

Microrrhinum litorale (BERNH. ex WILLD.) SPETA, a new species in the flora of Slovakia and Czech Republic

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ABSTRACT: *Microrrhinum litorale* found in anthropogenous stands in Žilina and Třinec is described. The species is in comparison with somewhat similar *M. minus* conspicuous by bigger, more intensively coloured petals, broader leaves and bigger fruits and seeds. In addition to description of the species the paper gives short discussion on problem of *Microrrhinum* genus and related genera. Brief account of taxonomic problems in *M. litorale* agg. and its general distribution is given. Karyological analysis of a sample confirmed hexaploid ploidy level of the species. It is not possible to exclude that *M. litorale* is more frequent synanthropic species in all the central Europe (and perhaps in southern Europe, too), but has been neglected so far.

Keywords: *Microrrhinum litorale*, *Microrrhinum minus*, synanthropic species, taxonomy, karyology, Czech Republic, Slovakia.

Introduction

Studying the synanthropic flora in proximity of railway station in the town Žilina (Slovak republic) in 1993 I found an interesting species, evidently from *Chaenorrhinum* group, but clearly different from relatively frequent (in Slovakia) *Microrrhinum minus* (L.)FOURR. The comparison with accessible literature lead to determination of the species *M. litorale* (BERNH. ex WILLD.)SPETA, not given from Slovakia so far. This was confirmed comparing the specimens with Austrian material of the species. In 1994 I found the species on one dump in an edge of the town Třinec (it is a new species for Czech Republic as well) and confirmed occurrence in Žilina. In 1995 I found species in railway station in Třinec and on another dumps on SW edge of the town Třinec.

