

## Notes on some species of *Diphasiastrum*

### Poznámky k některým druhům rodu *Diphasiastrum*

Josef Holub

HOLUB J. (1975): Notes on some species of *Diphasiastrum*. — Preslia, Praha, 47 : 232–240.

Taxonomic and nomenclatural problems of some species of *Diphasiastrum* HOLUB are discussed. A special attention is paid to the interspecies *D. /×/ issleri* and *D. /×/ zeileri*. Original plants of *D. /×/ issleri* correspond to the combination *D. alpinum*—*D. complanatum*. Plants corresponding to the combination *D. alpinum*—*D. tristachyum* have been collected in the Šumava Mts. Some taxa described from the subarctic regions of Europe and North America are shown to belong most probably to the neglected interspecies *D. /×/ zeileri*.

Botanical Institute, Czechoslovak Academy of Sciences, 252 43 Průhonice, Czechoslovakia.

### INTRODUCTION

This is a second part of my study of the new genus *Diphasiastrum* (HOLUB 1975), which could not be published in this journal in its entirety. Notes on taxonomy and nomenclature are selected from materials gathered originally for my “Catalogue of Czechoslovak vascular plants”. With regard to the character of that work the present observations summarize the results of my own studies and suggests problems to be studied in the future.

### OBSERVATIONS

#### *Diphasiastrum alpinum* (L.) HOLUB

Two varieties have been described in this species (both under the name *Lycopodium alpinum* L.): var. *thellungii* HERTER from Switzerland and var. *planiramulosum* TAKEDA from Japan. Both these taxa, especially the first one, require a taxonomic revision; the possibility cannot be excluded that they are conspecific with *D. /×/ issleri*. WILCE (1965) considers var. *planiramulosum* to be a hybrid *D. alpinum* × *D. sitchense*, OHWI (1965) referred it, with some hesitation, to *D. nikoense* and TOYOKUNI (1972) included it again in *D. alpinum*.

#### *Diphasiastrum complanatum* (L.) HOLUB

In a material from N. Fennoscandia, KUKKONEN (1967, 1970) detected a new infraspecific taxon (encompassing, in his circumscription *D. tristachyum* and therefore also *D. /×/ zeileri*). He described it (invalidly) as var. *montellii* in 1967 but reclassified it (validly) as a subspecies in 1970. The subspecific rank was proposed (as in *D. tristachyum*) with regard to the occurrence of transitional situations. The taxonomic position of subsp. *montellii* is not yet entirely clear. It cannot be included in *D. complanatum* s.s. because of its ventral leaves. In the Kola Peninsula Soviet authors (and perhaps WILCE as well) may have misidentified subsp. *montellii* as *D. tristachyum* (cf. Fl. Murmansk. Obl. 1, 1953). The relationships of this taxon to *D. /×/ zeileri* remain unexplained; the present author maintains that “*montellii*” is a subarctic race of *D. /×/ zeileri*. KUKKONEN (1967) himself presumes its hybridogeneous origin from the both subspecies (that is, *D. complanatum* and *D. tristachyum* in our classification scheme); this is supported by some distinguish-

ing characters. KALIO et al. (1969) united this race with *Diphasium complanatum* (L.) ROTHM. var. *polystachyum* (LINDB.) KUKKONEN which clearly belongs to *D. / × / zeileri*. The relationships of "montellii" to *Lycopodium complanatum* L. var. *canadense* M. VICT. 1925, var. *pseudo-alpinum* sensu M. VICT. 1925 and *L. tristachyum* PURSH var. *boreale* M. VICT. 1932 require further study. The descriptions of these three taxa suggest very close relationships to the race "montellii" and may well represent only various morphotypes of it.

Of the other European taxa *Lycopodium complanatum* L. subsp. *moniliforme* LINDM., Hedwigia 47 : 131, 1908, belongs with certainty to the species under discussion but differs by the suborbicular shape of lateral leaves. The taxon needs a further investigation. Its geographical distribution is virtually unknown. HULTÉN (1971) mentioned also *Lycopodium complanatum* var. *dilatatum* NAKAI, described from Korea, to which also plants from Japan may belong. Further taxonomic investigation is necessary.

