

Proposal (31) to conserve the name *Brachypodietalia pinnati* Korneck 1974 as a *nomen conservandum* with a conserved type

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Abstract

After a nomenclatural review of the available names for the order of mesoxeric grasslands within the class *Festuco-Brometea*, we propose the conservation of the name *Brachypodietalia pinnati* (with a conserved type) against the names *Brometalia erecti* and *Scorzoneretalia villosae*. In syntaxonomic concepts not accepting a single order for the mesoxeric grasslands of Europe, the latter names could still be used, as they are based on different nomenclatural types.

(31) *Brachypodietalia pinnati* Korneck 1974: 123 nom. cons. propos.

Typus: *Cirsio-Brachypodium pinnati* Hadač & Klika in Klika and Hadač 1944 (lectotypus; Dengler et al. 2003: 608; typus cons. propos.).

(=) *Brometalia erecti* W. Koch 1926: 20.

Typus: *Bromion erecti* W. Koch 1926: 121 (holotypus).

(=) *Scorzoneretalia villosae* Kovačević 1959: 7

Typus: *Scorzonerion villosae* Horvatić ex Kovačević 1959 (holotypus)

Syntaxonomic reference: Mucina et al. (2016).

Abbreviations: ICPN = International Code of Phytosociological Nomenclature, 4th edn (Theurillat et al. 2021).

Keywords

Brachypodietalia pinnati, *Brometalia erecti*, dry grassland, Europe, *Festuco-Brometea*, *nomen ambiguum*, *nomen conservandum*, phytosociological nomenclature, *Scorzoneretalia villosae*, syntaxonomy

Introduction

The mesoxeric basiphilous grasslands of Europe are of outstanding importance, both scientifically and from the conservation point of view. They host the highest ever

recorded vascular plant species richness values globally on grain sizes below 100 m² (Wilson et al. 2012; Dengler et al. 2020; Roleček et al. 2021). At the same time, as they are low-productivity grasslands, these formerly widespread habitats experience strong declines in area and quality throughout the continent, mainly due to intensification,

abandonment and eutrophication (Dengler and Schaminée 2016; Janssen et al. 2016; Dengler et al. 2020). While there is general agreement that this group of vegetation belongs to the class *Festuco-Brometea*, their recognition as a major unit within this class is relatively recent (Mucina and Kolbek 1993; Mucina et al. 2016; Chytrý et al. 2020). While Krausch (1961) and Korneck (1974) had already proposed such an order comprising all mesoxeric basiphilous grasslands of Europe, the prevailing practice until recently was to split the class *Festuco-Brometea* into several geographically defined orders (e.g. Oberdorfer and Korneck 1978; Royer 1991; Theurillat et al. 1995; Bardat et al. 2004), with mesoxeric units of these orders recognized at the suborder, alliance, suballiance or association level only. Since the available broad-scale data suggest that the floristic composition and ecological conditions of all mesoxeric basiphilous grasslands of Europe are so similar among one another and distinct from the xeric and rocky grasslands of the class *Festuco-Brometea* that they should be combined in a joint order (Mucina et al. 2016; Willner et al. 2017, 2019; Chytrý et al. 2020), we attempt here to establish its correct name according to the International Code of Phytosociological Nomenclature (ICPN; Theurillat et al. 2021). Currently, there are several names in use, among them *Brometalia erecti* (with different authorities) and *Brachypodietalia pinnati* Korneck 1974, but others, such as *Scorzoneretalia villosae*, also must be considered. Moreover, while several publications suggested *Brometalia erecti* as a *nomen ambiguum* and *Brachypodietalia pinnati* as a *nomen conservandum* (e.g., Dengler et al. 2012; Kuzemko et al. 2014; Mucina et al. 2016), the formal steps to reach an official decision according to the ICPN have not been taken yet.

Brometalia erecti

The order *Brometalia erecti* was first described by Koch (1926) from the Linth Plain (“Linthebene”) on the Swiss Plateau. On page 20, the author provides a syntaxonomic overview in which he places the *Mesobrometum erecti* as the sole association in the alliance *Bromion erecti*, the latter being the sole alliance in the order *Brometalia erecti*. Since Koch’s alliance and order were published without reference to previous publications, they are to be considered newly published, with *Mesobrometum erecti* being the holotype of the *Bromion erecti* and *Bromion erecti* the holotype of the *Brometalia erecti* (see Terzi et al. 2016 for a detailed discussion of the names *Brometalia erecti*, *Bromion erecti* and *Mesobrometum erecti*). Syntaxonomically, the *Mesobrometum erecti* clearly belongs to the subatlantic, mesoxeric basiphilous grasslands (Korneck 1974).

