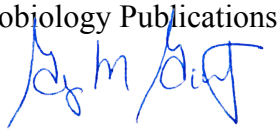
July 20, 2014

To: ICSP Executive Committee
Cc: US National Committee, SIMB Board of Directors, BAM Executive Committee, Society for General Microbiology Publications Office
From: George M. Garrity, Sc.D.
Subject: Report of ISCP Chair



Summary

The following report details the activities of the International Committee on Systematics of Prokaryotes, a Committee of the Bacteriology and Applied Microbiology Division of the International Union of Microbiological Societies for the time period between August 2008 and July 2014. Key accomplishments during that time period include revision of the ICSP Statutes, which have remained largely unmodified since first drafted in 1973 and publication of a new revision of the International Code of Nomenclature of Prokaryotes, which has undergone numerous emendations since it was last published in 1992. Both documents will be available in print and electronic form. The ICSP has also continued its publication of the International Journal of Systematic and Evolutionary Microbiology, in partnership with the Society for General Microbiology.

Background

The principal responsibility of the International Committee on Systematics of Prokaryotes (ICSP) is to maintain a system of nomenclature for *Bacteria* and *Archaea* that was originally conceived during the First International Congress of Microbiology in Paris, in 1930 (Lapage *et al.*, 1992; Parker *et al.*, 2014). In recognition of the central importance of a stable and well-maintained system of naming bacteria of importance in human and veterinary medicine, and in all other areas of bacteriology, a permanent program was established within the International Society of Microbiology to address this problem and to ensure balanced participation by representatives of member societies. In the ensuing 84 years, this program and its various successor committees, commissions and parent organizations have developed an effective system of nomenclature that continues to accommodate change and provides access to new knowledge while maintaining stable connections to prior microbiological knowledge contained in the scientific, technical, medical, legal and regulatory literature.

The early history of the ICSP is summarized in the synopses of Congresses in Appendix 12 of the International Code of Nomenclature Prokaryotes (ICNP) 2008 edition (Parker *et al.*, 2014), which will be circulated at the Fourteenth International Congress of Bacteriology and Applied Microbiology in Montreal. The history of International Union of Microbiological Societies (IUMS) (and its forerunners) is inextricably intertwined with that of the ICSP (and its forerunners), as highlighted by Kupferberg (Kupferberg, 1993). Schleifer (Schleifer, 2008) has emphasized the major roles of the divisional committees, commissions and federations (COMCOFs) that operate within the IUMS. Readers familiar with the structure and function of the ICSP and the ICNP will recognize that many of the issues that seem problematic today have strong parallels in the past, because the problems of nomenclature are centered on communication of complex concepts and the associated information represented by names; a

problem that is distinct from the methods used to derive a classification or identification scheme. Many of our predecessors were familiar with the difficulties that practitioners encountered when applying the botanical and zoological codes and devised novel solutions that remain in use today and play a critical role in defining a new taxonomy in which genomics and other developing technologies play an ever-increasing role; one that is firmly linked to our past knowledge through the establishment of accurate, centralized records of the validly published names at the taxonomic ranks from subspecies up to and including the rank of class of *Bacteria* and *Archaea*. In these respects the infrastructure implemented by the ICSP and the ICNP has become exemplary for the implementation of further developments such as ZooBank and MycoBank (Hawksworth, 2011, and articles therein; Sneath, 2005).

Duties of the International Committee on Systematics of Prokaryotes

The duties and responsibilities of the International Committee on Systematics of Prokaryotes (ICSP) are established in its Statutes that were approved in 1970 at the ninth International Congress of Microbiology in Moscow (Lapage *et al.*, 1992; Parker *et al.*, 2014). The Statutes establish the manner of representation of member societies on the ICSP and define its structure, functions, and the duties of its officers. These functions fall into five broad areas that were initially enumerated by Skerman in 1975 (in Lapage *et al.*, 1992) and have remained largely unchanged since at this time:

1. to hold meetings as part of the sessions of the Congresses of the International Union of Microbiological Societies and to sponsor a session on taxonomy at the Congresses;
2. to approve the *International Code of Nomenclature of Prokaryotes* and those changes recommended by the Judicial Commission;
3. to receive and approve the Opinions issued by the Judicial Commission;
4. to establish special Subcommittees on Taxonomy to make recommendations on the classification and nomenclature of taxa;
5. to publish the official publications of the ICSP (currently the *International Code of Nomenclature of Prokaryotes*, the Validation and Notification Lists, The Lists of Taxonomic Changes, the Statutes of the ICSP, and the *International Journal of Systematic and Evolutionary Microbiology*).

