

## Minutes

Günter Klein, *Secretary*

# International Committee on Systematics of Prokaryotes

## Subcommittee on the taxonomy of *Bifidobacterium*, *Lactobacillus* and related organisms

Minutes of the meetings, 1 and 2 April 2005, Stuttgart-Hohenheim, Germany

### Session 1 – Open meeting

**Minute 1. Call to order.** The open meeting was called to order at 13:15 on 1 April 2005 by the Chairman F. Dellaglio.

**Minute 2. Record of attendance.** The members present were B. Biavati (Deputy Chairman), F. Dellaglio (Chairman), W. P. Hammes, W.-H. Holzapfel, A. Kagermeier-Callaway, G. Klein (Secretary), B. Pot and G. Reuter. Apologies for absence were received from L. M. T. Dicks (Deputy Chairman), F. Gasser, M. C. Montel, E. Lauer, J. London, T. Mitsuoka, B. Sgorbati and N. Weiss. No apologies were received from M. D. Collins. The guests present were C. Bonaparte, J. Björkroth and M. Vancanneyt (as potential new members) and members of Hohenheim University and Karlsruhe.

**Minute 3. Call for research reports.** The following research reports on topics related to taxonomy of lactobacilli and bifidobacteria were presented:

Marc Vancanneyt: New species (2002-on) and taxonomic issues of the genus *Lactobacillus*.

Wilhelm Holzapfel (as a substitute for Einar Ringø): New species (2002-on) and taxonomic issues of the genus *Carnobacterium*.

Johanna Björkroth: New species (2002-on) and taxonomic issues of the genus *Leuconostoc*.

Christine Bonaparte: Identification of *Bifidobacterium* species from animal feces and along the meat processing chain.

A brief discussion followed each presentation.

**Minute 4. Adjournment.** The chairman thanked all the presenters for their contributions. The open meeting was adjourned at 15:05 on 1 April 2005.

### Session 2 – Closed meeting

**Minute 5. Call to order.** Chairman F. Dellaglio called the closed meeting to order at 15:30 on 1 April 2005.

**Minute 6. Record of attendance.** The members present were B. Biavati (Deputy Chairman), F. Dellaglio (Chairman), W. P. Hammes, W.-H. Holzapfel, A. Kagermeier-Callaway, G. Klein (Secretary), B. Pot and G. Reuter. Apologies for absence were received from L. M. T. Dicks (Deputy Chairman), F. Gasser, M. C. Montel, E. Lauer, J. London, T. Mitsuoka, B. Sgorbati and N. Weiss. No apologies were received from M. D. Collins. The guests present were C. Bonaparte, J. Björkroth, and M. Vancanneyt (as potential new members).

**Minute 7. Agenda.** The proposed agenda was approved.

**Minute 8. Approval of minutes.** The minutes of the meetings of the subcommittee in Verona, Italy, on 14 and 15 June 2002, were approved with two minor modifications.

**Minute 9. Membership.** Notices of resignation were received from J. London, T. Mitsuoka, F. Gasser, N. Weiss and E. Lauer. The subcommittee accepted the resignations with the exception of E. Lauer, because no formal resignation letter had been received from him. The Chairman and all present members of the subcommittee expressed their gratitude for the work and contributions of the retiring members. J. Björkroth, C. Bonaparte and M. Vancanneyt were present as candidates for membership. The subcommittee accepted all of the candidates as new members. E. Ringø was considered as a candidate, provided that he would be present at the next meeting with a presentation at the open meeting. The members also agreed to exclude non-active members if they do not attend meetings and/or do not contribute further to the work of the subcommittee.

**Minute 10. International Committee.** It was noted by the Chairman and the Secretary that the affiliation of the

Subcommittee had changed from the International Committee on Systematic Bacteriology (ICSB) to the International Committee on Systematics of Prokaryotes (ICSP) due to the renaming of the ICSB and the broadening of its scope.

