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## Typifications of the Linnaean name *Equisetum hyemale* and *E. ×moorei* (Equisetaceae)

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### Abstract

The lectotypes of the names *Equisetum hyemale* Linnaeus (1753: 1062) and *E. ×moorei* Newman (1854: 19) (Equisetaceae) are designated. Previously, a neotype for *E. hyemale* was selected by Hauke in 1962 from a specimen kept at LINN. However, this typification is rejected since there are two original elements that may contribute to a correct lectotypification of the name. Therefore this choice is ineffective and should be rejected. An illustration from Mattioli (1586) is designated as the lectotype. On the other hand, in order to avoid any ambiguity in the interpretation of the lectotype, an epitype is also selected. A lectotype for *E. ×moorei*, the putative hybrid between *E. hyemale* and *E. ramosissimum* Desfontaines (1799: 398–399) is designated on the basis of a specimen kept at DBN.

### Keywords

Epitype, *Equisetum*, lectotype, Linnaeus, nomenclature

### Introduction

*Equisetum* Linnaeus (1753: 1061) is one of the basal and morphologically distinctive clades of extant vascular plants, with fossil remains identified from as early Lower Cretaceous deposits (≈136 Ma) of Canada (Stanich *et al.* 2009). Currently, *Equisetum* is a small genus of 15 extant species (Guillon 2007) showing a subcosmopolitan distribution that are generally confined to seasonally or permanent wet habitats (Kenrick & Crane 1997).

Linnaeus (1753) published seven species names under the genus *Equisetum*. Several names have been typified previously by Jonsell & Jarvis (1994), Hauke (1963, 1978) and Mazumdar & Shalimov (2016). However, controversies about the type of the Linnaean name *E. hyemale* Linnaeus (1753: 1062) have been noted by several authors (see Jonsell & Jarvis 1994, Øllgaard 2000, Jarvis 2007). Hauke (1962: 59) was the first author aimed to typify this name. He suggested that a specimen preserved at LINN could be used as a neotype. The only herbarium sheet in the Linnaean collection at LINN containing material of *E. hyemale* is the sheet Herb. Linn. No. 1241.7 (LINN). He reasoned his choice on the basis that the gathering was not available to Linnaeus for study before the description of the species, since it was not present in 1753 in the Linnaean herbarium in London (Savage 1945, Hauke 1963: 71). Moreover, Jarvis (2007: 497) pointed out that it is unclear whether this specimen is part of the Linnaeus's original material. On this basis, authors dealing with this species (Øllgaard in Jonsell 2000) did not follow the typification of Hauke (1962) and indicated that the type of this name is currently not designated (see Jarvis 2007: 497).

The sheet at LINN, Herb. Linn. No. 1241.7 (LINN) (image available at <http://linnean-online.org/12435/>), is annotated “*hyemale*” and “artific” handwritten by Linnaeus, but lacks the relevant Linnaean species number present in the *Species Plantarum* work, in this case the number “6”. It is usually assumed that the Linnaean specimens that bear these numbers in the sheets were in Linnaeus's possession before the publication of *Species Plantarum*, and were original material for names published in that work (e.g., Stearn 1957, Turland & Jarvis 1997, Turland 2006, Jarvis 2007: 41–46). Accordingly, the specimen Herb. Linn. No. 1241.7 (LINN) cannot be presumed to be original material,

and therefore the designation by Hauke (1962: 59) is premature and not in conformity with Art. 9.7 and Art. 9.13 of the *ICN* (McNeill *et al.* 2012), since there are two original elements (see Jarvis 2007: 497) that may contribute to a correct lectotypification of the name. Therefore this choice is ineffective (the Art. 9.9 does not apply in this case) and should be rejected.

The purpose of this paper is to contribute to the nomenclatural stability of this name by a lectotypification based on the examination of Linnaeus's original material and the perusal of the literature cited in the protologue. Furthermore a lectotype for the name *E. ×moorei* Newman (1854: 19) [the putative hybrid between *E. hyemale* and *E. ramosissimum* Desfontaines (1799: 398–399)] is designated in this work.

## Typifications of the names

*Equisetum hyemale* Linnaeus (1753: 1062).

**Type** (lectotype, designated here):—[icon] “Equisetum” in Mattioli (1586: 770, f. A) (Image available at: <https://bildsuche.digitale-sammlungen.de/index.html?c=viewer&bandnummer=bsb00089694&pimage=00784&lv=1&l=es>) (Fig.1). (epitype, designated here): Herb. Linn. No. 1241.7 (LINN) (Image available at: <http://linnean-online.org/12435/>).



