Commentary

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70th Anniversary Collection for the Microbiology Society: International Journal of Systematic and Evolutionary Microbiology

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This year the Microbiology Society celebrates its 70th anniversary. On the occasion, 70 articles published in the society’s six journals from the early days until present will be featured in editorials published this month. As editor-in-chief of the International Journal of Systematic and Evolutionary Microbiology (IJSEM) I was given the opportunity to highlight 17 articles published in our journal since it was launched in 1951.

IJSEM joined the Microbiology Society’s portfolio of journals relatively recently. The journal was established at the 5th International Congress for Microbiology in 1950, and it started as a newsletter named the International Bulletin of Bacteriological Nomenclature and Taxonomy (IBBNT). In 1966 it was renamed the International Journal of Systematic Bacteriology (IJSB). It was first published by Iowa State College Press, and in the years 1971–1997 the American Society for Microbiology was its publisher. In 2000 its title changed to International Journal of Systematic and Evolutionary Microbiology. Since 1998 the journal has been published by the Microbiology Society on behalf of the Bacteriology and Applied Microbiology section of the International Union of Microbiological Societies and the International Committee on Systematics of Prokaryotes (ICSP).

My selection of the 17 articles highlighted below is entirely personal. I did not attempt to select only the most highly cited papers, although some papers in the list have amassed a large number of citations as indicated in square brackets (data from ISI Web of Science, accessed 5 July 2015). Instead, I tried to choose representative papers that show the different types of contributions published and their importance to the community of microbial taxonomists and to microbiology in general. I also attempted to include relevant papers from all periods, including from before the time the journal was published by the Microbiology Society.

The ICSP and its predecessors are/were responsible for the preparation and the updating of the International Code of Nomenclature of Prokaryotes – formerly the International Code of Nomenclature of Bacteria (the Bacteriological Code) and still earlier the International Code of Nomenclature of the Bacteria and Viruses. Therefore, the 1966 version of the Code was made available in its entirety on the pages of the journal (Editorial Board of the Judicial Commission of the International Committee on Nomenclature of Bacteria, 1966), and so was an advanced draft for the 1990 revision of the Code (Lapage et al., 1973) [10]. A major step towards the simplification of the nomenclature of prokaryotes was taken in 1980 with the publication of the ‘Approved lists of bacterial names’ in IJSB (Skerman et al., 1980) [1757]. From 1 January 1980 onwards, only the names featuring on those lists retained standing in the nomenclature, and IJSB/IJSEM became the only journal in which new names can be validly published according to the rules of the Code.

The rules of the Code determine which names of species, subspecies and higher taxa up to the rank of class have standing in the nomenclature, but they do not give any information on how to delineate species and other taxonomic ranks. Also today, in the era of genomics, there is still no generally accepted species concept for the prokaryotes. Since the early days of IJSEM and its predecessors, many pages of the journal have been filled with discussions about the nature of prokaryote species (as well as genera, families etc.), and the results of meetings of different ad hoc committees to evaluate the species definition in bacteriology have been published in IJSB/IJSEM (Wayne et al., 1987 [4017]; Stackebrandt et al., 2002 [935]).

Throughout its history, the journal has also been used as a framework for the publication of methodological papers to update the scientific community of the latest innovations in the methods for taxonomic characterization of prokaryotes (and also other micro-organisms – the journal also publishes papers about yeasts and other microfungi and about protists). In the same year in which Carl Woese and his colleagues surprised the world with their model of the three domains of life, Bacteria (Eubacteria), Archaea (Archaebacteria) and Eukarya (Eukaryotes), the technique that led to this major discovery was described in IJSB. Only very few microbiologists at the time had mastered his technique of comparative cataloguing of oligonucleotides formed from 16S or 18S rRNA following hydrolysis with T1 RNase (Fox et al., 1977) [277]. The discovery of PCR soon replaced the cumbersome oligonucleotide cataloguing as a much more rapid method to obtain the
sequence information required for those molecular phylogeny studies that have revolutionized our views of prokaryote evolution and systematics since the 1980s.

Small-subunit rRNA gene sequences are very useful for rapidly placing any organism within the three-domain phylogenetic tree, but they are insufficient to determine whether or not a new isolate may belong to an existing or to a novel species. As stated above, there still is no generally recognized species concept for the prokaryotes. For the past three decades, DNA–DNA reassociation values have been used as the ‘gold standard’ for species delineation (Wayne et al., 1987 [4017]; Stackebrandt & Goebel, 1994 [3774]; Stackebrandt et al., 2002 [935]). DNA–DNA hybridization experiments are not simple to perform and there are many problems associated with the methodology. Therefore, it is not surprising to see papers in IJSEM searching for possible correlations between DNA–DNA hybridization and 16S rRNA sequence similarity (Keswani & Whitman, 2001) [96] and more recently, with the increased availability of complete genome sequences, between DNA–DNA hybridization and whole-genome sequence similarities (Goris et al., 2007) [309].