Following proposals by HOLUB (1960a), WILCE (1961) and ROTHMALER (1962), the specific epithet "*complanatum*" has been most recently accepted in the sense of its established use disregarding its original confused character. WILCE (1961, 1965) designated the Linnaean diagnostic phrase as the type of the specific name *Lycopodium complanatum* L. 1753. Thus the epithet "*complanatum*" was maintained for the nomenclature of the species discussed. KUKKONEN (1967) suggested that LINNAEUS' specimens from Sweden or Lappland might be found in his herbarium material preserved in Paris. Especially Lapponian plants may well belong to the northern race of *D. / × / zeileri*. The present author considers WILCE's typification of *L. complanatum* L. 1753 (in the sense of *L. anceps* WALLR. 1840) to be correct and practically most useful. RAUSCHERT (1967) tried to typify *Lycopodium complanatum* L. 1753 by the phrase "*Lycopodium digitatum foliis Arboris Vitae, spicis bigemellis teretibus* DILL., Hist. Musc., 448, tab. 59". His proposal should not be accepted because this pre-Linnaean name refers to *D. digitatum* (A. BR.) HOLUB = *Lycopodium flabelliforme* (FERN.) BLANCHARD. This species does not correspond to the phrase of *L. complanatum* L. 1753 which, in my opinion, is the most important part of its protologue.

A list of synonyms of *D. complanatum* follows, including specific names only.

Nomen: *Diphasiastrum complanatum* (L. restr. WILCE) HOLUB, Preslia, Praha, 47 : 108, 1975.

Syn.: *Lycopodium complanatum* L. Spec. Plant. 2 : 1104, 1753, restr. WILCE, Nova Hedwigia, Weinheim, 3 : 97, 1961. — *Lycopodium anceps* WALLR., Linnæa, Halle, 14 : 676, 1840, non *L. anceps* PRESL 1830. — *Diphasium anceps* [WALLR.] Á. et D. LÖVE, Nucleus, Calcutta, 1 : 7, 1958, nomen illegitimum, incl. *Lycopodium flabelliforme* (FERN.) BLANCHARD 1911. — *Diphasium wallrothii* H. P. FUCHS, Acta Bot. Hungar., Budapest, 9 : 13, 1963.

*Diphasiastrum digitatum* (A. BR.) HOLUB

This is another characteristic species which has been ignored for a long time. It was described as early as by DILLENIUS 1741 but owing to its inclusion in *Lycopodium complanatum* by LINNAEUS it disappeared from taxonomic classification schemes for 150 years. The only other name recorded hitherto is *L. flabelliforme* (FERN.) BLANCHARD 1911, based on a variety described by FERNALD in 1903. However, A. BRAUN, renowned for his acute taxonomic observations, wrote in 1848 (Amer. Journ. Sci. Arts 50 : 681, 1848): "*L. complanatum* of the North American authors belongs mostly to *L. digitatum* (DILLEN.) A. BRAUN". M. VICTORIN (1925 : 60) did not consider

this name to have been validly published, because BRAUN provided neither description nor precise quotation. Under the provisions of the present Code (STAFLEU et al. 1972) the (indirect) reference to DILLENUS is sufficient for valid publication of that name. The only DILLENUS' work on club-mosses is his "Historia Muscorum" in which *L. flabelliforme* is given a polynomial phrase, beginning with the words "*Lycopodium digitatum*". There is also a description and a beautiful plate which might be taken as the type of the species, should no original plants exist. The name used by A. BRAUN is here considered to have been validly published by an indirect reference (abbreviation of the author's name) to an earlier description. A new nomenclatural combination has therefore been proposed by the present author (HOLUB 1975).

*Diphasiastrum* / × / *issleri* (ROUY) HOLUB

The taxonomy and nomenclature of this taxon have been subject to many discussions. Important data have been summarized by LAWALRÉE (1957); for a discussion concerning the correct specific name in *Lycopodium* see HOLUB (1964). Following LAWALRÉE's study, *D. issleri* has been generally accepted as a species and its inclusion in *D. alpinum* (for instance by ROUY, CHASSAGNE and KORNAŠ) or in *D. complanatum* (for instance by DOMIN and DOSTÁL) is considered unjustifiable. The specific status has been adopted by RAUSCHERT (1959, 1967), HOLUB (1960b), ROTHMALER (1962, 1963) WRABER (1962a, b), FUTÁK (1963, 1967), DAMBOLDT (1963), PACYNA (1972) and KUBÁT (1974).

DOMIN's classification of *D. / × / issleri* (as belonging to *D. complanatum*) was motivated by an overestimation of the shape of stegophylls. The form of stegophylls (important for basic species!) varies greatly in *D. / × / issleri* and can even match that of *D. alpinum*; this was correctly pointed out by KORNAŠ (1957), WRABER (1962a, b) etc. A plant of *D. / × / issleri* with stegophylls of the „*alpinum*“ type was described by DOMIN (1938) as a new taxon *Lycopodium alpinum* subsp. *kablikianum*. WRABER (1962a, b) considered this taxon to be a "complanatoid" type of *D. issleri* and treated it as a subspecies. He supposed the type subspecies to be a "tristachyoid" type of *D. / × / issleri*. Thus, for the first time, the fact was formally expressed that *D. / × / issleri* embraces plants of two different types, showing morphological and possibly genetical relationships to *D. alpinum* on one hand and to *D. complanatum* or to *D. tristachyum* on the other hand. This problem is rendered difficult by the fact that *D. / × / zeileri* cannot entirely be excluded from the presumed parentage of plants determined as *D. / × / issleri*.