**FIGURE 1.** Lectotype of *Equisetum hyemale* Linnaeus, [icon] “Equisetum” in Mattioli (1586: 770, f. A).

Linnaeus's protologue (1753: 1062) consisted of a *nomen specificum legitimum* “EQUISETUM caule nudo scabro basi subramoso” cited from an early Linnaean work (1745: 838 [page 305]) and Dalibard (1749: 308), followed by five synonyms, and the locality “*Habitat in Europae sylvis, asperis, uliginosis*” and the symbol “♯” [perennial plant]. The first synonym, “Equisetum scapo nudo simplicissimo”, was cited from Van Royen (1740: 496) and Gronovius (1739: 196); the second, “Equisetum hyemale” from an early Linnaean work (1737: 394 [page 311]); the third, “Equisetum foliis nudum ramosum”, from Bauhin (1623: 16); the fourth, “Equisetum nudum minus variegatum basiliense”, from Bauhin (1623: 16, prod. 25); and the fifth, “Equisetum” from Mattioli (1586: 770, f. A). Only one of these synonyms

was accompanied by an illustration (Mattioli 1586) that could be considered as original material (Fig. 1 and image also available at: <https://bildsuche.digitale-sammlungen.de/index.html?c=viewer&bandnummer=bsb00089694&pimage=00784&lv=1&l=es>).

Only one herbarium specimen is considered as original material by Jarvis (2007: 497): *Clayton 657*, pl. 2 (BM, with barcode BM000062952) (image available at: <http://www.nhm.ac.uk/resources/research-curation/projects/clayton-herbarium/lgimages/BM000062952.JPG>). The sheet contains a single vegetative stem, and two labels, (a) “Virginia Clayton Ex Herb. Gronova” (*printed label*), and (b) “Equisetum scapo nudo simplicissimo Roy. Prodr. p. 496 / Equisetum non ramosus Clayton n. 657 pl. 2 / Equisetum hyemale Linn fl. Lapp. p. 394 / Equisetum foliis nudum non ramosum C.B.p. 16 / Equisetum caules scabro basi subramosus Linn Syst. gen. 1033 n. 6” handwriting by John Clayton.

Gronovius was in possession of an extensive collection of Virginian material collected by John Clayton, the basis for Gronovius’s *Flora Virginica*. When Linnaeus was in the Netherlands during 1735–1738, he was able to study much of Clayton’s material. However, he acquired only a selection of duplicates for his own herbarium, chiefly via Gronovius and Peter Collinson (Stearn 1957: 108). The Clayton herbarium of Gronovius was later acquired by Banks in 1794 and it is now held at BM (Jarvis 2007: 198–199, 208).

Therefore, the provenance of the specimen preserved at BM is in conflict with the protologue, because Linnaeus cited “*Habitat in Europae...*” and this material was collected in Virginia (United States of America). The typical form of *E. hyemale* [subsp. *hyemale*] occurs in Europe and Asia to northwestern China in Xinjiang (Tutin 1964, Hauke 1993), but it is absent from North America where it is replaced by subsp. *affine* (Engelmann) Calder & Taylor (1965: 1387) (see Hauke 1962, 1993). Accordingly, the *Clayton 657*, pl. 2 specimen (BM) does not fit the current concept and use of the name *E. hyemale* s. str., and therefore it is not suitable for lectotypification.

We have been unable to trace any further original material in any of the other Linnaean or Linnaean-linked herbaria (e.g., at L, which would be linked to the synonym by Van Royen (1740) or at UPS which would be linked to the synonym by Bauhin (1623) cited by Linnaeus in the protologue).

Fortunately, Mattioli’s illustration (1586: 770, f. A) is eligible to serve as lectotype, and it is therefore designated here as such. This illustration shows two monomorphic aerial stems with strobili (Fig. 1), and it is the original element that shows the best matches with the traditional concept and current usage of the Linnaean name *E. hyemale*. Furthermore, an epitype is here designated as recommended by the Art. 9.8 of the ICN (McNeill *et al.* 2012), in order to avoid any eventual ambiguity coming from the taxonomic interpretation of the lectotype. This is further supported by the fact that the lectotype does not clearly show fine diagnostic characters which are essential to distinguish *E. hyemale* from other nothospecies where this species is involved in their origin, i.e., *E. ×moorei* Newman (1854: 19) [*E. hyemale* × *E. ramosissimum* Desfontaines (1799: 398–399)] morphologically very close to *E. hyemale*, and *E. ×trachyodon* Braun (1839: 305), pro sp. [*E. hyemale* × *E. variegatum* Schleicher ex Weber & Mohr (1807: 447)].

