Taxonomic Note

Correspondence

Brian J. Tindall

email address can be found at
www.dsmz.de

Valid publication of names of prokaryotes according to the rules of nomenclature: past history and current practice

Brian J. Tindall,¹ Peter Kämpfer,² Jean P. Euzéby³ and Aharon Oren⁴

¹DSMZ – Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Inhoffenstrasse 7b, D-38124 Braunschweig, Germany

²Institut für Angewandte Mikrobiologie, Justus-Liebig-Universität Giessen, Heinrich-Buff-Ring 26-32, D-35392 Giessen, Germany

³Société de Bactériologie Systématique et Vétérinaire (SBSV) and École Nationale Vétérinaire de Toulouse (ENV), 23 Chemin des Capelles, BP 87614, 31076 Toulouse Cedex 3, France

⁴The Institute of Life Sciences, The Hebrew University of Jerusalem, 91904 Jerusalem, Israel

It is now 30 years since the concept of valid publication was introduced into prokaryote systematics in such a way that a system of registration/indexing was integrated. Despite the success of this system and the introduction of the Approved Lists of Bacterial Names, accompanied by a new starting date in prokaryote nomenclature, there is a need to review both the historical aspects and current practices so that the current generation of prokaryote systematists have an up-to-date overview of some of the key elements.

The nomenclature of prokaryotes was given a solid foundation based on the cumulative work of several generations of dedicated microbiologists (Lapage *et al.*, 1992; Skerman *et al.*, 1989; Ad Hoc Committee of the Judicial Commission of the ICSB, 1976; Sneath, 2005; Murray & Holt, 2001). The key element is a system of **valid publication** of a name, which constitutes a form of official registration/indexing of that name. The current system has been in operation since 1 January 1980. In order to be **validly published** a name must meet the requirements laid down in the Bacteriological Code. It would seem timely to remind prokaryote taxonomists and microbiologists, in general, of the way this system operates.

Revision of the Code to document names that conform to its rules

The first significant steps in providing clarity in prokaryote nomenclature was a major revision of the Bacteriological Code, resulting in the publication of the 1975 revision (Lapage *et al.*, 1976), which laid down clear guidelines, in the

form of **General Considerations, Principles, Rules and Recommendations**, together with suitable appendices. This revision introduced the novel concept of being able to unambiguously document names that conform to the Rules of the Bacteriological Code. **Rules 23 and 24** covered the key aspects of determining priority and publication of names. The novelty of **Rule 24** was that it relied on a system of registering/indexing names, i.e. **valid publication**. It should be noted that the 1966 version of the Bacteriological Code (Editorial Board of the Judicial Commission of the International Committee on Nomenclature of Bacteria, 1966) also used the concept of valid publication but, like the current *International Code of Botanical Nomenclature* (Greuter *et al.*, 2000), it did not include the concept of registration/indexing.

Lists of validly published names – the older literature

In parallel with the revision of the Bacteriological Code (Lapage *et al.*, 1976), an evaluation of existing names was

The Bacteriological Code recognizes the *International Bulletin of Bacterial Nomenclature and Taxonomy* (IBBNT), the *International Journal of Systematic Bacteriology* (IJSB) and the *International Journal of Systematic and Evolutionary Microbiology* (IJSEM). In the context of valid publication post 1976, only the IJSB and IJSEM need be mentioned, while current publications will only appear in the IJSEM.

Technical terms used in the Bacteriological Code are marked in bold text.

Names of Cyanobacteria/cyanophytes are currently not covered by the Bacteriological Code.

B. J. Tindall is Chairman of the ICSP Judicial Commission, P. Kämpfer is Editor of the IJSEM, J. P. Euzéby is List Editor of the IJSEM and A. Oren is Chairman of the ICSP.

undertaken to determine those that would be retained for the future, as well as providing mechanisms by which names created in the future would be made readily available to the scientific community. These mechanisms are the key elements of **valid publication of a name**. The system considered most suitable was three-tiered; one tier dealing with names of the past and two parallel tiers dealing with names of the future.

