Minutes

J. J. Farmer III, *Secretary*
Barry Holmes, *Chairman*

International Committee on Systematics of Prokaryotes

Subcommittee on the taxonomy of *Aeromonadaceae*, *Vibrionaceae* and related organisms

Minutes of the meetings, 25 July 2005, San Francisco, CA, USA

Session 1. Closed meeting

Minute 1. Call to order and welcome by Chairman. The closed meeting was called to order at 09:00 on 25 July 2005 in Room 230 of the Moscone Convention Center by Chairman Barry Holmes. J. J. Farmer had previously agreed to serve as Secretary in light of the resignation of G. B. Nair, the previous secretary.

Minute 2. Record of attendance, apologies for absence. Members present were B. Holmes (Chairman), J. J. Farmer (Secretary), Rudolph Hugh (Honorary member), J. Michael Janda, Kumiko Kita-Tsukamoto, Y. Kosako and S. Shinoda. Apologies for absence were received from R. R. Colwell, Amy J. Horneman (listed previously as Amy Martin-Carnahan), Anwaral Huq, Geert Huys, G. Balakrish Nair, Henning Sørum, Fabiano Thompson and Antonio Ventosa. No response was received from other members, so they need to be contacted to determine whether they wish to retire from the subcommittee.

Minute 3. Opening remarks by the Chairman. The chairman opened the meeting with a special welcome and introduction for Dr Rudolph 'Rudy' Hugh who was our honoured guest to help celebrate the 40th anniversary of the Subcommittee. Dr Hugh was present at the first subcommittee meeting in 1965, at which time *Aeromonas* was included within the Family *Pseudomonadaceae*, and had been invited to talk about the organization and early days of the subcommittee. In the open meeting he was to present a lecture – *The Persistent Species Enigma* to celebrate the 40th anniversary of the Subcommittee.

Minute 4. Historical perspectives of the Subcommittee presented by R. Hugh in celebration of its 40th anniversary, 1965–2005. The first meeting of the subcommittee was on January 29, 1965 in Honolulu, Hawaii, USA, which makes it one of the oldest subcommittees of the ICSP. In the years preceding 1965 in its organizational stages, the subcommittee had only three members – J. C. Feeley, R. Hugh and R. Sakazaki. They were joined subsequently by S. Mukerjee and C. R. Manclark. With the exception of the latter, the other four

held the first official meeting of the subcommittee on 29 January 1965 in Honolulu, Hawaii, with R. Hugh as Chairman and J. C. Feeley as Secretary. The minutes of the first subcommittee meeting were published in the *International Journal of Systematic Bacteriology* [16 (1966), 135–142] and are listed along with all the other published minutes on the subcommittee's internet site. Its name in 1965 was 'The Subcommittee on Taxonomy of *Vibrios*' and many of the early discussions centred on the two important *Vibrio* species *Vibrio cholerae* and '*Vibrio eltor*'. There were heated discussions in the subcommittee and in the scientific community on whether these two organisms should be considered as the same or different species. R. Hugh passed out a paper he wrote and presented in 1965 'Nomenclature and Taxonomy of *Vibrio cholerae* Pacini 1854 and *Vibrio eltor* Pribram 1933' (US Public Health Service, Proceedings of the Cholera Research Symposium, 1965) that critically examined several issues. A divided subcommittee voted that these two organisms should be included in the same species, but as distinct biogroups. This helped to settle the issue and was important in forming an operational definition for the two organisms which is now widely accepted.

R. Hugh told of some of the early meetings and accomplishments of the subcommittee which included: proposing neotype strains of *V. cholerae* and '*V. eltor*' (later affirmed by the Judicial Commission); forming definitions of the genus *Vibrio* and its species; commenting on the differentiation of *Vibrio* species from *Aeromonas* species, formulating better techniques for differentiating the many *Vibrio* species and biogroups, issuing majority and minority reports on issues being discussed, and using mail correspondence to discuss and then vote on important issues. Our subcommittee internet site provides the literature citations for the minutes of subcommittee meetings that provide additional historical insights. The Subcommittee Secretary has a large box of subcommittee papers including letters, questionnaires, notes, photographs, reprints, and similar historical items. The tradition had been and should remain to preserve this file for its historical significance.