Some features present in *E. hyemale*, e.g., ridges with 2 rows of tubercles separated without cross-bands, (with cross-bands of silica covering the ridges in *E. ×moorei*), teeth of leaf-sheaths very soon deciduous, and fertile spores have been considered essential to distinguish *E. hyemale* from these two hybrids (see Schaffner 1931, Hauke 1962, Tutin 1964, Bennert *et al.* 2005, Jepson *et al.* 2013, Feoktistov & Gureyeva 2016). Moreover, the most visible diagnostic characters are those from leaf sheaths (Stace 2010), preferably observed in the middle part of the shoots (Pétrement *et al.* 2012, Kalinowski *et al.* 2016). Thus, in *E. ×moorei* the length/width ratio of the leaf sheets is 2 or more (up to 2.3) and showed a narrow black stripe at the base. In contrast, the *E. hyemale* sheets show a ratio ca. 1 (up to 1.5) and a conspicuous broad stripe is present.

These discriminant characters can be seen on the specimen of *E. hyemale* in the specimen at Herb. Linn. No. 1241.7 (LINN) herein proposed as the epitype. This sheet is annotated “*hyemale*” by Linnaeus and the specimen was identified as *E. hyemale* by Hauke (1962), and clearly represents the traditional concept (e.g., Linnaeus 1753, Newman 1854, Milde 1867) and current use of the name *E. hyemale* (e.g., Hauke 1962, 1963, Tutin 1964, Prada 1986, Bennert *et al.* 2005, Pétrement *et al.* 2012, Jepson *et al.* 2013, Feoktistov & Gureyeva 2016, Kalinowski *et al.* 2016).

*Equisetum ×moorei* Newman (1854: 19), pro. sp.

**Type** (lectotype, designated here):—[IRELAND]. On sea shore near Rockfield, Co. Wicklow, *D. Moore*, 1849, DBN (no. 004737) (Fig. 2).





**FIGURE 2.** Lectotype of *Equisetum xmoorei* Newman (DBN, with no. 004737). Photography by courtesy of the herbarium DBN; reproduced with permission.

Concerning the name *E. ×moorei*, a complete description of this plant is included in the protologue (Newman 1854), together with other remarks related to its discovery, its ecology and a account of the main features discriminating other species, especially *E. hyemale*. The geographical locality is also indicated “*Hab.* Clay-banks facing the sea at Rockfield, County Wicklow, Ireland; found by Mr. Moore, in company with Professor Melville, of Queen’s Collegue, Galway”, and herbarium material as “Herb. Moore, Newman, & c.”.

We have found three relevant herbarium sheets collected in the *locus classicus* cited in the protologue “Rockfield, County Wicklow” in Ireland. In the herbarium of the Natural History Museum (BM) there is a sheet containing several complete stems and a label “*Equisetum moorei* Newm. Coast of Co. Wicklow / W. D. Moore /1858” (image available at <http://plants.jstor.org/stable/history/10.5555/al.ap.specimen.bm001066238>). However, this material was collected post-1854 and therefore it is not suitable for a lectotypification. We have been unable to trace further original material in the BM herbarium.

In addition, in the Moore’s collection in the herbarium of the National Botanic Gardens at DBN there are two herbarium sheets that contain material identified as *E. ×moorei* and collected in 1849. The sheet DBN (with no. 004723) bears a complete plant and a label “Morii / *Equisetum* / ~~*E. Wilsoni*~~ [strikethrough] / on the sea shore at Rockfield / Co. Wicklow 1849”, and the sheet DBN (with no. 004737) bears two well preserved plants and an original label handwritten by Moore “*Equisetum moorei* Newm / on sea shore near Rockfield / Co. Wicklow / 1849 / D. Moore” (Fig.2).

In our opinion, the sheet DBN (with no. 004737) in the Moore’s collection can be considered as a syntype according to Art. 9.5 of the *ICN* (in the protologue was cited the geographical locality, the collector, and specimens as “Herb. Moore”), and therefore is designated herein as the lectotype of the name *E. ×moorei*. This specimen shows the main diagnostic characters of *E. ×moorei* (e.g., slender stems, with some teeth of leaf–sheaths persistent, and the length/width ratio of the leaf sheets is c. 2 or more) and represents the traditional concept and current use of the name *E. ×moorei* (e.g., Newman 1854, Hauke 1962, 1963, Tutin 1964, Pétremont *et al.* 2012, Jepson *et al.* 2013, Feoktistov & Gureyeva 2016, Kalinowski *et al.* 2016).

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