The system that was developed for the names of the past literature is documented in the Approved Lists of Bacterial Names (Skerman *et al.*, 1980a, b, 1989), a title which Skerman correctly pointed out in his preface meant that the placement of the name on the list had been 'approved' and not that the name itself was 'approved'. The Approved Lists of Bacterial Names contain a small number of names known to be synonyms, i.e. cases where taxonomic opinion was divided as to the most suitable name. A further key element in compiling the Approved Lists of Bacterial Names was to locate the authors, date and place of publication of the name and, in the case of genera, species and subspecies, to also provide reference to a suitable description, which was often a more recent publication in the case of older names. One of the additional key elements was also locating suitable type materials, preferably **type strains**. A decision was made at the 1978 International Congress of Microbiology in Munich, Germany, to list only a single designation, with preference being given to the American Type Culture Collection (Skerman *et al.*, 1980a, b, 1989). It is important, however, to remember that equivalent strains held by other culture collections may also serve as type material.

Names that did not appear on the Approved Lists of Bacterial Names lost standing in nomenclature. Thus all names on the Approved Lists of Bacterial Names are validly published and are automatically 'protected' over any other synonyms that would have competed for priority under earlier Codes. The Approved Lists of Bacterial Names was published both in book form (Skerman *et al.*, 1980b), including an amended edition (Skerman *et al.*, 1989), and also in the January 1980 issue of the *International Journal of Systematic Bacteriology* (IJSB) (Skerman *et al.*, 1980a). Given a deadline of 31 December 1977, it should be noted that **Rule 24a** of the Bacteriological Code, 1975 and 1990 revisions (Lapage *et al.*, 1976, 1992), clearly indicates that names validly published in the IJSB between 1 January 1978 and 1 January 1980 are also included in the Approved Lists of Bacterial Names. In addition to these lists, *Index Bergeyana* (Buchanan *et al.*, 1966) and the *Supplement to Index Bergeyana* (Gibbons *et al.*, 1981) contain comprehensive, but not necessarily exhaustive, lists of names, the majority of which lost standing in nomenclature on 1 January 1980.

Validly published names – new names and new combinations

Armed with the Approved Lists of Bacterial Names (Skerman *et al.*, 1980a, 1980b, 1989), the remaining task dealt with the future. While the major issue was the

description of new taxa and changes in nomenclature resulting from taxonomic revisions, it was also considered appropriate to provide a mechanism permitting taxonomists to recognize that an older name, which was not included on the Approved Lists of Bacterial Names, could also be **revived** and **validly published**. The principles behind the **Rules** that govern the mechanisms of valid publication of **new names** and **new combinations** (including **revived names**) are essentially based on those formulated in the 1975 revision of the Bacteriological Code (Lapage *et al.*, 1976), but have been revised in the light of experience and are documented in the 1990 revision of the Code (Lapage *et al.*, 1992), together with changes accepted by the ICSB/ICSP (International Committee on Systematic/s Bacteriology/ of Prokaryotes) at subsequent plenary sessions (Frederiksen, 1995; Labeda, 1997a, b, 2000; De Vos & Trüper, 2000; De Vos *et al.*, 2005; Goodfellow, 1995; Saddler, 2005).

Effective publication is the first step. The first criterion towards complying with valid publication is that a name must be **effectively published**, as laid down in **Rule 25**. Essentially the most important aspect being that publication is in a form that is widely available, cannot be altered, and is intended to serve as a permanent record. There is a tradition in prokaryote systematics that such works are peer-reviewed articles and some forms of publication are specifically listed as not being acceptable:

- (i) communications of new names or new combinations at a meeting, in minutes of a meeting or in abstracts of papers presented at meetings;
- (ii) placing of names in collections or in listings or catalogues of collections;
- (iii) distribution of microfilm, microcards or electronic files available on the Internet;
- (iv) reports in ephemeral publications, newsletters, newspapers, or non-scientific periodicals or books;
- (v) inclusion of a name in a published patent application or issued patents.

In addition, it is recommended that, when the name of a new taxon is published in a work written in a language unfamiliar to the majority of workers in bacteriology, the author(s) should include a description in English in the effective publication.