Minute 5. Responses to a questionnaire that had been distributed to subcommittee members. The Chairman

had previously circulated via e-mail two drafts of proposed agendas as well a questionnaire to discuss pending issues or problems and other items for possible discussion. Seven of 15 subcommittee members responded with comments or answers to the questions proposed.

At the 2002 meeting in Paris J. J. Farmer had proposed (see Minute 8 of that meeting) that official subcommittee business such as formal discussions and votes be done by e-mail to allow more input and assure that each member had a voice in the final decision. This was in response to the limited funding for travel to international meetings, the most common venue for actual subcommittee meetings. It would also revive the long-standing practice of doing all votes by mail because of limited attendance at subcommittee meetings. All those that responded to the questionnaire agreed that e-mail was the best way to handle discussions and votes.

The issue was raised on the questionnaire whether a separate subcommittee should be formed to deal with *Aeromonas* and its closest relatives or whether these organisms should continue to be considered as part of the *Vibrionaceae* Subcommittee. Only one member voted for forming a separate Subcommittee for *Aeromonas* and its closest relatives. Thus there was almost complete agreement that the *Vibrionaceae* Subcommittee should continue to deal with the organisms that it has historically dealt with, but that are now included in two different families, *Aeromonadaceae* and *Vibrionaceae*. Also included would be 'related organisms', which could include the genus *Plesiomonas*, which until recently was considered to be in the family *Vibrionaceae*. This issue of the genus *Plesiomonas* will need to be co-ordinated with the *Enterobacteriaceae* Subcommittee because of proposed alternative classifications of *Plesiomonas* in that family.

The traditional name of the subcommittee has thus been the *Vibrionaceae* Subcommittee but, with the foregoing changes in classification a more appropriate name appeared to be one that included *Aeromonadaceae* and also 'related organisms'. Two proposals had been made in a questionnaire submitted to the membership prior to the meeting. Members were asked to vote for their preference for one of two proposed new names: 1. The Subcommittee on the Taxonomy of *Vibrionaceae* and related organisms (Véron 1965); or 2. The Subcommittee on the Taxonomy of *Aeromonadaceae*, *Vibrionaceae* and related organisms. Though not unanimous, the majority vote was for the latter, which has become duly adopted as the current name of the subcommittee.

There was no clear majority agreement on the other issues presented on the questionnaire, thus no additional action was indicated at this time (see Open Meeting Minutes for discussion).

Minute 6. Approval of agenda. The revised agenda was approved.

Minute 7. Minutes of the previous meetings held in Paris in 2002. These had been approved, published [*Int J Syst Evol Microbiol* 55 (2005), 539–542], and listed on the subcommittee internet site (<http://www.the-icsp.org/subcoms/vibrionaceae.htm>).

Minute 8. Current membership and officers. G. B. Nair resigned as Secretary, and the Subcommittee expressed its sincere thanks for his service. J. J. Farmer and F. Thompson volunteered to be Secretary, but the latter was unable to attend the San Francisco meeting so J. J. Farmer will serve as Secretary.

Membership and officers are: B. Holmes (Chairman; UK), J. J. Farmer (Secretary; USA), R. R. Colwell (USA), A. J. Horneman (listed previously as Amy Martin-Carnahan; USA), Rudolph Hugh (Honorary member; USA), A. Huq (USA), G. Huys (Belgium), J. M. Janda (USA), Sam W. Joseph (USA), K. Kita-Tsukamoto (Japan), Y. Kosako (Japan), G. B. Nair (India), Ralph Schubert (Germany), S. Shinoda (Japan), H. Sørum (Norway), F. Thompson (Brazil) and A. Ventosa (Spain). They are listed on the subcommittee internet site which includes a reference to current affiliation and contact information (<http://www.the-icsp.org/contacts.htm>).

Three additional candidates have been submitted for consideration as future members of the subcommittee or one of its working groups. These were Jim Oliver, University of North Carolina, Charlotte (proposed by R. Colwell), Indrani Karunasagar, Mangalore, India (proposed by R. Colwell and G. B. Nair) and Tomoo Sawabe, Japan (proposed by K. Kita-Tsukamoto). It was proposed that, in the first instance, the Chair of the *Vibrio* working group, K. Kita-Tsukamoto, should invite them to membership of the group.

