

The 7th National Conference of Microbial Resources & the International Symposium on Microbial Systematics and Taxonomy: comments and conclusions

Aharon Oren*

(Department of Plant and Environmental Sciences, The Institute of Life Sciences, The Hebrew University of
Jerusalem, Edmond J. Safra Campus, 91904 Jerusalem, Israel)

第七届全国微生物资源学术暨国际微生物系统与分类学研讨会： 评论和结论

Aharon Oren*

(Department of Plant and Environmental Sciences, The Institute of Life Sciences, The Hebrew University of
Jerusalem, Edmond J. Safra Campus, 91904 Jerusalem, Israel)

At the annual meeting of the editorial board of the *International Journal of Systematic and Evolutionary Microbiology* (IJSEM), held in Hangzhou, Zhejiang, on August 30, 2015, the editors were presented with some statistics about submissions of papers to the journal from different countries. China is number 1: in 2014, 31.2% of all submissions came from China, leaving South Korea with 14.8% far behind. For China there has been a strong upward trend: in 2012 and 2013 Chinese scientists contributed 23.5% and 28.9% of all papers submitted to the journal. In 2008 China took the lead from South Korea (20.5% as compared to 14.0%). When realizing that just three years earlier only 8.0% of all papers came from China, it is obvious that China has now become the absolute leader in microbial systematics and taxonomy. The same trend can be seen in the number of taxonomic papers from China submitted to other leading journals that publish descriptions of new prokaryote species such as *Systematic and Applied Microbiology* and *Antonie van Leeuwenhoek Journal of Microbiology*.

The reasons for the explosive increase in microbiological science in China in general and in microbial taxonomy and systematics in particular can be easily understood. China is a huge country, and it has a tremendous diversity of unusual environments that thus far have remained unexplored. The potential of its microbial resources is only now becoming fully realized. This, together with the availability of large amounts of research money and plentiful well-trained manpower, led to the current interest in microbial taxonomy in China. That is also the reason why the series of National Conferences of Microbial Resources is so successful. A national meeting of over 400 microbial taxonomists would be unthinkable in any other country!

In view of the importance of China as the leading country with respect to the description of new taxa of Bacteria and Archaea, the editors of IJSEM were very happy with the kind invitation received from the organizers of the 7th National Conference of Microbial Resources & The International Symposium on Microbial Systematics and Taxonomy, held in the Zhijiang Hotel, Hangzhou, on August 28 and 29, 2015, to join the conference and to hold their editorial board meeting immediately following the event. The presence of twelve editors and former editors of IJSEM in Hangzhou provided a unique opportunity for Chinese scientists and their

*Corresponding author: Chairman of the conference and Editor-in-Chief, International Journal of Systematic and Evolutionary Microbiology. E-mail: aharon.oren@mail.huji.ac.il

students to directly interact with the editors who handle their papers. Such personal interactions are highly important: it is much nicer for an author to know his/her editor in person than to have to correspond with someone he or she has never met. And for the young generation is important to realize that editors are normal and generally very nice people who can be freely approached for questions and who are always prepared to help authors to get their manuscripts right. Eight of our editors presented talks at the conference: Editor-in-Chief Aharon Oren, former Editor-in-Chief Peter Kämpfer, Associate Editors Antonio Ventosa, Paul Lawson, Henrik Christensen, Ken-ichiro Suzuki, Xue-wei Xu, and former Associate Editor Jongsik Chun. These talks provided an opportunity for the Chinese audiences to familiarize themselves with the research interests of some of the leading scientists who handle their manuscripts for IJSEM.

The conference was attended by 436 Chinese scientists or students and 28 international scholars. In total there were 53 oral presentations, arranged in sessions on “New Microbial Resources, New Technologies, New Approaches”, “Microbial Systematics and Taxonomy”, “Resources and Applications”, “Diversity and Basics for Applications”, “Resources and Genomics”, and “Exploitation of Microbial Resources from Extreme Environments”, and three youth forums with as topics “New Technologies, New Approaches”, “Ocean and Polar Research” and “New Resources and New Mechanisms”. The properties of microorganisms found in unusual environments (cold-deep-sea and polar regions, hot, extreme saline, high and low pH) were discussed in-depth. Many of the talks centered on state-of-the-art techniques of genomics and metagenomics that have greatly increased our understanding in the last decades. Speakers from abroad included, in addition to the IJSEM editors mentioned above, Prof. Radhey Gupta (McMasters University, Canada) who spoke about the application of genomics-based methods to reconstruct microbial evolution, and Prof. Charles Dorman (University of Dublin, Ireland) who presented a talk about the role of DNA conformation in determination of microbial species. The plenary sessions on the first day were all held in English, while most of the talks in the parallel sessions on the second day of the symposium were in Chinese. In addition to oral presentations were also were 59 posters. A number of awards were presented to the authors of the best posters at the closing ceremony of the conference.

