

## ***Dichoropetalum schottii*: examination of the type specimen, distribution and comparison with *D. carvifolium-chabraei* (Apiaceae)**

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**Abstract** - The lectotype and isolectotype specimens of *Peucedanum schottii*, based on plants originally cultivated in Cremenets Botanical Garden, have been studied in detail. The geographic provenance of the plants is unknown but they are identical to natural populations in Albania, Bosnia & Herzegovina, Croatia, France, Greece, Italy, Montenegro and Serbia. The valid name for this plant is therefore *Dichoropetalum schottii*. It differs from a related species, *D. carvifolium-chabraei*, in having glabrous umbel rays, white (not yellow) petals, long styles and solitary secretory ducts in fruit valliculae.

**Key words:** *Dichoropetalum*, *Peucedanum*, nomenclature, anatomy, micromorphology.

**Riassunto** - *Dichoropetalum schottii*: esame del tipo, distribuzione e confronto con *D. carvifolium-chabraei* (Apiaceae).

Il lectotipo e l'isolectotipo di *Peucedanum schottii*, basati su piante originariamente coltivate nell'Orto Botanico di Cremenets, sono stati studiati approfonditamente. La provenienza geografica del campione è sconosciuta. Il tipo corrisponde alle popolazioni di Albania, Bosnia & Herzegovina, Croazia, Francia, Grecia, Italia, Montenegro e Serbia, identificate con *Dichoropetalum schottii*. Differisce dall'affine *D. carvifolium-chabraei* per i raggi glabri dell'ombrella, i petali bianchi (non gialli), gli stili corti e canali secretori solitari nelle vallicole del frutto.

**Parole chiave:** Anatomia, *Dichoropetalum*, micromorfologia, nomenclatura, *Peucedanum*.

### INTRODUCTION

The genus *Dichoropetalum*, described by Fenzl (1842), had for a long time been neglected, and was only recently reinstated (Pimenov *et al.*, 2007). It now contains 38 species from eastern, western and southern Europe, North Africa and Southwestern Asia, the centre of diversity being Turkey. A few local Mediterranean endemics and two widespread species, *D. schottii* (Bess.) Pimenov & Kljuykov and *D. carvifolium-chabraei* (Crantz) Soldano, Galasso & Banfi, have been reported for Europe, their range partly overlapping but with *D. schottii* growing further south than *D. carvifolium-chabraei*. The latter had been known under the name *Peucedanum carvifolia* Vill. nom. illeg. The nomenclatural problem was solved by Soldano *et al.* (2005) and Banfi *et al.* (2011). However, for *D. schottii*, some questions remained unanswered. The species was described as *Peucedanum schottii* by Besser (Candolle, 1830), based on a herbarium specimen of a plant originally cultivated in Cremenets. The geographic provenance of the plant material was unknown, being specified in the description as Vohlynia et Podolia (now Ukraine). In subsequent "Floras" (*e.g.*, Thellung, 1925; Shishkin, 1951; Tutin, 1968; Hartvig, 1986), Ukraine was mentioned as part of the distribution area of *D. schottii*. However, *D. schottii* has never been collected in natural habitats in Ukraine or neighbouring countries, its distribution being limited to South Europe, from Serbia to France. In Vohlynia and Podolia, only *D. carvifolium-chabraei* is present. Vinogradova (2004) in "Flora of Eastern Europe" placed *Peucedanum schottii* in synonymy with *P. carvifolium*. In addition, *P. schottii* was described as a plant having flowers with ochroleucous petals whereas the petals are pure white in the South European species, and yellowish or greenish in *D. carvifolium-chabraei*. Thus there is uncertainty as to whether the *Peucedanum schottii* type specimens are identical to the South European species. If the type belongs to *D. carvifolium-chabraei*, the South European species should be given a new name. The lectotype in G-DC was designated by Hartvig (1986); the isolectotype with the label "Cult. Crem. Besser" is in LE (Vinogradova, 2003).

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## MATERIALS AND METHODS

We have examined the photo of the lectotype in G-DC, the isolectotype of *P. schottii* in LE, visited its natural habitats in Italy and Montenegro, and studied numerous herbarium sheets in LE, MW, FL and BP (acronyms follow Thiers, continuously updated). We have also analyzed fruit anatomy and micro-morphology in *D. schottii* and *D. carvifolium-chabraei*.

