Minutes

Karl-Erik Johansson, *Secretary*
Janet M. Bradbury, *Chairman*

International Committee on Systematics of Prokaryotes

Subcommittee on the taxonomy of *Mollicutes*

Minutes of the meetings, 7 and 12 July 2002, Vienna, Austria

Session 1 – Closed meeting

Minute 1. Call to order. The meeting was called to order at 8:00 on 7 July 2002 by the Chairman, J. M. Bradbury.

Minute 2. Record of attendance. The members present were J. M. Bové, J. M. Bradbury (Chairman), G. Christiansen, K.-E. Johansson (Secretary), B. C. Kirkpatrick, G. Firrao, J. D. Pollack, S. Razin, R. F. Rosenbusch, K. Sachse and R. F. Whitcomb. Ex-officio members present were D. G. Pitcher of the Public Health Laboratory Service (UK), M. K. Davidson of the University of Florida (USA) and K. B. Waites, Chair of the Board of the International Organization of Mycoplasma (IOM) International Research Programme on Comparative Mycoplasma (IRPCM). K. S. Wise, Chair of the IOM, also attended and E. Vilei attended as an alternate for J. Frey. Apologies for absence were received from J. Frey, R. Harasawa, H. C. Neimark, D. Pollack, J. A. Robertson, D. Taylor-Robinson, J. G. Tully and from ex-officio member J. K. Davis.

Minute 3. Report of the Chairman. J. M. Bradbury thanked Drs R. Rosengarten, G. Stanek, C. Citti and the organizing committee of the 14th International Congress of the IOM for their assistance in making arrangements and for providing accommodation for the subcommittee meetings.

It was recorded with great regret that Dr Roger Miles had passed away on 25 October 2001. His contributions to subcommittee business since 1994 were much appreciated. The resignation of Dr F. Laigret was also recorded and his involvement with the subcommittee since 1992 was gratefully acknowledged.

The subcommittee was very pleased to congratulate Dr J. G. Tully on the award of the prestigious Bergey medal in recognition of his lifelong contributions in the field of systematic bacteriology.

Several novel species in the class *Mollicutes* were described in the previous biennium. These included *Mycoplasma agassizii*, *Mycoplasma alligatoris* and *Mycoplasma microti*, which were isolated from the desert tortoise, the American alligator and the prairie vole, respectively. Some organisms were also transferred into the genus *Mycoplasma* from other genera: *Mycoplasma haemofelis*, *Mycoplasma haemomuris*, *Mycoplasma suis* and *Mycoplasma haemocanis*

were transferred from the genus *Haemobartonella* and *Mycoplasma wenyonii* from the genus *Eperythrozoon*. Three novel 'Candidatus Mycoplasma' species were described. These were 'Candidatus Mycoplasma haemodidelphidis' from the opossum, 'Candidatus Mycoplasma haemolamae' from the alpaca and 'Candidatus Mycoplasma haemominutum' from the cat. *Ureaplasma parvum* was split off from *Ureaplasma urealyticum* as a separate novel species and there was a novel 'Candidatus Phytoplasma' species, 'Candidatus Phytoplasma brasiliense'.

Minute 4. Spiroplasma taxonomy. R. F. Whitcomb summarized recent work on the phylogeny and taxonomy of spiroplasmas and other mollicutes that included serology, 16S rRNA gene sequencing, phylogeny and the acquisition of 16 candidate novel species from tabanids (horseflies) collected in Costa Rica and Australia.

