

Notes on the taxonomy of *Pseudolysimachion longifolium* complex (Scrophulariaceae)

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ABSTRACT: The taxonomic evaluation of the *Pseudolysimachion longifolium* complex revealed differences between western (i. e., European and W Asian) populations and the other Asian plants. The examination of lectotype specimens of *Veronica longifolia* L. (≡ *Pseudolysimachion longifolium* (L.) OPIZ) and *Veronica maritima* L. (≡ *Pseudolysimachion maritimum* (L.) Á. & D. LÖVE) showed that the former name refers to the eastern populations whilst the latter belongs to the European/W Asian plants. The recognition of two subspecies within *Pseudolysimachion maritimum* is shown to be doubtful. Taxonomic position of *Pseudolysimachion septentrionale* (BORISS.) Á. & D. LÖVE and *P. taigischense* (STEPANOV) HOLUB is discussed.

KEYWORDS: *Pseudolysimachion longifolium* complex, taxonomy, nomenclature, distribution

Introduction

In the course of the study of the taxonomy and distribution of the genus *Pseudolysimachion* (KOCH) OPIZ in the Czech Republic (TRÁVNÍČEK 2000) and Slovakia (TRÁVNÍČEK 1997), a special attention had to be concentrated on the highly variable species *P. longifolium* s. lat. In addition to the investigation of the herbarium material from various parts of the distribution range of the species (main herbaria consulted were BRA, BRNM, BRNU, LIM, LTM, MMI, OL, OLM, OP, PR, PRC, ROZ, SAV, SLO; abbreviations by HOLMGREN et al. 1990), a

relatively detailed field examination of its variation and distribution of the diploid and tetraploid cytotypes in Czechia and Slovakia was carried out (TRÁVNÍČEK & VINTER 1999, TRÁVNÍČEK et al. 2001). Attention was also paid to the nomenclatural problems in the group.

A brief history of the taxonomic treatment

Problems of the taxonomy of the *Pseudolysimachion longifolium* complex were dealt with by a number of authors in the past. LINNAEUS himself (1753: 10) recognized two species of the group, *Veronica maritima* L. and *V. longifolia* L. In the 19th century, a period when taxonomy was based almost purely on morphological grounds, the conspicuous variability of the group of *Pseudolysimachion longifolium* attracted the attention of many botanists (see, for instance, SCHRADER 1803, ROEMER & SCHULTES 1817: 95, 96, OPIZ 1825: 109, 110 and 244, HOST 1827: 3-5, SEIDL in BERCHTOLD & SEIDL 1836: 30, 31, SCHUR 1866: 498, etc.). They introduced a series of species names, many of them, however, must be considered as taxonomic synonyms nowadays (see RÖMPP 1928: 47, 48, HÄRLE 1932: 16, 17, STROH 1942: 390, 391). One of the most remarkable contributions to the understanding of the taxonomy of the group is found in PRINTZ (1921: 380-384, t. X, XI), where *Veronica pseudolongifolia* PRINTZ was described, and an important fact was pointed out that the Siberian populations of the group were noticeably different from the European ones. Until recently, nevertheless, the latter work has remained neglected. It was the conspicuous morphological diversity of the European plants, and the relatively early discovery of the karyological variation within the group that absorbed an effort of recent students (HÄRLE 1932: 14-22, GRAZE 1933: 519-521, 1935, LEHMANN 1940: 480-487, SKALICKÝ 1956, HARTL 1966: 150-153, BORSOS 1967: 7-10, RAITANEN 1967, M. A. FISCHER 1969: 437-439, KUKKONEN 1986). A problem of the correlation between morphological traits of European plants and the ploidy level was addressed several times. Moreover, BORISSOVA (1955a: 341-343) proposed a separate, specific status for slightly aberrant northern populations of the group (see also HÄRLE 1932: 21) under the name *Veronica septentrionalis* BORISS. (= *Pseudolysimachion septentrionale* (BORISS.) Á. & D. LÖVE). On the other hand, a more separate position of the eastern, Siberian populations of the *Pseudolysimachion longifolium* group was generally considered as unjustified, or the problem was avoided (cf. MONJUSCHKO 1924: 117, 118, HÄRLE 1932: 20, BORISSOVA 1955b: 368 (see the synonymy), SKALICKÝ 1956: 128, ELENEVSKIJ 1968, STEPANOV 1997: 93). Only in the last decades, a certain distinctiveness of the Asiatic populations and their more or less separate status has been accepted again (BELJAEVA & SIPLIVINSKIJ 1975: 869, VOROSCHILOV 1982 sec. STEPANOV 1997: 93, IVANINA 1991: 313, TRÁVNÍČEK 1997: 270, HOLUB 1998: 109).