In the following decades, the concept of the order *Brometalia erecti* – mostly with the wrong author citation “Br.-Bl. 1936” – was narrowed down to the subatlantic parts of the class *Festuco-Brometea*, as opposed to the subcontinental and continental ones placed in the order *Festucetalia valesiaca* (e.g. Oberdorfer 1957; Oberdorfer and Korneck 1978; Schubert et al. 2001). In this understanding, the *Brometalia erecti* comprised the two alliances

Mesobromion erecti (≡ *Bromion erecti* W. Koch 1926 s.str.) and *Xerobromion erecti*. This concept of geographically vicariant orders, with *Brometalia erecti* vs. *Festucetalia valesiaca*, remained the same when additional geographically defined orders from the more distal parts of Europe were added, such as the *Helictotricho-Stipetalia*, *Scorzoneretalia villosae*, *Ononidetalia striatae* or *Brachypodietalia phoenicoidis* (Royer 1991; Theurillat et al. 1995; Rivas-Martínez 2002; Bardat et al. 2004). In all these systems, the *Brometalia erecti* – like the other orders – comprised edaphically different alliances or suborders, e.g. for mesoxeric, xeric and rocky sites (e.g. Oberdorfer and Korneck 1978; Royer 1991).

Finding a name for the mesoxeric order of the *Festuco-Brometea*

Krausch (1961) was the first who highlighted that the mesoxeric alliances of the two orders *Brometalia erecti* and *Festucetalia valesiaca*, namely that the (*Meso-*) *Bromion erecti* and *Cirsio-Brachypodion pinnati* share more floristic commonalities with one another than with their respective xeric counterparts *Xerobromion erecti* and *Festucetalia valesiaca*. He also proposed a provisional order name *Trifolietalia montani* nom. inval. (Art. 3b). Later, Korneck (1974) proposed to change the hitherto purely geographic order division of the *Festuco-Brometea* into a mainly edaphic division, with the orders *Festucetalia valesiaca* “Br.-Bl. & Tx. 1943”, *Brometalia erecti* “Br.-Bl. 1936” (consisting only of the *Xerobromion*, thus excluding the type of the order), *Koelerio-Phleetalia phleoidis* Korneck 1974 and *Brachypodietalia pinnati* Korneck 1974. The latter comprised the alliances “*Cirsio (pannonici)-Brachypodion pinnati* Hadač & Klika 1944” and “*Mesobromion erecti* Br.-Bl. et Moor 1938 em. Oberd. 1949”.

Korneck (1974) does not provide a direct reference to Klika and Hadač (1944), which contains the original diagnosis of the *Cirsio-Brachypodion pinnati*. In his description of the “*Cirsio (pannonici)-Brachypodion pinnati* Hadač & Klika 1944”, Korneck refers to Krausch (1961) for a list of all known associations of the alliance, also mentioning some of them himself. Among these is the “*Sesleria-Cirsium pannonicum*-Ass. Klika 1932” (recte: *Cirsio pannonicum-Seslerietum* Klika 1933 nom. invers.), which is the type of the alliance (Toman 1981: 569). In the references, the paper with the original diagnosis of the *Cirsio pannonicum-Seslerietum* (i.e., Klika 1933) is correctly cited, so the year “1932” in the text can be considered a typographic error. Thus, the name “*Cirsio (pannonici)-Brachypodion pinnati*” in Korneck (1974) can be interpreted as a later homotypic homonym of the *Cirsio-Brachypodion pinnati* Hadač & Klika in Klika and Hadač 1944. Moreover, Krausch (1961: 220) provides a reference to Klika (1955), where another homotypic homonym of the same alliance name was published.

Concerning the “*Mesobromion erecti* Br.-Bl. & Moor 1938 em. Oberd. 1949”, Korneck provides references

to both Braun-Blanquet and Moor (1938) – where the *Mesobromion erecti* was described as a suballiance – and to Oberdorfer (1957), where the name was validly described at alliance rank. Moreover, the type association of the *Mesobromion erecti* (Braun-Blanquet & Moor 1938) Oberdorfer 1957 and *Bromion erecti* W. Koch 1926, the *Mesobrometum erecti*, is included in the alliance, although it is given the wrong author citation “Br.-Bl. apud Scherrer 1925”.

Dengler et al. (2003: 608) chose the *Cirsio-Brachypodium pinnati* as the lectotype of the order *Brachypodietalia pinnati*. However, since the original diagnosis of the order includes the type of the *Brometalia erecti* W. Koch 1926, Korneck's name is a *nomen superfluum* and automatically receives the type *Bromion erecti* W. Koch 1926 (Art. 18b, 19c).

