

numbering of these Examples should be considered in relation to existing Examples 13–15.

In teaching the principles of nomenclature to trainee taxonomists and others, the ruling concerning orthography of compound epithets is difficult to explain because of a marked lack of guidance in Art. 60. While it is more or less universal practice to adopt spellings such as *myricifolia* and *aquilegifolia*, it is difficult to demonstrate the wording which requires this. The present Rec. 60G is far from explicit, and deals much more fully with so-called ‘pseudocompounds’ than it does with ‘regular compounds’. While rather obscure exceptional cases are discussed at length in paragraph (b), the normal compounding procedure in (a) is dealt with briefly and with no Examples. The above proposal would make clear how to form regular compounds, with Examples showing the principles already familiar to users but not clearly stated in the Code. The present Example 14 already exemplifies the requirement that the correct spelling of the generic name must be used, as also does the *Crocsmia* case.

**(275) In Rec. 60F.1, delete everything after the first comma.**

It is very widely established practice to decapitalise the initial letter of all specific and infraspecific epithets. However, the present Rec. 60F.1 seems to be an open invitation or encouragement for anyone to use capital initials for epithets derived from names of persons, vernacular names or former generic names. Most botanists would prefer to decapitalise the epithets in *Rosa Moyesii*, *Cestrum Parqui* and *Convolvulus Cantabrica* in horticultural or other literature, but the present explicit references to such cases as apparent exceptions in Rec. 60F.1 seems to significantly reduce the justification to argue for this. The present wording “although authors desiring to use initial capital letters may do so ...” seems particularly inappropriate since the context is merely a Recommendation anyway. Authors desiring to capitalise epithets in any name at all may do so at the moment—as in *Rosa Arvensis*. It seems preferable to promote a uniform system throughout rather than give any encouragement to people to sometimes adopt capitals.

## (276–278) Proposals on ‘living types’

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Among cultivated plants in botanic gardens, some represent the original material from which the type was prepared. Due to an increasing necessity to establish the status of voucher specimens prepared from such living material, a new category of type is here proposed: clonotype. Concomitantly a differentiated nomenclatural treatment is proposed for the living material: pre-type.

Throughout the world, around 1,800 botanic gardens are recognized in 148 countries, maintaining in their living plant collections over 4,000,000 registered specimens, representing more than 80,000 species under registered cultivation, almost one third of all known species of vascular plants (Jackson, Bot. Gard. Conservation News 3(3): 27–30. 1999). Such living collections in botanic gardens are important mainly for representing a vast genetic diversity, thus constituting one of humanity’s greatest resources for ex situ conservation (Heywood in Heywood & Jackson, Trop. Bot. Gard. Role Conservation Developm.: 11–23. 1991).

This ex situ conservation work is even more significant in tropical countries where diversity is greatest and many taxa remain to be described while habitat destruction is accelerating. Increasing population and the consequent rise in ecological pressure has transformed tropical forests into the most threatened region of the planet in relation to the loss of species (Lugo in Wilson, Biodiversity: 58–70. 1988).

It is usual in botanic gardens around the world for living material conserved in registered collections to be complemented by voucher specimens in an herbarium. Whenever an herbarium specimen is collected from a living plant from which a type specimen has been previously prepared, a duplicate (of sorts) will have been made. However, such a specimen is not a duplicate as defined in the Code (Art. 8.3 footnote) because it was collected at a different time from the type specimen.

A type is simply that element to which the name of a taxon is

permanently attached. No matter how the circumscription of a taxon may change upon taxonomic revision, the type must be included within that circumscription. It is this mechanism of nomenclatural types that allows nomenclature to remain distinct from taxonomy (Nicolson in Taxon 26: 569–574). Thus all taxonomists who choose to use a given name for a taxon must include the type within the circumscription of that taxon. This ensures that when a taxon is delimited differently by taxonomists, the different circumscriptions will not be mutually exclusive. Thus types are the ‘ties that bind’ taxonomists together with regard to the application of names of taxa (Moore in Bot. Rev. (Lancaster) 69: 2–21.2003).

In various herbaria around the world, especially in those attached to botanic gardens, it has become almost impossible to distinguish whether an apparent duplicate of a type specimen is indeed part of the original material or was prepared from the recollection of a ‘living type’, by virtue of the possible exact transcription of the label.

The following proposals address this problem and aim to formalize the treatment of ‘living types’ cultivated at various botanic gardens of the world. The possibility of recognizing a ‘living type’ in a scientific collection cultivated in a botanic garden will minimize many barriers to the scientific and technological development of botany, regarding the utilization of modern methodologies. Genetic, anatomical, phytochemical, and other studies that require living samples will benefit from the highest possible level of certainty in taxonomic determination when a ‘living type’ is available. Although to the herbarium curator it may sound strange to use registered living plants in scientific collections of botanic gardens, to the curator of living collections it is very usual to receive requests to use such resources.