Rule 28b also clearly indicates that, under certain additional circumstances, published names cannot be considered to be **validly published**.

The requirements of valid publication

- (i) **The protologue.** Once it has been established that the type of publication of choice will allow the name to qualify as being **effectively published**, there are a number of formal

requirements that must be met in order that a name qualifies for being **validly published**. In essence, the current requirements are based on good taxonomic practice and experience gained over the past 25 years, with emphasis that an author must make it clear to the reader the taxonomic rank of the name being proposed, that a summary of properties of the taxon is listed, so that other workers can recognize that taxon, and that appropriate types are designated. This has now taken on a standardized format, called the **protologue**, which was introduced from January 2001 and is covered by **Rule 27(2)** (see Table 1 for an overview).

(a) The new name or new combination is clearly stated and indicated as such (i.e. fam. nov., gen. nov., sp. nov., comb. nov., etc.), in order to show clearly the intention of the author(s) to create a new name.

(b) The derivation (etymology) of a new name (and if necessary of a new combination) must be given.

(c) The properties of the taxon being described must be given directly after (a) and (b). This may include reference to tables or figures in the same publication or reference to previously effectively published work.

(d) All information contained in (c) should be accessible.

(ii) Designation of the type. The **nomenclatural type** of the taxon must be designated. Types of the various taxonomic categories can be summarized as follows – class and subclass: one of the contained orders; order, suborder, family, subfamily, tribe and subtribe: genus on whose name the name of the higher taxon is based; genus and subgenus: designated species; and species and subspecies: designated type strain (Table 2).

In the case of species and subspecies, a key issue is that the biological material on which such descriptions are based is widely available for both comparative and further study.

It is also a requirement of the Bacteriological Code (starting from January 2001) (De Vos & Trüper, 2000; Labeda, 2000) that authors of novel species, novel subspecies and new combinations provide evidence that types are deposited in at least two recognized culture collections in two different countries and from August 2002 the *International Journal of Systematic and Evolutionary Microbiology* (IJSEM), as the official organ of the ICSP, has asked that authors provide documented evidence from the collections confirming deposition and availability of **type strains**. The accession numbers assigned to the strain by the culture collections should be quoted in the published description.

After much discussion at recent meetings of the Judicial Commission and ICSP, it was finally decided that some forms of deposit are not widely available and should not serve as type strains. In advance of the publication of the minutes of the Judicial Commission, the wording chosen, which will be changed in **Rule 30**, was:

‘Organisms deposited in such a fashion that access is restricted, such as safe deposits or strains deposited solely for current patent purposes, may not serve as type strains.’

The ICSP and its Judicial Commission introduced these rules in order to counter the undesirable trend whereby unreasonable restrictions were placed on the strains or where access was being denied. In this regard, some exceptions may be made, particularly in cases where only a limited number of collections have access to certain technical facilities (e.g. extreme fastidious organisms, extreme barophiles or organisms of Risk Group 3, etc.). In advance of the publication of the minutes of the Judicial Commission the wording which will be added to Rule 30 is:

‘Note: In exceptional cases, such as organisms requiring specialized facilities (e.g. Risk Group/Biological Safety Level 3, high pressure, etc.), exceptions may be made to this Rule. Exceptions will be considered on an individual basis, by a committee consisting of the chairman of the ICSP, the chairman of the Judicial Commission and the Editor of the IJSEM. Exceptions will be made known at the time of publication.’

The deposit of strains in at least two different collections, in two different countries, also ensures a system whereby type material is stored in at least two different global locations, ensuring the safe storage of this material. These rules are constantly under review and are intended to uphold an unwritten principle of securing access to type material for furthering the goals of prokaryote systematics.

Original articles in the IJSB/IJSEM

Publication of a name in the IJSB/IJSEM constitutes **effective publication**, but only if it conforms to the requirements laid down in the Bacteriological Code, as outlined above, can it be considered to be **validly published**. In such cases it would be possible to indicate that a name has not met these criteria by adding a footnote to the **Notification Lists** or in cases of uncertainty making a **Request for an Opinion**. Publication of an original article in the IJSB/IJSEM does not automatically constitute **valid publication**, it must conform to the **Rules** of the Bacteriological Code.