***Pseudolysimachion longifolium* s. lat. in Europe – one or two species ?**

The central, principal problem of the taxonomic investigation of the *Pseudolysimachion longifolium* group in Europe in the 20th century is represented by the above question. LINNAEUS (1753: 10) distinguished his two species *Veronica maritima* and *V. longifolia* primarily on the basis of the number of leaves per node and the character of indentation of leaf margins:

V. maritima: „spicis terminalibus, foliis ternis inaequaliter serratis“,

V. longifolia: „spicis terminalibus, foliis oppositis lanceolatis serratis acuminatis“.

The most remarkable gross morphological variability of the European *Pseudolysimachion longifolium* s. lat. is indeed exhibited by the arrangement of leaves along the stem and by the leaf shape, and it is therefore not possible to disregard the differences emphasized by LINNAEUS. The main difficulty in the taxonomic application of these characters consists in the fact that the two forms do not differ significantly in their ecological requirements nor they do form distinct populations. It is a well know fact, moreover, that they are linked by a series of intermediate morphotypes (HÄRLE 1932: 15, SKALICKÝ 1956: 125, 130, BORSOS 1967: 7, RAITANEN 1967: 483, 484). On the other hand, there have been two major arguments preventing botanists to treat the two forms as taxonomically identical. First, the morphotype 'maritima' predominates in northern Europe (and particularly on coastal habitats in Scandinavia) and hence there is a certain geographical (and, maybe, also ecological?) preference (LEHMANN 1940: 485, 486). It is, however, rather weak because the 'maritima' morphotype is found, relatively less frequently, in other parts of the European range of the species (HÄRLE 1932: 14, 15, LEHMANN 1940: 485, SKALICKÝ 1956: 125) where it forms mixed populations with the 'longifolia' form. In addition, even in the regions dominated by the 'maritima' morphotype the other form is not rare, either (RAITANEN 1967, KUKKONEN 1986; the author's herbarium findings). The difference merely consists in the relative frequency of the two forms in different regions.

The other circumstance supporting the apparent separate status of the two morphotypes is the absolute prevalence of diploids in the regions with the 'maritima' morphotype predominating (RAITANEN 1967: 471, KUKKONEN 1986: 41, TRÁVNÍČEK et al. 2000). Also the first chromosome counts made on plants more exactly characterized morphologically (HÄRLE 1932, GRAZE 1933: 519-521, 1935) pointed to a certain correlation between the ploidy level and the morphology of the samples analysed. As a consequence, the 'maritima' morphotype has repeatedly been characterized as diploid, and the 'longifolia' form as tetraploid in the literature (GRAZE 1935, LEHMANN 1940: 481, 482, HARTL 1966: 152, 153, M. A. FISCHER 1969: 438, ROTHMALER et al. 1982: 465). However, results of detailed studies of RAITANEN (1967) and KUKKONEN (1986) in Finland cast serious doubts on the above generalization. The Finnish plants were found (with a single exception) diploid but the ploidy level was recorded in the 'longifolia' morphotype, too.

A thorough evaluation of the distribution of the two cytotypes in Czechia and Slovakia yielded the following results (TRÁVNÍČEK et al. 2001, TRÁVNÍČEK & VINTER 1999):

- Tetraploid plants largely prevail; among 45 populations, only four proved to be diploid (in two geographically remote couples of populations). This situation substantially differ from that found in Finland.
- No population was comprised of both cytotypes.
- No clear correlation was ascertained between the ploidy level and the basic two morphotypes. Plants with 3(4) leaves per whorl were found either diploid or tetraploid, and the same applies to the opposite-leaved plants. The absolute majority of populations contained various morphotypes, not only the typical 'maritima' and 'longifolia' but also diverse intermediates. It turns out that the variation of leaf arrangement and shape cannot be classified as two main types, and that the character of variation is more complex (see also BORSOS 1967: 7-9).
- Certain differences were found between the two cytotypes in quantitative characters but the differences are manifested in the average population values and need not concern all individuals. Individual variation within populations is considerable, and some diploid plants may show values typical of tetraploids and *vice versa*. The determination of ploidy levels according to the quantitative morphological traits is therefore very unreliable.
- No differences have been observed in the ecological requirements of the two forms.

