Diploids of the Valeriana officinalis group (Valerianaceae) in Central Europe, and an attempt to unravel the nomenclatural chaos

Authors: Kirschner, Jan, and Zeisek, Vojtěch

Source: Willdenowia, 47(3) : 189-201

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.47.47301
Diploids of the *Valeriana officinalis* group (*Valerianaceae*) in Central Europe, and an attempt to unravel the nomenclatural chaos

Abstract: Diploid populations of *Valeriana officinalis* L. (*Valerianaceae*) in Central Europe exhibit an extensive variation, with two conspicuous morphotypes. One, corresponding to the lectotype of *V*. officinalis, is larger, with broader, distinctly dentate leaflets, the other is in many respects similar to *V*. pratensis Dierb. and *V*. stolonifera Czern., but is glabrous, with narrow, usually entire leaflets. The two forms also differ in their ecological optimum and geographical distribution, but are linked with numerous intermediates. Morphometric analysis (PCA) supports the picture outlined above. Nomenclatural analysis shows that the correct name for the taxon with narrow leaflets at the rank of variety is *V*. officinalis var. *tenuifolia* Vahl, with a very old synonym at the rank of subspecies, *V*. officinalis subsp. *tenuifolia* (Vahl) Schübler & Martens. A lectotype and epitype (from a plant with 2n = 14) are designated for this name. The epithet *tenuifolia* cannot be used for what has usually been called *V*. collina auct., or correctly, *V*. stolonifera subsp. *angustifolia* Soó. Further names were also studied in detail: *V*. officinalis var. *angustifolia* Wahlenb., *V*. officinalis var. *angustifolia* Hayne (for which a lectotype is designated), *V*. altissima Besser and *V*. officinalis var. *altissima* W. D. J. Koch.

Key words: *Valerianaceae*, *Valeriana officinalis*, *Valeriana officinalis* var. *tenuifolia*, taxonomy, nomenclature, Central Europe

Article history: Received 10 March 2017; peer-review completed 12 May 2017; received in revised form 25 May 2017; accepted for publication 14 June 2017.

Citation: Kirschner J. & Zeisek V. 2017: Diploids of the *Valeriana officinalis* group (*Valerianaceae*) in Central Europe, and an attempt to unravel the nomenclatural chaos. – *Willdenowia* 47: 189–201. doi: https://doi.org/10.3372/wi.47.47301

Introduction

The group of taxa around *Valeriana officinalis* L. includes a number of names used without appropriate nomenclatural evaluation, typification and interpretation. Although the group was subject to extensive field research and several taxonomic revisions, taxonomists did not reach any reasonable consensus about the number, circumscription and rank of taxa to be recognized. Objective reasons for this situation should be sought in the rather low level of structural differentiation among taxa, the existence of polyploid series (the most important works on *V*. officinalis polyploidy include Skalífska 1947; Titz 1969; Hidalgo & Vallès 2012; Bressler & al. 2017; and other relevant works cited below) and possible occasional intermediates or hybrids. Many problems, however, stem from uneven geographical exploration of the *V*. officinalis group and from very different methods used to understand the population variability (Walther 1949; Voroshilov 1959; Titz & Titz 1982; Titz 1984; Holub & Kirschner 1997; Buttler & al. 2008).

Taxonomic evaluation of the group of *Valeriana officinalis* therefore remains to be completed using modern methods of genomic analyses and on a geographically representative selection of population samples. The Central
European forms of this group have been studied profoundly by several specialists, most importantly by Titz & Titz (1982) and Titz (1984), and nomenclatural aspects have been outlined by Buttler & al. (2008). Results of detailed field observations in Baden-Württemberg were excellently summarized by Sebald (1996). From the above works and our own older research (Holub & Kirschner 1997; Kirschner 2002), we can derive a taxonomic survey of this group in Central Europe (Table 1).

The present paper is focused on the taxonomy and nomenclature of diploids of the Valeriana officinalis group in Central Europe. We do not include diploid forms occurring in S Europe because there are several diploid entities similar to V. stolonifera that remain to be studied and properly understood (Titz & Titz 1982) not only mention the “illyrica” diploid form from the Balkans but also a diploid from the Pyrenees; the latter might be close to V. hispida Boiss.). Seemingly, the study of Central European diploids is a relatively simple task because most of the above literature sources recognize only a single diploid taxon there, which is V. officinalis L. s.str., its name having recently been typified and interpreted (Kirschner 2007, with the name V. exaltata J. C. Mikan ex Pohl as a synonym). However, some comments in the literature indicate that another taxon might be involved in the relatively extensive variation of V. officinalis at the diploid level. Titz & Titz (1981) spoke about variants of V. exaltata with narrow leaflets in the region of Bodensee: “[shortened]
Table 2. Material used in the morphometric analyses. Preliminary identification based on general habit; samples difficult to assign to either group remain without the preliminary identification. – Abbreviations: O = *Valeriana officinalis* var. *officinalis*; T = *V. officinalis* var. *tenifolia* (*= isotypes of that name); country codes follow ISO 3166-1 alpha-2; herbarium codes follow Thiers (2017+).  