**Minute 11. Scope of the Subcommittee.** The status quo of genera within the scope of the subcommittee is as follows: *Bifidobacterium*, *Lactobacillus*, *Aerococcus*, *Carnobacterium*, *Leuconostoc*, *Pediococcus*, *Tetragenococcus*, *Weissella*, *Oenococcus*, *Vagococcus*, *Gardnerella*, *Paralactobacillus*, *Scardovia* and *Parascardovia*. Several new genera have been described which should be in the scope of the subcommittee according to their taxonomic position. The subcommittee proposed to include the new genera *Isobaculum*, *Aeriscardovia*, *Lactosphaera* and *Desemzia* in the scope of the subcommittee, whereas for the genera *Olsenella* and *Melissococcus*, it was concluded that they fall into the scope of the Subcommittee on the taxonomy of staphylococci and streptococci.

**Minute 12. Call for old business.** The problem of differentiation of the species *Bifidobacterium longum*/*Bifidobacterium infantis*/*Bifidobacterium suis* was discussed. B. Biavati pointed out that *B. infantis* and *B. suis* belong to the species *B. longum* and consequently three new subspecies of *B. longum* should be proposed. B. Biavati agreed to elaborate a Request for an Opinion concerning this problem. The subcommittee disagreed with the paper of Sakata *et al.* [*Int J Syst Evol Microbiol* 52 (2002), 1945–1951] and the unification of *B. infantis* and *B. suis* as *B. longum* and the establishment of only biotypes of the latter. The subcommittee noted again the problems with the type strains within the *Bifidobacterium indicum*/*Bifidobacterium coryneforme*/*Bifidobacterium asteroides* group. B. Biavati agreed to collect the type strains from different culture collections and to compare them and apply DNA fingerprinting. B. Biavati, B. Pot, C. Bonaparte and G. Klein agreed to reinvestigate the type strains and to report back to the subcommittee. In the meantime, *Bifidobacterium lactis* has been reclassified as a subspecies of *Bifidobacterium animalis* and consequently two new subspecies have been established: *Bifidobacterium animalis* subsp. *animalis* and *Bifidobacterium animalis* subsp. *lactis*. The origin of the type strain of the former species *B. lactis* remains unclear (isolation from yoghurt or re-isolation). B. Biavati will perform further investigations. Since the last meeting of the subcommittee no decision has been taken by the Judicial Commission concerning the rejection of *Lactobacillus paracasei*, the designation of strain ATCC 334 as the neotype of *Lactobacillus casei* and the reclassification of the current type strain of *Lactobacillus casei* ATCC 393<sup>T</sup>. The decision was postponed to the next meeting of the Judicial Commission in July 2005 in San Francisco. The whole subcommittee strongly supports the rejection of strain ATCC 393<sup>T</sup> as the type strain of *L. casei*. F. Dellaglio, A. Callaway, B. Pot, M. Vancanneyt, L. M. T. Dicks and G. Klein agreed to prepare a Request for an

Opinion. No new information was available concerning the separate species status of *Lactobacillus animalis* and *Lactobacillus murinus*. M. Vancanneyt agreed to undertake DNA–DNA hybridization studies.

**Minute 13. Adjournment.** The first session of the closed meeting of the Subcommittee on the Taxonomy of *Bifidobacterium*, *Lactobacillus* and Related Organisms was adjourned by the Chairman at 18:00 on 1 April 2005.

### Session 3 – Closed meeting

**Minute 14. Call to order.** Chairman F. Dellaglio called the second session of the closed meeting to order at 08:30 on 2 April 2005.

**Minute 15. Record of attendance.** The members present were B. Biavati (Deputy Chairman), C. Bonaparte, J. Björkroth, F. Dellaglio (Chairman), W. P. Hammes, W.-H. Holzapfel, A. Kagermeier-Callaway, G. Klein (Secretary), B. Pot, G. Reuter and M. Vancanneyt. For apologies, see Minute 6.