The above facts combined with further information from the literature make it possible to draw the following conclusions:

1. In spite of a certain difference in the geographical distribution between the two main morphotypes within the European populations of *Pseudolysimachion longifolium* s. lat., and although there is a weak correlation between the morphology and the ploidy level, the differentiation does not suffice to distinguish two separate taxa at the level of species or subspecies. The absence of features of qualitative nature may suggest that the tetraploids represent an autopoloid derivative of diploids. It is possible that the occurrence of certain prevailing character combinations in some regions (for instance, in Scandinavia) is a result of the partial ecological and geographical isolation. The isolation appears to be too incomplete and short, however, to lead to the formation of distinctly differentiated population structures that might be evaluated as subspecies.
2. Despite the fact that the coexistence of the two ploidy levels within populations has not been ascertained in Czechia and Slovakia, it cannot be excluded elsewhere in view of the sympatric overall distribution ranges and the indistinct differences in their ecology (see TRÁVNÍČEK et al. 2001). As shown by HÄRLE (1932) and GRAZE (1933, 1935), the gene flow between different ploidy levels in the genus *Pseudolysimachion* is not impossible. Crossing between a diploid (as a maternal plant, in particular) and a tetraploid may give rise to a fertile tetraploid hybrid (GRAZE 1933: 556, 1935:

658, 659). This process was also proven in the case of the two cytotypes of the European *P. longifolium* s. lat. (GRAZE 1935: 636, 654). It is likely that a tetraploid hybrid may easily backcross with its tetraploid parent. In mixed populations, this process may lead to a gradual elimination of diploids, and a change towards a purely tetraploid population may be expected. If a usual higher competitive ability of established polyploids (upon comparison with their diploid ancestors) is taken into account, the above process may be a very plausible scenario accounting for the prevalence of tetraploid populations in the area studied. Provided that such a process really takes place, the diploid populations might represent relict groups of individuals not yet absorbed by the gradually expanding tetraploid populations.

In this connection, it may be useful to mention that, in S Scandinavia, a hybridization was observed between the diploid *Pseudolysimachion longifolium* s. lat. and the tetraploid *P. spicatum* (L.) OPIZ subsp. *spicatum* (RAITANEN 1967, and the author's herbarium observations). These hybrids probably are tetraploid and, in all likelihood, frequent backcrosses with the tetraploid *P. spicatum* occur. Most of the hybrids are closer to *P. spicatum*, and it is impossible to draw a line between them and the 'true' *P. spicatum* (RAITANEN 1967: 483). In this case, a total disappearance of the diploid *P. longifolium* (s. lat.) is prevented by the substantially different ecological requirements of the two species.

By all accounts, the above picture of the relationships between the diploid and the tetraploid cytotypes within *P. longifolium* s. lat. in Europe gives arguments in favour of accepting a single, morphologically and karyologically variable species (see also TRÁVNÍČEK et al. 2001).

***Pseudolysimachion longifolium* s. lat. in Euroasia: one or two species ?**

In a broader circumscription, *Pseudolysimachion longifolium* occupies an extensive, Euroasian geographical range (cf. WALTERS & WEBB 1972: 251, BORISSOVA 1955b: 368-369, ELENEVSKIJ 1968: 66, YAMAZAKI 1957: 135, 1968: 409 etc.). In Europe, it occurs from France, Belgium, Holland and NW Germany to Denmark, Scandinavian countries (reaching Lapland, and the Pechora River basin up to Kolguev Island in the north). Its southern limit is found in S Italy, the former Yugoslavia, and from Bulgaria to Turkey (M. A. FISCHER 1978: 688). From Ukraine and European Russia it extends to the North Caucasus but does not reach Crimea in the south. The Asian part of its range includes Siberia from the Urals to the basins of rivers Khatanga, Lena and Kolyma. In the south, it occupies a territory from Aralo-Caspian region to the Tien-Shan, Balkhash Lake, the Altai, N Mongolia, and eastwards through the Baikal Lake area to the Okhotsk Sea, Amur basin, Mandshuria and North Korea. It is reported from Sakhalin (IVANINA 1991: 313, 315). Records from Japan probably refer to other, closely related taxa (cf. YAMAZAKI l. c.).

