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ARTICLE 59 AND NAMES OF PERFECT STATE TAXA IN IMPERFECT STATE GENERA

D. L. Hawksworth and B. C. Sutton**

Summary

Consideration is given to the several possible ways of treating the names of perfect states placed in imperfect state genera when original descriptions included either both states or the perfect state alone. A proposal is presented to cover this situation by the addition of a further paragraph and examples to Art. 59. The need for some clarification of Articles 34 and 72 in relation to their bearings on Art. 59 are pointed out and two proposals made to resolve existing anomalies.

While the nomenclature of imperfect states placed in perfect state genera is adequately covered in the Seattle Code (Stafleu *et al.* 1972), that of perfect states within imperfect genera is not. In the course of listing names of new taxa in the *Index of Fungi* it has come to our attention that several procedures are currently being followed by mycologists confronted with situations of this latter type. This is clearly contrary to Principle IV of the Code and the purpose of this note is to point out the various alternatives available and make a proposal to clarify this point for consideration by the next International Botanical Congress.

The name *Penicillium helicum* Raper & Fennell (Mycologia 40: 515. 1948) was published with descriptions of the perfect and imperfect states of the same fungus in Latin and a type which comprised both states of the species. The generic name *Penicillium* Link ex Fr., however, is typified by an imperfect state species name[1] and no separate name for the perfect state of *P. helicum* was proposed. The following interpretations of the status of binomials combining imperfect state generic names with epithets applied inclusive of the perfect state are available:-

(1) To treat the name as validly published but illegitimate because both states were included and as the imperfect state species name is limited in

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[1] *Penicillium crustaceum* Fr. (Syst. mycol. 3: 407. 1832), based on *Mucor crustaceus* L. (Sp. plant. 2: 1186. 1753), must be considered as the type species of this genus as Fries (*op. cit.*: 406) states "Typus: Mucor crustaceus. L.". Most later authors have cited "*P. expansum* Link" (correctly *P. expansum* Link ex Gray, Nat. Arr. Br. Pl. 1: 554. 1821) as the type species of the genus but Fries included *P. expansum*, together with *P. glaucum* Link, as synonyms of *P. crustaceum*. If *P. crustaceum* and *P. expansum* are synonyms, as suggested by Raper and Thom (Man. Penicillia: 515. 1949), *P. crustaceum* must be treated as the correct name for *P. expansum* in accordance with Art. 13(f). As far as we have been able to ascertain, however, neither *P. crustaceum* nor *P. expansum* have been properly typified. If no original material of these taxa is available *P. crustaceum* should be neotypified by a specimen conforming to Thom's (U.S. Dept. Agr., Bur. Anim. Ind., Bull. 118: 27-28. 1910) concept of *P. expansum* (imprefect state) to maintain current usage of the generic name *Penicillium* in accordance with Recommendation 7B.

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application to only a part of the fungus (its imperfect state). This procedure would render many names of imperfect states placed in *Aspergillus* Mich. ex Fr. and *Penicillium* illegitimate and so is not in the interests of nomenclatural stability.

(2) To treat the name as legitimate but referring to the imperfect state alone (i.e. to typify it by the imperfect state portion of the type specimen of the name) because of the limitation imposed by the use of the generic name. This would in most cases be in accord with the intention of the authors publishing such names and as it would not necessitate any changes in the names of imperfect states this would be in accord with interests of nomenclatural stability.

(3) To treat the name as legitimate but referring only to the perfect state portion of the type specimen. As in the case of alternative (1), this procedure would mean that many new names would have to be proposed for imperfect state names and is consequently not recommended from the standpoint of nomenclatural stability.

The following three methods of introducing names are available for perfect states in cases where a description included both states but the epithet proposed was combined with the name of an imperfect state genus:-

(A) To introduce a new combination based on the imperfect state name (e.g., *Talaromyces helicus* (Raper & Fennell) Benjamin, Mycologia 47: 684. 1955) but to continue to employ the same epithet as the legitimate name for the imperfect state (i.e. *Penicillium helicus* Raper & Fennell). This method, which has been employed by Subramanian (1972) is clearly not satisfactory as it means that the original epithet in the imperfect state genus is being employed in two different senses; i.e. typified by the different states on its type specimen. The typification of a single epithet by more than one type is clearly contrary to Art. 7 and so this procedure is unsatisfactory. A variation of this approach used by Malloch and Cain (1972a, b) is to not use any binomial name for the imperfect states alone implying the adoption of, for example, "*Penicillium* state of *Talaromyces helicus* (Raper & Fennell) Benjamin", in cases where only this state is being referred to.

(B) To introduce a name based on the perfect state element which may or may not have the same epithet as the name of the imperfect state. In accordance with the procedure of Art. 72 (Note) new combinations made as indicated under (A) can be treated as new names (i.e. "*Talaromyces helicus* Benjamin' and not "*T. helicus* (Raper & Fennell) Benjamin') as long as the original description accompanying the introduction of the epithet included a valid description of the perfect state and this state is represented on the type specimen. This overcomes the unsatisfactory aspects of procedure (A), necessitating only the correcting of many author citations, and is an extension of the situation described in the Code (Art. 59) for the names of perfect states discovered after their imperfect states have been named. As this is not a satisfactory way of introducing perfect state names we feel that combinations made in this manner after 1 January 1976 should not be treated as validly published either as new combinations or new names.