ISSLER (1909, 1910) designated his plant as *D. complanatum* subsp. *anceps*. In his first work of 1909 it is said to differ from *D. alpinum* by the green colour, flattened and broad branchlets and small ventral leaves. The relationships of this plant to *D. complanatum* s. s. have been repeatedly emphasized in ISSLER's papers. When considering the parentage of the original plants of *D. / × / issleri* on the basis of ISSLER's characters, it is evident that of the couple *D. complanatum* and *D. tristachyum* only the former species may be taken into account. This is also corroborated by ISSLER's original material from the type locality which was sent to DOMIN by ISSLER himself.

DOMIN (1938) considered ISSLER's original plant to be a "complanatoid" type and named it var. *vittiforme* DOMIN. This superfluous name covers also other "complanatoid" plants of *D. / × / issleri* from Czechoslovakia. DOMIN's *Lycopodium issleri* also included plants evincing morphological relationships to *D. tristachyum*; these were referred to var. *subquadrangulum* DOMIN. Because DOMIN's opinion concerning the status of the original plants of *D. / × / issleri* was clearly presented in the Czech section of his paper only, he was sometimes considered (see e.g. DAMBOLDT 1962, PACYNA 1972) to be a partisan of the "tristachyoid" origin of *D. / × / issleri*.

A professed advocate of the latter concept is the monographer WILCE (1965). Based on the width of sterile branchlets and the ratio of the total length of lateral leaves to the length of their free part, she found by extrapolation that the values for the unknown parent are close to those of *D. tristachyum* rather than to those of *D. complanatum*. (The second character used does not seem to be appropriate in this case regarding both its variation type and a small number of measurements in *D. /×/ issleri* by WILCE). She supports her opinion by the fact, that the distribution area of *D. /×/ issleri* matches those of *D. alpinum* and *D. tristachyum*, and that *D. tristachyum* participated also in the origin of other hybrid combinations. (The latter two reasons are not conclusive, however, because the same may be said of *D. complanatum*). In her list of materials studied, WILCE also mentioned materials from the type locality of *D. /×/ issleri* but did not pay any special attention to them. Obviously, WILCE was unaware of the plants of the combination *D. alpinum* — *D. complanatum*; because, in her opinion, these two species are sympatric, she presumes the existence of an internal isolating mechanism preventing the origin of hybrids between these two species.

The quantitative representation of characters of *D. complanatum*, *D. tristachyum* and *D. /×/ zeileri* in the characteristics of *D. /×/ issleri* has been studied by PACYNA (1972) who found that out of 24 characters studied 13 were common with *D. tristachyum*, 12 with *D. complanatum*, and 11 with *D. /×/ zeileri*; she therefore considers *D. /×/ issleri* to be closer to *D. tristachyum* than to other two species compared. She unfortunately failed to indicate explicitly the common characters of various species; the difference in the numbers of common characters are small and a degree of taxonomic unequivalence of the characters studied has to be taken into account. In the summary of her paper the author is, however, more reserved when the second parent of the Polish material of *D. /×/ issleri* is considered.

The study of Czechoslovak material of *D. /×/ issleri* revealed the presence of plants corresponding to the formula *D. alpinum* — *D. complanatum* in this country; these plants are identical with the authentic material of *D. /×/ issleri*. DOMIN (1938) reports six specimens of *D. /×/ issleri* related to *D. complanatum* and eight specimens related (according to him) to *D. tristachyum* (in the latter case relationships to *D. /×/ zeileri* cannot be excluded!). As DOMIN classified *D. complanatum* and *D. tristachyum* as mere varieties (!) of one species (including also *D. /×/ issleri* in the rank of subspecies); the problems mentioned above did not interest him much and he did not even try to solve them. The classification of those three taxa as separate species makes it necessary to distinguish the influence of the respective parents in hybridogeneous products.

For the correct use of the epithet “*issleri*” the original materials have to be taken into account, and these, in my opinion, belong to the parental combination *D. alpinum* — *D. complanatum* (see also ISSLER (1909), DOMIN (1938), LAWALRÉE (1957), HOLUB (1960b) and DAMBOLDT (1962)). Plants corresponding to this parental combination were recently described as *Diphysium hastulatum* by SIPLIVINSKIJ (1973) who seems to have accepted WILCE's hypothesis of the origin of *D. /×/ issleri*. His new species is taxonomically identical with *D. /×/ issleri*.