## RESULTS

### Type specimens of *Peucedanum schottii*

The lectotype of *Peucedanum schottii* in G-DC is presented by leaf fragments and some mature fruits with solitary secretory ducts in valliculas and long styles. The isolectotype of *Peucedanum schottii* (Fig. 1) in LE was collected at the stage of flowers and young fruits,



Fig. 1 - Isolectotype of *Peucedanum schottii* (LE).

without roots. Besser mentioned the following in the protologue: “terete stems, pinnate leaves with narrow linear segments, no involucre bracts, glabrous umbel rays, solitary vallecular secretory ducts and light-yellow petals”. In our anatomical cross sections of young fruits, we confirmed the presence of solitary secretory ducts. Stem, leaf, umbel and fruit characters of the type specimens match those of the South European species occurring in natural populations. Besser may have described the petal colour of a dried herbarium specimen because the fresh petals are white. We have noticed that when dried, the white petals of *D. schottii* become yellowish. The natural populations are therefore identical to the type specimens of *P. schottii*.

#### Fruit morphology, anatomy and micromorphology of *Dichoropetalum carvifolium-chabraei* and *D. schottii*

Morphology and anatomy (Figs. 2-4): fruits separate into mericarps; elliptic; with carpophore bifid to the base; mericarps homomorphic; glabrous; strongly compressed dorsally; dorsal ribs filiform; marginal ribs narrowly winged; calyx teeth obsolete; stylopodia conical; styles recurved; exocarp cells small; commissure broad, exocarp interrupted near edges of marginal ribs; inner fibrous mesocarp present; mesocarp parenchyma not lignified dorsally but with lignified pitted walls in marginal ribs; vascular bundles compact; situated in primary rib bases; vittae vallecular and commissural; rib secretory ducts small or large, present in all ribs; endocarp not lignified; endosperm flat, slightly convex or slightly concave on commissural side; embryo with two cotyledons.

#### Micromorphology (Fig. 5)

On dorsal ribs cell borders indistinct, surface smooth or undulate, on valleculae and marginal ribs cell borders indistinct or slightly distinct, cells arranged at random, isodiametric, anticlinal walls straight, raised, outer periclinal walls slightly concave, cuticula striate or sparsely striate with straight striae; stomata few, cuticula around stomata smooth. Epicuticular secretions scanty, as thin discontinuous layer.

Diagnostic characters are listed in Tab. 1.

#### DISCUSSION

The type specimen of *Peucedanum schottii* was cultivated from seed, presumably originally collected in South Europe. It is identical to natural populations, and the name *Dichoropetalum schottii* clearly applies to the South European species. *Dichoropetalum carvifolium-chabraei* and *D. schottii* have similar underground organs and are very much alike in habit. The petals, pure white in *D. schottii*, and greenish-yellowish in *D. carvifolium-chabraei*, become yellowish when dried. There are, however, several reliable diagnostic characters (Tab. 1) that enable us to regard the two plants as separate species.

#### Taxonomy

*Dichoropetalum carvifolium-chabraei* (Crantz) Soldano, Galasso & Banfi, Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano, 152(II): 89. 2011 ≡ *Selinum carvifolium-chabraei* Crantz, Inst. Rei Herb., 2: 126. 1766 ≡ *Seseli carvifolia* L. Sp. Pl.: 260. 1753, p.p. (excl. syn. Rivin.); L. Sp. Pl. ed. II: 350. 1762, p.

