): Mechorosty rezervací ChKO Slavkovský les. — Ms. Dipl. Pr., Knihovna Kat. Bot. Přírod. Fak. UK Praha.
- REIMERS H. (1954): Verbreitung und Verwandtschaft der europäischen Arten der Laubmoosgattung *Orthodontium*. — Willdenowia, Berlin, 1 : 275—337.
- VESECKÝ A. (1958): Atlas podnebí Československé republiky. — Praha.
- ZOUBEK V. [ed.] (1964): Geologická mapa ČSSR. Mapa předčtvrtohorních útvarů. — ÚÚG, Praha.

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