The following report highlights the activities of the ICSP for the time since the last plenary session at the Twelfth International Congress of Bacteriology and Applied Microbiology in Istanbul in 2008. Major accomplishments include: (1) a long overdue revision of the *International Code of Nomenclature of Prokaryotes* that encompasses all of the changes that have been approved since the last version was published in 1992 (1990 revision), including revisions and updates to the Appendices; (2) an equally long overdue revision of the Statutes of the ICSP, which have not been updated since 1973; (3) a summary of the publishing activities of the *International Journal of Systematic and Evolutionary Microbiology*; (4) Opinions rendered by the Judicial Commission, activities of the Subcommittees on Taxonomy; and (5) various outreach activities by members of the Executive Board. An update is also provided on matters of importance that were reported in the minutes of previous plenaries of the ICSP, but remained unaddressed or unresolved. Procedural and organizational issues that have arisen since the last plenary of the ICSP are also discussed.

Meetings of the ICSP and the Executive Board of the ICSP (EB-ICSP)

The ICSP convened during the Twelfth International Congress of Bacteriology and Applied Microbiology in Istanbul, Turkey in 2008 (Labeda & Oren, 2011). Highlights of that meeting included a reaffirmation of the need to revise Appendix 9 of the ICNP dealing with orthography, and the inclusion of an Appendix 11 describing application the *Candidatus* concept (Parker *et al.*, 2014). The committee also recommended adding cross-references to the General Considerations, Principles, Rules and Appendices in future revisions of the Code and to replace theoretical examples of names that contravene Rules with real examples that have been encountered since publication of the Approved Lists in 1980 (Skerman *et al.*, 1980, 1989).

The Judicial Commission recommended changes to Rules 8, 15, 24a, 24b and 37a and deletion of Note 1 of Rule 24a. The status of names validly published in the International Journal of Systematic Bacteriology between January 1, 1978 and January 1, 1980 (when the Approved List of Names went into effect) were also discussed in light of proposed changes to Rule 24a. Citation of authorship of coordinate status subspecies, arising by default via Rule 40d, was clarified. Opinions 80–87 were published prior to the meeting. Opinions 88–96 were awarded, but not yet published and Opinions 75, 79, and 83 were revisited. In particular, the status of a number of names at the rank of class, subclass and order are a cause for concern and need to be dealt with in an unambiguous manner (Garrity *et al.*, 2011; Parker *et al.*, 2014).

Taxonomic Subcommittees convened their meetings during the Congress (Holmes & Farmer, 2009a, b; Kuhnert & Christensen, 2009; Logan, 2009; Oren & Ventosa, 2008; Schumann *et al.*, 2009). Minimal descriptive standards were published for the *Pasteurellaceae* (Christensen *et al.*, 2007) and *Halomonadaceae* (Arahal *et al.*, 2007), and an update of the minimal standards for the class *Mollicutes* (*Tenericutes*) was published (Brown *et al.*, 2007; Whitcomb, 2007).

The ICSP did not meet during the Thirteenth International Congress of Bacteriology and Applied Microbiology in Sapporo, Japan in 2011. A combination of natural and man-made events preceding the Congress resulted a situation in which the Judicial Commission became inquorate and could not convene. Therefore, those meetings were postponed. Several other activities did take place during the Congress, including the ICSP being asked to announce the winner of the van Niel International Prize for Studies in Bacterial Systematics on behalf of the Head of the Department of Chemistry and Molecular Biology, University of Queensland, who could not attend the meeting in person, and meetings of several Taxonomic Subcommittees (Arahal & Ventosa, 2011; Arahal *et al.*, 2011; Bernardet & Bowman, 2013; International Committee on Systematics of Prokaryotes, 2011; Oren & Ventosa, 2011; Sawabe & Ventosa, 2012; Schumann & Gvozdyak, 2012). An emergency meeting of members of the Executive Board present in Sapporo was held to discuss progress on two key items arising from the 2005 and 2008 Congresses: revision and publication of the Code and revision and publication of the Statutes. Although the ICSP had unanimously agreed to this action, progress on the tasks had stalled despite efforts of the Chairman of the Judicial Commission who had provided an extensively annotated version. The Chairman of the ICSP was directed to find a remedy to the situation. This also applied to the long overdue publication of the minutes of the prior meetings of the ICSP and the Judicial Commission, which historically preceded each successive meeting rather than publishing immediately after the close of the meeting.

The Executive Board met on an as-needed basis throughout 2008–2014 to address various issues. This included planning for the Sapporo and Montreal Congresses, drafting and review of published committee reports, nomination of recipients of the van Niel International Prize for

Bacterial Systematics, and other unplanned business including several ethical issues arising from the publication of the IJSEM, reestablishing ownership of the ICSP bank account, and verification of society appointments of elected officers of the ICSP. This latter issue arose as the Publications Board of the ICSP undertook revision of the Statutes and realized the consequences of discontinuation of funding for the US National Committees (USNC) to the IUBS and IUMS. This impacted two members of the Executive Board. The Chairman participated in ongoing discussions between the IUMS and USNC to seek a resolution to this matter. Revision of the Statutes was long overdue, given changes between BAM-IUMS congresses made in the 1990's as well as infrastructural changes to the way the IJSB (now the IJSEM) was edited and published. This has also led to the recognition of many other customary practices of the ICSP that are in contravention including: (1) nomination and election of the Editor-in-Chief and editorial board members of the IJSEM; (2) merger of the duties of the Chairman of the ICSP and the Editor-in-Chief of the ICSP and (3) reinstatement of the duties of the Chairman of the ICSP as Chairman of the Editorial Board of the IJSEM. This latter revision retains the boundary between the editorial and business roles of the Chairman and the Editor, which ensures editorial independence consistent with modern publishing ethics (http://publicationethics.org/). The membership of the ICSP had been made aware of most of these issues at the 2005 plenary session, and saw no easy solution to the problems but unanimously agreed that the current *modus operandi* be sanctioned until such times as the Statutes could be brought up to date.