Minute 9. Report of the working group on *Aeromonas* taxonomy. This report was given by B. Holmes on behalf of A. J. Horneman, the working group chair who was unable to attend.

Summary of the Minutes of the *Aeromonas* working group meeting held during the 8th International *Aeromonas/Plesiomonas* Symposium, Halifax, Nova Scotia, USA on June 17, 2005.

(i) A previous agenda item from the 1999 Chicago meeting was the concern over possible confusion surrounding the usage of the nomenclature *Aeromonas veronii* biovars *sobria* and *veronii*. Three possible alternatives were suggested and briefly discussed and a future vote by e-mail was suggested. However, in light of the fact that this terminology has become well-accepted and used as such throughout the literature, including *Bergey's Manual of Systematic Bacteriology* (Vol. 2) and the *Manual of Clinical Microbiology Aeromonas* chapters, the need for an electronic vote for alternative nomenclature seems to be no longer warranted.

(ii) The validity of retaining subspecies designations within *Aeromonas salmonicida* was briefly discussed but, because of the growing number of 'atypical' strains, the matter was again deferred for further discussion.

(iii) The prioritization between *Aeromonas trota* and *Aeromonas enteropelogenes* was addressed in a 2002 IJSEM article by Huys *et al.* [*Int J Syst Evol Microbiol* **52** (2002), 1969–1972], where the consensus was that they are synonyms, and although the latter was proposed a few months prior to the former, *A. trota* has such a broad-based usage in the literature that perhaps it should be the preferred nomenclature. A Request for an Opinion on this matter, similar to the outstanding one concerning the priority of *Aeromonas punctata* over *Aeromonas caviae* should undoubtedly be written in the future, when that precedent Opinion has been published.

(iv) Data supporting the fact that *Aeromonas ichthiosmia* is a later synonym of *A. veronii* biovar *sobria* has also been published by Huys *et al.*, and likewise *A. ichthiosmia* has been dealt with as such in the *Aeromonas* chapters in *Bergey's Manual of Systematic Bacteriology* (Vol. 2) and the *Manual of Clinical Microbiology*.

(v) The *A. encheleia*/*A. eucrenophila* Group II/DNA HG 11 controversy is still under active consideration. It had been proposed at the Chicago meeting that Drs Brenner and Farmer be approached to be a third independent laboratory for definitive DNA–DNA hybridization data analyses. However, this never transpired due to the retirement of both parties from CDCP. Dr Huys did publish a subsequent paper in *Systematic and Applied Microbiology* in 2004 on another group of 'Aeromonas eucrenophila-like' isolates, but this did not resolve the foregoing original issues.

(vi) There had been past discussion about the validity of the separation of the two closely related species, *Aeromonas salmonicida* and *Aeromonas bestiarum*. However, Soler *et al.* [*Int J Syst Evol Microbiol* **54** (2004), 1511–1519] using multilocus sequence typing (MLST) with the *gyrB* and *rpoD* genes among the genus *Aeromonas*, provided initial evidence for the clear phylogenetic divergence between these two species to warrant their remaining as separate species. They have been treated as such in the *Aeromonas* chapters in *Bergey's Manual of Systematic Bacteriology* (Vol. 2) and the *Manual of Clinical Microbiology*.

(vii) It is hoped that future studies using MLST and numerous other genes to examine the genus *Aeromonas* will possibly shed some light on other currently unresolved 'species-related' issues within the genus.

(viii) Although minimal standards for the description of new taxa of *Aeromonas* are needed, no one has expressed a willingness to tackle this project at the present time. Drs Horneman (formerly Martin-Carnahan) and Huys would still like to be considered as possible authors of such a document at some future date.