| Serial numbers | Preliminary identification | Country code | Locality | Latitude, longitude | Herbarium |
|----------------|----------------------------|--------------|----------|---------------------|-----------|
| 1 – 9 O        |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 10 – 13 O      |                             | CZ           | Všetaty, margin of nature reserve | 50.2770494°N, 14.5720600°E | PRA       |
| 14 – 15 O      |                             | CZ           | Všetaty, margin of nature reserve | 50.2770494°N, 14.5720600°E | PRA       |
| 16 – 17 O      |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 18             |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 19 – 24 T      |                             | CZ           | Všetaty, road ditch | 50.2759111°N, 14.5746133°E | PRA       |
| 25 – 26 T      |                             | CZ           | Všetaty, margin of nature reserve | 50.2770494°N, 14.5720600°E | PRA       |
| 27 – 37 T      |                             | CZ           | Všetaty, road ditch | 50.2759111°N, 14.5746133°E | PRA       |
| 38 – 46 T      |                             | CZ           | S of Všetaty, at railroad crossing | 50.2718244°N, 14.5756864°E | PRA*      |
| 47             |                             | EE           | Hiiu County, Männamaa | 58.8471406°N, 22.6000136°E | TU        |
| 48             |                             | EE           | Tartu | 58.374°N, 26.730°E | TU        |
| 49             |                             | EE           | Saare County, Püha | 58.3133200°N, 22.7301664°E | TU        |
| 50             |                             | EE           | Abruka Island | 58.1606722°N, 22.5142114°E | TU        |
| 51             |                             | EE           | Pärnumaa | 58.3864700°N, 24.5087528°E | TU        |
| 52             |                             | CZ           | Cheb, Třebeň-Povodí | 50.1369958°N, 12.4304514E | herb. Velebil |
| 53             |                             | RU           | Sankt-Peterburg, Dachnoe | 59.85°N, 30.25°E | PRA (ex LE) |
| 54             |                             | RU           | Sankt-Peterburg, Dachnoe | 59.85°N, 30.25°E | PRA (ex LE) |
| 55             |                             | RU           | Sankt-Peterburg, Malaya Istinka | 59.6480°N, 33.05638°E | PRA (ex LE) |
| 56             |                             | RU           | Vyborg | 60.70°N, 28.75°E | PRA (ex LE) |
| 57             |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 58             |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 59             |                             | CZ           | Všetaty, railroad | 50.2742381°N, 14.5700644°E | PRA       |
| 60 – 62 O      |                             | CZ           | Lysá nad Labem, Hrabanov | 50.2198797°N, 14.8393314°E | PRA       |
| 63             |                             | CZ           | Lysá nad Labem, Hrabanov | 50.2198797°N, 14.8393314°E | PRA       |
| 64             |                             | CZ           | Kostelec nad Labem | 50.2380672°N, 14.5933500°E | PRA       |
| 65             |                             | CZ           | Kostelec nad Labem | 50.2380672°N, 14.5933500°E | PRA       |
| 66 – 68 CZ     |                             | CZ           | Kostelec nad Labem | 50.2380672°N, 14.5933500°E | PRA       |
| 69 – 80 CZ     |                             | CZ           | Újezd u Průhonic | 50.02173°N, 14.54478°E | PRA       |
It should be added that the “pseudopratensis” form usually has leaflets entire, very narrow and, as Sebald (1996) correctly says, at the sites where it is in contact with Valeriana officinalis s.str., there are numerous intermediates, both morphological and phenological.

In the present paper we therefore aim at the characterization of the above (so-called) “pseudopratensis” form, including its general distribution, and we revise the relevant nomenclature, with the emphasis on the correct interpretation of the name Valeriana officinalis var. tenuifolia Vahl.

Material and methods

Nomenclatural analysis was performed in strict accordance with the latest version of the International Code of Nomenclature for algae, fungi, and plants (hereafter “Code”; McNeill & al. 2012). Voucher specimens for chromosome counts and other material are deposited at PRA. A number of relevant herbarium collections were consulted in the course of the present study: BM, BRNM, BRNU, C, K, LI, OL, PR, PRC, W and WU. Herbarium codes are according to Thiers (2017+).

Chromosome numbers were determined in roots of mature cultivated plants, according to the techniques described in Štěpánek & al. (2011). The inevitable prerequisite for any study of the group of Valeriana officinalis was the typification and interpretation of this Linnaean name, which was done by Kirschner (2007; see also Kirschner & al. 2007).

Morphometric analyses were done on a selection of our population samples and additional herbarium specimens (LE, PRA, TU). The characters recorded were: (1) plant height at full flowering; (2) leaflet width (middle leaflet of middle cauline leaf); (3) leaflet length; (4) proportion of leaflets with teeth on both margins; (5) number of teeth (middle leaflet of middle cauline leaf); (6) number of leaflets (middle cauline leaf); and (7) proportion of leaflets with teeth (middle cauline leaf). The material measured is given in Table 2; altogether 80 specimens were measured. The material was selected to make it possible to evaluate the large-scale variation (Central Europe versus Estonia and NW Russia) and the variation within a series of large populations in C Bohemia.