Another important function of IJSEM is to provide information about important tools to help microbial taxonomists in their studies. Updated information about validly published names is essential for all prokaryote taxonomists. Indeed, all names with standing in the nomenclature can be found in the lists published by Skerman et al. (1980) [1757] and in later issues of the journal. But the most widely used resource today is the LPSN website (List of Prokaryotic Names with Standing in Nomenclature; www.bacterio.net), the launching of which was first announced in IJSB. The site was initially developed and until recently maintained by Jean Euzéby, who has served our journal for many years as list editor and nomenclature reviewer (Euzéby, 1997) [451]. Another important resource first announced in an IJSEM publication is the EzTaxon tool for the identification of prokaryotes based on 16S rRNA gene sequences, and developed by former associate IJSEM editor Jongsik Chun (Chun et al., 2007) [1419]. Also in this category of papers I want to mention the ‘Notes on the characterization of prokaryote strains for taxonomic purposes’ (Tindall et al., 2010) [362], which provide clear guidelines on what information is nowadays necessary for the description of novel species of Bacteria and Archaea.

Most papers published in recent years in IJSEM and IJSB are descriptions of new taxa of prokaryotes as well as some groups of eukaryotic micro-organisms. This has not always been the case: the first volumes of IBBNT were mainly filled with committee reports and with discussions on the nomenclature of previously recognized taxa. Except for the addition of a few novel serotypes of the genus Salmonella (a topic that kept many taxonomists very busy at the time), hardly any new taxa were described in the journal during its first two decades. The first proposal of a novel species was a new member of the genus Brevibacterium that was not included in the Approved lists of 1980, and only about 15 novel species were described in volumes 10–19 (1960–1969) of the journal. Out of the several thousand papers with descriptions of novel species that have appeared in IJSEM and its predecessors in later years, I here highlight three examples. Two of these papers are mentioned as they describe novel species selected among the ‘top ten new species’ chosen for 2010 and 2014 by the International Institute for Species Exploration, founded in 2007, formerly at Arizona State University and now hosted by the State University of New York’s College of Environmental Science and Forestry, Syracuse, NY, USA (http://www.esf.edu/species). Generally, these lists of ‘top ten new species’ selected annually from the biological literature consist of higher animals and plants with unusual novel eukaryotic microorganisms featuring occasionally. The 2010 entry is Halomonas titanicae, a halophilic bacterium isolated from the wreck of the RMS Titanic, the steamship that in 1912 struck an iceberg on its maiden voyage and sank in the Atlantic Ocean, where it has been deteriorating. Halomonas titanicae sticks to steel surfaces, creating knob-like mounds of corrosion products (Sánchez-Porro et al., 2010) [11], see also http://www.livescience.com/14276-top-ten-species-2010.html. In 2013, Tersicoccus phoenicis gen. nov., sp. nov. (Vaishampayan et al., 2013) [2] was featured in the ‘top ten new species’ list. It is aptly named phoenicis after the Mars Phoenix lander, as it was found in the supposedly sterile clean room facilities used to assemble the Mars Phoenix spacecraft assembly facilities (see also http://earthsky.org/earth/top-10-new-species-of-2014). I don’t know whether at the time Haloquadratum walsbyi was nominated for the 2007 ‘top ten new species’, but it does not appear in the list, although it could easily have qualified. Ninety-degree angles may occur in crystals but are seldom found in the living world. Only in 1980 were these extremely thin (<0.15 μm), flat, square to rectangular cells recognized as living entities. This elusive, extremely halophilic archaean, abundantly found in saltern crystallizer ponds all over the world, defied all attempts towards its isolation for nearly a quarter of a century until in 2004 its cultivation was announced independently by two groups: one from Australia and a consortium of Spanish and Dutch microbiologists. Since the description in IJSEM, jointly by the two teams, in 2007 (Burns et al., 2007) [66], the genus name Haloquadratum and the species name Haloquadratum walsbyi have obtained standing in the nomenclature and the organism has been available to the scientific world for further study.

The last two articles I selected among the 17 papers chosen are papers that have aroused lots of controversy. The long paper by Thomas Cavalier-Smith on ‘The neomuran origin of archaeabacteria, the negibacterial root of the universal tree and bacterial megaclassification’ (Cavalier-Smith, 2002) [232] featured a rather unconventional way to classify the prokaryotes and included many newly proposed names for the higher taxa of Bacteria and Archaea that were later rejected by the ICSP. And last but not least,
the ‘Proposal to place the nomenclature of the cyanobacteria (blue-green algae) under the rules of the International Code of Nomenclature of Bacteria’ (Stanier et al., 1978) [97] was a kind of declaration of war against the botanical authorities on the topic of the nomenclature of the cyanobacteria, traditionally governed by the provisions of the International Code of Botanical Nomenclature, now the International Code of Nomenclature for algae, fungi, and plants. However, they were now claimed to belong to the International Code of Nomenclature of Bacteria/Prokaryotes because of the prokaryotic nature of their cells. The two Codes of Nomenclature differ in many respects, and in spite of many discussions in different committees the issue is still not resolved.

I am sure that IJSEM will publish many more similarly exciting papers in the future, and I am looking forward to many more years of fruitful collaboration between the Bacteriology and Applied Microbiology section of the International Union of Microbiological Societies and the International Committee on Systematics of Prokaryotes as the owner of the journal and the Microbiology Society as its publisher. I wish the Microbiology Society all the best on the occasion of its 70th anniversary.

**Highlighted articles**