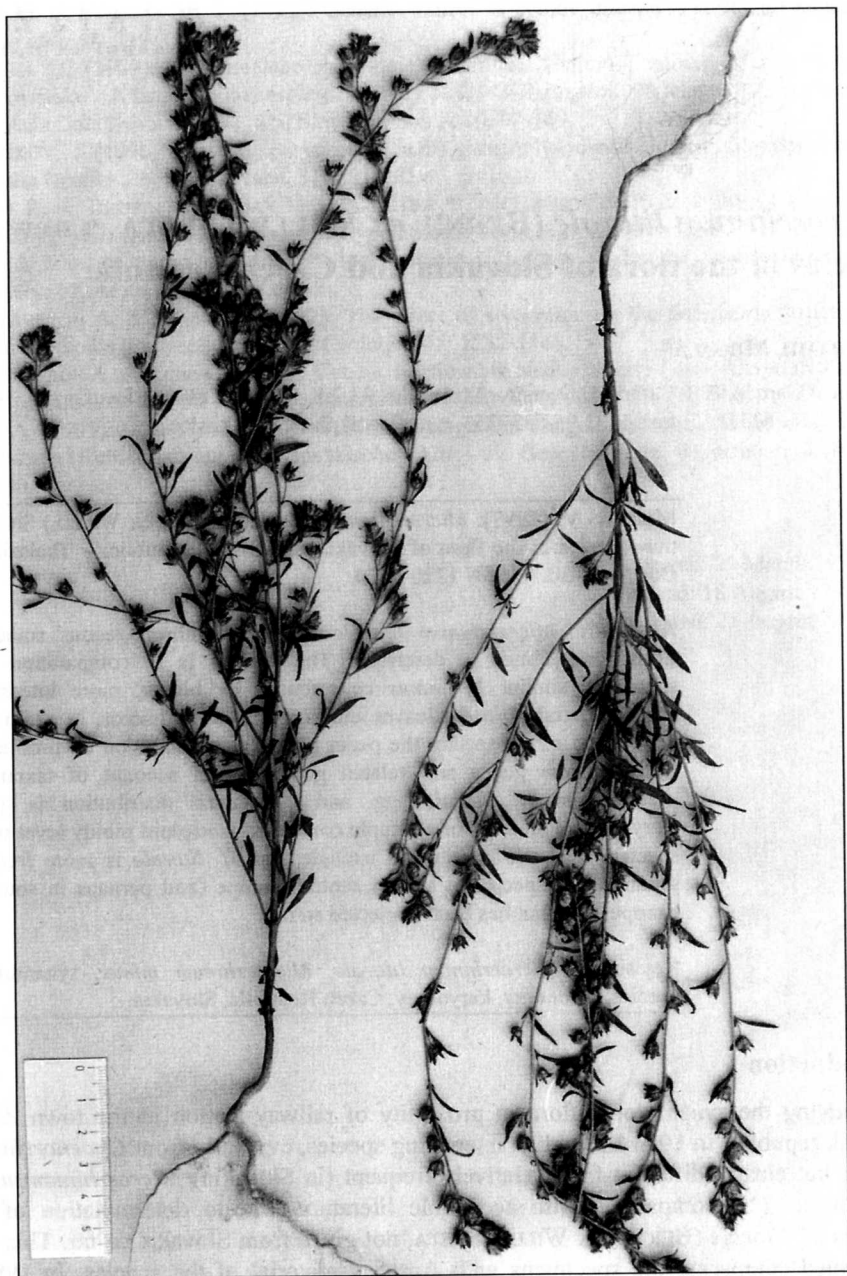


Fig. 1: *Microrrhinum litorale* (locality Žilina, Slovakia).

Name, synonyms and illustrations

Nomen: *Microrrhinum litorale* (BERNH. ex WILLD.) SPETA, Candollea 32: 144, 1977.

Bas.: *Linaria litoralis* BERNH. ex WILLD., Enumer. Pl. Hort. Berol.: 641, 1809.

Synonyms:

≡ *Chaenorhinum litorale* (BERNH. ex WILLD.) ROUY, Naturaliste 24: 190, 1882.

≡ *Antirrhinum litorale* (BERNH. ex WILLD.) DC. in LAM. et DC., Fl. Fr., 3rd ed., 5: 410, 1815.

≡ *Linaria minor* var. *litoralis* (BERNH. ex WILLD.) BÉGUINOT in FIORI et PAOL., Fl. Anal. Ital. 2: 425, 1902.

SPETA (1980) evaluates also *Ch. aschersonii* SIMONKAI, differing by completely glabrous leaves, stems etc. and somewhat smaller seeds as synonym of the species.

Typus: SPETA (1980, p. 17) gives as unfounded so far, but he supposes it can originate in environs of the town Trieste or Istria (former part of Austria-Hungary) and it is possible that neotypification will be needed or, as the case may be, lectotypification, if authentic material of J. J. BERNHARDI will be found in future.

Selected illustrations and photographs:

CHAMPAGNAT, Bull. Soc. Bot. Fr. 99, 1952, p. 302, fig. 1 (habitat)

FERNANDEZ, Bol. Soc. Brot., ser. 3, 47, 1973, p. 31, pl. VI (20-22, corolla, calyx, lower and upper lips, seed)

DAVIS, Not. Roy. Bot. Gard. Edinburgh 36, 1978, pl. 1C opp. to p. 6 (microphotograph of seed, ssp. *pterosporum*)

SPETA, Stapfia 7, 1980, p. 47, tab. 7 (herb.spec.), p. 66, tab. 26b (microphotograph of seeds)

SUTTON, A revision of the tribe *Antirrhineae*, London et Oxford, 1988, p. 124 (fig. 27.1 and 27.2, SEM of seeds)

BIGAZZI & TARDELLI, Grana 29, 1990, p. 265 (fig. 3 - pollen grain, but subsp. *pterosporum*)

Some notes on delimitation of the genus *Microrrhinum* and related genera

The genus belongs to subfamily *Scrophularioideae*, tribe *Antirrhineae* (SUTTON 1988). SPETA (1982) distinguishes three subtribes in the Old World: *Anarrhininae*, *Linariinae* and *Antirrhininae*, the latter is newly described. SUTTON (1988) considers it an assemblage of genera which is poorly defined. Subtribes were raised to rank of tribes and the tribe *Antirrhineae* to the rank subfamily by BETSCHE (1984). Group differentiation is, however, not clear so far and the status of *Antirrhineae* calls for further research, as well (SUTTON 1988).