My supposition that *D. /×/ issleri* does belong to the above combination is corroborated by another fact. Revising herbarium material of *Diphysiastrum*, collected by F. Procházka in the Bohemian Forest (Šumava Mts.) years ago, I found interesting plants closely related to *D. /×/ issleri*, com-

binning characters of *D. alpinum* and *D. tristachyum*. The plants were distinctly bluegreen (the colour was preserved also in the herbarium material), branchlets were narrow, only slightly flattened, ventral leaves slightly narrowed to the base, somewhat removed from the stem in their lower portion but inclining to it by the top, hardly different from lateral leaves, with the top reaching the following ventral leaf. The main stem is missing but seems to have been subterraneous as in *D. tristachyum*. In my personal notes from that time this material was tentatively named "*Diphasiastrum pseudo-issleri*".

Having been unable to study these plants in the field, I have abstained from any taxonomic treatment. PROCHÁZKA (1965, 1966) later mentioned these plants. Further study is required. Literature data on *D. /×/ issleri* may partly belong to this taxon, as for instance those from the Massif Central in France (CHASSAGNE 1956), where *D. complanatum* is not known to occur.

The knowledge of the distribution of *D. /×/ issleri* continues to increase; it has been shown to occur in northeastern part of North America and in Central Siberia, and new localities have been reported from within its known distribution area (e.g. KUBÁT, 1974, Czech Lands). According to DAMBOLDT (1962) *D. /×/ issleri* extends up to 2300 m a.s.l. The disjunct character of the distribution area may be due to imperfect investigation (combined with taxonomic difficulties); the possibility of polytopic origin should also be taken into account.

As regards nomenclature of *D. /×/ issleri*, an earlier specific epithet may exist. GANDOGER (1880) described five species of the *D. alpinum* complex, and some of them might be identical with *D. /×/ issleri*. An identification on the basis of imperfect descriptions is impossible, however. To understand GANDOGER's species it is necessary to study the original material.

A list of synonyms of the species discussed follows, including names in all taxonomic ranks.

Nomen: *Diphasiastrum /×/ issleri* (ROUY) HOLUB, Preslia, Praha, 47 : 108, 1975.

Syn.: *Lycopodium alpinum* L. race *issleri* ROUY Fl. France 14 : 489, 1914. — *Lycopodium issleri* (ROUY) DOMIN, Věda Přír., Praha, 18 : 204, 1937. — *Lycopodium complanatum* L. subsp. *issleri* (ROUY) DOMIN, Rozpravy Čes. Akad. Věd Umění, Cl. Mat. Natur., Praha, 47/1937, 19 : 25, 1938 (sep. 1937?). — *Lycopodium alpinum* L. subsp. *issleri* (ROUY) CHASSAGNE Fl. Auvergne 1 : 3, 1956. — *Diphasiastrum issleri* (ROUY) HOLUB, Preslia, Praha, 32 : 423, 1960. — *Lycopodium complanatum* L. subsp. *genuinum* ČELAK. f. *fallax* ČELAK. Prodr. Fl. Böhmen 1 : 14, 1867. — *Lycopodium complanatum* L. subsp. *genuinum* ČELAK. var. *fallax* (ČELAK.) ČELAK., Věstník Král. Čes. Společ. Nauk, Praha, 83 : 57, 1884 (an 1885 ?). — *Lycopodium complanatum* L. var. *pseudo-alpinum* FARWELL, Michigan Acad. Sci. 18 : 94, 1916 [n. v.]. — *Lycopodium alpinum* L. subsp. *kablikianum* DOMIN, Rozpravy Čes. Akad. Věd Umění, Cl. Mat. Natur., Praha, 47/1937, 19 : 13, 1938. — *Diphasiastrum issleri* subsp. *kablikianum* (DOMIN) T. WRABER, Bull. Scient., Ljubljana, 7/1—2 : 4, 1962. — *Diphasiastrum hastulatum* SIZPLIVINSKIJ, Novosti Sist. Vysšich Rast., Leningrad, 10/1973 : 348, 1973.

### *Diphasiastrum tristachyum* (PURSH) HOLUB

Though morphologically clear cut, this species has often been united with *D. complanatum*. In the Czech literature it has been treated as a variety (DOMIN 1938) or subspecies (DOSTÁL 1948). The majority of modern authors recognize it as a separate species (ROTHMALER 1944; HOLUB 1960b; WILCE 1965; RAUSCHERT 1967; KUBÁT 1974; etc.); the same treatment had been adopted by LLOYD (1899), however. Because of transitional situations, KUKKONEN (1967) and PACYNA (1972) recently preferred an intraspecific treatment. KUKKONEN (1967) did not examine *D. /×/ zeileri* in detail, to which many of his transitional forms may belong. On the basis of his own experience, the present author considers the specific rank fully justified.