The morphometric data were visualized using PCA in R 3.3.2 (R Core Team 2016), from package ade4 (Dray & Dufour 2007), the resulting graphics having been adjusted in CorelDraw 16. The variables for PCA were scaled and centred. The samples were labelled according to preliminary visual taxonomic assessment of herbarium material as a synthetic recognition of Valeriana officinalis var. tenuifolia-like plants, V. officinalis var. officinalis-like specimens and unclear cases. The hierarchical clustering (UPGMA, not displayed) was carried out in NTSYSpc 2.2, Exeter Software.

Results

Morphometric analysis of the Valeriana officinalis diploids

The material used for the morphometrics consists of a representative sample of a large metapopulation in the W part of the Elbe basin, C Bohemia (between Všetaty and Kostelec nad Labem), and a sample from another two C Bohemian populations (Hrabanov, Újezd u Průhonic); in all these subsamples, both forms are represented, although not at the same habitats. These samples were supplemented with herbarium specimens from the NE part of the distribution range of the form with narrow leaflets (Estonia and Saint Petersburg, Russia), and additional samples of (presumed) Valeriana officinalis var. officinalis s.str.

The PCA (Fig. 1) ordination shows a clear variation trend but with no really distinct entities, which corresponds to the hypothesis of two morphological units connected with a range of intermediates. The presumed identity of samples (if we disregard the intermediates) was obtained by means of a preliminary general habit assessment, and the two groups coincide with the main trend displayed in Fig. 1. Two major groups are also recognized by the hierarchical cluster analysis (UPGMA, not shown), with about 10 % of samples wrongly assigned in the preliminary assessment. The intermediates are almost evenly divided between the two major groups.

Brief characterization of the “pseudopratensis” form of Sebald

The morphometry-based subdivision of the diploids within Valeriana officinalis subsp. officinalis is in good agreement with the observations of Titz & Titz (1981) and Sebald (1996). If we summarize the data, the following short description of the “pseudopratensis” form can be compiled from the above sources and from our measurements: Diploids (2n = 14); early flowering (June; in the Scandinavian populations, peak flowering is in July); plants usually 50–120 cm tall, without stolons; stem ± glabrous, with very short, thick hairs at or near nodes on ridges, usually suffused red in lower part (often not so in N part of range of this form); lower and middle leaves long petiolate, petiole usually villous in proximal part; leaflet pairs numerous, usually 6–9 in middle leaves; leaflets narrow, usually 2–6 mm wide, entire or rarely with a few teeth, ± glabrous, often with relatively sparse, very short and thick, almost subconic hairs on margins and some veins beneath (binocular lens needed).

Concerning distribution, the form is known to occur in Central Europe, from Switzerland, Austria, Slovakia and Hungary in the south, through Germany and Czech Republic to Denmark and S Sweden and along the S Baltic shore (Baltic states and the Saint Petersburg region). It is to be expected in Poland and Finland (specimens of promising appearance but with unknown chromosome number were seen).
We have concluded that the diploid *Valeriana officinalis* consists of two population entities linked by intermediates; the rank of variety seems to be appropriate for this type of differentiation. As regards the tall, late flowering form with large, conspicuously dentate leaflets, it corresponds to the type of the name *V. officinalis* (Kirschner 2007; Kirschner & al. 2007; see also Fig. 2). It remains, then, to find the correct name for the form with narrow, entire leaflets, the "pseudopratensis" form of Sebald (1996). The first infraspecific names to be considered were published by Wibel (1799: 87). From the vicinity of Wertheim, Baden-Württemberg, Germany, Wibel published *V. officinalis* with two varieties (explicitly assigned to this rank): the first one, var. *montana* Wibel, characterized by narrower leaflets and the habitat confined to "montosis, saxosis et nemorosis", which makes it possible to equate this name with *V. stolonifera* subsp. *angustifolia* Soó. We have to refrain from the typification of var. *montana* because the original material was not traced in the herbarium collections known to preserve Wibel’s specimens (GOET, JE). The second variety, var. *palustris* Wibel, is characterized by larger, more conspicuously dentate leaflets, and may belong to *V. excelsa* Poir. or to *V. officinalis* var. *officinalis*.

*Valeriana officinalis* var. *tenuiifolia*

We will concentrate on one of the earliest varietal names published within *Valeriana officinalis*, the name *V. officinalis* var. *tenuiifolia* Vahl (1805). It was Holub (1983) who listed a number of early subspecies names published by Schübler & Martens (1834), and the names *V. officinalis* subsp. *tenuiifolia* (Vahl) Schübl. & G. Martens and *V. officinalis* subsp. *latifolia* (Vahl) Schübl. & G. Martens turned out to be the earliest names at subspecific rank in the genus (disregarding early *Valeriana* subspecies names in Ehrhart (1783) – see Chater & Brummitt (1966) – because they belong to *Valerianella*). In this way, the overlooked, almost forgotten name of var. *tenuiifolia* became important for the nomenclature of the whole group.