SPETA (1980, p. 36) mentions that the delimitation of the genus *Microrrhinum* (ENDL.) FOURR. from *Chaenorhinum* (DUBY) REICHENB. is not problem due to

differences in sepals, spur length, capsule structure and protein cell bodies content as well, and points out an affinity of the genus *Cymbalaria*. *Cymbalaria* and *Microrrhinum* have dehiscent, paper fruit walls, very short funiculus, sphaeroid protein bodies in cell nucleus, ventral loculus of capsule is (in both genera) bigger than dorsal, basic chromosome number is 7 and in both genera polyploidy (rare in tribe) is present (SPETA 1986). *Cymbalaria* has, however, thicker carpel walls, and it differs in development of capsule walls. Differences are also found in development of seed integuments, and growth character (*Cymbalaria* is blastochorous chasmophyte, cf. op.cit.). RITTER (1984) points out certain similarity of the genus *Cymbalaria* (and *Asarina*) to North American tribe *Maurandiyinae* (correspondence in endosperm development, in seed epidermis development, but differences are found in seed integument development).

The genus *Microrrhinum* is, in the other hand, evaluated by SUTTON (SUTTON 1988, p. 99) as section *Microrrhinum* (ENDL.) SUTTON of the genus *Chaenorrhinum*. SUTTON (op. cit.) makes content of this section more accurate, classifying with this section also SPETA's subgenera *Tapirorrhinum* (of the genus *Chaenorrhinum* s. s.) and species *Ch. foroughii* SPETA because these species are characterised by entire corolla lobes and clavate hairs, present abaxially in corolla tube. This emendation will be probably well-founded and if we evaluate the genus *Microrrhinum*, it is need to emend of the genus in SUTTON's sense. SPETA (1980, 1982) gives another character differences: *Chaenorrhinum* with more or less dorsiventral flattened corolla, expressive spur, somewhat different opening of capsules, quantitative differences in seed size and also irregular development of loculi (*Microrrhinum* with bigger ventral loculum, *Chaenorrhinum*, on the other hand, bigger dorsal loculum). SPETA (1977) also gives presence of round protein bodies in cell nucleus for *Microrrhinum*, opposite to additional presence of one cubic protein body in *Chaenorrhinum*. However, data are insufficient and the study of another species in this respect is very desirable.

The genus *Microrrhinum* seems to be a natural unit, if we accept the emendation of SUTTON (1988) and was already accepted in some Floras and Checklists, e.g. MARTINČIĆ & SUŠNIK (1984), DOSTÁL (1989), ADLER & al. (1994) and TRPIN & VREŠ (1995). Careful study of more taxa of the genus *Chaenorrhinum* s. l. with cladistic analysis is, however, necessary for firmer solution of the problem and clear determination of limits of natural evolutionary units in this group.

Description of the species

[compiled partly on the basis of author's study, partly on the basis of critical summarization of the literature cited, esp. SPETA (1980) and SUTTON (1988); cf. fig. 1].

Annual herbs, erect, usually rather rich branching plants, to 0.3-0.5(-1.0) m high, with thick radix, yellowish on its surface, the aboveground parts with very rich glandular hairs. Leaves oblong to lanceolate, dark green, homomorphic, entire, continually narrowing in petiole, subacute, (10.0-)20.0-30.0 × (1.5-)3.0-5.0(-9.0) mm.