Following Krausch (1961) and Korneck (1974), more and more authors adopted their view of a primarily edaphic subdivision of the *Festuco-Brometea* at the ordinal level over the previous geographic subdivision. A mesoxeric order comprising at least the (*Meso-*) *Bromion erecti* and the *Cirsio-Brachypodium pinnati* is accepted in many of the more recent syntheses (Mucina and Kolbek 1993; Dengler 1994, 2003, 2004; Dengler et al. 2012; Pedashenko et al. 2013; Kuzemko et al. 2014; Mucina et al. 2016). Recently, Willner et al. (2017, 2019) demonstrated with the analysis of a large dataset from Central and Eastern Europe that three main subtypes of the class can be distinguished in this region according to their soil conditions (mesoxeric: *Brometalia erecti* / *Brachypodietalia pinnati*; xeric: *Festucetalia valesiacae*; rocky: *Stipo pulcherrimae-Festucetalia pallentis*). This concept of a mesoxeric order of the *Festuco-Brometea* was also implicitly accepted in the European Red List of habitats (Dengler and Schaminée 2016; Janssen et al. 2016: “E1.2a Semi-dry perennial calcareous grassland”) and the refined EUNIS habitat typology (Chytrý et al. 2020: “R1A – Semi-dry perennial calcareous grassland (meadow steppe)”).

While this concept of a mesoxeric order within the *Festuco-Brometea* became more and more accepted, its proper name remained disputed. However, an increasing number of authors highlight the ambiguity of the name “*Brometalia erecti*” due to the fact that (a) it in the past had been exclusively applied for a geographic order concept and (b) was sometimes even used in a sense that excluded its type (i.e., only including the *Xerobromion*) (e.g. Dengler et al. 2003; Mucina et al. 2016). Therefore, numerous authors throughout Europe now use Korneck's (1974) name *Brachypodietalia pinnati* to denote the mesoxeric order of the *Festuco-Brometea*, often explicitly proposing it as a *nomen conservandum*, e.g. Dengler (2003, 2004), Dengler et al. (2003, 2012, 2019), Boch and Dengler (2006), Löbel and Dengler (2008), Becker et al. (2012), Kuzemko et al. (2014), Pedashenko et al. (2013), Mucina et al. (2016), Willner et al. (2019, 2022), Zolotareva and Korolyuk (2019), García-Mijangos et al. (2021), Lysenko et al. (2021), Magnes et al. (2021) and Vynokurov et al. (2021).

The distribution range and diagnostic species of the mesoxeric *Festuco-Brometea* order are well-known through

detailed maps and species lists (Dengler 2003; Willner et al. 2019; Chytrý et al. 2020). However, because a pan-European synthesis based on vegetation plots from the European Vegetation Archive (EVA; Chytrý et al. 2016) is pending (see <http://euroveg.org/requests/EVA-data-request-form-2019-03-11-Dengler.pdf>), it is still not fully resolved which alliances belong to this order. The following alliances listed in the EuroVegChecklist (Mucina et al. 2016) can probably be seen as the consensus core: *Bromion erecti* W. Koch 1926, *Cirsio-Brachypodium pinnati* Hadač & Klika in Klika and Hadač 1944, *Filipendulo vulgaris-Helictotrichion pratensis* Dengler & Löbel in Dengler et al. 2003, *Gentianello amarel-lae-Helictotrichion pratensis* Royer ex Dengler in Mucina et al. 2009, *Potentillo montanae-Brachypodium pinnati* Br.-Bl., 1967, *Polygalo mediterraneae-Bromion erecti* (Biondi et al. 2005) Di Pietro in Di Pietro et al. 2015 and *Chrysopogono-Danthonion calycinae* Kojić, 1959. According to Willner et al. (2019) and Chytrý et al. (2020), the *Scorzonerion villosae* Horvatić ex Kovačević 1959 belongs here as well, along with the *Brachypodium phoenicoidis* Br.-Bl. ex Molinier 1934 according to the latter authors. Recently, the analyses of García-Mijangos et al. (2021) supported the view that the *Potentillo montanae-Brachypodium pinnati* Br.-Bl. 1967 and a second alliance containing at least large parts of the alliance *Brachypodium phoenicoidis* Br.-Bl. ex Molinier 1934 should be included in the *Brachypodietalia pinnati* Korneck 1974 nom. cons. propos. Their synoptic table clearly demonstrates that the two associations included in their unnamed alliance 2.1, *Prunello hyssopifoliae-Plantaginetum serpentinae* F. Prieto et al. ex Biurrun 1999 and *Carduncello mitissimi-Brachypodietum phoenicoidis* García-Mijangos et al. in Berastegi 2013, which had been subordinated to the alliances *Deschampsion mediae* (*Holoschoenetalia*, *Molinio-Arrhenatheretea*) and *Brachypodium phoenicoidis* (*Brachypodietalia phoenicoidis*, *Festuco-Brometea*), respectively, by Spanish authors, belong to the *Brachypodietalia pinnati*. However, for the French type association of the *Brachypodium phoenicoidis*, the *Brachypodietum phoenicoidis* Braun-Blanquet ex Molinier 1934, the situation is less clear, as the table in the protologue contains a much lower share of species from mesoxeric and mesic sites.