Phylogenetic trees constructed by using maximum-parsimony (the preferred method), maximum-likelihood or distance-matrix-based methods gave trees with similar topologies. Serology had been fundamental in the establishment of the existing spiroplasma species and groups. More than 5000 serological cross-tests were carried out and none disagreed with the phylogenetic trees. In terms of host association, the spiroplasmas from horseflies fell into two groups, which were earlier judged as short or long in morphology. Members of the former group grow to 10^{11} colony-forming units (c.f.u.) in culture, are easily filterable, utilize arginine, and the G+C content of their DNA is high (29–31 mol%). Although the second group of horsefly spiroplasmas is technically not monophyletic, its members occupy a group of closely related clades of the apis group. The G+C content of the DNA of members of this clade set is 26 mol%, the members' cells are very long, grow to 10^{10} c.f.u. in culture and glucose, but not arginine, is utilized. These two groups appear as clades in the overall tree. The research group has compiled the polyphasic classification using all the available information on G+C content, genome size, serology, sterol requirement, glucose utilization etc. This approach permits an organism to be classified in the absence of a 16S rRNA gene sequence.

Serological methods for identification of spiroplasmas were regarded as highly appropriate, especially when used in conjunction with 16S rRNA gene sequence analysis. These

tests are less cumbersome than the DNA–DNA reassociation method. Furthermore, serology operates at the same level of taxonomic resolution as DNA–DNA reassociation. Availability of antisera, although not currently a problem, could become one in the future. At this point, antisera to all existing species, groups, and candidate species and/or groups are available.

Minute 5. *Phytoplasma* taxonomy. G. Firrao reported on phylogeny and taxonomy of phytoplasmas. Classification of phytoplasmas will in the near future be based on polyphasic taxonomy. In a paper on the aster yellows cluster of phytoplasmas, classification was based on sequence comparisons of the 16S rRNA genes and the *tuf* genes [Marcone *et al.*, *Int J Syst Evol Microbiol* **50** (2000), 1703–1713]. By this approach, the number of groups was reduced, although it may not be applicable to all phytoplasmas. A short manuscript on the genus ‘*Candidatus Phytoplasma*’ was in preparation in which the essential properties of this *Candidatus* genus are described. A list of species will probably also be included. The proposed classification will be based on results already published and an alignment of all 16S rRNA gene sequences currently available for phytoplasmas (about 150) will be provided. About 30 ‘*Candidatus Phytoplasma*’ species will be described, based on a cut-off level of 97.5 % sequence similarity of the 16S rRNA genes.

The difficulties associated with defining a type for a *Candidatus* genus were discussed and another concern was that authors who determined the 16S rRNA gene sequences of a particular ‘*Candidatus Phytoplasma*’ species might not necessarily be involved in naming the species, thus denying them some credit for their work. It was suggested that a series of short papers defining the various novel species should be published in association with the paper on the genus ‘*Candidatus Phytoplasma*’.

A problem among the phytoplasmas is the existence of isolates that are very similar, and which would normally be classified as members of the same species, but which occur in different hosts and cause very different diseases. For plant pathologists, it would be useful to have such pathogenic strains designated taxonomically. However, the solution is not to contravene the accepted species concept in bacteria [Wayne *et al.*, *Int J Syst Bacteriol* **37** (1987), 463–464]. The problem can be resolved by using pathovar designations. This system has been used successfully with other plant-pathogenic prokaryotes.

Minute 6. *Ureaplasma* taxonomy. J. A. Robertson, in a written statement, pointed out the limitations in our understanding of ureaplasma pathogenicity. She emphasized that differences in molecular structure and function, even small differences between strains, may be useful in studying evolution and phylogeny but may not be of any value for predicting the biological or pathogenic properties.

Minute 7. Final report on 16S rRNA gene sequencing of the genus *Mycoplasma*. K.-E. Johansson reported that the 16S rRNA gene sequences from all members of the genus *Mycoplasma* were available from GenBank and a list of the most recently sequenced species could be found in the book *Molecular Biology and Pathogenicity of Mycoplasmas*, edited by S. Razin and R. Herrmann (Kluwer, New York, 2002). Sequencing of the 16S rRNA genes of the remaining species of the genus *Acholeplasma* should be completed by the July 2004 meeting of the sub-committee.