In 1921, PRINTZ (1921: 380-384, t. X, XI) published a description of a new species, *Veronica pseudolongifolia*. The description was based on plants from

southern Krasnoyarsk region (upper Yenisei River basin). PRINTZ gave a detailed comparison of his new species with the European *V. „longifolia”* and with *Veronica spuria* L. (= *Pseudolysimachion spurium* (L.) RAUSCHERT). *Veronica pseudolongifolia* is reported to differ from the European *V. „longifolia”* primarily by remarkably shorter petioles (only 1-2 mm long), always rounded or slightly cordate (not cuneate) leaf blade base, usually almost entirely glabrous leaves (if hairy then trichomes confined to veins beneath), short pedicels (c. 1 mm long), shorter bracts, shorter, ovate, usually obtuse (not lanceolate, distinctly acute) calyx teeth, tooth margins with short glandular hairs. In addition to the region mentioned, PRINTZ reports his new species from more northerly regions in the Yenisei valley, at about 60°N. On the basis of his study of the herbarium material at Botanical Gardens, St. Peterburg (LE nowadays), PRINTZ suggested that *V. pseudolongifolia* extended throughout Siberia, westwards approximately to the Tomsk region. PRINTZ also supposed that *V. pseudolongifolia* substituted the related species, “*V. longifolia*” and *V. spuria* in that territory.

MONJUSCHKO (1924: 117, 118) discussed the question of the separate status of *Veronica pseudolongifolia* when describing a new species *V. komarovii* MONJUSCHKO from the Far East (Amur, Mandshuria, Korea). Based on a herbarium study at LE, he did not accept *V. pseudolongifolia* as a separate species. The main support for his conclusions is the fact that the Siberian population almost always have pedicels (and often petioles) longer than the measurements given by PRINTZ. This was confirmed by HÄRLE (1932: 20) who studied Siberian material in the Moscow University herbarium (MW). On the other hand, he pointed out the fact that the eastern plants have exclusively opposite leaves, in contrast to the European populations with common, or even dominating plants with leaves in 3(-4)-leaved whorls. Specimens of the typical ‘three-leaved’ plants were reported by HÄRLE as far to the east as the Tobolsk vicinity (the westernmost Siberia). The separate specific status of the PRINTZ taxon has not been accepted by most of the later authors (BORISSOVA 1955b: 368, SKALICKÝ 1956: 128, ELENEVSKIJ 1968, 1977: 151, POLOZHIIJ 1996). STEPANOV (1997: 93) again refers to the MONJUSCHKO’s arguments, and confirms their validity. Recently, some botanists working in Siberia and the Far East have accepted *V. pseudolongifolia* (BELJAEVA & SIPLIVINSKIJ 1975: 869, VOROSCHILOV 1982 sec. STEPANOV 1997: 93). IVANINA (1991: 313) acknowledged the existence of *V. pseudolongifolia* but did not include the Far East populations in it.

After a detailed study of the herbarium material of *Pseudolysimachion longifolium* s. lat., I have arrived at the conclusion that the taxon described by PRINTZ represents the most distinct aberrant within *P. longifolium* s. lat. It is therefore justified to evaluate it at least as a subspecies, or more probably as a separate species. However, its variation range is wider than that reported by PRINTZ, which also concerns the characters commonly discussed in the literature, i. e. the length of pedicels and petioles. Plants more or less corresponding to the description given by PRINTZ were seen from the Urals, West Siberian Lowlands, the Altai, the West Sayan, Baikal Lake vicinity, N Mongolia,

the Nerczynsk, Blagoveshchensk and Vladivostok regions (see the list of localities below). On the contrary, no similar plants were observed in a relatively rich herbarium material from various regions of Europe. Tab. 1 summarizes main differences between the European and Asian plants of *P. longifolium* complex.

