



## IOP NEWSLETTER 93

**October 2010**

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*IOP Logo: The evolution of plant architecture (© by A. R. Hemsley)*

## OTHER ITEMS OF INTEREST

### Nomenclature, typification and correct description of fossil plants

#### 1. Introduction

This note is the result of a talk given at the EPPC in Budapest in the summer of 2010. Every 6 years a new edition of the International Code of Botanical Nomenclature appears in an updated version made by the International Botanical Congress; the last one is the so-called Vienna Code (McNeill et al., 2006; here referred to as ICBN); nowadays the code is also online: <http://ibot.sav.sk/icbn/main.htm>, and can easily be consulted by all (palaeo)botanists.

In 1994, Punt already wrote a short note in which he gave guidelines for the correct description of new palaeobotanical taxa. Recently, a paper appeared dealing with the role of types in palaeobotanical nomenclature, a subject against which many mistakes are made in palaeobotanical literature (Kvaček, 2008). That paper, however, appeared in a journal that may not be as widespread as the IOP newsletter. Therefore, the aim of the present note is first of all to stipulate the most important rules for the correct description and naming of fossil plant taxa, and secondly to briefly discuss the typification of the names of fossil plant species.

Two points for a good understanding of this note: It should be noticed that the rules as given below, apply to fossil plants. In some aspects, the rules for recent plants are different, e.g. in some situations, then an illustration can be a type. Moreover, in more rules than in the few in which we mentioned a date, a date exists in the ICBN. An example: in paragraph 2.3, we refer to Art. 38.1 and 38.2; rules that have to be taken into account from 1 January 1912 on and from 1 January 2001 on, respectively.

#### 2. Correct description of new (fossil) plant taxa (genera, species) and new combinations

##### 2.1 General rules for valid publication of names of taxa in the rank of genus or below (see Art. 32, 36.3 and 37 of the ICBN):

- the name must be accompanied by a description or diagnosis (or by a reference to a previously published description or diagnosis) (Art. 32.1d)
- a diagnosis of a taxon is a statement of that which in the opinion of its author distinguishes the taxon from other taxa (Art. 32.2)
- the description or diagnosis should be in Latin or English (Art. 36.3)
- the type of the name should be indicated (Art. 37)
- indication of the type must include one of the words 'typus' or 'holotypus', or its abbreviation, or its equivalent in a modern language (Art. 37.6).

##### 2.2 Rules for the description of a new genus (see also Art.20 in the ICBN), in addition to the general rules mentioned above:

- *generic name* followed by the author's name(s) and *gen. nov.*
- for purposes of designation of the type of a generic name, mentioning of the *species name* alone suffices as reference to the type *specimen* (Art. 10.1)

Recommendations:

- etymology or derivation of name (*derivatio nominis*)

- the diagnosis should be concise and based on the most important characters only
- a discussion with comparison to other genera.

### **2.3 Rules for the description of a new species (see also Art. 23 and 38 in the ICBN), in addition to the general rules mentioned above:**

The name of a species is a binary combination consisting of the name of the genus followed by a single specific epithet in the form of an adjective, a noun in the genitive, or a word in apposition, but not a phrase name of one or more descriptive nouns and associated adjectives in the ablative (Art. 23.1). If an epithet consists of two or more words, these are to be united or hyphenated.

The rules that should be dealt with for a new species:

- *species name* followed by the author's name(s) and *sp. nov.*
- an illustration or figure showing the essential characters, in addition to the description or diagnosis (or a reference to a previously published illustration or figure) (Art. 38.1)
- the type is a single specimen conserved in one herbarium or other collection or institution (Art. 8.1). See chapter 3 on typification.
- a specimen is (part of) a gathering of a single taxon made at one time; it may consist of multiple small plants (Art. 8.2) and it may be mounted as more than one preparation, as long as the parts are clearly labelled as being part of that same specimen (Art. 8.3)
- at least one of the validating illustrations must be identified as representing the type specimen (Art. 38.2)
- repository: specimen number and institution where it is deposited must be specified (Art. 37.7).

