

We are proposing several additions to Article 9 to clarify points of confusion that we became aware of in the process of editing Phylonyms contributions. Additions are shown in boldface, deletions with strikethrough.

New Note 9.6.2 and related changes

9.6. A maximum-clade definition (formerly known as a branch-based or a stem-based definition) associates a name with the largest clade that contains one or more internal specifiers but does not contain one or more external specifiers. Such a definition may take the form “the clade consisting of A and all organisms or species that share a more recent common ancestor with A than with Z” or “the clade originating in the earliest ancestor of A that is not an ancestor of Z” or “the largest clade containing A but not Z”, where A is an internal specifier (Art. 11.2) and Z is an external specifier (Art. 11.2). A maximum-clade definition may be abbreviated “ $\max \nabla (A \sim Z)$ ”. Additional external specifiers (e.g., Y & X & W, etc.) may be used as needed (e.g., if the sister group of the named clade is uncertain). For defining the names of crown clades using maximum-clade definitions, see Art. 9.9; for defining the names of total clades using maximum-clade definitions, see Art. 9.10.

Note 9.6.1. Provided that the internal and external specifiers have a common ancestor, a maximum-clade definition as described in Art. 9.6 necessarily identifies a clade; there can be disagreements about the composition of the clade when the definition is applied in the context of different phylogenetic hypotheses, but not about its existence. It is possible to formulate a maximum-clade definition according to which the defined name does not apply to any clade under particular phylogenetic hypotheses through the use of a qualifying clause (see Art. 11.12) or multiple internal specifiers (see Art. 11.13, Example 2).

Note 9.6.2. It is important to use the appropriate operator, “and” (“&”) versus “or” (“ \vee ”), in definitions employing multiple external specifiers (only the “and” operator would normally be used in definitions employing multiple internal specifiers). The “and” operator is to be used when the intent is to exclude jointly all of the external specifiers from the named clade. For example, it would be appropriate to use “and” when using a maximum-clade definition with multiple external specifiers to deal with uncertainty regarding the sister group of the named clade—that is, to exclude jointly every taxon that is a potential sister group. By contrast, the “or” operator is to be used when the intent is to exclude, whether individually or jointly, any one (or more) of the external specifiers from the named clade. For example, it would be appropriate to use “or” when using a minimum-clade definition with multiple external specifiers, including those used in qualifying clauses, to render the defined name inapplicable in the context of phylogenetic hypotheses in which any one (or more) of the external specifiers is more closely related to some of the internal specifiers than those internal specifiers are to other internal specifiers (see Art. 11.12, Example 1).

Related changes:

9.4. A phylogenetic definition is a statement that explicitly identifies a particular clade as the referent of a taxon name. Different categories of acceptable phylogenetic definitions include, but are not limited to, those described in Arts. 9.5–9.7 and 9.9–9.10. Arts. 9.5–9.7 describe general categories; Arts. 9.9 and 9.10 describe categories designed for naming crown clades and total clades, respectively. Qualifying clauses are described in Art. 11.12.

Note 9.4.1. The following conventions are adopted for abbreviated definitions: max = the largest; min = the smallest; ∇ = clade; $()$ = containing; $[]$ = as exhibited by; apo = characterized by apomorphy [followed by the name or description of the apomorphy]; & = and; \surd = or; \sim = but not; A, B, C, etc. = species or specimens used as internal specifiers; Z, Y, X, etc. = species or specimens used as external specifiers; M = an apomorphy used as an internal specifier.

9.9. A crown-clade definition is a phylogenetic definition that necessarily identifies a crown clade (Art. 2.2) as the referent of a taxon name.

- A maximum-clade definition (Art. 9.6) is a crown-clade definition if 1) at least one of the (explicitly mentioned) internal specifiers (Art. 11.2) is extant and 2a) the word “extant” is included before “organisms” under the first wording (Art. 9.6) or 2b) the word “crown” is included before “clade” under the third wording (Art. 9.6). A maximum-crown-clade definition (formerly known as a branch-modified or a stem-modified node-based definition) may thus take the form “the crown clade originating in the most recent common ancestor of A and all extant organisms or species that share a more recent common ancestor with A than with Z” or “the largest crown clade containing A but not Z”, where A is an extant internal specifier and Z is an external specifier (Art. 11.2). A maximum-crown-clade definition may be abbreviated “max crown ∇ (A \sim Z)”. Additional internal specifiers (e.g., C & D & E, etc.) and external specifiers (e.g., Y & X & W, etc.) may be used as needed (e.g., if the extant outgroup relationships of the named clade are poorly supported in the case of external specifiers, or if the author intends for the name not to apply to any clade in the context of particular phylogenetic hypotheses in the case of internal specifiers, as described in Art. 11.13, Example 2; **but see Note 9.6.2**). If this kind of definition is used and “extant” is intended to mean anything other than extant on the publication date of the definition (thus affecting the concept of a crown clade; see Art. 2.2), the author should specify the intended meaning (within the restrictions described in Art. 9.11)—e.g., the internal specifiers were extant (and thus the clade was a crown clade) at a particular time in human history.

Commented [c1]: This symbol is also an addition here, but when I try to boldface it, MS-Word converts it to a different symbol.

Additions to Articles 9.9 and 9.10

9.9. A crown-clade definition is a phylogenetic definition that necessarily identifies a crown clade (Art. 2.2) as the referent of a taxon name.

