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PROBLEMS WITH THE PUBLICATION OF ORIGINAL DIAGNOSES OF ASSOCIATIONS; SYNTAXONOMIC AND NOMENCLATURAL IMPLICATIONS

Jaroslav MORAVEC[1]

ABSTRACT

Association –the basic rank in the hierarchical system of syntaxa– must be defined by means of at least one vegetation relevé to be published validly. The same is true for subassociation. The Code of Phytosociological Nomenclature recommends publishing at least 10 relevés in the original diagnosis of these syntaxa. The difficulty of printing phytosociological tables can be overcome by publication of vegetation relevés and constancy tables in non-tabular form.

Key words: Diagnosis of Association; Phytosociological Nomenclature; Syntaxonomy.

Introduction

Syntaxonomy operates with vegetation units called syntaxa which represent class concepts expressing degrees of identity of real parts of vegetation - the "vegetation individuals". To communicate knowledge of syntaxa it is necessary to define them. From the point of view of intuitive and formal logic a syntaxon represents a "logical class" which can be defined (a) by "extension", i.e. by enumeration of elements belonging to the given syntaxon and/or by (b) "intension", i.e. indicating specific features common to the elements of the given syntaxon and characterizing it.

Since 1910 the floristic composition of stands serves as the principal tool for the definition of syntaxa, primarily of the association as the syntaxon of the basic rank (Flahault & Schroeter 1910). In the two decades which followed, the principle of definition of syntaxa based on the floristic composition was generalized also for syntaxa of superior ranks (BRAUN-BLANQUET, 1925).

[1] Institute of Botany, Academy of Sciences of the Czech Republic, CZ-252 43 Průhonice near Prague, Czech Republic; Tel. +420 2 67750190; Fax +420 2 67750031

The diagnosis of a syntaxon

For the description (definition) of a syntaxon the term "diagnosis" is used (see BARKMAN, MORAVEC & RAUSCHERT, 1986: Code, Art. 7 and 8), similarly as it is the case in taxonomy of plants and animals. Two different kinds of diagnoses are used in syntaxonomy and nomenclature:

a) For an association (or a syntaxon of lower rank) the diagnosis is represented by (1) the elements (vegetation relevés - see Code, Def. VIII) included in the given syntaxon and (2) species (or lower taxa) differentiating the syntaxon - diagnostic (i.e. character and differential) species.

b) For syntaxa of higher ranks the diagnosis is represented (1) by the elements included in the given syntaxon (i.e. by syntaxa of the next lower principal rank - see Code, Def. VIII) and (2) by the diagnostic species of the given syntaxon.

Earlier, more emphasis was put on the diagnostic species, which was reflected in changes of names of syntaxa when it was found that the original diagnostic species did not fulfil this function. This practice was not adopted by the Code.

Newly also the negative floristic differences of a syntaxon in comparison with the next similar syntaxa (absence of certain species) seem to be acknowledged in syntaxonomy.

The diagnosis of a syntaxon is completed successively in later papers owing to the progress of syntaxonomic research and the increasing number of vegetation relevés. Associations with diagnosis actually including many hundreds of relevés are no longer the exception.

What is the original diagnosis of a syntaxon?

The first effectively published diagnosis to which the validly published syntaxon name is bound is called "the original diagnosis" (Code, Art. 7 and 8). This diagnosis needs not be published simultaneously with the name; it can be published earlier but it must be clearly indicated by an unambiguous reference in the original publication of the name (see Art. 2b). In fact, the Code does not define the original diagnosis as such, but conditions when it is sufficient.

From Art. 7 it is evident that vegetation relevés (and for names published before 1/1/1979 also synoptic tables) are acknowledged as original diagnosis of an association (or subassociation). According to Art. 7 an original diagnosis is sufficient when it contains at least one single relevé. The indication of character or differential species is not required by the Code.

Art. 8 shows that the original diagnosis of a syntaxon superior to association is, first of all, the indication of at least one syntaxon of the next subordinate principal rank with validly published name. The indication of character and/or differential species is required for syntaxon names published after 1/1/1980.

The original diagnosis of an association

The original diagnosis of an association (or of a lower syntaxon) includes all elements (relevés or synoptic tables effectively published) given in the original

paper either directly or by reference. Unfortunately, this fact is not explicitly and clearly stated in the Code.