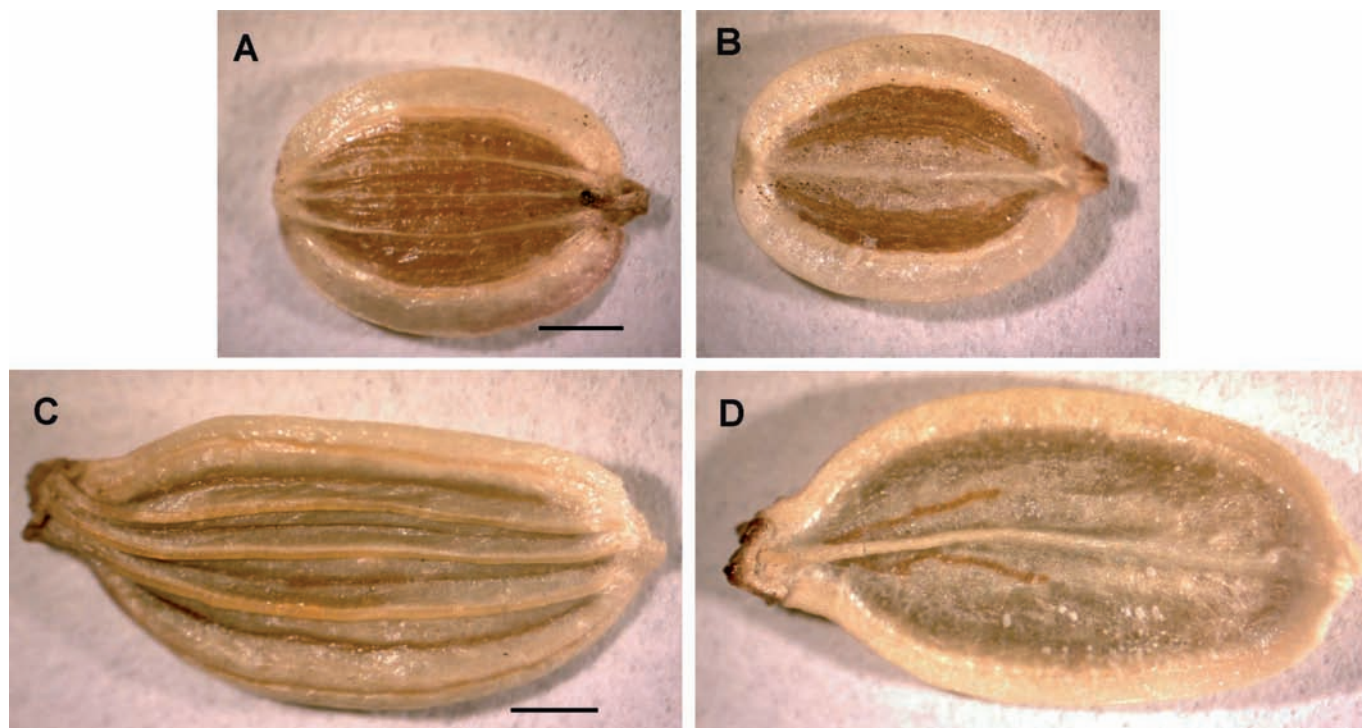


Fig. 2 - Mericarps. A, B) *Dichoropetalum carvifolium-chabraei*; C, D) *D. schottii*; A, C) dorsal side; B, D) commissural side. Scale bars = 1 mm.