Inflorescence in terminal, rather dense racemes, branches subtended by bracts. Pedicels suberect, in flowering time ca. 2-3(-8) mm long, in fruiting elongated,

(3-)4-8(-11) mm, subtending bracts in pedicel axils (2.5-)8.0-25.0 mm long. Calyx-lobes linear, with stalked glands, in flowering time (3.0-)4.0-4.5-(5.0) × 0.6-0.8 mm long, in fruiting elongated, (5-)6-7(-8) × 1.0-1.6 mm long, capsules considerably exceeding. Flowers of medium size, corolla 6.5-8.0(-9.0) mm long, blue-purple to whitish. Spur 1.5-2.0 × 0.7-1.3 mm, violet, obtuse, widest at the base or in the central part, forming obtuse angle, is white in this place. Corolla tube hirsute abaxially inside, with two strips consisting of up to 0.6 mm long, clavate glands. Corolla tube 3-4 mm long, with divergent sides, lips spreading, upper one violet, 3.5-4.5 mm with tips to 1 mm long, lower one violet, 3.5-4.5 mm long, up to 5 mm wide, with tips up to 1 mm; palate whitish, partly occluding the mouth of the tube. Ovoid ovaries dense hirsute, with ventral loculus evidently bigger than dorsal one, and with basal nectaries. Style 3.0-3.5 mm long, with globose stigma. Stamens non protruding from corolla tube, 5; four didynamic and fertile, dorsal stamen evolved in staminodium. Lateral stamens with filaments 2.5 mm long, evidently shorter than both ventral stamens (with filaments 4.5 mm long), whitish anthers 0.8-0.9 mm. Pollen grains of subprolate shape, with furrows, single, 3-colporate, radially symmetric, isopolar with fusiform colpi (with granular membrane) and with microreticulate exine (cf. BIGAZZI & TARDELLI 1990).

Semiovoid capsules rather big, 4-5-(7) × 3.5-5.0 mm, ventral loculus bigger than dorsal, with thin, papery walls, corrugate with translucent seeds. Capsules divided at apex into 3-5 triangular teeth, rarely with dorsal (abaxial) loculus indehiscent. Seeds (0.8)-0.9-1.1-(1.2) × 0.45-0.60-(0.80) mm, black-brown, oblonge ovoid to ellipsoid, with ca. 10 longitudinal discrete, parallel ridges (on ridge-apex smooth and sharp), their height reaches 0.3-0.9-(1.5) × distance between ridges (0.06-0.08 mm), papillae round to conical, their length is 0.6-1.5 × width and their width is 0.25-0.7 × distance between papillae. Micropylar crown well developed, hilum in the direction of chalaza (a little lower).

2n=42 (CHAMPAGNAT 1952, from cultivated plants of unknown origin, MÁRTONFIOVÁ 1995 unpubl. data, from plants of Žilina locality, leg. V. MIKOLÁŠ). It is unclear if 2n=14 (HEITZ 1927, NILSSON & LASSEN 1971, the later for Croatian coast plants) are correct data for this species (and in this way 2 cytotypes are present in the species). More probable is confusion with *Microrrhinum minus* (L.)FOURR. s. s. agg., that is diploid (2n=14), rarely (?) tetraploid (BADEN 1983 sec. GOLDBLATT 1985) and aneuploid (2n=12, MAGULAJEV 1984 sec. GOLDBLATT 1988).

Notes to the species close to *Microrrhinum litorale*

The species *Chaenorhinum aschersonii* SIMONKAI is included in *M. litorale* by SPETA (1980), what was probably the correct step. Perhaps it is only a little form (or variety?) characterized by complete glabrescence. *M. praetermissum* (DELASTRE) SPETA in *M. minus* agg., a glabrous taxon studied by CHAMPAGNAT (1952), can be analogical form. She found out that the glabrescence of the taxon is determined by one dominant gene (however, this taxon is accepted recently in TRPIN & VREŠ 1995). SIMONKAI (1904) distinguished 6 species in *M. minus* (s.l.) agg. The author describes also *Ch. aschersoni* f. *subglabra* (op. cit., p. 238) that is (probably) identical with *Linaria litoralis* var.

glabrata BORBÁS 1876 and it is characterized by a somewhat intermediate character between *Ch. aschersonii* and *Ch. (M.) litorale*. In the probably predominant autogamic *M. minus* (s.l.) agg. (cf. e.g. ARNOLD 1982 for *M. minus*) surviving of separate lines and their another spreading is possible. However, because of ruderal character of *M. minus* (s.s.) agg., their mixing and casual hybridization, which causes surely and continually an interconnection between separated clones, can be supposed.