(ix) Since the last published minutes of the working group, three subspecies of *Aeromonas hydrophila* and three novel species of *Aeromonas* have been proposed. They are as follows:

Aeromonas hydrophila subsp. *hydrophila* [Huys *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 705–712]

Aeromonas hydrophila subsp. *dhakensis* [Huys *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 705–712]

Aeromonas hydrophila subsp. *ranae* [Huys *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 885–891]

Aeromonas culicicola [Pidiyar *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 1723–1728]

Aeromonas simiae [Harf-Monteil *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 481–485]

Aeromonas molluscorum [Minana-Galbis *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 2073–2078]

(x) Both the type strain of *Aeromonas hydrophila* ATCC 7966^T and an *Aeromonas salmonicida* strain from diseased brown trout have had their complete genome sequenced and were due to be published by the end of 2006. The former was being done with NSF funding given to TIGR (The Institute for Genomic Research) with Dr A. Horneman as the principal investigator and the latter was being done at the National Research Council-Institute for Marine Biosciences under the direction of Drs Laura Brown and Michael Reith.

(xi) The 8th International Symposium on *Aeromonas* and *Plesiomonas* was held at the NRC Halifax Institute from June 15–17, 2005 with over 75 participants and 25 invited speakers, including *Aeromonas* working group members A. J. Horneman, G. Huys, A. Martinez-Murcia and B. Austin. There were also 41 poster presentations of current research. It was determined by voting that the next meeting will be in Vila Real, Portugal, 10–12 September 2008.

Minute 10. Report of the working group on *Vibrio* taxonomy. K. Kita-Tsakamoto, chair of the working group, passed out a six-page written report describing the group's activities. A list of *Vibrio* species has been compiled and posted on the subcommittee internet site (<http://www.the-icsp.org/taxa/vibriolist.htm#vibrio>). This list will be updated with 16S rRNA gene accession numbers in due course since these data are becoming used in many classification studies. The report included a tentative list of these numbers. Whilst *Vibrio* continues to be classified in the family *Vibrionaceae*, there have been several proposals to subdivide it into new genera that include species that are closely related in an evolutionary sense. A list of these was included in the report and additional lists can be found on several internet sites and also in the 2005 Edition of *Bergey's Manual of Systematic Bacteriology* (pages 494–546). These are by definition 'alternative classifications' for the genus *Vibrio* that

compete for usage in the literature with 'original classification'.

Minute 11. Establishment of a subgroup on *Vibrio* sequencing. This group has been proposed as an aid to 'set priorities and recommendations as to which strains/species should be sequenced'. Priority might be based on criteria such as taxonomic, economic, pathogenicity, public health, etc. R. R. Colwell and A. Ventosa expressed an interest to lead in this activity.

Minute 12. Date and location of next scheduled subcommittee meeting. These will be organized by the officers and scheduled at the IUMS International Congress on Bacteriology in Istanbul, Turkey, August 5–9, 2008 (<http://www.iums2008.org/>).

Minute 13. Adjournment. The meeting was adjourned at 10:33 on 25 July 2005.

Session 2. Open meeting

Minute 14. Call to order and welcome by Chairman. The open meeting was called to order by Chairman Barry Holmes at 10:35 on 25 July 2005 in room 230 of the Moscone Convention Center.

Minute 15. Record of attendance. Members present were B. Holmes (Chairman), J. J. Farmer (Secretary), R. Hugh (Honorary member), J. M. Janda, K. Kita-Tsukamoto, Y. Kosako, S. Shinoda and two guests.

Minute 16. Chairman's report on activities of the Subcommittee.

(i) The chairman gave several updates on correspondence and questionnaire responses received from subcommittee members, brief reports, comments or suggestions concerning the taxonomy of the genera *Aeromonas* and *Vibrio* and related organisms and proposals for future activities of the subcommittee or its working groups.

(ii) R. R. Colwell raised the issue of how the genus *Vibrio* is 'being split', i.e. through 'alternative classifications' that are being proposed in the literature. How did we feel, for example, about proposals such as *Grimontia* Thompson *et al.* 2003?

(iii) Fabiano Thompson raised the issue of the definition of species in the genus *Vibrio* and its future perspectives.

(iv) There was a discussion of proposed changes in nomenclature or classification and of newly described organisms since the last subcommittee meeting.

(v) J. J. Farmer and J. M. Janda related their experiences in writing the chapters on *Vibrionaceae* and *Vibrio* for the new edition of *Bergey's Manual of Systematic Bacteriology*. Several problems had been noted in the areas of nomenclature, classification, pronunciation and the

Bacteriological Code. Each of these deserves a complete discussion and with the proposal of solutions or resolution. Several of these were discussed (see vi–xii below).