Recommendations:

- It is strongly recommended that the material on which the name of a taxon is based, especially the holotype, be deposited in a public collection with a policy of giving bona fide researchers access to deposited material, and that it be scrupulously conserved (ICBN Recommendation 7A.1).
- type locality and stratigraphic horizon from where the type specimen originates
- etymology or derivation of name (*derivatio nominis*)
- the diagnosis should be concise and based on the most important characters only
- the description should include all additional data of secondary importance (i.e. not included in the diagnosis), like measurements
- a discussion with comparison to other species; this should give the differential characters in which the new species differs from other species, at least in the same genus.

### **2.4 Rules for a new combination:**

A new combination is a combination formed from a previously published legitimate name and employing the same final epithet (Art. 7.4), e.g. the result of the transfer of a species to another (or new) genus.

Requirements for a new combination:

- *name of the new combination* followed by successively (if it concerns a species name): generic name plus epithet plus in parentheses the author's name(s) of the basionym plus the author's name(s) of the new combination, followed by *comb. nov.* (Art. 49.1)
- if the generic name is clear from the context, e.g. a preceding diagnosis with the name of a new genus, it may be abbreviated to its capital first character plus period
- the basionym has to be mentioned. A basionym is a previously published legitimate epithet-bringing synonym from which a new name is formed for a taxon of different rank or position
- for citation of the basionym a full and direct reference to its author and place of valid publication is required, with page or plate reference and date (Art. 33.4)
- this page reference is a reference to the page(s) on which the basionym was published, not to the pagination of the whole publication (Art. 33, Note 1)

Recommendations:

- diagnosis and reason for transfer

- an illustration is not necessary but always very useful!

### 3. Typification (Art. 7-9)

A nomenclatural type (typus) is that element to which the name of a taxon is permanently attached, whether as the correct name or as a synonym. The nomenclatural type is not necessarily the most typical or representative element of a taxon (Art. 7.2).

The type (holotype, lectotype, or neotype) of a name of a species or infraspecific taxon is a single specimen conserved in one herbarium or other collection or institution (Art. 8.1). In fossil plants, the type always is a specimen. One whole specimen is to be considered as the nomenclatural type (Art. 8.5).

With respect to the designation of lectotypes, neotypes and epitypes, for purposes of priority, designation of a type is achieved only if the type is definitely accepted as such by the typifying author, if the type element is clearly indicated by direct citation including the term “type” (typus) or an equivalent, and, on or after 1 January 2001, if the typification statement includes the phrase “designated here” (hic designatus) or an equivalent (Art. 7.11).

#### 3.1 Holotype (Art. 9.1)

A holotype is the one specimen used by the author, or designated by the author as the nomenclatural type. As long as the holotype is extant, it fixes the application of the name concerned. For the indication of a holotype, see above under § 2.1 and 2.3.

#### 3.2 Isotype (Art. 9.3)

An isotype is any duplicate of the holotype; it is always a specimen. In fossil plants it can only be applied when a number of small plant fragments are found together that clearly belong together but that are not attached to each other. So an isotype always comes from the same locality and collection as the holotype.

#### 3.3 Syntype (Art. 9.4)

A syntype is any specimen cited in the protologue when there is no holotype, or any one of two or more specimens simultaneously designated as types (see Art. 37 note 1: When the type is indicated by reference to a gathering that consists of more than one specimen, those specimens are syntypes). The term is relevant for names published in old times when the type concept did not yet exist, and when authors occasionally cited and/or illustrated the specimens that they used. Example: In 1858 Bronn described *Phylladelphia strigata* Bronn, an enigmatic leaf from the Triassic of Raibl, without indicating a holotype. He based his description on a number of specimens of which he figured two. These are the syntypes (see also Kustatscher & van Konijnenburg-van Cittert, 2008).