Availability of type material is essential for taxonomic studies, and therefore the culture collections have an important task of maintaining large numbers of type strains and making these available upon request. This is not an easy task. Restrictions on distribution of biological resources between countries (as e.g. regulated by the ‘Nagoya Protocol’) and between culture collections and their customers make the issue of availability of type material highly complex. The talk by Dr. Ken-ichiro Suzuki (Biological Resource Center, NBRC, Japan) did much to clarify these important issues.

I predict that the current trend of increasing interest in microbial taxonomy in China will continue in the coming years, and that the relative share of China in the number of newly described taxa will also continue to rise. For this to occur, training of new generations of taxonomists is of utmost importance. When the organizers of the Hangzhou conference invited me to give a training course for about 200 Chinese students in the two days preceding the conference, I accepted the challenge with great pleasure. I consider myself a microbial ecologists and not a taxonomist, and I was never trained as a taxonomist. But in the course of the years I have dealt with many different groups of microorganisms, and my past work as chairman and as executive secretary of the International Committee on Systematics of Prokaryotes (ICSP), as a member of some of its taxonomic subcommittees, and as editor and editor-in-chief of IJSEM have given me extensive experience in many aspects of taxonomy. My work as a nomenclature reviewer for IJSEM, for which my studies of Latin and Greek in high school have proven extremely useful, also gave me a deeper insight in the ways names of new genera and species of prokaryotes must be formed. The number of expert microbiologists – linguists worldwide is very small indeed, and therefore I decided to try to explain to the trainees some of the basics of prokaryote nomenclature. I showed that, even for students who only know Chinese and some English and without knowledge of Latin, it is possible to propose correct names for newly isolated taxa of Bacteria and Archaea.

The training course was composed of eight one and a half hour sessions, as follows:

1. Introduction; Publishing scientific papers; Where to submit your paper; How to deal with editors and reviewers

Here I tried to explain how the peer review system works, what the function is of editors and reviewers, and how decisions (acceptance, revision, or rejection) are made. Editors are nearly always nice and experienced scientists who have one goal only: to help colleagues to publish their work if that work meets the standards set by the journal. The different types of journals with respect to the way their revenue is generated were explained: subscription-based journals where the reader pays (but sometimes the authors pay a modest page fee as well) and open-access journals where the author pays an often hefty fee, he retains the copyright, and anyone can freely download the article. Further issues important while selecting a suitable journal of a new manuscript were discussed, such as the paper's scientific content, the scope of the journal, its impact factor, and (for open-access journals) the ability of the authors to pay the publication fee. The special status of IJSEM as the preferred journal for descriptions of new taxa of prokaryotes was explained: names are validly published there, while publication in other journals results in effective publication only.

2. Characterization and classification of Prokaryotes; the species concept for Prokaryotes

In this session I tried to familiarize the students with the ways prokaryotes are classified, and with the problematics associated with species and genus concepts for the prokaryotes. 16S rRNA gene sequences are insufficient to delineate species and genera. In the 1990s, DNA-DNA hybridization was introduced as the 'gold standard' for species delineation. However, the test is not simple to perform, it can be expensive, and results between different laboratories are not always comparable. Alternatives were discussed such as genome sequence based approaches, which will probably soon replace DNA-DNA hybridization as the 'gold standard' toward a definition what a species and what a genus is for the prokaryotes.

3. How to write a paper describing a new taxon

In this talk I introduced the importance of the polyphasic approach, including description of phenotypic, chemotaxonomic and genotypic properties, for the description of new prokaryotes. A genomics-based taxonomy is not yet feasible today. Phenotypic tests are still essential, and it is important that such phenotypic tests be performed using proper techniques. Examples of 'good' and 'bad' manuscripts and papers were presented to show what to do and what not to do to make reviewers and editors of taxonomic papers happy.