- A minimum-clade definition (Art. 9.5) is a crown-clade definition if all of the internal specifiers (Art. 11.2) are extant, **or if the definition is explicitly stated as applying to the name of a crown clade**. A minimum-crown-clade definition may thus take the form “the crown clade originating in the most recent common ancestor of A and B” or “the smallest crown clade containing A and B”, where A and B are ~~extant~~ internal specifiers. A minimum-crown-clade definition may be abbreviated “min crown ∇ (A & B)”. Additional internal specifiers (e.g., C & D & E, etc.) may be used as needed (e.g., if the basal relationships within the clade are poorly supported). If this kind of definition is used and “extant” is intended to mean anything other than extant on the publication date of the definition (thus affecting the concept of a crown clade; see Art. 2.2), the author should specify the intended meaning (within the restrictions described in Art. 9.11)—e.g., the internal specifiers were extant (and thus the clade was a crown clade) at a particular time in human history.

Note 9.9.1. Minimum-crown-clade definitions can be either implicit (if all of the internal specifiers are extant but application to the name of a crown clade is not expressly stated) or explicit (if application to the name of a crown clade is expressly stated).

Note 9.9.2. If some or all of the internal specifiers are extinct in a minimum-clade definition or if all of the internal specifiers are extinct in a maximum-clade definition or an apomorphy-based definition, **and if the name is not explicitly stated as applying to the name of a crown clade**, the defined name may apply to a crown clade in the context of a particular phylogenetic hypothesis. However, it is not considered to be a crown-clade definition because the defined name does not necessarily apply to a crown clade in the context of all relevant phylogenetic hypotheses.

Recommendation 9.9A. When a minimum-clade definition is intended to define the name of a crown clade, application to a crown clade should be stated explicitly.

[Renumber old Notes 9.9.1 and 9.9.2]

9.10. A total-clade definition is a phylogenetic definition that necessarily identifies a total clade (Art. 2.2) as the referent of a taxon name.

- A minimum-clade definition is not to be used to define the name of a total clade, as that practice would require certainty that the internal specifiers represent both branches of the earliest divergence within the total clade.

- A maximum-clade definition is a total-clade definition if at least one of the internal specifiers (Art. 11.2) and all of the external specifiers (Art. 11.2) are extant, **or if the definition is explicitly stated as applying to the name of a total clade**. A maximum-total-clade definition may thus take the form “the total clade consisting of A and all organisms or species that share a more recent common ancestor with A than with Z” or “the total clade originating in the earliest ancestor of A that is not an ancestor of Z” or “the largest total clade containing A but not Z”, where A is an ~~extant~~ internal specifier (Art. 11.2) and Z is an ~~extant~~ external specifier (Art. 11.2). A maximum-total-clade definition may be abbreviated “max total ∇ (A ~ Z)”. Additional internal specifiers (e.g., B & C & D, etc.) and external specifiers (e.g., Y & X & W, etc.) may be used as needed (e.g., if the outgroup relationships of the named clade are poorly supported in the case of external specifiers, or if the author intends for the name not to apply to any clade in the context of particular phylogenetic hypotheses in the case of internal specifiers, as described in Art. 11.13, Example 2). If this kind of definition is used and “extant” is intended to mean anything other than extant on the publication date of the definition (thus affecting the concept of a total clade; see Art. 2.2), the author must indicate explicitly or implicitly the meaning of “extant” (within the restrictions described in Art. 9.11)—e.g., that the relevant specifiers were extant (and thus the clade was a total clade) at a particular time in human history.

Note 9.10.1. Maximum-total-clade definitions can be either implicit (if at least one of the internal specifiers and all of the external specifiers are extant but application to the name of a total clade is not expressly stated) or explicit (if application to the name of a total clade is expressly stated).

Recommendation 9.10A. When a maximum clade definition is intended to define the name of a total clade, application to a total clade should be stated explicitly.

New Note 9.15A.1 and related changes

Recommendation 9.15A. If possible, the bibliographic citation demonstrating authorship of the preexisting name should refer to the original publication of the name (but see Note 19.1.1), spelled the same way as when converted and regardless of the rank and composition originally associated with the name (provided it is not a homonym; see Note 9.15A.24). If the original publication of the name cannot be determined, the earliest publication that can be found in which the name is valid (*ICNAFP*, *ICNB*) or available (*ICZN*) may be cited. If the publication cited is likely not to be the one in which the name was originally published, it should be explicitly stated that the author cited is likely not to be the nominal author (see Art. 19.1) of the name. Under certain conditions (see Notes 9.15A.32 and 9.15A. 43), a differently spelled name may be cited. If a citation is for a different spelling than the one adopted in the converted name, the difference in the spelling of the name should be explicitly stated.

Note 9.15A.1. The “original publication of the name” for the purpose of attributing authorship may predate its first publication as a valid (*ICNAFP*, *ICNB*) or available (*ICZN*) name. [Renumber subsequent Notes under Rec. 9.15A.]

Example 1. Lindley (1830) should be cited as the author of *Angiospermae* under this code even though Lindley’s publication of that name was not valid according to the *ICNAFP* because it was assigned a rank that was contrary to the required relative order of ranks under that code. *Angiospermae* was later validated under the *ICNAFP* by Eichler (1880) and therefore qualifies as a preexisting name under this code (Art. 6.2), but the name is to be attributed under this code to Lindley rather than Eichler.