Taxonomic Note

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Should we alter the way that authorship of a subspecies name that is automatically created under Rule 40d of the Bacteriological Code is cited?

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Rule 40d of the International Code of Nomenclature of Bacteria governs the way subspecies names are to be automatically created if they contain the type of the corresponding species. The way that authorship is to be cited is also covered by this Rule, but in its present form may not be helpful. Due consideration should be given to altering the way such subspecies names are cited.

When a species is subdivided into subspecies, an important aspect is the fact that the Rules of the International Code of Nomenclature of Bacteria (the Bacteriological Code) govern the way a subspecies is to be named that includes the designated type of the corresponding species, as well as authorship of the resulting subspecies name.

Rule 40d (formerly Rule 46) of the Bacteriological Code (Lapage *et al.*, 1992; De Vos & Trüper, 2000) reads:

‘The valid publication of a subspecific name which excludes the type of the species automatically creates another subspecies which includes the type and whose name bears the same specific and subspecific epithets as the name of the type.

For example: Publication of *Bacillus subtilis* subsp. *spizizenii* Nakamura *et al.* 1999 automatically created a new subspecies name *Bacillus subtilis* subsp. *subtilis*.

The author of the species name is to be cited as the author of such an automatically created subspecific name.

Example: *Bacillus subtilis* subsp. *subtilis* (Ehrenberg 1835) Cohn 1872.’

This follows the principle of co-ordinate status used under the International Code of Zoological Nomenclature (Ride *et al.*, 1999) and the principle of autonyms used under the International Code of Botanical Nomenclature (McNeill *et al.*, 2006). While the wording of the Bacteriological Code follows closely the principle of co-ordinate status, there are some differences from the principle of autonyms, namely that, although the subspecies which includes the type of the species and whose name bears the same specific and subspecific epithets as the name of that species follows the

principle of the Bacteriological Code, the subspecies name so created is not assigned authorship [e.g. *Bacillus subtilis* (Ehrenberg 1835) Cohn 1872 subsp. *subtilis*].

While both systems have a tradition, it should not be forgotten that names alone have little meaning, and the Bacteriological Code requires that, in order to be validly published, a name must be accompanied by a formal statement of the rank of the taxon, derivation of the name, a description and designation of a type (see Rule 27). The purpose of the author citation and date of publication is to allow the identification, directly or indirectly, of the information required by Rule 27. This is one of the key problems with the current way of citing the authorship of such names: locating the associated correct reference. It should also be noted that, although automatically creating a name and fixing the type is regulated by Rule 40d, it should be evident that this does not automatically create a description of the subspecies.

In the case cited, neither Ehrenberg (1835) nor Cohn (1872) divided the species that they were referring to into subspecies. This creates two problems. The first problem is whether the description associated with the name *Bacillus subtilis* (Ehrenberg 1835) Cohn 1872 caters for the properties of the new subspecies, *Bacillus subtilis* subsp. *spizizenii* Nakamura *et al.* 1999. It should be remembered that the description associated with the validly published name *Bacillus subtilis* (Ehrenberg 1835) Cohn 1872 as listed on the Approved Lists of Bacterial Names (Skerman *et al.*, 1980, 1989) is the description in the 8th edition of *Bergey's Manual of Determinative Bacteriology* (Gibson & Gordon, 1974) and is, in fact, an emended description (with respect to Cohn, 1872), though not referenced as such. The second issue is the description of the subspecies whose name and type are automatically created by Rule 40d on the creation of

the name *Bacillus subtilis* subsp. *spizizenii* Nakamura *et al.* 1999, which appears in the paper by Nakamura *et al.* (1999).

In the case of the species *Bacillus subtilis* (Ehrenberg 1835) Cohn 1872, this form of citation makes reference to the publication of the epithet in the basonym '*Vibrio subtilis*' Ehrenberg 1835 and the subsequent transfer to the genus *Bacillus* by Cohn (1872). In the case of a name on the Approved Lists, the citation *Bacillus subtilis* (Ehrenberg 1835) Cohn 1872 (Approved Lists 1980) or *Bacillus subtilis* (Approved Lists 1980) would also provide indirect reference to the location of the description used at the time of valid publication of the name in 1980, though it is highly unlikely that the published descriptions would be consistent with that of *Bacillus subtilis* subsp. *spizizenii* Nakamura *et al.* 1999. It is common practice to ignore the way the taxon at the next highest rank has been described and circumscribed when adding new subordinate taxa. Thus, when dividing a species into subspecies, it may also be necessary to provide an emended description of the species. The other way to cite a name on the Approved Lists is *Bacillus subtilis* nom. approb., which is similar in form to *Bacillus subtilis* (Approved Lists 1980), provided no other such lists are ever produced.

In the case of the subspecies name *Bacillus subtilis* subsp. *subtilis*, which is automatically created (and typified) on publication of the name *Bacillus subtilis* subsp. *spizizenii* Nakamura *et al.* 1999, the form of the citation *Bacillus subtilis* subsp. *subtilis* (Ehrenberg 1835) Cohn 1872 provides no reference to the publication that has caused this name to be automatically created. Furthermore, it is unclear where to find a description of the subspecies. In certain cases, they are certainly missing, because too much emphasis was put on automatically creating a subspecies, rather than a subspecies name (and associated type) to which a description was attached. Strictly speaking, names not accompanied by a description are not validly published (Rule 27). The only way to tackle such a problem would be to rule that all subspecies names created to date in this fashion and currently treated as validly published, but lacking a description, are to be considered to be validly published. An additional task would be to locate appropriate descriptions. Subspecies names created in this fashion outside of the IJSB/IJSEM must be included in the Validation Lists [see Howey *et al.* (1990) for examples where this has not occurred].

In the present case, there are a number of ways of citing a subspecies name, including:

Bacillus subtilis subsp. *subtilis* (Ehrenberg 1835) Cohn 1872; but this would provide no bibliographic reference to the publication in which that name (combination) was created, nor the description.

Bacillus subtilis subsp. *subtilis* (Ehrenberg 1835) Nakamura *et al.* 1999; this would provide bibliographic reference to where the name (combination) was automatically created and, in this case, where the type is designated and description given.

When taking such cases into consideration in the future, it should be remembered that Rule 40d covers the form of a

subspecies name and type when the subspecies includes the type strain of the species, but it does not automatically create a description. It is important that authors take into consideration both that the species description may have to be emended and that all subspecies names, whether created automatically or not, must meet the requirements of Rule 27 (see also Rule 32a). The principle underlying Rule 40d is sound, but the way that it has been handled in practice may have caused problems. It would also be wise to take a closer look at the way that the authors of such subspecies names are to be cited, and alter the wording if necessary. The same principle applies to subgenus names, although author citation is not dealt with in Rules 39a–c.

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