Minute 8. Problems in differentiation of *Mycoplasma agalactiae* and *Mycoplasma bovis*. Discussion took place on the similarity between *Mycoplasma agalactiae* and *Mycoplasma bovis* and the associated problems in differentiation of these species. To illustrate this, R. F. Rosenbusch described a disease with up to 10 % mortality in American bison, which had a mycoplasmal aetiology. 16S rRNA gene sequencing suggested that the mycoplasma could be *Mycoplasma agalactiae*, which is exotic to the USA; however, RFLP and serology suggested that it was *Mycoplasma bovis*, and sequencing of the *uvrC* gene finally confirmed this. It should be noted that the intra-specific variation in the 16S rRNA genes is high within *Mycoplasma agalactiae* and *Mycoplasma bovis* and that there are strains that are difficult to identify by 16S rRNA gene sequencing alone.

Minute 9. Problems arising from *Candidatus* proposals. D. G. Pitcher described problems arising during the previous biennium as a result of the transfer of members of the genera *Eperythrozoon* and *Haemobartonella* to the genus *Mycoplasma* and ‘*Candidatus Mycoplasma*’ species status. These organisms apparently have a close phylogenetic relationship to mollicutes. The 16S rRNA genes of a few members of *Eperythrozoon* and *Haemobartonella* have been sequenced, and the results indicate that these organisms form a distinct clade within the pneumoniae group. A letter of objection had been received by the Editor of the *International Journal of Systematic and Evolutionary Microbiology* indicating that the genus *Eperythrozoon* should have priority over the genus *Mycoplasma* because it was published a year earlier.

Minute 10. A common name for *Mycoplasma mycoides* subsp. *capri* and *Mycoplasma mycoides* subsp. *mycoides* LC. At the 2000 subcommittee meeting in Fukuoka, there appeared to be no arguments against considering these two organisms as a single species, with the possible name *Mycoplasma capri*, although there was no clear agreement as to whether there should be a single species or two subspecies. E. Vilei, on behalf of J. Frey, reported that a common name for *Mycoplasma mycoides* subsp. *capri* and *Mycoplasma mycoides* subsp. *mycoides* LC had also been discussed at former COST meetings. (COST

is an intergovernmental framework for European Co-operation in the field of Scientific and Technical Research.)

Three publications had indicated the similarity of these mycoplasmas: comparison of 16S rRNA gene sequences [Pettersson *et al.*, *J Bacteriol* **178** (1996), 4131–4142], comparison of a gene coding for a putative membrane protein [Thiaucourt *et al.*, *Vet Microbiol* **72** (2000), 251–268] and comparison of the gene encoding lipoprotein LppA [Monnerat *et al.*, *Clin Diagn Lab Immunol* **6** (1999), 224–230]. The differences found by 16S rRNA gene sequencing, and by protein analysis, suggest that the organisms represent different serovars, but not different subspecies. Therefore, to avoid confusing the pathogenic *Mycoplasma mycoides* subsp. *mycoides* SC with the LC subspecies, LC strains might be grouped with *Mycoplasma mycoides* subsp. *capri* and the 'LC' terminology abandoned. The name *Mycoplasma mycoides* subsp. *mycoides* could then be reserved for SC strains. Considerable discussion ensued as to whether enough strains within each taxon had been examined to justify these taxonomic changes and whether DNA–DNA reassociation values could be established on more strains. The potential value of using a pathovar system of classification was again noted.

K. Sachse, in studying the 23S rRNA gene region of these organisms, had found that the SC and LC strains and *Mycoplasma mycoides* subsp. *capri* clustered very closely together. However, he suggested that further evidence from different loci should be explored for these taxa. K. S. Wise cautioned that mobile elements and gene order might be of great importance when interpreting relationships at this level. He wondered if there were suitable housekeeping genes that might become a 'standard set' for determining phylogenetic distances in addition to the 16S rRNA gene. R. F. Whitcomb suggested the 23S–16S intergenic spacer region (ISR) as a possible locus since data on this region are growing and it appears to function taxonomically. D. G. Pitcher agreed, indicating that the ISRs of *Mycoplasma* spp. that he had examined were very conserved within a species but very different from one another.