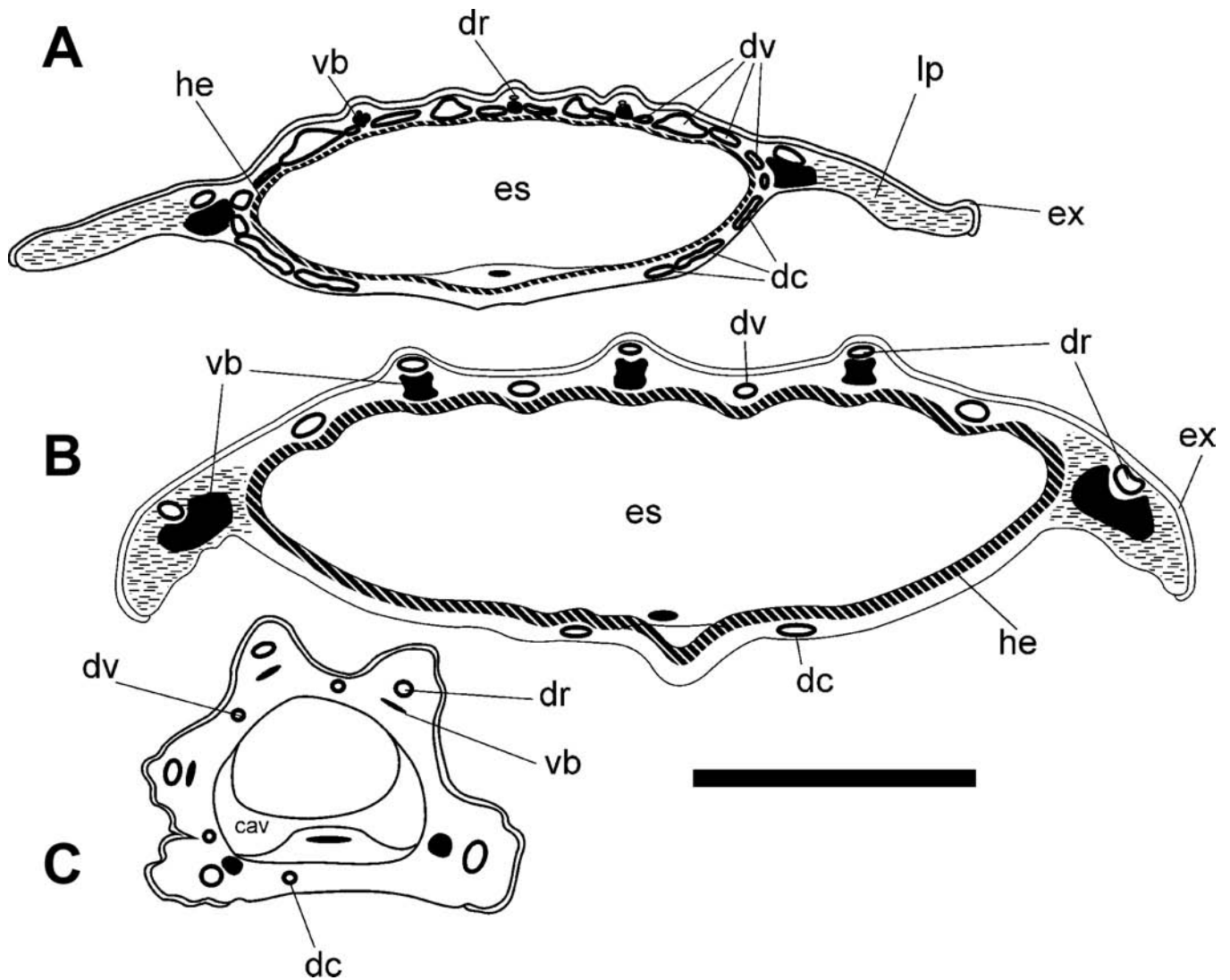


Fig. 3 - Mericarp transections, schematic. A) mature mericarp of *Dichoropetalum carvifolium-chabraei*, B) mature mericarp of *D. schottii*; C) immature mericarp of isolectotype of *D. schottii*. Scale bar = 1 mm. Abbreviations: cav) cavity, dc) commissural secretory duct, dr) rib secretory duct, dv) vallicular secretory duct, es) endosperm, ex) exocarp, he) hypendocarp, lp) lignified pitted parenchyma, vb) vascular bundle.