Important differences between the two taxa consist in the character of indumentum of individual parts of the inflorescence. While the European form has calyx tooth margin with eglandular, usually longer trichomes (Figs. 1, 2), the Asian plants possess calyx teeth with margins covered with very short, mostly glandular hairs (Figs. 3, 4). This character is illustrated also in the original work by PRINTZ (1921: 381); the original figure also very clearly shows the prevailing shape of calyx in the Asian taxon. Another figure with a detail of flower, pedicel and the bract (MONJUSCHKO 1924: 123, under the name *Veronica longifolia*) also seems to correspond to the features of the Asian *Pseudolysimachion longifolium* plants discussed. As regards the indumentum of the remaining parts of the inflorescence (axis, bracts, pedicels), it is generally sparser in the Asian plants.

Further differences given in the Tab. 1 are less constant but, when used as a character complex, may represent a useful aid in the correct identification of the two taxa.

With the exception of two plants on a single herbarium sheet from Mongolia (where leaves were in 3-leaved whorls in the uppermost nodes), all the other specimens studied had exclusively opposite leaves. PRINTZ (1921: 380) admits that the Asian taxon may include 'three-leaved' specimens but HÄRLE (1932: 20) did not observe such plants. Also ELENEVSKIJ (1968: 66) mentioned the fact that opposite-leaved plants clearly predominate in the area to the east of the Urals, and in E Siberia they represent the sole form of *Pseudolysimachion longifolium* s. lat. Z. KAPLAN (pers. comm.) studied two medium sized populations of *P. longifolium* s. lat. in the Baikal region; all the plants studied were found opposite-leaved.

On the contrary, in the populations of the European form, individuals with leaves in three-leaved whorls almost always prevail (in the northern coastal populations this dominance is even more pronounced), sometimes plants with 4-leaved whorls are found.

The length of petioles is a frequently discussed character (MONJUSCHKO 1924: 118, HÄRLE 1932: 20, 21, SKALICKÝ 1956: 128, ELENEVSKIJ 1968: 66, STEPANOV 1997: 93). In the Asian type, the most common range is 3-4 mm according to my measurements (PRINTZ, 1921: 382, gives 1-2 mm) but rare aberrants with petioles to 1 cm long can be found. In the European plants, the petiole length seems to decrease from the south to the north (see also ELENEVSKIJ, l. c.). Central European plants often have petioles 8-10 (15) mm long, north European specimens the petioles are often shorter, sometimes only 4-5 mm. Nevertheless, plants with petioles only (1) 2-3 mm long, not rare in the Asian populations, were not found in the European material.

Tab. 1. – Differences between the western (mostly European) and eastern (Asian) plants of the group of *P. longifolium*

	Western type (Europe and W Asia)	Eastern type (Asia)
Stem	glabrous in lower part, covered with eglandular, arcuate, recurved (or often irregularly arranged, flexuose and partially intertwined) hairs below inflorescence; in the inflorescence ± densely covered with curved, relatively long eglandular hairs	glabrous in lower part, covered with eglandular, arcuate, recurved hairs below inflorescence; in the inflorescence (sometimes also just below it) with short, ± straight or curved eglandular hairs, often also with scattered glandular trichomes
Leaves	often in 3(-4)-leaved whorls, rarely opposite (two per node)	two per node, opposite, exceptionally in 3-leaved whorls in upper part of stem
Leaf blade base	cuneate, truncate or cordate	truncate or shallowly cordate, rarely cuneate
Petioles	(4) 6-10 (15) mm long	(2) 3-4 (10) mm long
Indumentum of upper stem leaves	sparsely or densely (also among veins on both sides) covered with longer eglandular hairs, adaxial surface sometimes also with scattered very short glandular hairs or sessile glands, rarely leaves glabrous or only with scattered short glandular hairs	glabrous on both sides, or adaxial surface exclusively with very short glandular hairs and abaxial surface with very sparse (usually confined to veins) eglandular and/or glandular hairs
Bracts	usually narrow, linear to linear-subulate, gradually narrowing in a long apex, reaching at least 1/3 of calyx but frequently exceeding it	narrowly oblong-lanceolate to narrowly linear, often subabruptly contracted in a relatively shorter apex, usually ± equalling pedicels or shorter, sometimes as long as calyx
Pedicels	(1) 1.5-3 (5) mm long, often densely covered with relatively long slightly curved eglandular hairs	(1) 1.5-2.5 (3.5) mm long, with scattered short ± straight eglandular and sometimes also glandular hairs
Calyx	(1.5) 2-3 (4) mm long, often dissected to 3/4 or more	usually 1.-1.5 mm, rarely to 3 mm, dissected usually to 2/3