4. "What's in a name?" Introduction to prokaryote nomenclature; the International Code of Nomenclature of Prokaryotes

Since the pioneering work of the Swedish biologist Carl von Linné (Carolus Linnaeus) a binomial nomenclature system is used for plants and animals, in which each organism has a Latin-based genus name and a specific epithet. Such a binomial nomenclature system was adopted for the bacteria in the 19th century. Rules of biological nomenclature are internationally agreed, and are fixed in 'Codes', including the International Code of Nomenclature of Prokaryotes. The rules of this Code are determined by the International Committee on Systematics of Prokaryotes. The rules of the Code include provisions for the valid publication of name, for changing existing names, and more. In this session I discussed the formal framework for prokaryote nomenclature, based on the rules and the recommendations of the Code. I also explained how a new beginning was made in prokaryote nomenclature on January 1st, 1980 with the publication of the 'Approved Lists of Bacterial Names'. From that day onward new names of prokaryotes obtain standing in the nomenclature only after they are published in the International Journal of Systematic Bacteriology or its successor IJSEM.

5. How to name new species and genera of prokaryotes; Introduction to nomenclature (Neo-) Latin, Latin grammar and Appendix 9 of the Code

In two one and a half hour sessions I tried to explain some of the basics of Latin and 'Neo-Latin' necessary to correctly name new genera and species of prokaryotes. I was under no illusion that in one morning session all the students can become experts in nomenclature Latin. But there are some basic concepts and a few simple tricks that can help authors to avoid the most commonly made errors. Furthermore, there are clear guidelines in Appendix 9 to the Code, and there are two good review-style papers that explain how microbiological name-giving is done, also for those not proficient in ancient Greek and classical Latin. Based on these

documents I explained the ways genus names and specific epithets are correctly formed.

6. Nomenclature quiz

The theoretical material learned in class was followed by an ‘exam’ consisting of ten challenges: how to correctly name a number of (imaginary, yet-to-be-isolated) new bacterial genera and species based on certain properties one would like to see reflected in the names. The challenges were at different levels: Easy, Intermediate, Hard, and Expert. For this purpose the class was divided into a number of 14 teams, each with a ‘captain’ – coordinator. The event was held as an ‘open book exam’: students were allowed to use the articles from the course material, access the internet, and consult a paper Latin – English / English Latin dictionary.

7. Solutions to the nomenclature quiz and concluding comments

In this final session the answers given by the different teams were analyzed, explaining what was correct, what was incorrect, and why. I was pleased to see that all teams had passed the exam, with grades between 71 and 89 out of a maximum of 100 points. The winning team was awarded a bottle of wine as a prize.

Based on the material covered in this two-day training course, each participant now should have a basic knowledge of how the publication process works, how to write good taxonomic papers, how to properly name new organisms, what other important rules exist in the International Code of Nomenclature of Prokaryotes, and finally, how to deal with editors and reviewers to get good taxonomic papers published in quality journals.

On behalf of all participants in the conference and in the training course and on behalf of the editors of IJSEM and the other guests from abroad I want to thank Prof. Xue-wei Xu and his crew for the perfect organization of the event. It was a great experience for all of us.

Curriculum Vitae:

Aharon Oren was born in 1952 in Zwolle, the Netherlands. He now is a professor of Microbial Ecology of the Hebrew University of Jerusalem, Israel. He served as the chairman of the International Committee on Systematics of Prokaryotes (2002–2008) and the vice-president or president of the International Society for Salt Lake Research (2002–2009, 2009–2014). He is the editor-in-chief of *International Journal of Systematic and Evolutionary Microbiology*, and member of the editorial board of other academic journals, including *FEMS Microbiology Letters*, *Extremophiles*, *Frontiers in Extreme Microbiology*, and *Journal of Biological Research Thessaloniki*. Professor Oren long been engaged in research on the adaptation of microorganisms to life at high salt concentrations, the microbiology of the Dead Sea and solar salterns, diversity of anaerobic halophilic life, sulfur metabolism in phototrophic prokaryotes and taxonomy of prokaryotes. He was elected Fellow of the American Academy of Microbiology (2000), and was the recipient of the Moshe Shilo prize (1993) and the Ulitzki prize (2004) of the Israel Society for Microbiology. He obtained Doctor Honoris Causa degrees from the University of Osnabrück, Germany (2010) and Charles University in Prague (2015).