#### 3.4 Paratype (Art. 9.5)

A paratype is a specimen cited in the protologue that is neither the holotype nor an isotype, nor one of the syntypes if two or more specimens were simultaneously designated as types. It usually provides information additional to the holotype. Example: *Scolopendrites grauvogelii* van Konijnenburg-van Cittert et al, 2006. Here the paratype gave details about the morphology of the sporangia and in situ spores, which were not available in the holotype.

N.B. In most cases in which no holotype was designated there will also be no paratypes, since all the cited specimens will be syntypes. However, when an author designated two or more specimens as types (Art. 9.4), any remaining cited specimens are paratypes and not syntypes.

N.B. Which specimen is the holotype, and which specimens are isotypes, syntypes and/or paratypes, can only be seen in the protologue, or derived from the protologue.

The protologue is everything associated with a name at its valid publication, i.e. description or diagnosis, illustrations, references, synonymy, geographical data, citation of specimens, discussion, and comments (Recommendation 8, footnote).

#### 3.5 Lectotype (Art. 9.2 and 9.10)

A lectotype is a specimen designated from the original material as the nomenclatural type, in conformity with Art. 9.9 and 9.10, if no holotype was indicated at the time of publication, or if it is missing, or if it is found to belong to more than one taxon.

In lectotype designation, an isotype must be chosen if such exists, or otherwise a syntype if such exists. If no isotype, syntype or isosyntype (duplicate of syntype) is extant, the lectotype must be chosen from among the paratypes if such exist. If no cited specimens exist, the lectotype must be chosen from among the uncited specimens, which comprise the remaining original material, if such exist. Examples: *Stachyopitys preslii* Schenk 1867: the syntypes in Schenk's publication were found to belong to two taxa (Kirchner & van Konijnenburg-van Cittert, 1996); hence a lectotype had to be designated. For *Scytophyllum waehneri* (Stur) Kustatscher et al. nov. comb., only uncited specimens from the original material still existed, hence a lectotype had to be designated (see Kustatscher et al. (submitted)). So, a lectotype always comes from the original material but is designated afterwards.

### 3.6 Neotype (Art. 9.6 and 9.11)

A neotype is a specimen selected to serve as nomenclatural type if no original material is extant, or as long as it is missing. A lectotype always takes precedence over a neotype, with one exception: When a holotype or a previously designated lectotype has been lost or destroyed and it can be shown that all the other original material differs taxonomically from the destroyed type, a neotype may be selected to preserve the usage established by the previous typification (Art. 9.14). Example: All original material of *Pterophyllum brevipenne* Kurr ex Schenk was destroyed, hence a neotype had to be designated (Pott et al., 2007).

So, a neotype always comes from a later collection of material than described in the original publication, and is designated afterwards.

### 3.7 Epitype (Art. 9.7)

An epitype is a specimen selected to serve as an interpretative type when the holotype, lectotype, or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name of a taxon. When an epitype is designated, the holotype, lectotype, or neotype that the epitype supports must be explicitly cited, since it only has standing as long as that type is accepted. An epitype is often selected when additional information on a species becomes available later on, e.g., cuticle characters when so far only leaf gross morphology was known. Example: Bosma et al. (2009) designated an epitype for *Aachenia debeyi* Knobloch (a Late Cretaceous conifer cone scale assigned to the Doliostrobaeae), because it showed a preserved cuticle that was hitherto unknown, and that differentiated it from other taxa.

### 3.8 Repository and terminology

Designation of a lectotype, neotype or epitype is only effected if full details of the specimen are given, including citation of the institution in which it is conserved. (Art. 9.19-9.20).

Lecto- or neotypification is not effected unless indicated by the use of the term 'lectotypus' or 'neotypus', its abbreviation, or its equivalent in a modern language (Art. 9.21).

### 3.9 Rejection of typifications (Art. 9.16-9.18)

The designation of a lectotype, neotype or epitype concerns a choice. If it can be proven that it was a bad choice, this typification may be superseded.

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