Tab. 1. - continued

	Western type (Europe and W Asia)	Eastern type (Asia)
Calyx teeth	acute, narrowly triangular to broadly lanceolate, rarely ovate-lanceolate (Fig. 1)	most often obtuse to rounded, broadly ovate to ovate, less often ovate-lanceolate to lanceolate (and then \pm acute) (Fig. 3)
Calyx indumentum	calyx margins with eglandular, longer (usually many-celled) straight or curved hairs (Fig. 1, 2), sometimes hairs also on the tooth surface, rarely calyx almost glabrous	calyx margins with very short (usually one-celled) straight, mostly glandular hairs (Fig. 3, 4), tooth surface glabrous, rarely with scattered very short glandular trichomes
Capsule	glabrous	glabrous or rarely with solitary glandular hairs on the top

In the European plants, upper cauline leaves often possess a \pm continuous both-side indumentum of longer eglandular hairs, whilst this type of hairs either is completely absent from the leaves of the Asian type or is confined to veins underneath upper leaves. Exceptionally, however, plants with leaves lacking the longer eglandular hairs can be found in populations of the European type, too.

While bracts of the European type most often exceed lower half of calyx during flowering time (and frequently even exceed the whole length of calyx), the Asian taxon possesses bracts usually \pm reach calyx base. Not seldom the bracts of Asian plants are even shorter than pedicels (a character shared with *Pseudolysimachion spurium*). The opposite extreme, i. e. bracts reaching 1/2 or even the top of calyx, is much less frequent (in particular, such plants are found in the vicinity of Nerczynsk).

Another important character is the shape and size of calyx. About 95 % of the European plants have calyx teeth distinctly acute, usually lanceolate to triangular-lanceolate. Only c. 10 % of Asian plants were found to have calyx teeth acute, approaching the shape teeth of the European plants. Similar situation is found in the case of calyx size.

No distinct differences were observed between the two taxa in the length of pedicels. Pedicels c. 1 mm long reported by PRINTZ (1921: 380, 383) represent a marginal condition, not a rule, in the Asian plants.

The Asian taxon in question resembles *Pseudolysimachion spurium* in the character of calyx indumentum. Asiatic plants also \pm match *P. spurium* in the shape of calyx teeth and in the tendency to develop shorter bracts and petioles. The Asian type of *P. longifolium* has leaf blades widest in their proximal part and the blade base usually is rounded to shallowly cordate; *P. spurium* is

characterized by leaf blades having the widest dimension in the middle, the blade base being always cuneate. Further differences between the two taxa can be observed in the density and the shape of inflorescence. Plants of *P. spurium* have, as a rule, racemes less dense but the whole inflorescence is more densely branched than that of *P. longifolium* s. lat. (irrespective of the origin of plants). While *P. spurium* has stems most often hairy throughout, plants of *P. longifolium* s. lat. are characterized by stems glabrous near base. Finally, *P. spurium* is a species of drier habitats, confined to dry steppe or sparsely wooded steppe stands; the Asian *P. longifolium* is ecologically close to the European type, and prefers moist (or even swampy) habitats.

In conclusion, it is obvious that the typical representatives of the Asian taxon of the *Pseudolysimachion longifolium* complex differ from the European ones in a whole set of characters. In the extensive territory from the Altai to the region of Lake Baikal and N Mongolia (from where a satisfactory material was available) the Asian taxon is very distinctive, with a relatively restricted variation. Much less satisfactory material was studied from regions farther to the east. In a preliminary way, it is possible to suggest that the variation increases towards the east, the situation will require additional study. The most eastern plants, however, are generally closer to the Asian taxon than to the European plants.

The territory of West Siberian Lowlands and the Urals, only a limited material was studied by me (about 15 specimens). A part of the plants corresponded to the Asian type, another part was intermediate between the two types, and the rest was referable to the European taxon. Generally speaking, it is obvious that both types occur in the W Asian areas, and their hybridization there is very likely.

