

(101–103) Proposals to modify the provisions in the *Code* for naming plant fossils

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The treatment of palaeobotanical (including palynological) taxonomic nomenclature within the *Code* has remained contentious since the original proposals were made by Thomas (in *J. Bot.* 73: 111. 1935) and Jongmans & al. (Proposed Additions Int. Rules Bot. Nomencl. 1935) where the concepts of form- and organ-genera were introduced. Over the intervening years attempts have been made to improve the palaeobotanical provisions in the *Code*, trying to take into account the varying levels of information that different types of fossil reveal. None of the proposed solutions have proved satisfactory, however, partly because the resulting regulations in the *Code* have proved too proscriptive and partly because they tended to constrain what should be purely taxonomic decisions.

In a recent review (Cleal & Thomas in *Taxon* 59: 261–268, 2010—this issue) we concluded that the problem stemmed partly from a lack of clarity as to exactly what is being classified. We argued that the nomenclatural regulations in the *Code* should be concerned exclusively with the naming of taxa of plant fossils (i.e., the dead and fragmentary remains of plants that are preserved in sediment) and not with trying formally to name the hypothetical reconstructed parent plants of those fossils, which we termed fossil plants. The current *Vienna Code* (McNeill & al. in *Regnum Veg.* 146. 2006) variously uses the terms plant fossils and fossil plants when referring to the fossils. One of the present proposals is, therefore, that as we are dealing with the names of the fossils, all references to fossil plant(s) in the *Code* should be changed to plant fossil(s).

The *Vienna Code* refers to two types of taxa for classifying plant fossils: fossil taxa and morphotaxa. Fossil taxa are defined as any taxon whose type is a fossil (footnote to Preamble 7). Other than differences in the starting point for their nomenclature (Art. 13.1), the selection of types (Art. 9.13), the language that is allowed for descriptions or diagnoses (Art. 36.3) and the role of illustrations in protologues (Art. 38), the only substantive difference from non-fossil taxonomic nomenclature is that names of fossil taxa are allowed to represent remains of isolated parts of plants in different stages of their life histories, and preserved in different ways.

A morphotaxon is a type of fossil taxon that can only include fossils of the same plant part, life-history stage or preservational state as represented by the type (Art. 1.2). Cleal & Thomas (l.c.) have examined the role of morphotaxa in palaeobotanical nomenclature and found that there are significant practical and philosophical problems with their use. By stipulating what can or cannot be included in a morphotaxon based on a feature of the type results in taxonomic decisions being controlled by nomenclatural regulations. Moreover, although the *Code* explains how you decide what can or cannot be included within a particular morphotaxon, nowhere does it explain what makes a particular fossil taxon a morphotaxon in the first place, only what is not a morphotaxon (“Any fossil taxon that is described as including more than one part, life-history stage, or preservational state is not a morphotaxon”—Art. 1 Note 1). There is also nothing to prevent the diagnosis of a morphotaxon from being subsequently

emended so that it includes more than one plant part, life-history stage or preservational state, so that it becomes a non-morphotaxon fossil taxon. The recognition of a rigidly demarcated subset of fossil taxa as morphotaxa is therefore meaningless.

In our view, the best solution is the most flexible one. We should remove the concept of morphotaxa from the *Code*—all taxa that are based on fossil types are just fossil taxa. The practical implications of this are discussed in more detail by Cleal & Thomas (l.c.). As with all other taxa dealt with in the *Code*, how widely or narrowly a fossil taxon is circumscribed is set-out in its diagnosis. The diagnosis and thus circumscription of a fossil taxon can of course be emended by subsequent authors. If there is a good taxonomic case for emending a taxon so that it can include additional plant parts, life history states or preservation states to those given in the original diagnosis, the *Code* should not and does not prevent this. As far as we can see, there is no useful role for the concept of morphotaxa as a rigidly demarcated subset of fossil taxa.

Finally, we suggest that fossil taxon and associated terms as used in the *Code* (fossil genus, fossil species, etc.) should be modified to fossil-taxon, fossil-genus, fossil-species, etc. We are dealing here with discrete taxonomic concepts and referring to them using adjective-noun couplets can, from our experience, lead to ambiguities in practical application. It also brings it into line with the terminology of form-genera and organ-genera used in the earlier *Codes*.