Art. 8.4 of the Code is very clear when stating that living plants cannot be designated as types. However, the same Article

makes an exception in that cultures of fungi and algae preserved in a metabolically inactive state (e.g., by lyophilization or deep-freezing) are acceptable as types. Moreover, Rec. 8B.2 recommends that “any living isolates obtained from [cultures thus preserved] should be referred to as “ex-type” (ex typo), “ex-holotype” (ex holotypo), “ex-isotype” (ex isotypa), etc., in order to make it clear they are derived from the type but are not themselves the nomenclatural type.” We propose a new Recommendation 8B.3, similar to 8B.2, but in reverse order and valid also for vascular plants, in the sense that the specified living material is the origin of the preserved herbarium sheet (type material).

**(276) Add a new Recommendation immediately following Rec. 8B.2:**

“8B.3. In cases where the nomenclatural type was prepared from cultivated material in a registered collection of a botanic garden, such cultivated material (but not its sexually propagated progeny) should be referred to as “pre-type” (*pre typum*), “pre-holotype” (*pre holotypum*), “pre-paratype” (*pre paratypum*), etc., in order to make it clear that that material was the origin of the type but not itself the nomenclatural type.”

The most judicious way to distinguish a duplicate of the original material from a duplicate of a subsequent gathering from the same pre-type is to create a new category of type: a *clonotype*. This would allow information from all the specimens prepared from a pre-type to be aggregated, while avoiding the accidental confusion of a later specimen with original material. Following this line of thinking, any new herbarium specimen prepared from a pre-type from which, for example, a paratype was previously prepared should be referred to as a *clonoparatype*.

In herbaria, the clonotype should be seen as an additional source of information, complementing the original material and contributing mainly in four ways: (1) avoiding further physical degradation of historical types during handling; (2) presenting the

same plant in various phenological stages; (3) complementing information present in the protologue but absent in herbaria; and (4) to be primarily used should there ever be need to designate a neotype or epitype.

**(277) Add a new Article and Note between Art. 9.7 and 9.8:**

“9.7 *bis*. A clonotype is a specimen prepared from a pre-type (see Rec. 8B.3) to serve as an interpretative type. When an epitype is designated, the holotype, lectotype, or neotype that the epitype supports must be explicitly cited.

*Note 3 bis*. A clonotype will never substitute a holotype, isotype, paratype or syntype and will never have priority over any specimen from among the original material. A clonotype will have priority when the necessity arises for the designation of an epitype or neotype. When a clonotype is prepared after the designation of an epitype or neotype, this recent material should be designated as epitype or neotype substituting the previous designation, also substituting any original illustration designated as lectotype since Art. 9.10 places illustrations, even those based upon a holotype, as possessing inferior priority compared with any herbarium material. A clonotype can never substitute a specimen designated as a lectotype, as in accordance with Art. 9.10 such a lectotype would be a specimen from among the original material.”

**(278) Add a new Recommendation following Rec. 9B:**

“9C.1. The herbarium label of a clonotype should include primarily the collection data of the botanic garden where it is cultivated, the collector and date being those of the *ex situ* gathering. The data of the original *in situ* gathering should be mentioned in the observations field. This order should be followed also in publications.”

## (279–280) Proposals towards harmonization in the ranks in which names can be conserved and rejected

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There is a strange anomaly in the *Code*, in that at present Art. 14 on conservation applies only to the names of “families, genera, and species” (Arts 14.1), whereas Art. 56 on rejection can be applied to “any name that would cause disadvantageous nomenclatural change” (Art. 56.1). In consequence, names in, for example, the rank of variety are listed in App. IV (e.g., *Actaea spicata* var. *alba* L., *Lecanora anomala* var. *tenebricosa* Ach.), which even includes a subdivision of a genus of uncertain rank (i.e., *Peziza* [unranked] *Phialea* Pers.). While there are unlikely to be many cases for the conservation of names other than in the principal ranks which would ever be formally proposed for consideration by the appropriate Permanent Committee, there are instances where being able to conserve a taxon in some other rank, perhaps with a conserved type, could be the simplest solution to prevent some disadvantageous change in name. An example is afforded by the name *Parmelia perlata* var. *olivaria* Ach., where conservation with a conserved type would have been an unambiguous and preferred solution to a long-standing confusion, as opposed to a pro-

posal to reject the name in order to protect that of both a rare and local species and simultaneously safeguard that of another much better known and widely distributed species (Hawksworth & al. in *Taxon* 51: 626–627. 2002).

When the decision was taken to permit the conservation of names in the rank of species at the Sydney Congress in 1981, the provision was initially “restricted to species of major economic importance” (*Sydney Code* Art. 14.2. 1983) because there were major concerns over the burden that might be placed on the Permanent Committees by large numbers of proposals. It was even suggested that an office be provided and financed “to handle the flood of proposals that would come in” (Fosberg in *Englera* 2: 53. 1982). When the decision to remove the “major economic importance” restriction was taken at the Toyko Congress in 1993 (*Tokyo Code* Art. 14. 1994), a key factor was that the floods of proposals which had been forecast when species rank names had first been agreed as eligible for conservation had not occurred (e.g., Brummitt in *Englera* 14: 97. 1994). Experience over the last