At the conclusion of these discussions it was clear that some subcommittee members were in favour of a revised nomenclature while others preferred a more cautious approach pending further studies. The Chairman, J. M. Bradbury, suggested that those directly involved in the problem should pool their data, prepare a summary and then take informal advice from members of the Judicial Commission. K.-E. Johansson (Secretary) pointed out that the subcommittee itself cannot suggest a new name but can give a recommendation; the interested researchers should collaborate to draw up a proposal for publication.

Minute 11. Species or subspecies status for bovine group 7. On behalf of J. Frey, E. Vilei introduced the complex situation of mycoplasmas in bovine group 7. The relationship between this group and *Mycoplasma capricolum*

subsp. *capripneumoniae*, *Mycoplasma capricolum* subsp. *capricolum* and *Mycoplasma mycoides* subsp. *mycoides* SC had not yet been clearly resolved. It would be helpful to give species designation to the bovine group 7 mycoplasmas because there are numerous reports describing their isolation from arthritic joints and mastitic milk. The Swiss group was inclined to propose the name *Mycoplasma mycoides* subsp. *boviarthritidis*. R. Rosenbusch pointed out that Australian strains of bovine group 7 are more pathogenic than those seen in the USA and a method of distinguishing between them is needed for regulatory purposes.

K. S. Wise again warned of the possible pitfalls of comparing pieces of mycoplasma genomes because they represent large mixtures of mosaics of genes and because they appear to be more 'scrambled' in mollicutes than in many other groups of bacteria. Once complete genome sequences are known it might be necessary to re-examine the whole problem since the genomes of mollicutes may be unstable. He urged caution when starting to use new regions of the genome.

The Chairman reminded the meeting that there was still in existence an ad hoc group on the taxonomy of the *Mycoplasma mycoides* cluster. Current members included K.-E. Johansson, S. Razin and J. G. Tully. It was suggested that K. Sachse, J. Frey and S. Djordjevic join these members. K.-E. Johansson expressed the wish to step down as Chair of this group and suggested J. Frey as his successor.

Minute 12. Problems involved in classification schemes based on a single genomic locus or region.

K. Sachse re-emphasized that the taxonomy of the mollicutes is in a transitional period before whole genome sequences are available. In the meantime, he suggested that workers should base new classifications not only on 16S rRNA but also on the sequences of more genomic loci. His team had sequenced 44 species of mycoplasma in the 23S rRNA gene signature region (the entire gene is almost 3 kb) and found a rather characteristic central domain of about 500 nucleotides, which has the potential to differentiate between species of *Mycoplasma* and might also prove useful for other mollicutes. He suggested that future classifications and definitions might be based on 16S rRNA gene sequences, the ISR and this 23S rRNA gene signature region, and possibly also the elongation factor *tu*. By using four sets of sequences, problems such as those of *Mycoplasma bovis* and *Mycoplasma agalactiae* (Minute 8 above) might be avoided.

B. C. Kirkpatrick suggested that the ISR, in phytoplasma work, is good for identification purposes but not for constructing a phylogeny. Other workers have had some success in generating trees from these data, so the utility of this region appears to differ in its potential utility among taxa. The possibility of using amplified fragment length polymorphism for examining diversity was raised but K.-E.

Johansson pointed out that, while the technique is useful for examining strains or closely related species, it is not useful for work concerning distinct species.

Minute 13. Higher classification of mollicutes. R. F. Whitcomb described the polyphyletic nature of the genus *Mycoplasma*, which consists essentially of two monophyletic clusters of organisms (although the hominis and pneumoniae groups are technically paraphyletic). As a possible taxonomic resolution, he introduced the concept of subgenus status for the *Mycoplasma mycoides* phylogenetic group and for the group containing the remaining members of the genus *Mycoplasma*. He discussed the pros and cons of an active versus passive approach to taxonomic resolution of this problem. Support for the proposal was mixed and, in a written statement, J. G. Tully suggested that opinions should be sought from experts in veterinary medicine and taxonomy on the implications of such name changes, especially as there may be far-reaching consequences for some changes regarding international quarantine regulations etc.