**Minute 16. Minimal Standards.** The minimal standards for description of novel species within the genus *Bifidobacterium* have not so far been published in *IJSEM*. The subcommittee identified the following minimal requirements for the description of novel species within the scope of the subcommittee: classical morphological characteristics, physiology (growth characteristics, temperature, lowest pH, culture medium), ecology (origin and habitat of type strain), biochemical characteristics, DNA–DNA-hybridization data, DNA G+C content (mol%), cell-wall composition (chemotaxonomy) in the case of heterofermentative lactobacilli, bifidobacteria, *Weissella* and *Leuconostoc*, 16S rRNA gene sequence data (>97% similarity as a prerequisite) and other genes. An additional requirement could be genotyping of the strain. The description of species or genera comprising only one strain should be limited to exceptional situations.

Working groups were established for the following genera in order to prepare minimal standards for the respective genus/genera (\* indicates the coordinator of the group): *Lactobacillus* and *Paralactobacillus* (Dellaglio\*, Hammes, Klein, Vancanneyt, Pot, Callaway), *Bifidobacterium*, *Gardnerella*, *Scardovia*, *Parascardovia* and *Aeriscardovia* (Lauer, Biavati\*, Bonaparte), *Weissella* (Holzapfel\*, Hammes), *Leuconostoc* (Holzapfel, Björkroth\*), *Pediococcus* (Holzapfel\*, Hammes, Dellaglio, Dicks), *Oenococcus* (Dicks\*, Dellaglio), *Tetragenococcus* (Dicks, Holzapfel, Hammes\*, Dellaglio) and *Carnobacterium* (Hammes, Holzapfel\*).

**Minute 17. Review of new species and subspecies.** The following new species and subspecies were acknowledged by the subcommittee: *Bifidobacterium animalis* subsp. *animalis* [Masco *et al.*, *Int J Syst Evol Microbiol* 54 (2004), 1137–1143], *Bifidobacterium animalis* subsp. *lactis*

[Masco *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 1137–1143], *Bifidobacterium psychraerophilum* [Simpson *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 401–406], *Bifidobacterium thermacidophilum* subsp. *thermacidophilum* [Zhu *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 1619–1623], *Bifidobacterium thermacidophilum* subsp. *porcinum* [Zhu *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 1619–1623], *Carnobacterium maltaromaticum* [Mora *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 675–678], *Carnobacterium pleistocenium* [Pikuta *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 473–478], *Carnobacterium viridans* [Holley *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 1881–1885], *Lactobacillus acidifarinae* [Vancanneyt *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 615–620], *Lactobacillus antri* [Roos *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 77–82], *Lactobacillus delbrueckii* subsp. *indicus* [Dellaglio *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 401–404], *Lactobacillus fuchuensis* [Sakala *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 1151–1154], *Lactobacillus gastricus* [Roos *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 77–82], *Lactobacillus hammesii* [Valcheva *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 763–765], *Lactobacillus ingluviei* [Baele *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 133–136], *Lactobacillus kalixensis* [Roos *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 77–82], *Lactobacillus kitasatonis* [Mukai *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 2055–2059], *Lactobacillus mindensis* [Ehrmann *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 7–13], *Lactobacillus pantheris* [Liu & Dong, *Int J Syst Evol Microbiol* **52** (2002), 1745–1748], *Lactobacillus paracollinoides* [Suzuki *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 115–117], *Lactobacillus rossii* [Corsetti *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 35–40], *Lactobacillus saerimneri* [Pedersen & Roos, *Int J Syst Evol Microbiol* **54** (2004), 1365–1368], *Lactobacillus satsumensis* [Endo & Okada, *Int J Syst Evol Microbiol* **55** (2005), 83–85], *Lactobacillus spicheri* [Meroth *et al.*, *Syst Appl Microbiol* **27** (2004), 151–159], *Lactobacillus suntoryeus* [Cachat & Priest, *Int J Syst Evol Microbiol* **55** (2005), 31–34], *Lactobacillus ultunensis* [Roos *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 77–82], *Lactobacillus versmoldensis* [Kröckel *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 513–517], *Lactobacillus zymae* [Vancanneyt *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 615–620], Reclassification of *Lactobacillus kefirgranum* as *Lactobacillus kefiranofaciens* subsp. *kefirgranum* comb. nov. [Vancanneyt *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 551–556], *Leuconostoc inhae* [Kim *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 1123–1126], *Pediococcus clausenii* [Dobson *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 2003–2010], *Weissella koreensis* [Lee *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 1257–1261] and *Vagococcus carniphilus* [Shewmaker *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 1505–1510]. *Lactobacillus arizonensis* has been reclassified as *Lactobacillus plantarum* [Kostinek *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 2485–2489]. *Lactobacillus cellobiosus* has been reclassified as *Lactobacillus fermentum* [Dellaglio *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 809–812]. *Leuconostoc argentinum* is