Two other species are recognized by SPETA (1980): *M. janchenii* SPETA and *M. pterosporum* (FISCH., C.A.MEYER & TRAUTV.) SPETA (op. cit., pp. 13-19). The former species was described by the author from Jugoslavia (prov. Crna gora) and it is given by the author also from Greece (Epirus Mts.) and Roumania (Mehedinți distr. in SW part of the country, cf. also BELDIE & VÁCZY 1976 as *Ch. litorale*). SUTTON (1988) evaluates this species in the synonymy of *Ch. litorale*, but precocious flowering in connection with some characters (pink and smaller corollas, smaller calyx, capsules and seeds) may indicate species (microspecies) value of the taxon.

The later species, *M. pterosporum* was newly revised by SUTTON (1988). SUTTON (op. cit.) evaluates consistency of the taxon excluding Dalmatian populations, thus including only the Anatolian material. The species delimited in this way is characterized by the fruit pedicells exceeding the bracts and simple inflorescence without axillary branchlets. Other characters are not unambiguously dissected (opposite to *M. litorale* s.s.). SUTTON's evaluation of the taxon as *M. litorale* subsp. *pterosporum* (FISCH., C. A. MEYER et TRAUTV.) P. H. DAVIS (in agreement with DAVIS 1978) is thus more suitable.

General distribution of the species

The species *M. litorale* (of delimited selected content, cf. above) is indigenous only in Dalmatian region (Slovenia, Croatia, Bosna-Herzegovina, Crna gora in SE Jugoslavia), and it reaches to adjacent territories of Italy (Triest). PIGNATTI (1982) gives it also for NE Italy, Romagna territory and from Pesaro (terr. Marche), and adjacent hill region, but evidently a part of the Italian distribution is an adventive occurrence. SIMONKAI (1904, p. 236) gives the species also from Albania, (this can be, however, a problematic close species *M. janchenii*). Thus *M. litorale* can be characteristic as a representative of Adriatic province of Mediterranean region which spreads to close part of western-illyrian province of Euro-Siberian region. It can be thus characterized as illyrian-adriatic florographic element (HORVATÍĆ 1967). With regard to classification of illyrian element (TRINAJSTIĆ 1992), *M. litorale* can be adjoin to the group of species characteristic for heliophilous habitats of rock-fissures and screes.

Adventive occurrence of the species has been known already for long time. For Austria - part Steiermark (Rosenthal at Köflach) it is given by FRIISCH (1931, sec. MELZER 1984). MELZER (1984, 1989a,b, 1994, 1995a, b, 1996) and MELZER & BREGANT (1994) give new data from Carinthia, northern Tyrol and Steiermark. MELZER (pers. comm.) supposes the species is recently more widely distributed, but omitted.

The species grows synanthropically usually in railway stations and dumps, always in sparse vegetation, or without other vegetation at all, on gravel, or sandy gravel, occurring often only ephemerically and retreating with progressing vegetation succession.

Adventive findings are given also from inland part of Slovenia (cf. SPETA 1980) and probably also from inland of Croatia and Bosna and Herzegovina, and NE Italy, respectively. In Slovenia *M. litorale* grows on river alluvial gravels, walls, railway embankments and cemeteries (WRABER 1984).