M. VICTORIN (1932) described *Lycopodium tristachyum* PURSH var. *boreale* M. VICT. from northern Canada. This taxon shows certain relationships to the northern race of *D. /×/ zeileri*

(see the text on *D. complanatum*), but has, in contradistinction to KUKKONEN's description of this race, a subterraneous rhizome, thus approaching *D. tristachyum*. WILCE does not mention this interesting taxon in her monograph (she included, however, one specimen of VICTORIN's original material in *D. complanatum* s.s.).

*D. tristachyum* was described from North America. Á. et D. LÖVE (1961) treated European plants as specifically different and used the name *Diphasiium chamaecyparissus* (A. BR.) Á. et D. LÖVE for them. This taxon is supposed by the authors to differ from *D. tristachyum* by several (not mentioned) characters which should be as important as those separating *D. tristachyum* from *D. complanatum*. The possibility cannot be excluded that the material studied by Á. et D. LÖVE was actually *D. /×/ zeileri*. On the basis of the study of European and North American material, the present author cannot but subscribe to ROTHMALER's (1962) and WILCE's (1965) opinion that American and European plants of *D. tristachyum* are taxonomically identical (cf. HOLUB 1964).

The rhizomatic nature of *D. tristachyum* is one of its most distinctive features. Plants of *D. tristachyum* from an isolated station ("arella") in Turkish Lazistan are reported to have a terrestrial main stem (see WILCE 1965) and should therefore be carefully studied.

### *Diphasiastrum /×/ zeileri* (ROUY) HOLUB

*D. /×/ zeileri* has long been neglected. Its intermediate position between *D. complanatum* and *D. tristachyum* has led many taxonomists to merge these two species. Within this huge taxon, *D. /×/ zeileri* has often entirely disappeared. Its intermediate or vergent character is reflected in names as for instance *Lycopodium complanatum* var. *intermedium* LINDM. or *L. chamaecyparissus* var. *subanceps* JUNGE. Ecologically, *D. /×/ zeileri* is also intermediate between the putative parental species. The spores tend to be abortive, suggesting probable hybridogeneous origin. The species was described on the basis of plants from lower altitudes of the Vosges Mts. At present it is known to occur in North America, Fennoscandia and Central Europe. Its distribution area often overlaps that of the putative parental species — one (usually *D. tristachyum*) or both.

In subarctic regions a degree of racial differentiation may be observed, producing plants with one or two strobiloids on shortened peduncles, and condensed short branchlets of lateral stems (race "montellii", see the text on *D. complanatum*). Plants from Greenland, referred previously to *D. tristachyum*, have been critically revised by PORSILD (1935) and seem to belong to this taxon also.

The following list of synonyms refers to European plants only; it includes names in all taxonomic ranks.

Nomen: *Diphasiastrum /×/ zeileri* (ROUY) HOLUB, Preslia, Praha, 47 : 108, 1975.

Syn.: *Lycopodium complanatum* (L.) SCHK. race *zeileri* ROUY, Fl. France 14 : 491, 1914. — *Diphasiium zeileri* (ROUY) DAMBOLDT, Ber. Bayer. Bot. Ges., München, 36 : 26, 1963. — *Lycopodium complanatum* L. [subsp.] *sabinaefolium* (WILLD.) A. GRAY var. *majus* SANIO, Verh. Bot. Prov. Brandenburg, Abhandl., Berlin, 23 : 19, 1881. — *Lycopodium complanatum* L. subsp. *anceps* f. *polystachyum* H. LINDB. Plant. Finland. Exsicc., Helsingfors, 1 : 5, 1906. — *Lycopodium complanatum* L. var. *polystachyum* (H. LINDB.) HIITONEN Suomen Kasvio, 52, 1933. — *Diphasiium complanatum* (L.) ROTHM. var. *polystachyum* (H. LINDB.) KUKKONEN, Annal. Bot. Fenn., Helsinki, 4 : 469, 1967. — *Lycopodium chamaecyparissus* A. BR. var. *subanceps* P. JUNGE, Jahrb. Hamburg. Wiss. Anstalt. 27/1909, Beih. 3 : 211, 1910. — *Lycopodium complanatum* L. subsp. *eucomplanatum* DOMIN, Rozpravy Čes. Akad. Věd Umění, Cl. Mat. Natur., 47/1937, 19 : 25, 1938 (seorsim 1937 ?). — *Lycopodium complanatum* L. var. *intermedium* LINDQUIST, Bot. Notiser, Lund, 1929 : 98.

Incl.: *Diphasium complanatum* (L.) ROTHM. subsp. *montellii* KUKKONEN, Annal. Bot. Fenn., Helsinki, 17 : 142, 1970.