R. F. Whitcomb raised another problem in higher classification (genus) with regard to testing for sterol requirement. The genera *Spiroplasma*, and especially *Mesoplasma* and *Entomoplasma*, are polyphyletic with regard to this requirement and work performed [Rose *et al.*, *Int J Syst Bacteriol* **43** (1993), 527–532] after the 1993 revision of *Mollicutes* indicated that the ability to grow in Tween 80 and, in fact, the sterol test itself, were not particularly helpful in classifying these organisms. He pointed out that the results from the division of mesoplasmas and entomoplasmas using this test do not correlate with any other phenotypic property. In a written statement J. G. Tully agreed that, based on 16S rRNA gene sequencing, members of the *Entomoplasmataceae* probably represent a single cluster. However, there were more than 12 mesoplasma strains that should be sequenced before changes could be proposed regarding sterol and Tween 80 tests. The subcommittee would make every effort to encourage completion of the 16S rRNA gene sequencing of this group. There was some concern that any changes regarding recommendations for these tests would not be in the new edition of *Bergey's Manual*. However it was agreed that a statement could be added to indicate that changes are expected and would appear in the relevant literature.

Minute 14. Revision of minimum standards. It was agreed that, now that the 16S rRNA gene sequences were available for most *Mollicutes*, including all members of the genus *Mycoplasma*, it would be appropriate to revise the minimum standards for the description of novel species. Much revision could be agreed by email correspondence. The subcommittee considered that determination of the 16S rRNA gene sequence should be mandatory, although K. S. Wise pointed out that large insertion elements could contribute up to 15% of the genome size and, because their presence or absence might not be consistent within a species, results could be misleading. It was felt that the

determination of genome size, while potentially useful in some cases, should not be mandated. It was agreed that genome size could be useful in ruling out the presence of an L-phase bacterial variant. This was also true of G+C determination.

Minute 15. The proposal to modify recommendation 30b of the *Bacteriological Code*. A proposal had been made [Christensen *et al.*, *Int J Syst Evol Microbiol* **51** (2001), 2221–2225] that descriptions of novel species of bacteria should be based on as many strains as possible, with a minimum of five. The subcommittee agreed that this condition would be impossible to fulfil for many fastidious mollicutes. For example, D. Taylor-Robinson pointed out in a written statement that *Mycoplasma genitalium*, a human pathogen of emerging importance, would never have been described under those circumstances since there are so few isolates. It was agreed that the proposal could inhibit the advancement of the field even though there was merit in examining as many strains as practical under the prevailing circumstances.

Note: The proposition by Christensen *et al.* was discussed by the International Committee on Systematics of Prokaryotes (ICSP) in July 2002, who decided that it would remind systematists of best practice but that there should be no hindrance to the description of single-strain taxa [Saddler, *Int J Syst Evol Microbiol* **55** (2005), 533–537].

Minute 16. The status of the *Mycoplasma* Culture Collection at the University of Florida. M. K. Davidson, the Director of the collection, reported approximately 85 antisera and 170 seed cultures had been supplied to workers in many different countries. The greatest numbers of requests had been for *M. pneumoniae* cultures by pharmaceutical companies. Charges were as recommended by the IOM: \$100 per vial to non-IOM members and \$50 to IOM members. Production of some antiserum could be funded from this income.

Discussion followed on the appropriateness of using type strain cultures from this collection *vis à vis* cultures from the American Type Culture Collection (ATCC). In the event of conflicting data, it would become necessary to use ATCC material, to be sure the discrepant result was not the result of a mix-up. It was agreed that the University of Florida collection should seek association with the World Federation of Culture Collections. K. B. Waites suggested that a list of available cultures and antiserum be posted on the IOM website.