If we accept that each of the two types should be considered as a separate taxon, a question arises, what rank should be assigned to them. In view of the fact that the two taxa differ in several characters that are usually accorded higher importance in the genus *Pseudolysimachion*, I prefer the treatment at the rank of species. On the other hand, I admit that the taxa might be evaluated as distinctly differentiated subspecies of a single species, mainly because of the existence of intermediate populations. Taxonomic evaluation at the rank lower than subspecies (or even full synonymization) should be considered as inappropriate, however. The whole problem requires a more profound study of the material from various parts of the Asian part of the geographical range of the whole group.

Correct names for the European and Asian species

The search for correct names applicable to the European and Asian species of the *Pseudolysimachion longifolium* complex inevitably must start (and, as shown below, also end) with LINNAEUS. A fact was mentioned above that LINNAEUS (1753: 10) used the number of leaves per node and leaf margin indentation as diagnostic characters for distinguishing his two species, *Veronica maritima* and *V. longifolia*. Although the latter name has generally been used to cover both Linnaean taxa (KOCH 1837: 527, 528), KERNER (1874: 22) proposed

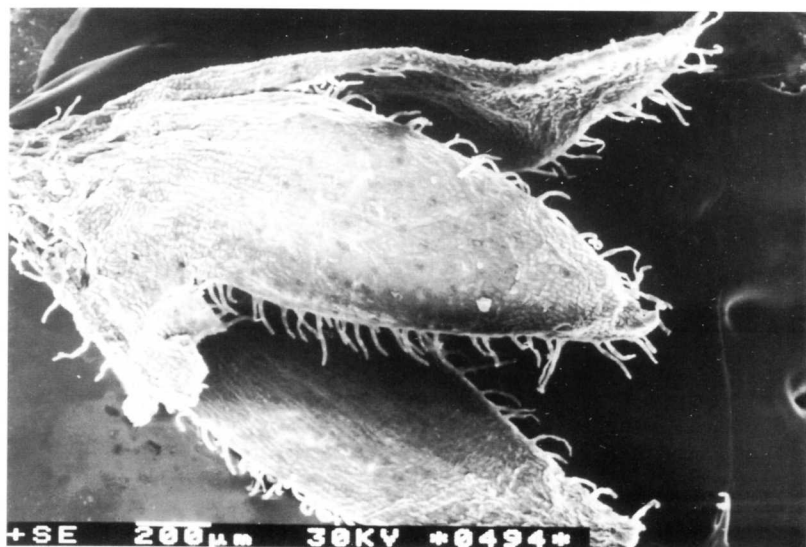


Fig. 1: *Pseudolysimachion maritimum* (L.) Á. & D. LÖVE: calyx tooth with indumentum (locality: the Czech Republic, S Bohemia, Lužnice R. basin, Dráčov near Soběslav).

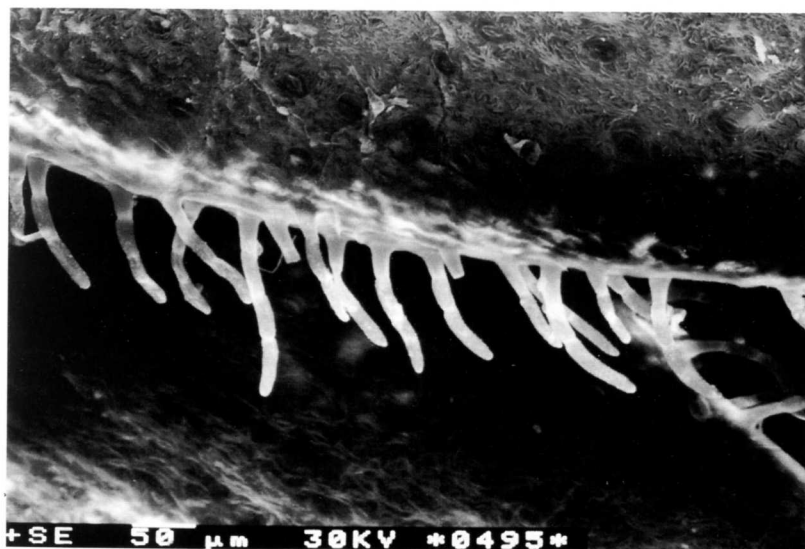


Fig. 2: *Pseudolysimachion maritimum* (L.) Á. & D. LÖVE: detail of indumentum of the calyx tooth margin (locality: the Czech Republic, S Bohemia, Lužnice R. basin, Dráčov near Soběslav).