Of the synonyms based on North American plants the following appear referable to *D. [x] zeileri*: *Lycopodium complanatum* L. var. *canadense* M. VICT. 1925; var. *pseudo-alpinum* sensu M. VICT. 1925; var. *elongatum* M. VICT. 1925; var. *gartonis* BOIVIN 1960; *L. tristachyum* PURSH var. *boreale* M. VICT. 1932.

## SUMMARY

The paper is a continuation of a previous one containing the description of a new genus *Diphasiastrum* HOLUB 1975. Notes on taxonomy and nomenclature of some species of the genus, published here, were originally intended for "Catalogue of Czechoslovak vascular plants". They summarize the present author's results and suggest problems for further research. A special attention is paid to the interspecies *D. [x] issleri* and *D. [x] zeileri*. The variation in the shape of stegophylls in *D. [x] issleri* does not allow to refer this taxon to *D. complanatum*. *Lycopodium alpinum* L. subsp. *kablikianum* DOMIN is shown to belong to *D. [x] issleri*. This species, as circumscribed by various authors, comprises two taxa corresponding morphologically (and most probably also evolutionarily) to the combinations *D. alpinum* - *D. complanatum* and *D. alpinum* - *D. tristachyum*. The original concept of *D. [x] issleri* refers, according to the description and ISSLER's plants from the type locality, to the first combination. The taxon corresponding to the latter combination requires further investigation before it is described; for the time being it may be informally referred to as *D. "pseudo-issleri"*. The present author accepts WILCE's typification of the name *Lycopodium complanatum* L. 1753 in the taxonomic sense of *L. anceps* WALLR. 1840 as justified. Any other typification would necessarily exclude the epithet "*complanatum*" from the use. *D. tristachyum* is classified as a separate species, very distinct from *D. complanatum*. Its inclusion into that species would make the inclusion of a number of other species necessary. Taxonomically, North American and European plants of *D. tristachyum* are fully identical; classification of European plants as a separate species (*Lycopodium chamaecyparissus*) is incorrect. *D. [x] zeileri* is a neglected taxon. Some taxa from subarctic Europe and North America, referred previously to *D. complanatum* or *D. tristachyum*, are shown to belong probably to *D. [x] zeileri*. An example is *Diphasium complanatum* subsp. *montellii* KUKKONEN 1970 which represents a northern race of *D. [x] zeileri*. Lists of synonyms of *D. [x] issleri* and *D. [x] zeileri* are provided. In *Lycopodium flabelliforme*, the epithet "*digitatum*" is shown to have priority over "*flabelliforme*". *Lycopodium digitatum* A. BR. was validly published by an indirect reference.

## SOUHRN

Článek navazuje na předešlou publikaci s popisem nového rodu *Diphasiastrum* HOLUB 1975. Převážně na základě materiálů připravovaných původně pro dříve plánované dílo „Katalog československých cévnatých rostlin“ jsou uvedeny poznámky k taxonomickým a nomenklatorickým problémům některých druhů rodu *Diphasiastrum*. Podle charakteru dříve plánovaného „Katalogu“ jsou tyto poznámky buď souhrnem výsledků vlastního výzkumu nebo poukazem na problémy, které je nutno v budoucnosti řešit. Největší pozornost je věnována mezidruhům *D. [x] issleri* a *D. [x] zeileri*. Variabilita stegofylů u *D. [x] issleri* nedovoluje přiřadit tento taxón do druhu *D. complanatum*. *Lycopodium alpinum* L. subsp. *kablikianum* DOMIN patří podle svého charakteru k *D. [x] issleri*. V pojetí tohoto druhu se u různých autorů skrývají dva taxóny, odpovídající z hlediska morfologického kombinacím *D. alpinum* - *D. complanatum* a *D. alpinum* - *D. tristachyum*. Původní pojetí *D. [x] issleri* se podle popisu i rostlin sbíraných Isslerem na originální lokalitě vztahuje k první kombinaci. Taxón odpovídající druhé kombinaci musí být popsán; vyžaduje však předtím ještě další studium. Prozatím pro něj může být používáno provizorní označení *D. „pseudo-issleri“*. Autor pokládá *D. tristachyum* na základě vlastního studia za dobrý druh, jenž nemůže být zařazen do společného druhu s *D. complanatum*; v případě takového zařazení by do tohoto druhu musely být pak zařazeny četné další druhy rodu *Diphasiastrum*. Severoamerické a evropské rostliny *D. tristachyum* jsou taxonomicky zcela identické; vylíčení evropských rostlin jako samostatného druhu *Lycopodium chamaecyparissus* je nesprávné. *D. [x] zeileri* je přehlížený taxón; některé taxóny popsané jako infraspecifické taxóny druhů *D. complanatum* nebo *D. tristachyum*, vyskytující se v subarktické Evropě a Severní Americe, patří podle svých znaků k tomuto mezidruhu. Je to hlavně *Diphasium complanatum* subsp. *montellii* KUKKONEN 1970, jenž představuje podle názoru autora tohoto článku severskou rasu *D. [x] zeileri*. K anglickým textům o *D. [x] issleri* a *D. [x] zeileri* jsou připojeny přehledy synonym těchto druhů. U *D. digitatum* je uvedeno zdůvodnění nutnosti změny druhového epitheta z „*flabelliforme*“ na „*digitatum*“.