(C) To require retrospectively the introduction of new names for the perfect state accompanied by descriptions (in Latin on or after 1 Jan. 1935) of that state and the designation (on or after 1 Jan. 1958) of a perfect

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state type specimen (which may or may not be the same as that of the imperfect state also) treating all new names or new combinations already proposed as not validly published. E.g., "*Talaromyces helicus* Benjamin spec. nov." (in Stolk & Samson, Stud. Mycol. 2: 16. 1972) was introduced as a new species, with a reference in Latin to a Latin description of the perfect state and a perfect state type specimen was designated; *T. helicus* (Raper & Fennell) Benjamin (Mycologia 47: 684. 1955) not being treated as validly published either as a new name or a new combination. This procedure is unsatisfactory because although the name *Talaromyces helicus* (Raper & Fennell) Benjamin might be considered illegitimate (see alternative (2) of methods of typification above) it must be considered as validly published because the basionym was validly published. The '*Talaromyces helicus* Benjamin, spec. nov.', introduced in Stolk & Samson (1972) is consequently a later homonym of the combination published in 1955 because it is typified by a different type (i.e. the perfect state element alone of the type specimen of *P. helicum*). This approach is not satisfactory because it assumes that the Code currently invalidates new combinations from imperfect into perfect genera of epithets originally based on types comprising both imperfect and perfect states, whereas Art. 59 of the Code does not in fact mention this situation at the present time. As so many "combinations" of this type have already been proposed, this procedure should not in our view be used retroactively but take effect from the beginning of the year following the acceptance of the proposal submitted for consideration here.

So far we have discussed only the case of names in imperfect state genera the original descriptions and type of which included both the perfect and imperfect states of the same fungus. The treatment of names originally typified by a specimen showing the perfect state (with or without the imperfect state) accompanied by a description or diagnosis of only the perfect state but placed in an imperfect state genus should also be considered here. Thom (in Emmons, Mycologia 27: 138. 1935), for example, described "*Penicillium stipitatum* Thom sp. nov." based on material comprising both imperfect and perfect states but only provided a Latin diagnosis of the perfect state and not of the imperfect state. As Art. 59 already treats imperfect states in perfect state genera as validly published but illegitimate, we feel that the converse situation should also apply; i.e. that names typified by perfect states alone placed in imperfect state genera should be treated as validly published but illegitimate names. In the case of this example, the name *P. stipitatum* must therefore be regarded as illegitimate, and a new epithet in *Penicillium* described for the imperfect state.

Proposal no. 33 to add the following paragraph and example to the end of Art. 59

The nomenclatural type of a taxon whose name has been ascribed to a genus characterised by an imperfect state must be one of which the original protologue included a description or diagnosis of the imperfect state. If this requirement is not fulfilled the name, although validly published, shall be considered illegitimate. Where the nomenclatural type of a taxon whose name has been ascribed to a genus characterised by an imperfect state includes both the perfect state and the imperfect state of the fungus, and where both states were included in the original diagnosis or description, the name is considered as validly published only as the name of the imperfect state and must be typified by the portion of the type specimen bearing the imperfect state. New combinations based on epithets in imperfect state genera, but whose original diagnosis or

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descriptions included both states, into genera typified by perfect states shall be treated as not validly published as new combinations, but as validly published new names based on the perfect state portion of the type specimen when the original place of publication of the epithet included (a) a valid description of the perfect state (in Latin, on or after 1 Jan. 1935) and (b) the designation of a type bearing both states (on or after 1 Jan. 1958). However, publication on or after 1 Jan. 1976 of a new combination based on an epithet in an imperfect state genus originally applied inclusive of both imperfect and perfect states into a genus characterised by a perfect state shall be considered as not validly published as a new name of the perfect state.

Examples: The name *Penicillium helicum* Raper & Fennell (Mycologia 40: 515. 1948) included a description in Latin of both the imperfect and perfect states of the fungus and a type which comprised both states of the species; this name must be typified by the imperfect state portion of the type specimen. The new combination *Talaromyces helicus* (Raper & Fennell) Benjamin (Mycologia 47: 684. 1955) is consequently treated as not validly published as a new combination as the generic name *Talaromyces* is characterised by a perfect state, but it is validly published as a new name which must be cited as *Talaromyces helicus* Benjamin and which is typified by the perfect state portion of the type specimen of *Penicillium helicum* Raper & Fennell. A name published in this manner after 1 Jan. 1976, however, is not validly published either as a new combination or a new name, the name for the perfect state being correctly formed after this date only by introducing a new species name (which may or may not bear the same epithet as the imperfect state) accompanied by a description of the perfect state in Latin (or a reference to a previously validly published description of the perfect state) and the designation of a type specimen bearing the perfect state. The name *Penicillium stipitatum* Thom (in Emmons, Mycologia 27: 138. 1935) was based on material comprising both imperfect and perfect states but a Latin diagnosis was provided only for the perfect state. This name is consequently validly published but illegitimate for both the perfect and the imperfect states of this species.