a later heterotypic synonym of *Leuconostoc lactis* [Vancanneyt *et al.*, *Int J Syst Evol Microbiol* **56** (2006), 213–216]. *Pediococcus urinaeequi* has been reclassified as *Aerococcus urinaeequi* [Felis *et al.*, *Int J Syst Evol Microbiol* **55** (2005), 1325–1327]. *Enterococcus solitarius* has been reclassified as *Tetragenococcus solitarius* [Ennahar & Cai, *Int J Syst Evol Microbiol* **55** (2005), 589–592].

*Lactobacillus ferintoshensis* [Simpson *et al.*, *Microbiol* **147** (2001), 1007–1016] and *Lactobacillus thermotolerans* [Niamsup *et al.*, *Int J Syst Evol Microbiol* **53** (2003), 263–268] were considered as controversial by the subcommittee. In the case of *L. thermotolerans*, according to Vancanneyt, DNA–DNA hybridization to *L. ingluvei* has to be cleared and in the case of *L. ferintoshensis*, the type strain deposition has to be confirmed.

**Minute 18. Review of new genera.** The new genera *Aeriscardovia*, with the respective novel species *Aeriscardovia aeriphila* [Simpson *et al.*, *Int J Syst Evol Microbiol* **54** (2004), 401–406], *Desemzia*, with the respective novel species *Desemzia incerta* comb. nov. [Stackebrandt *et al.*, *Int J Syst Bacteriol* **49** (1999), 185–188], and *Isobaculum*, with the respective novel species *Isobaculum melis* [Collins *et al.*, *Int J Syst Evol Microbiol* **52** (2002), 207–210], were acknowledged by the subcommittee.

**Minute 19. Miscellaneous.** A website for the subcommittee should be established and relevant information should be forwarded to the Secretary. The outline of a scientific history of the subcommittee to be published in a journal was proposed by Reuter and a first draft will be presented at the next meeting.

**Minute 20. Present membership.** The following individuals are members of the Subcommittee on *Bifidobacterium*, *Lactobacillus* and related organisms: Bruno Biavati (Deputy Chairman) (Bologna, Italy), Johanna Björkroth (Helsinki, Finland), Christine Bonaparte (Hannover, Germany), Matthew D. Collins (Reading, UK), Franco Dellaglio (Chairman) (Verona, Italy), Leon M. T. Dicks (Deputy Chairman) (Stellenbosch, South Africa), Walter P. Hammes (Stuttgart, Germany), Wilhelm H. Holzapfel (Karlsruhe, Germany), Angelika Kagermeier-Callaway (Mainz, Germany), Günter Klein (Secretary) (Hannover, Germany), Eckhard Lauer (Berlin, Germany), Marie-Christine Montel (Saint-Genes-Champagne, France), Bruno Pot (Lille, France), Gerhard Reuter (Berlin, Germany), Barbara Sgorbati (Bologna, Italy) and Marc Vancanneyt (Gent, Belgium).

**Minute 21. Date and place of the next meeting.** The next meeting of the subcommittee will be together with the Food Micro meeting in 2006 in Bologna, Italy.

**Minute 22. Adjournment.** The closed meeting was adjourned at 11:00 on 2 April 2005.