The epithet *tenuiifolia* (Vahl 1805) was mentioned at various ranks under *Valeriana officinalis* (form, variety, subspecies) in the floristic and taxonomic literature (Rouy 1903; Pleijel 1925; Wisskirchen & Haeupler 1998; Sebald 1996; Fischer & al. 2008; Tison & Foucault 2014; Vásquez Pardo & al. 2007) and with doubtful or probably erroneous taxonomic meaning (usually with the names *V. collina* auct. or *V. wallrothii* Kreyer in synonymy). In what follows, the name *V. officinalis* var. *tenuiifolia* is typified and interpreted taxonomically. Other relevant names then are briefly discussed.

The protologue of *Valeriana officinalis* var. *tenuiifolia*

*Enumeratio plantarum*, vol. 2 (Vahl 1805) was published posthumously, under the editorship of N. Tönder, J. W. Horneman and P. Thonning. We compared the published protologue (Fig. 3) with Vahl’s original manuscript (deposited at Copenhagen, C) and found the two sources identical. Vahl (1805: 6) characterized *Valeriana officinalis* using his own phrase name (in principle, a Linnaean phrase name with an addition: “pinnis lanceolatis serratis”). Then
Fig. 2. Epitype of *Valeriana officinalis* and neotype of *V. exaltata* (PRA-00000072). The specimen consists of six parts, of which four are shown here.
he recognized two subordinate names within the species (β and γ); according to the Code (McNeill & al. 2012: Art. 37.4) they are varieties. The first is var. [β] latifolia, without a new phrase name, quoting, together with several pre-Linnæan sources, the Linnæan phrase name from Species plantarum to the 13th edition of Systema vegetabilium, and adding a reference to Oeder (1771: 1–570). Because of the inclusion of the phrase name used by Linnaeus in numerous works including Species plantarum (see Richter 1840), it is reasonable to equate var. latifolia Vahl with the typical variety of V. officinalis (Kirschner 2007), as a taxonomic synonym. It is also supported by the fact that plate 570 from Flora danica (Oeder 1771) was seen by Linnaeus and included in V. officinalis in his later works. The plate depicts a plant very similar to the epitope of V. officinalis (Kirschner 2007; Fig. 2). The second variety is V. officinalis var. [γ] tenuifolia, published without any reference to other sources, solely on the basis of material seen by Vahl. The complete diagnosis of var. tenuifolia is quite concise. The entry in Vahl (1805) (Fig. 3) is closed by general remarks pertaining to the whole species and is therefore also applicable to var. tenuifolia. The following protologue characters are relevant from the point of view of the modern understanding of the variation within the V. officinalis group: plants 2–4 feet tall; stem glabrous; stem leaves distinctly petiolate; petiole hairy (villous); leaflets linear, very narrow; leaflet margin entire; habitat: marshy leaves distinctly petiolate; petiole hairy (villous); leaflets linear, very narrow; leaflet margin entire; habitat: marshy groves (“in […] nemoribus paludosis”).

Original material and typification of Valeriana officinalis var. tenuifolia

As stated above, in the protologue of this name, there is no reference to older sources nor any specimen or locality citation. The major part of the herbarium collection of M. Vahl is deposited in Copenhagen (C); the other herbarium with numerous specimens coming from the Vahl herbarium is G, but no relevant specimen was traced there. The keepers of the herbarium C searched the collection for Vahl’s material of Valeriana officinalis s.lat. and found a single specimen that was studied and annotated by Vahl (Fig. 4). The specimen does not bear any text other than “Valeriana officinalis L. S. N. [= Linnaeus, Systema naturae 44.5” on the reverse side of the sheet. However, the plant on the sheet matches the protologue characters of var. tenuifolia (see the list above) in every detail; in all likelihood the plant represents the original material for the name, which was also noted by I. Hiitonen on a separate label in 1966. As regards the absence of the epithet tenuifolia on the specimen, it should be taken into consideration that Vahl’s work was published posthumously. The above specimen is therefore selected as the lectotype of the name. Because of the utmost importance of the ploidy level in the V. officinalis group, and in order to avoid future misinterpretations of the name, we also select an epitope with determined chromosome number (diploid); see also the taxonomic discussion below.