## REFERENCES

- CHASSAGNE M. (1956): Inventaire analytique de la flore d'Auvergne et contrées limitrophes des départements voisins. I. — Paris.
- DAMBOLDT J. (1962): *Lycopodium issleri* in Bayern. — Ber. Bayer. Bot. Ges., München, 35 : 20—22.
- (1963): Zur Kenntnis der Flachen Bärlappe in Bayern. — Ber. Bayer. Bot. Ges., München, 36 : 25—28.
- DOMIN K. (1938): *Lycopodium issleri* Rouy v Československu a o variabilitě našich plavuní ze sekce *Heterophylla* Spring. — Rozpravy Čes. Akad., Cl. 2, Praha, 49/19 : 1—28.
- DOSTÁL J. (1948): Květena ČSR. — Praha.
- FUTÁK J. (1963): Rod *Diphasium* Presl em. Rothm. (*Lycopodium* L. p.p.) na Slovensku. — Biológia, Bratislava, 18 : 256—264.
- (1967): *Lepidophytina*. — In: FUTÁK J. [red.]: Flóra Slovenska 2 : 11—44. — Bratislava.
- GANDOGER M. (1880): *Pugillus plantarum novarum vel minus recte cognitarum*. — Österr. Bot. Zeitschr., Wien, 30 : 323—328.
- HOLUB J. (1960a): Nové nebo méně známé rostliny květeny ČSSR. — Preslia, Praha, 32 : 423—426.
- (1960b): Kleine Beiträge zur Flora der ČSSR. — Novitates Bot., Praha, 1960 : 3—9.
- (1964): *Miscellanea ad floram czechoslovacam pertinentia* (1.—17.). — Acta Horti Bot. Praagensis, Praha, 1963 : 47—59.
- (1975): *Diphasiastrum*, a new genus in *Lycopodiaceae*. — Preslia, Praha, 47 : 97—110.
- HULTÉN E. (1971): The circumpolar plants. II. Dicotyledons. — Kungl. Svenska Vetenskapsakad. Handl., Ser. 4, 13/1 : 1—463.
- ISSLER E. (1909): Die Vegetationsverhältnisse der Zentralvogesen mit besonderer Berücksichtigung des Hohneckgebietes. — Engler Bot. Jahrb., Leipzig, 43, Beibl. 99 : 6—62.
- (1910): Über 3 in den Vogesen vorkommende *Lycopodium*-Formen aus der *complanatum*-Gruppe. — Mitteil. Philomat. Ges. Elsass-Lothringen, Strasbourg, 4 : 438—442.
- KALIO P., U. LAUTE et Y. MÄKINEN (1969): Vascular flora of Inari Lapland. I. Introduction and *Lycopodiaceae* — *Polypodiaceae*. — Annal. Univ. Turkuensis, Ser. A, Biol. — Geogr., Turku, 42 : 1—108.
- KORNAŚ J. (1957): Rośliny naczyniowe Gorców. — Monograph. Bot., Warszawa, 5.
- KUBÁT K. (1974): *Diphasium issleri* (Rouy) Holub a *D. tristachyum* (Pursh) Rothm. v Čechách a na Moravě. — Preslia, Praha, 46 : 310—318.
- KUKKONEN I. (1967): Studies on the variability of *Diphasium* (*Lycopodium*) *complanatum*. — Annal. Bot. Fenn., Helsinki, 4 : 441—470.
- (1970): A nomenclatural note on the Fennoscandian *Diphasium complanatum*. — Annal. Bot. Fenn., Helsinki, 7 : 142.
- LAWALRÉE A. (1957): Une lycopode ardennaise méconnue, *Lycopodium issleri*. — Bull. Soc. Bot. Belg., Bruxelles, 90 : 109—120.
- LLOYD F. (1899): The hitherto confused species of *Lycopodium*. — Bull. Torrey Bot. Club, New York, 27 : 559—567.
- LÖVE Å. et D. (1961): Some nomenclatural changes in the European flora I. Species and supra-specific categories. — Bot. Notiser, Lund, 114 : 33—47.
- OHWI J. (1965): Flora of Japan. — Washington.
- PACYNA A. (1972): Biometrics and taxonomy of the Polish species of the genus *Diphasium* Presl. — Fragm. Flor. Geobot., Kraków, 18 : 255—297.
- PORSILD M. (1935): Stray contributions on the flora of Greenland. VI. The Greenland species of *Lycopodium*, sect. *Complanata* Victorin. — Meddel. Groenland, København, 93/3 : 3—24.
- PROCHÁZKA F. (1965): K rozšíření *Pteridophyt* na Šumavě a v Předšumaví. — Sborník Jihočes. Mus. České Budějovice 5 : 37—60.
- (1966): K problematice chráněných druhů kapradorostů v Československu. — Ochrana Přír., Praha, 21 : 141—144.
- RAUSCHERT S. (1959): *Lycopodium issleri* (Rouy) Lawalrée. — Wiss. Zeitschr. Univ. Halle, Ser. Mat. Natur., 8 : 493—494.
- (1967): Taxonomie und Chorologie der *Diphasium*-Arten Deutschlands (*Lycopodiaceae*). — Hercynia, Leipzig, 4 : 439—481.
- ROTHMALER W. (1944): *Pteridophyten-Studien* I. — Feddes Repert., Berlin, 54 : 55—82.
- (1962): Über einige *Diphasium*-Arten (*Lycopodiaceae*). — Feddes Repert., Berlin, 66 : 234 bis 236.
- (1963): Exkursionsflora von Deutschland, Kritische Ergänzungsband. Gefäßpflanzen. — Berlin.