One vegetation relevé can be acknowledged as a sufficient original diagnosis only from the nomenclatural point of view. In fact, one single relevé is sufficient to decide, on the basis of the comparison of the floristic composition with other relevés, whether it belongs to a certain syntaxon or not. Nevertheless, relevés representing original diagnoses of syntaxa can be found, which do not permit unequivocal classification in a certain syntaxon, either because of the complexity or incompleteness of the relevé. The Code allows a syntaxon name based on such relevés to be rejected as nomen dubium (Art. 37).

From the syntaxonomic point of view, objections can be raised to an original diagnosis containing one vegetation relevé only, because one single relevé does not allow either the variability or the homotoneity of the new syntaxon to be checked. For this reason the Code recommends publishing at least 10 relevés in the original diagnosis of an association or subassociation (see Recommendation 7A). However, this recommendation can cause difficulty to authors who wish to fulfil it and include tables containing more relevés, some journals refuse to accept such papers for publication (Tikhomirov, personal communication, 1993).

Publication of original diagnoses of associations

In my opinion, the condition for effective publication of a sufficient original diagnosis of an association (or a syntaxon of lower rank) –one single relevé– is simple and easily fulfilled. The Code does not require the publication of the relevé in the form of a table - it can be published as a simple text (e.g. by GOLUB & SAVELJEVA, 1992: 429 for the *Poo bulbosae-Artemisietum austriacae*).

Table 1. Condensed constancy table of the *Poo bulbosae-Artemisietum austriacae* (Golub & Saveljeva 1992: 424).

Diagnostic species of the *Polygono-Artemisietea austriacae*, *Polygono-Artemisietalia austriacae* and *Alysso-Artemision austriacae*:

V: *Artemisia austriaca* Jacq., *Polygonum arenastrum* Boreau; I: *Bassia sedoides* (Pall.) Aschers., *Ceratocarpus arenarius* L.

Diagnostic species of the association:
V: *Poa bulbosa* L.; IV: *Elytrigia repens* (L.) Nevski, *Myosurus minimus* L.

Other species:
III: *Inula britannica* L.; II: *Eremopyrum orientale* (L.) Jaub. et Spach., *Ceratocephala falcata* (L.) Pers., *Limonium sareptanum* (A. Beck.) Gams, *Psammophiella muralis* (L.) Ikonn., *Rorippa brachycarpa* (C.A.Mey.) Hayek, *Berteroa incana* (L.) DC., *Lepidium perfoliatum* L., *Alopecurus pratensis* L., *Euclidium syriacum* (L.) R. Br.; I: *Acroptilon repens* (L.) DC., *Carex melanostachya* Bieb. ex Willd., *C. stenophylla* Wahlenb., *Crepis tectorum* L., *Descurainia sophia* (L.) Webb ex Prantl, *Potentilla bifurca* L., *Tanacetum millefolium* (L.) Tzvel.

In the same way the constancy table of an association can be published (see Tab. 1). Thus the diagnosis would become more informative and Recommendation 7A could be met. In this case I recommend the use of constancy percentages than constancy classes. Constancy percentages make it possible to synthesize such tables using the calculation of weighted means of constancy percentages (MORAVEC, 1978).

When constancy classes are used it is necessary to give the number of relevés used for the synthesis; this makes it possible to calculate the mean percentage for each constancy class. The mean percentages of the 5 constancy classes currently used in syntaxonomy (I-V with intervals of 20%) were published by ČEŠKA (1966) for constancy tables synthesized from 5-20 relevés. The following mean constancy percentages can be used for constancy classes when more than 20 relevés are synthesized (MORAVEC, 1973: 431 - see Tab. 2).

Table 2. Mean constancy percentages of constancy classes

Constancy class	V	IV	III	II	I
Oscillation for 5-20 relevés	100-91	80-67	60-50	40-28	20-11
Mean for 20-200 relevés	91	71	51	31	11
Mean for more than 200 relevés	90	70	50	30	10

Importance of the original diagnosis for syntaxonomy

The original diagnosis of a syntaxon is the first definition of the given syntaxon. Once effectively published, the original diagnosis cannot be changed. For an association it represents the reference information with which new vegetation relevés are to be compared in order to decide whether they belong to this association or not. For this reason it is an advantage if the original diagnosis contains at least the constancy table, when it is not possible to publish more than the type-relevé.