Valeriana officinalis var. tenuifolia Vahl, Enum. Pl. 2: 6. 1805 = Valeriana officinalis subsp. tenuifolia (Vahl) Schüb. & G. Martens, Fl. Württemberg: 25. 1834 = Valeriana officinalis f. tenuifolia (Vahl) Neuman, Sver. Fl.: 101. 1901 = Valeriana officinalis var. angustifolia Wahlenb., Fl. Suec. 1: 19. 1824, nom. illeg. (Art. 52.1 and 53.1), see comment below. – Lectotype (designated here): “Valeriana officinalis L. S. N. 44.5, Hb. Vahl”, without locality, date or collector (C [Fig. 4]). – Epitope (designated here): Bohemia centr., distr. Mělník, distr. phyto-geogr. 11a. Všetatské Polabí, pagus Všetaty, in fossa ad viam publicam ad compitum viae et ferroviae, c. 1.5 km merid. a pago [50.2657°N, 14.5879°E], 16 Jun 1986, J. Kirschner K-28 & J. Hašková (PRA-00011994 [Fig. 5]; isoeptypes: B, BM, PRA-00011995, PRA-00011996, W, WU); chromosome number: 2n = 14, det. by J. Kirschner as K-28 in 1987; also from the same population as K-31.

Taxonomic interpretation of the name Valeriana officinalis var. tenuifolia

The lectotype and epitope (and numerous isoeptypes) belong to our “pseudopratensis” form characterized above. We therefore conclude that the correct name for the early flowering meadow diploid with narrow, entire leaflets within Valeriana officinalis is var. tenuifolia at the rank of variety and V. officinalis subsp. tenuifolia (Vahl) Schüb. & Mart. at the rank of subspecies. It is a mistake to use the latter name for the tetraploids of drier habitats, correctly to be called V. stolonifera subsp. angustifolia Soó at the rank of subspecies.

Notes on the epithet “angustifolia” in the Valeriana officinalis group

It was shown by Holub & Kirschner (1997) and Buttler & al. (2008) that the epithet “angustifolia” belongs to the earliest name at the rank of subspecies for what was commonly called Valeriana collina, but (due to the dou-
Fig. 4. Lectotype of Valeriana officinalis var. tenuifolia (C).
Fig. 5. Epitype of *Valeriana officinalis* var. *tenuifolia* Vahl
Enum. Pl. 2: 6 (1805)

Epitype, designated by J. Kirschner, 2016

Fig. 5. Epitype of *Valeriana officinalis* var. *tenuifolia* (PRA-00011994).
ble threat of homonymy) only outside V. officinalis (the basionym, V. angustifolia Tausch ex Host 1827, is a later homonym of V. angustifolia Mill. 1768, which applies to a taxon of Centranthus DC.). Within V. officinalis, the epithet cannot be used at the rank of subspecies because of the existence of two earlier, seemingly heterotypic names, usually referred to as V. officinalis var. angustifolia Hayne (1813) and V. officinalis var. angustifolia Wahlenb. The latter name was published (Wahlenberg 1824: 19) with a short diagnosis (“β. angustifolia, pinnis subintegerrimis”), with a direct reference to variety “γ” in Roemer & Schultes (1817: 351). On the page referred to, we find a variety “γ”, but with the epithet tenuifolia and a reference to Vahl (1805) and another reference to Dufresne (1811), where var. tenuifolia was accepted without any reference). Thus, the name V. officinalis var. angustifolia Wahlenb., renaming the existing, legitimate V. officinalis var. tenuifolia, was nomenclaturally superfluous when published and thereby illegitimate (McNeill & al. 2012: Art. 52.1), is homotypic with var. tenuifolia (Art. 7.5) and at the same time is illegitimate as a later homonym (Art. 53.1) of V. officinalis var. angustifolia Hayne. The name published by Hayne (1813: t. 32 and text without pagination) refers to Schrader (1806: 85), where two varieties were recognized but their names were not in a form that could be validly published (“β. foliis angustioribus”). Hayne gave a number of references to various sources, including images, but there is a nice plate of var. angustifolia accompanying the description, with all the relevant details and characters, and that is suitable for the role of the lectotype (see below), when no herbarium specimens are extant. As regards the taxonomic interpretation of this name, the lectotype plate leaves no doubt that Hayne’s var. angustifolia is to be equated with V. officinalis s.str.

A note on the name Valeriana altissima

Although the Code (McNeill & al. 2012) reckons with mistakes in newly published names (e.g. in Art. 41), there are mistakes in names that have nomenclatural consequences. One such mistake is the name Valeriana altissima Besser [recognized as a mistake by Koch (1840)]. Pohl (1809) published V. exaltata “Mikan jun.”, a name introduced but not published by Mikan, and later treated by Kirschner & al. (2007, equated with V. officinalis s.str.). Roemer & Schultes (1817: 351) published a note under V. officinalis: “α pro specie habetur, (V. altissima Mikan vide Pohl tent. fl. boëm. p. 41. […]”) meaning that variety “α” (i.e. var. excelsa (Poir.) Roem. & Schult.) is treated as a separate species, V. altissima, by other authors. They therefore did not validly publish the name V. altissima because they did not accept it in their treatment (Art. 36.1(a)).