The addition of this proposal and examples to Art. 59 makes the wording of the whole Article somewhat cumbersome and is likely to lead to some confusion with mycologists wrestling with nomenclature of imperfect and perfect state taxa. We have consequently tabulated the situations which are covered by the extended Art. 59 and indicated the nomenclatural status of names fulfilling various combinations of the criteria considered (Table 1).

Some mycologists are of the opinion that the whole of Art. 59 needs rethinking and simplifying and Hennebert (1971) has recently presented a skilful review of the topics requiring consideration in the discussions of the naming of fungi with more than a single state in their life cycles. Several proposals have been discussed by mycologists informally but it seems unlikely that any general agreement will be achieved in the forseeable future. In the meantime mycologists actively engaged in taxonomic work with plemorphic fungi require firm decisions of an International Botanical Congress adopted in the Code to govern the situations which they encounter in their revisionary studies. It is to this end that the above proposal has been made here.

We would, however, also like to draw attention here to the two following points in the Code which require some clarification of their relationships to Art. 59.

(1) Art. 34 "A name is not validly published . . . (2) when it is merely proposed in anticipation of the future acceptance of the group concerned, or of a particular circumscription, position or rank of the group (so-called provisional name);". It is unfortunate that no example devoted solely to this alternative "(2)" is included in the Seattle Code in order to clarify

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TABLE 1. *Nomenclatural status of epithets considered by Art. 59 (including the proposal made here)*

DESCRIPTION		TYPE SPECIMEN		GENERIC NAME		NOMENCLATURAL
Perfect	Imperfect	Perfect	Imperfect	Perfect	Imperfect	STATUS*
+	—	+	—	+	—	Legitimate name for the perfect state
—	+	—	+	—	+	Legitimate name for the imperfect state
+	+	+	+	+	—	Legitimate name for the perfect state
+	+	+	+	—	+	Legitimate name for the imperfect state
+	—	+	+	+	—	Legitimate name for the perfect state
+	—	+	+	—	+	Illegitimate for both states
—	+	—	+	+	—	Illegitimate for both states
—	+	+	+	+	—	Illegitimate for both states
—	+	+	+	—	+	Legitimate name for the imperfect state
+	+	+	+	+	+	Each name legitimate for its own state

+ = criterion fulfilled
— = criterion not fulfilled
* *Note*: all names are validly published assuming the criteria of Arts. 29-37, 43-45 and date limits of Art. 59 are satisfied.

its meaning. In the case[1] of imperfect state fungi described on the basis of imperfect state material but placed by the describing author under a perfect state generic name because he believes the perfect state, when found, will belong to that genus to be regarded as not validly published under Art. 34? One of the examples under Art. 59, that of *Ravenelia cubensis* Arth. & J. R. Johnston, falls into this category – a name based on the imperfect (*Uredo*) state placed in a genus characterised by a perfect state. Under this example to Art. 59 it is stated that this name "... was validly published but is considered illegitimate because the species concerned was described in a genus characterised by a perfect state". If this aspect of Art. 34 is considered to apply to cases like *Ravenelia cubensis* then there is a clear conflict between the two Articles as they stand at the moment. We consequently make the following proposal to clarify this point:-

Proposal no. 34 to add the following additional Note to Art. 34

Note 3. Provision no. 2 does not apply to names or epithets in Fungi typified by imperfect state specimens placed in perfect state genera in anticipation of their perfect states being discovered in the future and being found to belong to that genus if the

[1] As noted by Groves and Elliott (1969).

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author accepts the name in the perfect state genus as the correct one for that taxon. Such names are validly published but illegitimate (see Art. 59).

(2) Art. 72 (Note) permits authors to take up epithets previously employed in an illegitimate name if there is no obstacle to their employment in the new position or sense. The epithets in the resultant combination being treated as new. This principal has been followed in the existing Art. 59 and in the proposal presented here, but there is one point which requires clarification. In Art. 72 there is no date given after which such a name is to be treated as not validly published but 1 January 1967 appears in Art. 59 and, to accord with this, 1 January 1976 has been included in our proposal. At the present time no reference to Art. 59 appears in Art. 72 and it seems clear that the following proposal should be included so as to avoid any possible confusion arising here.

Proposal no. 35 to add the following new sentence to the Note of Art. 72

In cases where the name or epithet of a fungus is illegitimate because it was placed in a genus typified by a state other than that represented by the nomenclatural type of the name or epithet, new combinations published after 1 Jan. 1967 (imperfect states in perfect state genera) or 1 Jan. 1976 (perfect states in imperfect state genera) are treated as not validly published either as new combination or new names (see Art. 59).

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