Conclusions and proposal

The concept of a mesoxeric order within the class *Festuco-Brometea* has become more and more popular among phytosociologists, particularly those who have analysed large datasets. While it is generally acknowledged that the current nomenclaturally valid name would be *Brometalia erecti* W. Koch 1926, this solution is widely considered confusing due to the history of different meanings of this name (see above). The reasoning for conserving the name *Brachypodietalia pinnati* is analogue to the proposal for the conservation of the name *Mesobromion erecti* against the earlier name *Bromion erecti* (see Terzi et al. 2016; Theurillat et al. 2017) and should be ruled in a similar way. Since the publication of the EuroVegChecklist (Mucina et al. 2016), the name *Brachypodietalia pinnati*

Korneck 1974 nom. cons. propos. has strongly prevailed for this taxonomic entity, but despite many proposals to conserve this name, the formal step has not yet been taken.

We consider the time ripe for a formal decision by the Group for Phytosociological Nomenclature to ensure that clarity about the proper name of the order is (re-)established. We thus propose conserving the name *Brachypodietalia pinnati* Korneck 1974 against previously published order names within the *Festuco-Brometea* adhering to geographic order concepts and typified by mesoxeric alliances. This is evidently true for *Brometalia erecti* W. Koch 1926. However, it is also true for the *Scorzoneretalia villosae* Kovačević 1959 (typified by the *Scorzonerion villosae* Horvatić ex Kovačević 1959). This order name would make even less sense for a mesoxeric order across Europe, since to our knowledge it has never been used in this sense, while the current order concept (see Mucina et al. 2016) comprises five xeric or rocky orders and only one mesoxeric order. By contrast, although the *Brachypodietalia phoenicoidis* Br.-Bl. ex Molinier 1934 consist largely of mesoxeric units in many taxonomic overviews, the position of the type alliance (*Brachypodion phoenicoidis* Br.-Bl. ex Molinier 1934) needs to be established by a large-scale plot-based classification first; thus we refrain from including this order in our proposal for the time being.

Moreover, we propose to conserve the name *Brachypodietalia pinnati* Korneck 1974 with a conserved type, namely the alliance *Cirsio-Brachypodion pinnati* Hadač & Klika in Klika and Hadač 1944. We intentionally do not propose the name *Brometalia erecti* W. Koch 1926 as a *nomen ambiguum*, as we want to keep this and the other order names available if someone wishes to retain

the traditional concept of purely geographically delimited orders. Indeed, if our proposal is accepted, an order comprising the alliances *Bromion erecti* (\equiv *Mesobromion*) and *Xerobromion* (but not the *Cirsio-Brachypodion*) would still be called *Brometalia erecti*, an order comprising the alliances *Festucion valesiacae* and *Cirsio-Brachypodion* (but not the *Bromion erecti*) would be called *Festucetalia valesiacae* (since the name *Festucetalia valesiacae* has priority over *Brachypodietalia pinnati*), and an order comprising the alliances *Scorzonerion villosae* and *Saturejion subspicatae* (but not the *Cirsio-Brachypodion* or *Bromion erecti*) would continue to bear the name *Scorzoneretalia villosae*.

Thus, by accepting the *Brachypodietalia pinnati* as a *nomen conservandum* with the conserved type *Cirsio-Brachypodion*, this order name could only be used when referring to a concept of a purely mesoxeric order. By contrast, there would be no change for authors who prefer using purely geographically defined orders within the *Festuco-Brometea*. We believe that acceptance of this proposal would support nomenclatural stability and, at the same time, avoid the confusion caused by identical names applying to vastly different taxonomic concepts.

Author contributions

J.D. conceived the idea of this paper, while both authors wrote and revised it jointly.

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