It was Besser (1821), in his enumeration of plants of Volyn, who validly published the name Valeriana altissima “Mikan”. The ascribed authorship is here understood as an indirect reference, via “V. altissima” in Roemer & Schultes (1817), to V. exaltata J. C. Mikan ex Pohl (1809), who in fact published V. exaltata and V. sambucifolia, not V. altissima. Because of the indirect form of the references to both Roemer & Schultes (1817) and Pohl (1809), V. altissima Besser can only doubtfully be considered as a superfluous, illegitimate substitution of V. exaltata. Moreover, there is a V. altissima Hornem. (Hornemann 1815), a name published on the basis of plants cultivated in the Copenhagen Royal Gardens, with a diagnosis different from (though similar to) those of V. altissima Besser and V. exaltata, i.e. a name with independent typification. The name V. altissima was later used at the rank of variety, as V. officinalis var. altissima (“Mikan”) W. D. J. Koch, synonymous but doubtfully homotypic with the earlier V. officinalis var. exaltata (J. C. Mikan ex Pohl) Kostel. The nomenclature of V. exaltata and V. altissima is summarized below.

Note. — There is a presumably authentic specimen of Valeriana exaltata (BM 1134437) sent by J. C. Mikan to J. J. Roemer and acquired by R. J. Shuttleworth. The transcribed label repeats the diagnosis from Pohl (1809), and it is difficult to decide if Mikan collected and sent the material in the period between 1804 (when the name was first introduced) and 1809, or between 1809 and 1819 (when Roemer died), which is more probable.

Selected synonyms of Valeriana officinalis var. officinalis

As a summary, we list the main synonyms of Valeriana officinalis var. officinalis. It should be noted that only the epitype of V. officinalis is identical with the neotype of V. exaltata, so that the two names are not homotypic (Kirschner & al. 2007).

Valeriana officinalis L., Sp. Pl. 1: 31. 1753 var. officinalis, – Lectotype (designated by Kirschner 2007): Herb. Burser VIII: 100 (UPS). – Epitype (designated by Kirschner 2007): Czech Republic, S Bohemia, Písek, along railway between Ražice and Heřmaň, 49°14’31”N, 14°07’30”E, 380 m, 16 Aug 2006, J. Kirschner & M. Soukup 1608 (PRA-00000072 [Fig. 2]; isoneotype: BM); see also Kirschner & al. (2007: 352).

= Valeriana officinalis var. latifolia Vahl, Enum. Pl. 2: 6. 1805. – Original material: Oeder, Fl. Dan. 4(10): t. 570. 1771.

= Valeriana exaltata J. C. Mikan ex Pohl, Tent. Fl. Bohem. 1: 41. 1809 = Valeriana officinalis var. exaltata (J. C. Mikan ex Pohl) Kostel., Clav. Anal. Fl. Bohem.: 9. 1824 = Valeriana palastris Kreyer in Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 5: 192. 1924, nom. illeg. (Art. 52.1. V. exaltata included). – Neotype (designated by Kirschner & al. 2007: 353, q.v.): Czech Republic, S Bohemia, Písek, along railway between Ražice and Heřmaň, 49°14’31”N, 14°07’30”E, 380 m, 16 Aug 2006, J. Kirschner & M. Soukup 1608 (PRA-00000072 [Fig. 2]; isoneotype: BM).
Representative herbarium specimens studied

Specimens listed in Table 2 are not included.

AUSTRIA: [Niederösterreich, Wien-Umgebung, Wien, 48.0156461°N, 16.4732775°E], s.d., Heimerl, Flora Exsiccata Austro-Hungarica 3444, as Valeriana officinalis (PRC, W, WU). — CZECH REPUBLIC: BOHEMIA: [Mělník] Čečelické černavy [Čečelice fens, (PRC, W, WU). — Czech Republic: [Moravský Beroun] Bärn, Wiesen bei An­­nderdorf [Ondřejov, 49.9112594°N, 17.2878853°E], 1933, Otruba (PRC); Olomouc, rašelinné louky [49.6207767°N, 17.2708611°E], 1933, Otruba (PRC); Olomouc, Černovírský les, rašelinné louky Černovíra [49.6207767°N, 17.2708611°E], 1933, Otruba (PRC); Olšiny u Kostomlaty [Kostomlaty nad Labem, 50.1820461°N, 14.9533139°E], 1947, Kaufmann (PRC); Velenka [50.1515325°N, 14.9037897°E], 1904, Domin (PRC); [Mladá Boleslav] Pěčice, bažantnice [49.6048325°N, 14.6164056°E], 1939, Picbauer (OLM); [Nové Mlýny] Neumühl an der Thaya [48.8552333°N, 16.7264097°E], 1897, Schierl (BRNM); Břeclav – Lednice [48.7807036°N, 16.8429247°E], 161 m, 1983, Hermann (BRNU); [Velké Bílovice] Podvín: Hradištěk prope Bílovice [48.8464653°N, 16.8990581°E], 1921, Podpěra (BRNU); [Břeclava] Břeclava, prope Kostice [47.7428033°N, 16.9861944°E], s.d., Podpěra (BRNU).