- SIPLIVINSKIJ V. N. (1973): Zamětki o bajkalskoj flore, 1. — Novosti Sist. Vyssich Rast., Lenin-grad, 10/1973 : 345—361.
- STAFLEU F. A. et al. (1972): International Code of botanical nomenclature. — Utrecht.
- TOYOKUNI H. (1972): Notes on circumpolar elements in the alpine floras of the Hidaka — Yûpári Ranges, Hokkaido, Japan (1.). — Mem. Nation. Sci. Mus. Tokyo 5 : 183—201.
- VICTORIN M. (1925): Les Lycopodinéés du Québec. — Contrib. Laborat. Bot. Univ. Montréal 3 : 1—117.
- (1932): Sur quelques Ptéridophytes nord-américaines. — Contrib. Laborat. Bot. Univ. Montréal 21 : 1—7.
- WILCE J. H. (1961): Lycopodium complanatum L. and four new allied species of the Old World. — Nova Hedwigia, Weinheim, 3 : 93—117.
- (1965): Section Complanata of the genus Lycopodium. — Beih. Nova Hedwigia, Weinheim, 19.
- WRABER T. (1962a): Die Arten der Ordnung Lycopodiales in Slowenien. — Bull. Scient., Ljubljana, 7/1962/1—2 : 3—4.
- (1962b): Vrste reda Lycopodiales v Sloveniji. — Biol. Vestnik, Ljubljana, 10 : 11—25.

Received September 4, 1974

Reviewed by J. Chrtek

A. Hadas, D. Schartzendruber, P. E. Rijtema, M. Fuchs et B. Yaron [ed.]:

### Physical Aspects of Soil Water and Salts in Ecosystems

Springer-Verlag, Berlin—Heidelberg—New York 1973, 460 str., 221 obr., cena váz. 94,— DM. (Kniha je v knihovně ČSBS.)

Recenzovaná kniha vychází jako 4. svazek edice „Ecological Studies“. Je souborem referátů přednesených na sympoziu v Izraeli v r. 1971 pod názvem „Soil water physics and technology“.

Referáty jsou rozděleny do tří tematických celků. V první části jsou obsaženy referáty týkající se teoretických problémů, především matematických modelů pohybu vody v půdě, energetických aspektů půdní vody a vzájemných vztahů mezi půdou a vodou. Druhá část shrnuje dvě skupiny referátů. V první skupině jsou referáty pojednávající o evapotranspiraci z různých hledisek a metodických přístupů. V druhé skupině jsou výsledky aplikovaného výzkumu vodního režimu zemědělských plodin. Třetí část sborníku je věnována referátům o kontrole vodního režimu ve slaných půdách, která je klíčovým problémem zemědělské praxe při zavlažovacích projektech v aridních zónách. Každá z těchto tří částí je uzavřena shrnující kapitolou nazvanou poznámky a diskuse, spojující hlavní smysl a tendence společně všem v té části uvedených referátů, vyplývající také z diskuse k nim proběhlé.

Fyzika půdy se stává v současné době důležitým předmětem, který se nutně spojuje se studiem biologických problémů, ať z hlediska čistě teoretického, či aplikované zemědělské praxe. Je proto nutno tento obsáhlý sborník doporučit všem, kteří chtějí získat skutečně moderní informace o stavu znalostí, a to jak z hlediska teoretického, tak i aplikovaného.

J. Slavíková