Minute 17. Liaison with IRPCM. K. B. Waites, on behalf of the IRPCM, asked for up-to-date information concerning mollicute taxonomy and a list of all the currently recognized species to be supplied for the IOM website. (Note: this has now been accomplished through the auspices of the ICSP and has a link from the IOM website.)

Minute 18. Future meeting schedule. The next meeting is in Athens, GA, USA in July 2004. K. B. Waites indicated

that there was increasing time pressure on IOM Congresses and the ancillary meetings, which include the subcommittee meeting. This could pose considerable problems for the subcommittee since it meets only once each biennium, and the agenda contains important and complex issues that require full discussion and debate. The Chairman agreed to ask the Congress organizers to allocate more time to the meeting and to avoid running it in parallel with scientific sessions. It was noted that local conference organizers have so far provided a meeting room from their budget.

Minute 19. Election of officers and membership changes. The Chairman and Secretary were re-elected to another term of office. A. Blanchard was appointed as a new member.

Minute 20. Current membership. The current membership of the subcommittee is as follows: J. M. Bradbury (Chairman; UK), K.-E. Johansson (Secretary; Sweden), A. Blanchard (France), J. M. Bové (France), G. Christiansen (Denmark), G. Firrao (Italy), J. Frey (Switzerland), R. Harasawa (Japan), B. C. Kirkpatrick (USA), H. C. Neimark (USA), J. D. Pollack (USA), S. Razin (Israel), J. A. Robertson (Canada), R. F. Rosenbusch (USA), K. Sachse (Germany), J. G. Tully (USA) and R. F. Whitcomb (USA). Advisory member is D. Taylor-Robinson (UK). Ex-officio members are K. B. Waites (IOM IRPCM Chair; USA), M. K. Davidson and J. K. Davis (USA) and D. G. Pitcher (UK).

Minute 21. Adjournment. The meeting was adjourned at 12:35 on 7 July 2002.

Session 2 – Open meeting

Minute 22. Call to order. The open meeting of the subcommittee was called to order at 13:30 on 12 July 2002 by the Chairman, J. M. Bradbury.

Minute 23. Record of attendance. The members present were J. M. Bové, J. M. Bradbury (Chairman), G. Christiansen, G. Firrao, K.-E. Johansson (Secretary), B. C. Kirkpatrick, J. D. Pollack, S. Razin, R. F. Rosenbusch, K. Sachse and R. F. Whitcomb. Ex-officio members present were D. G. Pitcher of the Public Health Laboratory Service (UK), M. K. Davidson of the University of Florida (USA) and K. B. Waites, Chair of the Board of the International Organization of Mycoplasma (IOM) International Research Programme on Comparative Mycoplasma (IRPCM).

Minute 24. J. M. Bradbury welcomed approximately 75 attendees to the meeting and gave a brief explanation of the function of the subcommittee, its relationship to the ICSP and of the arrangement that allows the subcommittee to meet alongside the biennial IOM congress. She acknowledged the valuable contributions of the late Roger Miles to the work of the subcommittee and also those of

F. Laigret, who had recently tendered his resignation. The Chairman congratulated J. G. Tully on the award of the Bergey medal. This prestigious award is in recognition of his lifelong contributions to the field of systematic bacteriology.

Novel species published during the biennium included *Mycoplasma agassizii*, *Mycoplasma alligatoris* and *Mycoplasma microti*. Several organisms were transferred into the genus *Mycoplasma* from other genera. These were *Mycoplasma haemofelis*, *Mycoplasma haemomuris*, *Mycoplasma suis* and *Mycoplasma haemocanis* from the genus *Haemobartonella* and *Mycoplasma wenyonii* from the genus *Eperythrozoon*. Three novel 'Candidatus *Mycoplasma*' species were also described: 'Candidatus *Mycoplasma haemodidelphidis*' from opossum, 'Candidatus *Mycoplasma haemolamae*' from alpaca and 'Candidatus *Mycoplasma haemominutum*' from cats. *Ureaplasma parvum* was split off from *Ureaplasma urealyticum* as a separate novel species and one novel 'Candidatus *Phytoplasma*' species was described. This was 'Candidatus *Phytoplasma brasiliense*'.