— ESTONIA: Põlva, Kanepi, Pühajõe, 1961, Pilhapuu (TU309436, TU309481); [Tartu] Ulila [58.3632403°N, 26.4355406°E], 1963, Pullissaar (TU). — SWEDEN: Sm. [Småland], Oskarshamn, 24 Jul 1908, Köhler (W); ibid., 14 Jul 1914 (PRC).

Acknowledgements

The study was supported by the Czech Grant Agency, under no. 14-36079G (PLADIAS). Thanks are due to the keepers of the herbarium collections consulted (BM, BRNM, BRNU, C, K, LI, OL, PR, PRC, W and WU). We are indebted to the staff of the PRA herbarium for preparation of the material and for photographic documentation of the specimens. The photograph of the lectotype of Valeriana officinalis was kindly provided by the curators of the herbarium UPS, and that of V. officinalis var. tenuifo­lia by the staff of the herbarium C. We are grateful to Dr. Karl Peter Buttlar (Frankfurt am Main) for corrections and fruitful discussions, as well as to Dr. Fred R. Barrie (Chicago) and Dr. Francisco María Vázquez Pardo (Bada­joz) for their comments on an earlier version of this paper.

References

Besser W. S. J. G. 1821: Enumeratio plantarum per Vol­­hyniam et Podoliam hucusque observatarum. – Wil­­na: J. Jawadski.

Bressler S., Klatte-Assel­meyer V., Fischer A., Paule J. & Dobeš C. 2017: Variation in genome size in the Valeriana officinalis complex resulting from multiple chromosomal evolutionary processes. – Preslia 89: 41–61.

Buttler K. P., Hand R. & Kirschner J. 2008: 7. Valeriana­­officinalis-Gruppe. – In: Beiträge zur Fortschreibung der Florenliste Deutschlands (Pteridophyta, Sperma­­tophyta) – Zweite Folge. – Kochia 3: 82–86.

Chater A. O. & Brum­mitt R. K. 1966: Subspecies in the works of Friedrich Ehrhart. – Taxon 15: 95–106.

Dray S. & Dufour A. 2007: The ade4 package: implementing the duality diagram for ecologists. – J. Stat. Softw. 22: 1–29.

Dufresne P. 1811: Histoire naturelle et médicinale de la famille des Valerianées […]. – Montpellier: Jean Martel.
Ehrhart F. 1783: Fortsetzung des Versuches eines Verzeichnisses der um Hannover wild wachsenden Pflanzen. – Hannover. Mag. 20: [columns] 361–364.

Fischer M. A., Oswald K. & Adler W. 2008: Exkursionsflora für Österreich, Liechtenstein und Südtirol. Ed. 3. – Linz: Land Oberösterreich, Biologizentrum der Oberösterre. Landesmuseen.

Hayne F. G. 1813: Getreue Darstellung und Beschreibung der in der Arzneykunde gebräuchlichen Gewächse, wie auch solcher, welche mit ihnen Verwechselt werden können. 3. – Berlin: auf Kosten des Verfassers.

Hidalgo O. & Vallès J. 2012: First record of a natural hexaploid population for Valeriana officinalis: genome size is confirmed to be a suitable indicator of ploidy level in the species. – Caryologia 65: 243–245.

Holub J. 1983: Some neglected subspecies names from Schübler and Martens. Flora von Württemberg (1834). – Folia Geobot. Phytotax. 18: 325–328.

Holub J. & Kirschner J. 1997: Valerianaceae Batsch – kozlikovité. – In: Slavík B. (ed.), Květena České republiky 5: 510–527. – Praha: Academia.

Hornemann J. W. 1815: Hortus regius botanicus Hafniensis [...] 2. – Hauniae: typis E. A. H. Mölleri.

Kirschner J. 2007: Valeriana officinalis L. – Praha: Academia.

Kirschner J. 2002: Valerianaceae Batsch – kozlikovité. – Pp. 491–495 in: Kubát K., Hrouda L., Chrtek J. jun., Kaplan Z., Kirschner J. & Štěpánek J. (ed.), Klič ke květeně České republiky [Key to the flora of the Czech Republic]. – Praha: Academia.

Kirschner J. 2007: Valeriana officinalis Linnæus. – P. 913 in: Jarvis C., Order out of chaos. Linnaean plant names and their types. – London: Linnean Society of London & Natural History Museum London.

Kirschner J., Kirschnerová L. & Štěpánek J. 2007: Generally accepted plant names based on material from the Czech Republic and published in 1753–1820. – Preslia 79: 323–365.

Kirschner J. & Raab Straube E. von 2017+ [continuously updated]: Valeriana officinalis agg. – In: Raab Straube E. von & Henning T. (ed.), Valerianaceae. Euro+Med PlantBase – the information resource for Euro-Mediterranean plant diversity. – Published at http://ww2.bgbm.org/EuroPlusMed [accessed 9 Oct 2017].