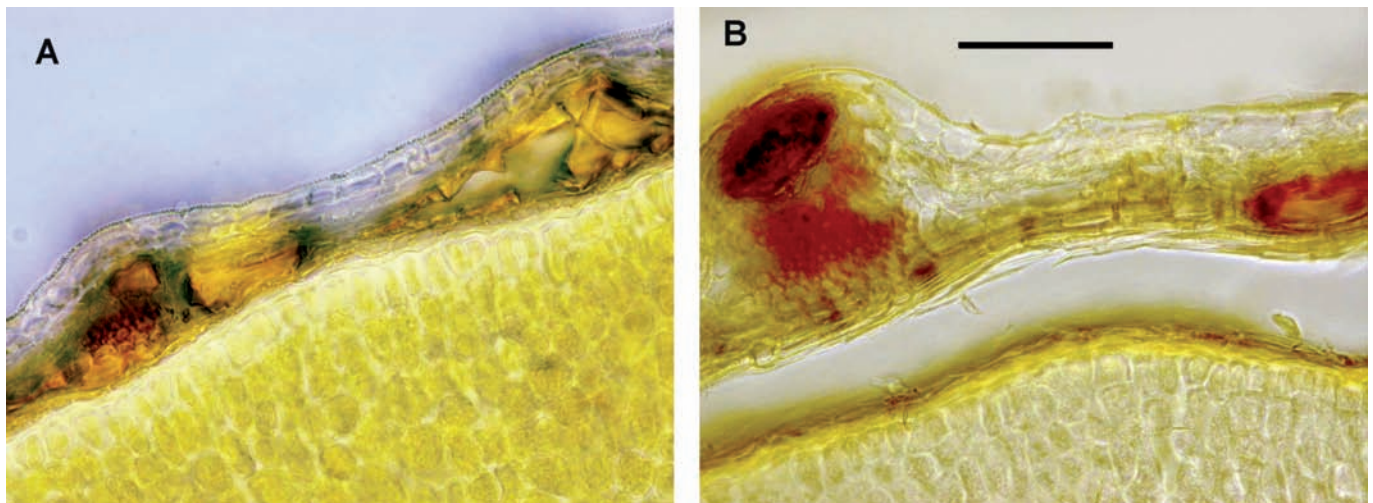


Fig. 4 - Microphotographs of mericarp transections. A) *Dichoropetalum carvifolium-chabraei*; B) *D. schottii*. Scale bar = 0.1 mm.