Despite the fact that only the relevé-table allows us to check the homotoneity of the set of relevés and to exclude outlaying ones ("heterotoneity analysis" when simple numerical procedure is used - MORAVEC, 1971: 164), the constancy table makes it possible to estimate some synthetic features of a new association, which a single relevé does not. The following syntaxonomic operations can be performed:

1. Determination of the nucleus of the characteristic combination of species (= species with constancy of 60-100% together with character species; BRAUN-BLANQUET, 1925: 146, 1932: 68); the data of constancy of species allow us to judge the importance of character or differential species.
2. Calculation of the mean species number per relevé (MORAVEC, 1971: 156, 1978: 35).
3. Estimation of the homotoneity of the set of relevés (NORDHAGEN, 1924 = homogeneity) synthesized in the constancy table by means of calculation of the mean floristic similarity within the synthesized set (ČEŠKA, 1966, 1968) or of the basic homotoneity-coefficient (MORAVEC, 1971).
4. Calculation of the floristic similarity of further vegetation relevés or synthetic tables to the constancy table of the original diagnosis (ČEŠKA, 1966: 95).
5. Synthesis of further vegetation relevés and/or synthetic tables included in the association with the constancy table of the original diagnosis (MORAVEC, 1978).

The above calculations are more precise when constancy percentages are given instead of constancy classes.

Determination of species of higher constancy for the characteristic combination of species

The species participating in the composition of the characteristic combination of species owing to their constancy above 60% can be read directly in the constancy table; e.g. for the *Poo bulbosae-Artemisietum austriacae* (Tab. 1) they are:

Artemisia austriaca Jacq., *Polygonum arenastrum* Boreau, *Poa bulbosa* L., *Elytrigia repens* (L.) Nevski, *Myosurus minimus* L.

Calculation of the mean species number per relevé

The calculation of the mean species number per relevé (d) proceeds according to the following formula:

$$d = \left(\sum_{i=1}^{k} C_i\right)/100$$

(C_i = constancy percentage of species i or the mean constancy percentage of the given constancy class for n relevés, k = total species number of the set of relevés). This represents the sum of products of constancy percentages and species numbers. The mean species number per relevé of the *Poo bulbosae-Artemisietum austriacae* calculated from the constancy percentages (Tab. 3) is 10.6; the species number of the type-relevé is 11 which shows practically no deviation from the mean species number for the given set.

Table 3. Species numbers of the *Poo bulbosae-Artemisietum austriacae* (5 relevés) in individual constancy classes

Constancy classes					Σ
V	IV	III	II	I	
3	2	1	9	9	24
Constancy percentages					
100	80	60	40	20	

Mean species number per relevé: 10.6 (species number in the type-relevé: 11).

Estimation of the homotoneity of a set of relevés

The homotoneity of a set of relevés can be expressed by means of the floristic similarity between the relevés of the set. ČEŠKA (1966, 1968) proposed modified formulae for indices of similarity of different authors which allows us to calculate directly the mean floristic similarity using the constancy percentages of species. The following simple numerical coefficient based on the importance of species with constancy above 60% for a set of relevés, called "basic homotoneity-coefficient", was published by MORAVEC (1971):

$$bH = \sum_{j=1}^{\ell} C_j/d$$

(C_j = constancy percentage of species j [= species with constancy above 60%] or the mean constancy percentage of the given constancy class for n relevés, d = mean species number per relevé, ℓ = number of species with constancy above 60%). The basic homotoneity-coefficient of the above set of relevés is 43.4, the mean floristic similarity (M) calculated according to ČEŠKA (1966) is 50.9.

Calculation of the floristic similarity of further vegetation data to the constancy table of the original diagnosis

The formulae published by ČEŠKA (1966, 1968) allow us to calculate the floristic similarity of further relevés or synthetic tables with the constancy table of the original diagnosis of an association. All vegetation data found to belong to the given association can be synthesized in one constancy table by means of calculation of weighted means of constancy percentages (Moravec 1978).