(vi) '*Vibrionales*' – this name is being used in the literature even though it has never been proposed. It is sometimes written without quotation marks which are used to warn that it is an illegitimate (non-proposed) name. Authors using the name have indicated that it would seem to be a good idea to propose it formally so it can change in status from illegitimate to legitimate.

(vii) In the genus *Vibrio* some names have a complex or convoluted history such that it may be difficult to determine the correct citation under the *Bacteriological Code*. For example, the following complex citation was needed for *Vibrio natriegens* in *Bergey's Manual of Systematic Bacteriology*.

Vibrio natriegens (Payne, Eagon and Williams 1961) Baumann, Baumann, Bang and Woolkalis 1981, 217^{VP} (Effective publication: Baumann, Baumann, Bang & Woolkalis, 1980, 127) [*Pseudomonas natriegens* Payne, Eagon and Williams 1961, 125; '*Vibrio natriegens*' (Payne, Eagon and Williams 1961) Webb and Payne 1971, 1080; *Beneckea natriegens* (Payne, Eagon and Williams 1961) Baumann, Baumann and Mandel 1971a, 291].

(viii) The way genus and species names are divided into syllables has not been consistent. This is also true for syllables that are accented. Should these pronunciations be corrected?

(ix) The specific epithet '*damselae*' in '*Vibrio damsela*' is without standing in nomenclature, but is being used in the literature. This is causing confusion.

(x) At least one *Vibrio* species is represented by a type strain that was deposited as a 'patent strain' and thus is essentially unavailable for acquisition or study.

(xi) Judicial matters. The *Bacteriological Code* is sometimes unclear or does not cover a specific situation. Should we and other subcommittees form a working group(s) on the *Bacteriological Code* to address our specific issues and other problems? What is our role as individual scientists vs our role as Subcommittee members?

(xii) The subcommittee internet site (<http://www.the-icsp.org/subcoms/vibrionaceae.htm>) has been improved and up-dated, and this must be a continuing process.

(xiii) The development of minimal standards for organisms covered by our subcommittee needs further discussion. Is it perhaps time to form a new working group to progress the issue.

(xiv) A discussion was held on the importance of using precise names in describing names and classifications. A point of confusion was discussed – the confusion about usage as to 'original classification' and 'proposed alternative classification' of a taxon. There is a general belief in the scientific community that the most recent 'proposed

alternative classification' equates to 'correct names' and 'correct classification'. This is an erroneous assumption and a serious misunderstanding of the rules of the *Bacteriological Code*. All classifications are equal unless they are in conflict with one or more rules of the *Bacteriological Code*. Usage determines the usefulness and acceptance of all competing classifications; there is no such entity as the 'correct classification'. The *Bacteriological Code* may need amending to help clarify this issue.

Minute 17. 'The persistent species enigma' a celebratory lecture delivered by Rudolph Hugh (Subcommittee Honorary member) commemorating the 40th Anniversary of the Subcommittee. Dr Hugh has had a lifelong interest in the concept of a 'bacterial species' and has done extensive reading and research on the subject. He presented his findings on this subject in a historical and interesting manner, and used helpful illustrations of the changing species definition. The concept and definitions have evolved as scientific methodology has improved.

Minute 18. Other business. Members were invited to attend the Subcommittee dinner at Millennium Restaurant in San Francisco; members and several guests attended. Members were also invited to attend a cruise along San Francisco Bay that was being hosted by Biolog Inc. Hayward, CA, USA. Biolog's hospitality is hereby gratefully acknowledged for a pleasant evening of sailing, food, wine and fellowship of subcommittee members and guests.

J. J. Farmer alerted members that a meeting to reinvigorate the *Enterobacteriaceae* Subcommittee was going to be held at this IUMS Congress, Thursday, July 28, 09:00 to noon, room 232, Moscone Center as listed on page XIII of the official program. Those interested in our 'sister Family' of organisms were invited to give input on the reorganization and attend (for more details see: the internet site of the *Enterobacteriaceae* Subcommittee: (<http://www.the-icsp.org/subcoms/Enterobacteriaceae.htm>)).

Minute 19. Adjournment. The meeting was adjourned at 12:05 on 25 July 2005.