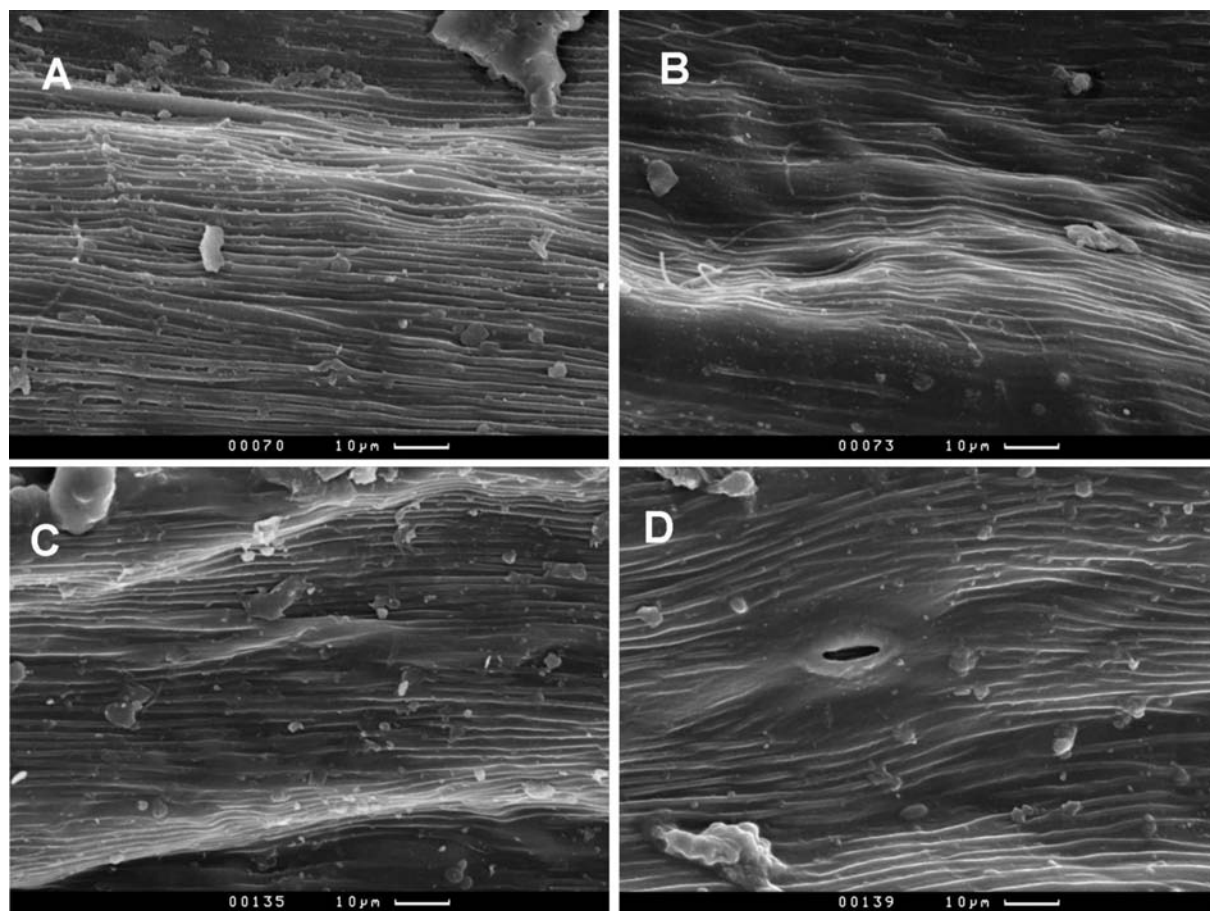


Fig. 5 - Fruit micromorphology. Mericarps. A, B) *Dichoropetalum carvifolium-chabraei*; C, D) *D. schottii*; A, C) dorsal rib; B, D) vallecule.

Tab. 1 - Diagnostic characters of *Dichoropetalum carvifolium-chabraei* and *D. schottii*.

Character	<i>D. carvifolium-chabraei</i>	<i>D. schottii</i>
Umbel rays	Scabrous	Glabrous
Petal colour	Yellowish or greenish	White when fresh, yellowish when dry
Style length	Short, ca. 1 mm, slightly longer than stylopodium	Long, ca. 2 mm, 2-3 times longer than stylopodium
Fruit length, mm	4-5	5-7.5
Fruit width, mm	2.5-3.5	4-6
Vallecular secretory ducts	Several	Solitary
Rib secretory ducts	Small	Small to large

min. p. ≡ *Peucedanum carvifolia* Vill., Prosp. Hist. Pl. Dauphiné: 25. 1779 [& Hist. Pl. Dauphiné 2: 638. 1787] nom. illeg. ≡ *Dichoropetalum carvifolia* Pimenov & Kljuykov, Willdenowia, 37, 2: 478. 2007 nom. illeg. ≡ *Selinum chabraei* Jacq., Fl. Austriac. 5: 72. 1778 [& in Murray, Syst. Veg., ed. 14: 279. 1784] nom. illeg. Lectotype (designated by Frey 1989: 280): [icon] *Selinum carvifolia-chabraei* Crantz, Stirp. Austr. Fasc. 3, t. 3, fig. 2. 1767.

= *Selinum podolicum* Bess., Prim. Fl. Galic. 2: 392. 1809 ≡ *Peucedanum podolicum* (Bess.) Eichw., Naturhist. Skizze: 155. 1830

= *Peucedanum euphymiae* Kotov, Ukrainsk. Bot. Zhurn. 1, 2: 278. 1940. Holotype: "Inter frutices in decliviis calcareis et cretaceis in parte orientali Ucrainae" (KW).

*Distribution.* – Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Czech Rep., Croatia, France, Germany,

Hungary, Italy, Luxembourg, Moldavia, the Netherlands, Romania, Russia, Serbia, Slovakia, Spain, Switzerland, Ukraine.

*Dichoropetalum schottii* (Bess.) Pimenov & Kljuykov, Willdenowia, 37, 2: 480. 2007 ≡ *Peucedanum schottii* Bess. in Candolle, Prodr. 4: 178. 1830. Lectotype (designated by Hartvig 1986): G-DC!; isolectotype “Cult. Crem. Besser” (Vinogradova 2003) (LE!).

= *Peucedanum petraeum* W.D.J.Koch, Syn. Fl. Germ., ed. 1: 304. 1837 ≡ *Peucedanum schottii* var. *petraeum* W.D.J.Koch, Syn. Fl. Germ., ed. 2: 334. 1843 ≡ *Peucedanum schottii* subvar. *petraeum* (W.D.J.Koch) Burnat, Fl. Alp. Marit. 4: 206. 1906. – Holotype: Italia “In rupibus et locis asperis saxosis (zwischen Triest u. Fiume an Felsen der neuen Straße), Noe” (W; isotype: G).

*Distribution.* – Albania, Bosnia & Herzegovina, Croatia, France, Greece, Italy, Montenegro, Serbia.

The main synonyms are mentioned here; for the full list of synonyms see Pimenov *et al.* (2007).

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