Minute 25. *Spiroplasma* taxonomy. R. F. Whitcomb summarized the results of a large phylogenetic study by Gasparich and co-workers that had been undertaken with *Spiroplasma*, noting that they fell into distinct clades similar to those of Weisburg *et al.* [*J Bacteriol* **171** (1989), 6455–6467]. He emphasized the valuable part played by serology, which appears to have a resolving power similar to that of DNA–DNA reassociation to differentiate between species, but he drew attention to the difficulties involved in producing or obtaining antisera.

Minute 26. *Phytoplasma* taxonomy. G. Firrao reported that a manuscript was in preparation that would describe the properties of the genus 'Candidatus *Phytoplasma*' that should prove valuable to workers in this field.

Minute 27. *Mycoplasma* taxonomy. K.-E. Johansson reported that the 16S rRNA gene sequences from all members of the genus *Mycoplasma* were now available from GenBank. The Chairman congratulated him on this achievement, which would be of great benefit to the field. J. G. Tully's contribution in assembling antisera to the vast majority of the species of *Mollicutes* was also recognized. The transfer of several members of the genus *Haemobartonella* and the genus *Eperythrozoon* to the genus *Mycoplasma* was described, together with the associated problems. K.-E. Johansson then summarized the difficulties regarding the possible amalgamation of *Mycoplasma mycoides* subsp. *capri* and *Mycoplasma mycoides* subsp. *mycoides* LC into a single taxon and indicated that some of the subcommittee favoured obtaining more evidence before deciding about further division into subspecies. The problems associated with classification of bovine group 7 were also pointed out.

Minute 28. Classification schemes based on a single genomic locus or region. K. Sachse emphasized that workers should base new classifications not only on 16S rRNA gene sequences but also on the sequences of more genomic loci. He mentioned the work of his team in sequencing part of the 23S rRNA gene signature region and its potential to differentiate between species of *Mycoplasma*. There was general consensus that future classifications should be based on more than just 16S rRNA gene sequences and that both the ISR and this 23S rRNA gene signature region could prove to be of value.

Minute 29. Higher classification of mollicutes. R. F. Whitcomb presented his ideas for proposing a subgenus status for the two polyphyletic groups within the genus *Mycoplasma* and the Chairman cautioned about the possible implications for veterinary medicine and quarantine regulations.

Minute 30. Revision of minimum standards. R. F. Whitcomb stated that members of the subcommittee were preparing new minimum standards for the description of novel species of *Mollicutes*. There were several issues to be resolved but the general aim would be to reduce the burden of serological testing by restricting the tests to the clade identified in 16S rRNA gene analyses; this approach had been recommended by K.-E. Johansson and his colleagues.

Minute 31. The proposal to modify recommendation 30b of the *Bacteriological Code*. J. M. Bradbury outlined the proposal made by Christensen *et al.* [*Int J Syst Evol Microbiol* **51** (2001), 2221–2225] and the possible negative implications for the field of mycoplasmaology and for characterization of novel species.

Minute 32. The status of the *Mycoplasma* Culture Collection at the University of Florida. M. K. Davidson reported on the current status of the collection, the supply of reagents around the world and future plans for developing the collection.

Minute 33. Liaison with IRPCM. K. B. Waites, Chair of the IRPCM, reiterated the wish for taxonomic information on the mollicutes to be placed on the IOM website. The Chairman and Secretary have agreed to look into this.

Minute 34. Next meeting. The next meeting will be held in Athens, GA, USA in July 2004.

Minute 35. Adjournment. J. M. Bradbury thanked those attending the meeting and especially those who had contributed to the discussions. She thanked the Secretary K.-E. Johansson for his great help in preparation for the meeting. The open meeting was adjourned at 14:30 on 12 July 2002.