Koch [W. D. J.] 1840: Zusätze und Verbesserungen zu meiner Synopsis florae germaniae et Helveticaae. – Flora 23: 353–363.

Maillefer A. 1946: Etude du Valeriana officinalis L. et des espèces affines. – Mém. Soc. Vaud. Sci. Nat. 8: 277–340.

McNeill J., Barrie F. R., Buck W. R., Demoulin V., Greuter W., Hawksworth D. L., Herendeen P. S., Knapp S., Marhold K., Prado J., Prud’homme van Reine W. F., Smith G. F., Wiersema J. H. & Tutin T. N. J. 2012: International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011. – Königstein: Koeltz Scientific Books. – Regnum Veg. 154.

Oeder G. C. 1771: Flora danica 4(10). – Köpenhagen: Martin Hallager.

Pleičel J. 1925: Skandinaviens samkönade Valeriana-former. – Acta Horti Berg. 8: 71–87.

Pohl J. E. 1809: Tentamen florum bohemiae 1. – Prag: Gottlieb Haase.

R Core Team 2016: R: A language and environment for statistical computing. – Published at https://www.r-project.org/ [accessed 15 Feb 2017].

Richter H. E. 1840: Caroli Linnaei systema, genera et species plantarum uno volumine. Codex botanicus Linnaeaus. – Lipsiae: O. Wigand.

Roemer J. J. & Schultes J. A. 1817: Caroli a Linné equi- ter W., Hawksworth D. L., Herendeen P. S., Knapp Titz E. & Titz W. 1969: Beitrag zur Kenntnis der österreichischen Farn- und Blütenpflanzen Baden-Württembergs 6. – Stuttgart: Eugen Ulmer.

Skališka M. 1947: Polyploidy in Valeriana officinalis Linn. in relation to its ecology and distribution. – Bot J. Linn. Soc. 53: 159–186.

Skočdopolová B. & Chrtek J. [sen.] 2008: Wallroth’s collection of vascular plants in the herbarium of the National Museum, Prague. – Sborn. Ná. Muz. Praze, Řada B, Přír. Vědy 64: 5–37.

Štěpánek J., Kirschner J., Jarolímová V. & Kirschnerová L. 2011: Taraxacum nigricans, T. alpestre und allies in the Taraxacum sect. Alpestria: taxonomy, geog- phy and conservation status. – Preslia 83: 537–564.

Thiers B. 2017+ [continuously updated]: Index Herbariorum. A global directory of public herbaria and associated staff. New York: Botanical Garden’s Virtual Herbarium. – Published at http://sweetgum.nybg.org/science/ih [accessed 9 Oct 2017].

Tison J.-M. & Foucault B. de (ed.) 2014: Flora gallica. Flora de France. – La Rochelle: Société des Sciences naturelles de la Charente-Inferieure.

Sebald O. 1977: Der Arznei-Baldrian (Valeriana officinalis agg.) in Württemberg. – Jahresh. Ges. Naturk. Württemberg 132: 152–168.

Sebald O. 1996: Valeriana officinalis s.lat. – Pp. 24–33 in Sebald O., Seybold S., Philipp G. & Wörz A., Die Farn- und Blütenpflanzen Baden-Württembergs. 6. – Stuttgart: Eugen Ulmer.

Titz E. 1984: Die Arzneibaldriane Deutschlands mit Sippen des Valeriana officinalis-Aggregats und ihrer Chromosomensahlen. – Österr. Bot. Z. 116: 172–180.
Titz W. & Titz E. 1982: Analyse der Formenmannigfaltigkeit der *Valeriana officinalis*-Gruppe im zentralen und südlichen Europa. – Ber. Deutsch. Bot. Ges. 95: 155–164.

Vahl M. 1805: Enumeratio plantarum vel ab aliis, vel ab ipso observatum […] 2. – Hauniae & Lipsiae: apud J. H. Shubothe.

Vázquez Pardo F. M., Devesa J. A. & López Martínez J. 2007: *Valeriana* L. – Pp. 205–223 in: Devesa J. A., Gonzalo R. & Herrero A. (ed.), Flora iberica XV. Rubiaceae-Dipsacaceae. – Madrid: Consejo Superior de Investigaciones Científicas.

Ворошилов В. [Voroshilov V.] 1959: Лекарственная валериана [Lekarstvennaya Valeriana]. – Москва: Изд-во Академии наук СССР [Moscow: Publishing house of Soviet Academy of Sciences].

Wahlenberg G. 1824: Flora suecica […] 1. – Upsaliae: Palmblad & C.

Walther E. 1949: Zur Morphologie und Systematik des Arzneibaldrians in Mitteleuropa. – Mitt. Thüring. Bot. Ges., Append. 1: 1–108.

Wibel A. W. E. C. 1799: Primitiae florae wertheimensis. – Ienae: summibus Goepferdi.

Wisskirchen H. & Haeupler H. 1998: Standardliste der Farn- und Blütenpflanzen Deutschlands. – Stuttgart: Bundesamt für Naturschutz & Eugen Ulmer.