Articles in other forms of effective publication

Only names that have been published in the IJSB/IJSEM and are supported by the criteria laid down in the Bacteriological Code are **validly published**. The IJSB/IJSEM serves as a central registration/indexing system and also provides a peer-review mechanism by which experts in prokaryote systematics can determine whether a name meets the requirements for **valid publication**. When a name is effectively published in another journal or in a book and it meets the requirements for **valid publication**, three hard copies (or an electronic copy of the published paper) may be submitted to the IJSEM Editorial Office (see the journal’s

Table 1. Overview of the requirements of the **protologue**, with cross-reference to other relevant **Rules** and their corresponding **Recommendations**

Rule/recommendation	Applicable to:	Requirement
Name*: Rule 27 (2a & 2b) See also Rules 6, 7, 8, 9, Section 9 and Appendix 9; Rules 10a–c, 29 (genus and subgenus names), 12a–c, 13a–d, 30, 32a & 40a–d (species and subspecies names)	New name	Give the new name being created and clearly state after it the rank: e.g. <i>Pseudohalomonas</i> gen. nov., <i>Pseudohalomonas marina</i> sp. nov. Include the pronunciation of the name followed by the origin of the name, Neo-Latin (N.L.), Medieval Latin (M.L.), Latin (L.), Greek (Gr.) and in the case of species epithets whether it is a noun (n.) or adjective (adj.). In the case of genera indicate the gender (masc., fem., neut.). [Pseu.do.ha.lo.mo'nas. Gr. adj. <i>pseudes</i> false; Gr. n. <i>hals halos</i> salt; Gr. n. <i>monas</i> a unit; N.L. fem. n. <i>Pseudohalomonas</i> the false, salt (loving) unit.] The gender of species and subspecies epithets that are based on adjectives must agree with the gender of the genus name; indicate whether it is noun (n.) or adjective (adj.). (ma.ri'na. L. fem. adj. <i>marina</i> of the sea) Do not use names that have been rejected by the Judicial Commission.
See also Rules 14b, 34a, 34b, 41a & b	New combination	The creation of a new combination applies primarily to species and subspecies and is indicated by the abbreviation comb. nov.
See also Rules 28a & 33c	Revived name	A name published prior to 1 January 1980, but not included on the Approved Lists of Bacterial Names. The authors consider that they have discovered a taxon which fits that description.
Properties: Rule 27(2c & 2d) See also Rules 29 & 30		The properties that characterize the taxon must be listed here. They must be based on experimental observation and the methods used to obtain these results clearly documented. The information may be based on data collected in the present work or also draw on other publications. Do not refer to data only available as supplementary data. Typically one starts with basic properties. In the case of genera, species and subspecies this would include cell shape, motility, colour (of cell suspensions/colonies), spore formation, Gram-staining, shape and size of colonies, etc. Salt, pH and temperature range/optima and relationship to oxygen (or other gases) are important parameters. Include all important biochemical properties. Chemotaxonomic data may include cell wall analysis, fatty acid composition, ether lipid composition, polar lipid composition, nature of any respiratory lipoquinones present and polyamines. Although not current practice, it would appear to be sensible to list any gene sequence accession numbers associated with (at least) type strains at this point. The G+C content is given in mol%. This list is by no means exhaustive.
Typification: Rules 15, 16, 17 & 27 (3) See also Rules 8 & 22	Class/subclass	The name of the class/subclass is based on a combination of characters of the taxon or from a single character of outstanding importance. The type of the class/subclass is one of the contained orders.
See also Rules 9 & 21a	Order, suborder, family, subfamily, tribe, subtribe	Base the name on one of the genera placed within these ranks. The genus on which the name is based becomes the type of these ranks. The endings used are listed in Table 2.
See also Rules 20a–g & 29	Genus and subgenus	Define one of the species within the genus/subgenus as the type species of the genus/subgenus (see Table 2).
See also Rules 12b, 18a, 18f, 30, 31a, 31b, 32a & 32b	Species/subspecies (includes new combinations)	The type strain must be deposited in (at least) two different collections in two different countries. Strains deposited in such a fashion that access is restricted (e.g. safe deposits or strains deposited solely for current patent purposes) may not serve as type strains (see Table 2).