Importance of the original diagnosis for nomenclature

The original diagnosis of a syntaxon is decisive in the following nomenclatural operations:

1. The typification of names (see Code, Def. VIII).
2. The inversion of names according to Art. 42 (although this is not explicitly stated there).
3. The judgement of the emendation of a syntaxon (see Recommendation 47A) after syntaxonomic changes (division of a syntaxon or uniting syntaxa of the same rank).

Typification of names

As given in Def. VIII, the holotype is the element that is indicated as the nomenclatural type in the original diagnosis by the author or that is the only element published or cited there; a lectotype is a nomenclatural type that is chosen from several elements published and/or cited in the original diagnosis when none of these elements has been indicated as the holotype. This definition also states explicitly that an element for typification is a vegetation relevé in associations and subassociations and a syntaxon of the next subordinate principal rank in syntaxa of higher rank (i.e. an association in an alliance or suballiance, an alliance in an order or suborder, an order in a class or subclass).

Only the neotype can be chosen from a later published diagnosis of an association (or subassociation) the original diagnosis of which contains only a synoptic table. For syntaxa superior to association the neotypification comes not in question (this is not explicitly stated in the Code, however it follows from Art. 8).

The key importance of the original diagnosis follows clearly from the above definition. Nevertheless, we can still find wrong typifications in the recent syntaxonomic literature; e.g. lectotypification of an association by a relevé published later and not included in the original diagnosis (even when the holotype has been

designated by the author of the association) or the designation of a vegetation relevé as a type of an alliance-name.

Inversion of names

Art. 42 allows us to modify a syntaxon name derived from two plants of which one is dominant when the name was formed in contradiction to Recommendation 10C. According to this recommendation the name of the dominant plant should appear in the second place with the termination indicating rank. According to Art. 42 the inversion should be proposed to the Nomenclature Commission which must decide on the question and publish the nomen inversum. Such a proposal would be based on the dominance of the name giving taxa given in the original diagnosis of the syntaxon in question (primarily of an association). Relevés published later are irrelevant for inversion of a syntaxon name. Unfortunately, nomina inversa are often published by different authors (not by the Nomenclature Commission and therfore they are illegitimate) the inversion of which is based on the dominance of name-giving taxa in relevés published later (and not included in the original diagnosis).

Emendation of syntaxa

Recommendation 47A allows to express a considerable alteration of the circumscription (emendation) of a syntaxon. The emendation is indicated in the author citation of the syntaxon name. Unfortunately, no precise instructions are given as to which alterations of the circumscription of a syntaxon should be considered as considerable. Nevertheless, the reference to Art. 24 and 25 shows that alterations follow either division of a syntaxon or uniting syntaxa of the same rank.

From the example to Recommendation 47A and Art. 24 it can be seen that the "considerable alteration" of the circumscription of a syntaxon concerns changes in the original diagnosis. I do not recommend indicating as an emendation either the removal of elements not included in the original diagnosis of the syntaxon but added later, or the later inclusion of other elements in the syntaxon.

Conclusions

Problems with the publication of new associations arise from the disagreement about the definition of association, which is optimal by means of a table of vegetation relevés, and technical limitations to the printing of such tables. The Code of Phytosociological Nomenclature permits the valid publication of a new association with an original diagnosis of only one vegetation relevé. Such a diagnosis can be considered sufficient only from the point of view of nomenclature, but not that of syntaxonomy. The solution proposed is to join a constancy table to the relevé, which must be designated as the nomenclatural type of the new association name. Neither the constancy table nor the type-relevé need to be published in tabular form. The constancy table gives more syntaxonomic information on the new syntaxon than one single relevé.

For valid publication of a new association name the following conditions of the Code must be met:

1. The name must be published effectively, i.e. in printed matter distributed to the general public or at least to libraries generally accessible to botanists.
2. The name must be accompanied by a sufficient original diagnosis (or by an unambiguous reference to an earlier, effectively published, sufficient diagnosis).
3. In the original diagnosis, at least one vegetation relevé must be published.
4. The association name must be formed from the scientific names of 1 or 2 plant species (or infraspecific taxa) occurring in the original diagnosis in accordance with Art. 10 and 11 of the Code and it must be clear from what species it was derived.
5. One vegetation relevé published in the original diagnosis must be designated as the holotypus of the association name.

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