Occurrence of *M. litorale* in Slovakia and Czech Republic

The species was firstly collected (by author in September 10th, 1993) in the town Žilina (NW Slovakia), ca. 0.5 km NWW from the main railway station. The occurrence was confirmed next year at the same place. In both cases dozens of very well developed individuals (up to 300-350 mm height) of the species, sparsely branching, grew in submonocoenosis with *Plantago major*, *Ranunculus repens*, and some other species: *Persicaria lapathifolia*, *Lolium perenne*, *Elytrigia repens*, *Clematis vitalba*, *Lactuca serriola*, *Chenopodium strictum*, *Sonchus oleraceus*, *Linaria vulgaris*, *Equisetum arvense*, *Pastinaca sativa*, *Senecio viscosus*, *Amoria repens*, *Taraxacum* sect. *Ruderalia*, *Solidago altissima* (*S. canadensis* auct.), *Poa* cf. *palustris*, *Cirsium arvense*, and also *M. minus* (species nomenclature usually according to DOSTÁL 1989). With regard to the fact that stout layer of limestone (?) gravel evidently reduced the speed of succession, the species can survive in numerous individuals for several years, probably.

On June 25, 1994 I found (during an excursion with P. LUSTYK) the species in one dump on SW edge of the town Třinec, part Třinec forest (NE of Czech Republic), between river Tyra and petrol station (300 m westwards), in altitude ca 350 m a. s. l. With regard to early state of development only the first upper flowers were in bloom (cooccurring *M. minus*, on the contrary, was in full bloom and even had already the first fruits). The species grew there also in places with little progressing vegetation on slaggy surface of dump. SOBOKOVÁ (1994) gives (from dumps at Třinec) blue flowering form of *Ch. minus* that is really *M. litorale*.

The species was newly confirmed in the locality (29. VII. 1995), and also at the railway station in the town Třinec (opposite to Třinec ironworks). It is probably the original place from where the species expanded on dumps, and possibly (??) also to Žilina (however, on limestone gravels!). There are further dumps between the petrol station and the ironworks in Třinec. The author studied only some of the dumps with sparse vegetation. On the dump close to the ironworks the forest woods are already present (e.g. birchs and willows) and the species is probably absent there because of the advanced vegetation condition.

Conclusions

Microrrhinum litorale was newly found in two localities in Slovakia and Czech Republic (as new species there). It is the hexaploid species and in the comparison with *M. minus* is differentiated by more characters (size of plant, flower colour, leaf width and fruit and seed size). Secondarily it is spreading to synanthropic stands which enable its development and reproduction. It is possible to suppose more extant distribution of the species in central Europe, but omitting.



Fig. 2: Distribution of *Microrrhinum litorale* in Slovakia and Czech Republic

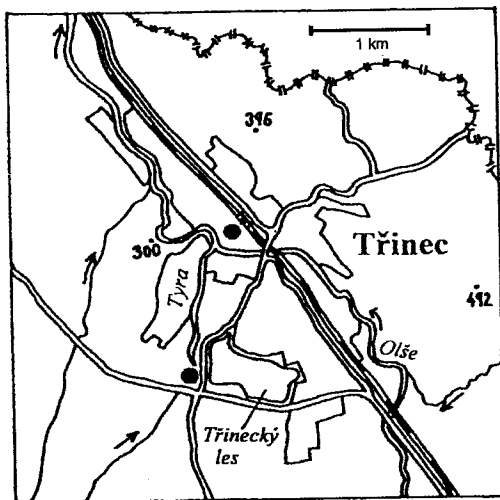
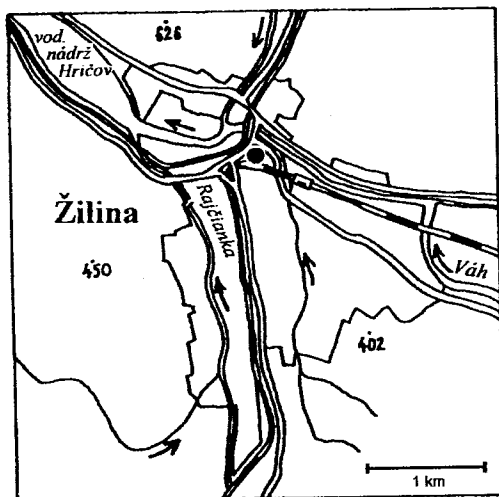


Fig. 3: Detail maps of distribution of *Microrrhinum litorale* in Slovakia and Czech Republic

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