*Readers are referred to resources located at the List of Prokaryote Names with Standing in Nomenclature at <http://www.bacterio.cict.fr> Specifically:

List of genders of genus names: <http://www.bacterio.cict.fr/gender.html>

Latin and Neo-Latin adjectives or participial adjectives used as specific or subspecific epithets: <http://www.bacterio.cict.fr/adjectives.html>

Genus names formed from personal names: <http://www.bacterio.cict.fr/personalnames.html>

Conserved names of prokaryotic taxa: <http://www.bacterio.cict.fr/conserved.html>

Rejected names of prokaryotic taxa: <http://www.bacterio.cict.fr/rejected.html>

Buchanan's articles on chemical terminology and microbiological nomenclature: <http://www.bacterio.cict.fr/buchanan.html>

Help! Latin! By Hans Trüper: <http://www.bacterio.cict.fr/trueper.html> (see also Trüper, 1999).

Table 2. Overview of taxonomic ranks, their suffixes and appropriate types as listed in the Bacteriological Code revisions 1975 and 1990 (Lapage *et al.*, 1992)

The ranks of subfamily, tribe, subtribe and subgenus are not widely used at present.

Rank	Suffix	Example*	Based on the type
Order	-ales	<i>Pseudomonadales</i>	<i>Pseudomonas</i> (genus)
Suborder	-ineae	<i>Pseudomonadineae</i>	<i>Pseudomonas</i> (genus)
Family	-aceae	<i>Pseudomonadaceae</i>	<i>Pseudomonas</i> (genus)
Subfamily	-oideae	<i>Pseudomonadoideae</i> †	<i>Pseudomonas</i> (genus)
Tribe	-eae	<i>Pseudomonadeae</i>	<i>Pseudomonas</i> (genus)
Subtribe	-inae	<i>Pseudomonadinae</i> †	<i>Pseudomonas</i> (genus)
Genus		<i>Pseudomonas</i>	<i>Pseudomonas aeruginosa</i> (species)
Species		<i>Pseudomonas aeruginosa</i>	RH 815 = ATCC 10145 = CCEB 481 = CCUG 551 = CCUG 28447 = CCUG 29297 = CFBP 2466 = CIP 100720 = DSM 50071 = IBCS 277 = IFO (now NBRC) 12689 = JCM 5962 = LMG 1242 = NCCB 76039 = NCIB (now NCIMB) 8295 = NCTC 10332 = NRRL B-771 = VKM B-588
Subspecies		<i>Pseudomonas aeruginosa</i> subsp. <i>aeruginosa</i> ‡	RH 815 = ATCC 10145 = CCEB 481 = CCUG 551 = CCUG 28447 = CCUG 29297 = CFBP 2466 = CIP 100720 = DSM 50071 = IBCS 277 = IFO (now NBRC) 12689 = JCM 5962 = LMG 1242 = NCCB 76039 = NCIB (now NCIMB) 8295 = NCTC 10332 = NRRL B-771 = VKM B-588

*Throughout these examples, at ranks higher than genus the stem is *Pseudomonad-*.

†Although included in the Bacteriological Code, revisions 1975 and 1990, the subfamily and subtribe names are not validly published.

‡The subspecies name *Pseudomonas aeruginosa* subsp. *aeruginosa* is not validly published, but would be created automatically (Rule 46) if *Pseudomonas aeruginosa* were to be divided into subspecies.

instructions to authors at <http://ijs.sgmjournals.org> for contact details) with the request that the name be included on a **Validation List**. If small details are missing from the original publication, such as etymology, designation of the type or citation of culture collections accession numbers, these may be added to the data in the **Validation Lists**. In exceptional cases, such data may be missing from effective publications in the IJSEM itself and this may also be corrected via publication of the name in the **Validation Lists**.