In conclusion, we make the following three proposals to simplify the *Code*, to make the rules for naming plant fossils more flexible and therefore of more use to practicing palaeobotanists and palynologists.

(101) Change the words “fossil plant” to “plant fossil” in Rec. 8A.3 and in the Index; and change the words “fossil plants” to “plant fossils” in Arts. 8.5, 9.13 13.1, 36.3, 38.1 and 38.2. in Div. III.2(6), and in the headings of Apps. IIA F, III F, and IV F.

(102) Remove mention of the concept of “morphotaxa” from the *Code*. This requires the following inter-related changes.

(i) Amend Art. 1.2 to read:

“A taxon based on a fossil type is a fossil-taxon. A fossil-taxon comprises the remains of one or more parts of the parent plants, or one or more of their life history stages, preserved in one or more preservational states, as indicated by the description or diagnosis of the taxon.

(ii) Amend Art. 1 Ex. 1 and Ex. 2 to read:

“Ex. 1. *Alcicornopteris hallei* J. Walton (in *Ann. Bot. (Oxford)*, n.s., 13: 450. 1949) is a fossil-species for which the original description included rachides, sporangia, and spores of a pteridosperm, preserved in part as compressions and in part as petrifications.”

“Ex. 2. *Protofagacea allonensis* Herend. & al. (in *Int. J. Pl. Sci.* 56: 94. 1995) is a fossil-species for which the original description

included dichasia of staminate flowers, with anthers containing pollen grains, fruits, and cupules, and thus comprises more than one part and more than one life-history stage.”

(iii) Delete the footnote to “fossil and non-fossil” in Preamble 7 which becomes redundant, as the application of the word “fossil” to taxa is dealt with in the revised Art. 1.2.

(iv) Delete Art. 1.3.

(v) Amend Art. 7.9 so that it begins:

“The typification of names of fossil-taxa (Art. 1.2), of fungal ...”

(vi) Amend the last sentence of Art. 11.1 to read:

“However, the use of separate names for the form-taxa of fungi is allowed (Arts. 59.4 and 59.5) and also for fossil-taxa that represent different parts, life-history stages or preservation states of what may have been a single biological entity or even a single organism (Art. 1.2).”

(vii) Amend Art. 11.7 to read:

“For purposes of priority, names of fossil-taxa (diatoms excepted) compete only with names based on a fossil type.”

(viii) Delete Art. 11 Ex. 28 (in order to include an emended version following Art. 1.2, see Prop. 103).

(ix) Amend Art. 11 Ex. 29 and Ex. 30 as follows:

In Ex. 29 replace “morphogeneric” by “fossil-generic” in the first line.

In Ex. 30 replace “morphospecies” by “fossil-species” in the fourth line, and “morphogenus” by “fossil-genus” in the fifth line.

(103) Insert in Art. 1 the following additional examples of the use of the term fossil-taxa

“Ex. 3. *Stamnostoma* A. Long (in Trans. Roy. Soc. Edinburgh 64: 212. 1960) is a fossil-genus that was originally described with a single species, *S. huttonense*, comprising anatomically-preserved ovules with completely fused integuments forming an open collar around the lagensostome. Rothwell & Scott (in Rev. Palaeobot. Palynol. 72: 281. 1992) have subsequently enlarged the circumscription of the genus to include also the cupules in which the ovules were borne. The name *Stamnostoma* can be applied to either circumscription or to any other that may involve other parts, life-history stages or preservation states, so long as it includes *S. huttonense*, but not the type of any earlier generic name.”

“Ex. 4. The generic name *Sigillaria* Brongn. (Mém. Mus. Hist. Nat. 8: 222. 1822) was established for fossils of “bark” fragments, but Brongniart (in Arch. Mus. Hist. Nat. 1: 405. 1839) subsequently included anatomically-preserved stems within his concept of *Sigillaria*. Anatomically-preserved cones that may in part represent the same biological taxon are referred to as *Mazocarpon* M.J. Benson (in Ann. Bot. (London), ser. 2, 32: 569. 1918), whereas such cones preserved as adpressions are known as *Sigillariostrobus* Schimp. (Traité Paléont. Vég. 2: 105. 1870). All these generic names can be used concurrently in spite of the fact that they may, at least in part, apply to the same organism.”