Taxonomic Note

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Nomenclature and taxonomy of halophilic archaea – comments on the proposal by DasSarma and DasSarma for nomenclatural changes within the order *Halobacteriales*

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P. DasSarma & S. DasSarma [*Saline Systems* 4 (2008), 5] have proposed far-reaching changes in the nomenclature and taxonomy of the halophilic archaea of the order *Halobacteriales*, family *Halobacteriaceae*. While re-evaluation of the taxonomic classification of strains within the group is to be encouraged, the nomenclatural changes proposed are in violation of the General Considerations, Principles and Rules of the International Code of Nomenclature of Bacteria.

DasSarma & DasSarma (2008) have proposed far-reaching changes in the nomenclature and taxonomy of the halophilic archaea of the order *Halobacteriales*, family *Halobacteriaceae*. While claiming that, for the ‘extremely halophilic Archaea, ... the order, family, and even a genus designation have become obsolete’, the authors propose ‘to modernize haloarchaeal taxonomy and terminology’. Based on the fact that the order *Halobacteriales* belongs to the archaeal domain, the authors propose to rename the genus *Halobacterium* – the type genus of the family and the order – as ‘*Haloarchaeum*’, ‘to reflect its membership in the archaeal rather than the bacterial domain’, the family *Halobacteriaceae* as ‘*Haloarchaeaceae*’ and the order *Halobacteriales* as ‘*Haloarchaeales*’. To justify their proposal, the authors stated that ‘these revisions would help update the taxonomy and terminology of halophilic microorganisms to be consistent with our current understanding of the microbial world’.

The nomenclatural changes proposed are in violation of the General Considerations, Principles and Rules of the International Code of Nomenclature of Bacteria (the Code; Lapage *et al.*, 1992). The Code governs the nomenclature of all prokaryotes, and ‘Prokaryote’ covers also ‘those organisms that are variously recognized as e.g. ... *Archaeobacteria*, *Archaea*, ...’ (De Vos & Trüper, 2000). The intention of DasSarma & DasSarma (2008) is to introduce new names that would reflect the taxonomic position and the properties of the halophilic archaea. This idea is alien to the Code. Principle 4 states: ‘The primary purpose of giving a name to a taxon is to supply a means of referring to it rather than to indicate the characters or the history of the taxon’. If the names indeed were to reflect the characters of the taxa, then additional nomenclature changes would be necessary within the *Halobacteriales*.

For example, the genus *Natrialba* (‘sodium white’, referring to the high sodium requirement and the non-pigmented colonies) was originally created to accommodate a non-pigmented isolate, *Natrialba asiatica*, proposed as the type species of the genus (Kamekura & Dyal-Smith, 1995). The genus *Natrialba* currently also contains three red-pigmented species. According to Principle 4, the genus name does not need to be changed, although emendation of the genus description will be necessary. In the case of the genus name *Halobacterium* (Gr. n. *hals*, *halos* the sea, salt; Gr. n. *bakterion* a small rod; N.L. neut. n. *Halobacterium* salt rod), the name still appropriately describes the properties of the organism, and the etymology does not refer to the domain *Bacteria*.

Implementation of the newly proposed names would violate Principle 1(1) and 1(3) of the Code (aim at stability of names and avoid the useless creation of names) as well as Rule 55, which states that a legitimate name may not be replaced for instance because it is inappropriate, it is disagreeable or another name is preferable. One of the reasons for DasSarma & DasSarma (2008) to propose nomenclatural changes is their claim that the naming and renaming of certain species has led to much confusion in the scientific community. It is possible that part of the scientific community is unaware of the sources where correct and updated nomenclature information can easily be obtained [e.g. Jean Euzéby’s website (<http://www.bacterio.cict.fr>) as well as the periodically updated list in the website of the ICSP Subcommittee on the Taxonomy of *Halobacteriaceae* (<http://www.the-icsp.org/taxa/halobacterlist.htm>)]. Changing validly published names of taxa as suggested by DasSarma & DasSarma (2008) would not only be impossible under the Rules of the Code, but would inevitably cause more confusion.

It is possible that the genus *Halobacterium* needs a taxonomic re-evaluation and that the outcome of such a re-evaluation may in the future necessitate nomenclatural changes and the proposal of novel species. The Code encourages such re-evaluations, as 'Nothing in this Code may be construed to restrict the freedom of taxonomic thought or action' (addition to Principle 1 as approved by the International Committee on Systematic Bacteriology at its meeting in Sydney in 1999; De Vos & Trüper, 2000). There is still no well-defined species concept for the prokaryotes (Stackebrandt *et al.*, 2002; Wayne *et al.*, 1987), and this is true for the *Halobacteriaceae* as well. However, rules of nomenclature do not govern the delimitation of taxa nor determine their relations. The Rules are primarily for assessing the correctness of the names applied to defined taxa (General Consideration 4), and the name of a taxon should not be changed without sufficient reason based either on further taxonomic studies or on the necessity of giving up a nomenclature that is contrary to the rules of the Code (Principle 9). Whatever the outcome of a future taxonomic re-evaluation of the genus *Halobacterium* and its relatives, the genus name will have to be retained and *Halobacterium salinarum* will have to remain the type species of the genus, with ATCC 33171 as the type strain.

References

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