While it is the primary responsibility of the authors of new names or new combinations to submit articles containing names that are effectively published and conform to the **Rules** of the Bacteriological Code to the IJSEM, other scientists who are aware of publications in which names are effectively published that fit such criteria and have not appeared on the **Validation Lists** may also submit articles.

Authors of **effective publications** of names that do not meet the requirement for valid publication will be contacted with a brief summary of aspects which do not conform to the **Rules** of the Bacteriological Code.

Checking that names conform to the Rules of the Bacteriological Code

At a meeting of the Editorial Board of the IJSEM, held at the 2nd FEMS Symposium, in Madrid, on 6 July 2006, the opinion was expressed that there was a need to clarify the

requirements of **valid publication** of a name and also to review the process by which these names appear in the IJSEM. The Editorial Board expressed the opinion that it was necessary that the process of **valid publication** be outlined in a Note. It was emphasized that, in original articles submitted to the IJSEM, names should be automatically checked during the review and editing process for their conformity with the **Rules** of the Bacteriological Code. In the case of articles containing names that are submitted via the **Validation Lists**, it was felt that the same criteria apply and that authors should be aware that such names must be checked for conformity with the Bacteriological Code before they are included on those lists. The IJSEM, as the official publication of the ICSP, serves as the vehicle for **valid publication** of names and has the infrastructure in the form of an editorial board or members of the ICSP and its Judicial Commission who can evaluate whether a name can be **validly published**. The role of the List Editor, among others, is to compile a list of names for inclusion on the **Validation Lists**, acting on the advice of experts associated with the IJSEM/ICSP.

It is hoped that by outlining the mechanisms by which prokaryote names have been and are being validly published, these important procedures will reach a wider audience. While it serves as a guideline for authors submitting manuscripts to journals dealing with taxonomy and nomenclature, it is also intended to help the editorial boards of other journals or books publishing work dealing with nomenclatural and taxonomic matters. Key aspects of

the requirements of the 1990 revision of the Bacteriological Code (Lapage *et al.*, 1992), including recent revisions, are listed in Table 1. In cases of doubt, the experts within the ICSP are also willing to offer their expertise. Those reading this article are reminded that this is a summary of key elements and does not replace a more complete consideration of the Bacteriological Code (Lapage *et al.*, 1992) and modifications sanctioned by the ICSP. Some changes are also to be expected in the future, although we hope that these will be of a minor nature.

Finally, the authors would like to draw attention to the presence on the Internet of up-to-date, cumulative, authoritative lists of names of prokaryotes that have been **validly published** according to the Bacteriological Code.

List of Prokaryote Names with Standing in Nomenclature at <http://www.bacterio.cict.fr>

Bacterial Nomenclature Up-to-Date at <http://www.dsmz.de>

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References

- Ad Hoc Committee of the Judicial Commission of the ICSB (1976).** First draft. Approved Lists of Bacterial Names. *Int J Syst Bacteriol* **26**, 563–599.
- Buchanan, R. E., Holt, J. G. & Lessel, E. F. (1966).** *Index Bergeyana*. A companion volume to Bergey's Manual of Comparative Bacteriology. Baltimore: Williams & Wilkins.
- De Vos, P. & Trüper, H. G. (2000).** Judicial Commission of the International Committee on Systematic Bacteriology. IXth International (IUMS) Congress of Bacteriology and Applied Microbiology. Minutes of the meetings, 14, 15 and 18 August 1999, Sydney, Australia. *Int J Syst Evol Microbiol* **50**, 2239–2244.
- De Vos, P., Trüper, H. G. & Tindall, B. J. (2005).** Judicial Commission of the International Committee on Systematics of Prokaryotes. Xth International (IUMS) Congress of Bacteriology and Applied Microbiology. Minutes of the meetings, 28, 29 and 31 July and 1 August 2002, Paris, France. *Int J Syst Evol Microbiol* **55**, 525–532.
- Editorial Board of the Judicial Commission of the International Committee on Nomenclature of Bacteria (1966).** International Code of Nomenclature of Bacteria. *Int J Syst Bacteriol* **16**, 459–490.
- Frederiksen, W. (1995).** Judicial Commission of the International Committee on Systematic Bacteriology. Minutes of the meetings, 2 and 6 July 1994, Prague, Czech Republic. *Int J Syst Bacteriol* **45**, 195–196.
- Gibbons, N. E., Pattee, K. B. & Holt, J. G. (1981).** *Supplement to Index Bergeyana*. Baltimore: Williams & Wilkins.
- Goodfellow, M. (1995).** International Committee on Systematic Bacteriology. XVI International Congress of Microbiology. Minutes of the meetings, 2, 3 and 5 July 1994, Prague, Czech Republic. *Int J Syst Bacteriol* **45**, 613–615.
- Greuter, W., McNeill, J., Barrie, F. R. & 9 other editors (2000).** *International Code of Botanical Nomenclature (Saint Louis Code)*. Regnum Vegetabile, vol. 138. Königstein, Germany: Koeltz Scientific Books.
- Labeda, D. P. (1997a).** Judicial Commission of the International Committee on Systematic Bacteriology. VIIIth International Congress of Microbiology and Applied Bacteriology. Minutes of the meetings, 17 and 22 August 1996, Jerusalem, Israel. *Int J Syst Bacteriol* **47**, 240–241.
- Labeda, D. P. (1997b).** International Committee on Systematic Bacteriology. VIIIth International Congress of Microbiology and Applied Bacteriology. Minutes of the meetings, 17, 18 and 22 August 1996, Jerusalem, Israel. *Int J Syst Bacteriol* **47**, 597–600.
- Labeda, D. P. (2000).** International Committee on Systematic Bacteriology. IXth International (IUMS) Congress of Bacteriology and Applied Microbiology. Minutes of the meetings, 14 and 17 August 1999, Sydney, Australia. *Int J Syst Evol Microbiol* **50**, 2245–2247.
- Lapage, S. P., Sneath, P. H. A., Lessel, E. F., Skerman, V. B. D., Seeliger, H. P. R. & Clark, W. A. (editors) (1976).** *International Code of Nomenclature of Bacteria (1975 Revision)*. Washington, DC: American Society for Microbiology.
- Lapage, S. P., Sneath, P. H. A., Lessel, E. F., Skerman, V. B. D., Seeliger, H. P. R. & Clark, W. A. (editors) (1992).** *International Code of Nomenclature of Bacteria (1990 Revision)*. Bacteriological Code. Washington, DC: American Society for Microbiology.
- Murray, R. G. E. & Holt, J. G. (2001).** The history of Bergey's Manual. In *Bergey's Manual of Systematic Bacteriology*, 2nd edn, pp. 1–13. Edited by D. R. Boone & R. W. Castenholz. New York: Springer.
- Saddler, G. S. (2005).** International Committee on Systematics of Prokaryotes. Xth International (IUMS) Congress of Bacteriology and Applied Microbiology. Minutes of the meetings, 28 and 30 July 2002, Paris, France. *Int J Syst Evol Microbiol* **55**, 533–537.
- Skerman, V. B. D., McGowan, V. & Sneath, P. H. A. (editors) (1980a).** Approved Lists of Bacterial Names. *Int J Syst Bacteriol* **30**, 225–420.
- Skerman, V. B. D., McGowan, V. & Sneath, P. H. A. (editors) (1980b).** *Approved Lists of Bacterial Names*. Washington, DC: American Society for Microbiology.
- Skerman, V. B. D., McGowan, V. & Sneath, P. H. A. (editors) (1989).** *Approved Lists of Bacterial Names (Amended Edition)*. Washington, DC: American Society for Microbiology.
- Sneath, P. H. A. (2005).** The preparation of the Approved Lists of Bacterial Names. *Int J Syst Evol Microbiol* **55**, 2247–2249.
- Trüper, H. G. (1999).** How to name a prokaryote? Etymological considerations, proposals and practical advice in prokaryote nomenclature. *FEMS Microbiol Rev* **23**, 231–249.