Publishing Activities of the ICSP

The ICSP functions in a manner analogous to modern, multi-tiered standards organizations. Like such organizations, its principle objective is to promulgate a set of well-designed standardized operating procedures (SOPs familiar in ISO and similar national and international regulations) that are open and readily adopted by various organizations in the public and private sectors. Well-developed standards are known to improve efficiency and ensure that various products and services employing such standards are interoperable, interchangeable and reliable. The need for such standards is essential in the exchange of data and metadata, especially in the life sciences and the various codes of nomenclature (see Appendix 1 in Parker, *et al.* 2014). The accurate use of nomenclature and its link to the underlying properties of strains can have significant consequences in human and veterinary medicine, biosafety, biosecurity, agriculture, industry and law. The names vetted by these codes are used in biological safety evaluation (e.g., the German "Technische Regeln für Biologische Arbeitstoffe Einstufung von Prokaryonten (*Bacteria* und *Archaea*) in Risikogruppen TRBA 466) national laws governing genetically engineered organisms (e.g., laws governing genetically engineered organisms), the restricted agents list (e.g., laws governing handling of potential biothreat agents and dual use organisms), import/export/quarantine (e.g., phytosanitary regulations) as well as the International Airline Transportation Authority (IATA) and the UN Convention on Biological Diversity Access and Benefit Sharing regime (Nagoya Protocol).

The principal manner in which the ICSP functions is through its publications. The ICNP (also referred to herein as the *Code*) governs the formation, application and modification of names that are applied to taxonomic concepts used for *Bacteria* and *Archaea*. The *International Journal of Systematic and Evolutionary Microbiology* serves as the only authoritative mechanism for the dissemination of validly published names, either through the direct publication of descriptions of

new and revised taxa (including designation of types), in the form of taxonomic proposals, or by vetting names "effectively published" outside the IJSEM and publishing them on a Validation List in the IJSEM (Lapage *et al.*, 1992; Parker *et al.*, 2014). If the latter route is taken each effectively published name is reviewed by a list editor to ensure conformance to the rules of the *Code*. The process of valid publication is essentially a centralized registration/indexing of a nomenclatural act and is unique to the ICNP. It has proven to be successful in rendering a workable and durable system of nomenclature since it was implemented on January 1, 1980 (Skerman *et al.*, 1980, 1989) . The Statutes serve to govern administration of the entire system, and to establish and revise rules for the implementation and maintenance of the organizational infrastructure. The ICNP also includes rules for adjudicating issues that arise if application of the rules yields unintended or unforeseen problems, or conflict with other codes of nomenclature. Such issues may result in re-examination and revision of the *Code*.

Revision of the International code of Prokaryotic Nomenclature

As part of the normal operation of the ICSP, changes are periodically introduced into the *Code* to address problems that are encountered through its application. These changes are announced in the minutes of meetings of the Judicial Commission and during ICSP plenaries. The revisions go into effect on publication in the IJSEM, in keeping with the Rule 1b. Proper application of the *Code* therefore requires one to consult not only the latest revision of the *Code*, but all of the published minutes, in the correct temporal order. While this task may be feasible for an experienced judicial commissioner or a well-seasoned taxonomist, the majority of working microbiologists find proper application and modification of names to be arcane and unnecessarily difficult. The ICSP recognizes that one step towards alleviating this problem is publication of a new edition of the *Code* that compiles all accumulated changes into a complete volume. During the 2005 Congress in San Francisco, the ICSP entered into an agreement with the Society of General Microbiology to publish a new edition of the Code, in both print and electronic form (Labeda & Oren, 2008). The matter was subsequently revisited during the Congress in 2008 (Labeda & Oren, 2011) and was on the agenda for the Congress in 2011. Newer technologies are now in place compared with those used in 1992 (the prior edition) that will allow for more frequent updates in the future (Parker *et al.*, 2014).

The Publications Committee of the Judicial Commission began work on the task in 2009 and produced a preliminary draft of the relevant sections (General Consideration, Principles, Rules, Advisory notes and Appendices), portions of which were delivered to the SGM editorial office in 2010. However, progress on the effort was delayed because of the departure of key personnel, recruitment and engagement of new editorial personnel, relocation of the SGM headquarters, and a lack of financial support. In parallel to that effort, a prototype online version of the Code was developed by CT Parker and GM Garrity in 2011, in which the draft of the Code was converted to XML (NLM JATS format) and XHTML and hosted using the Open Journal System (OJS) of the Public Knowledge Project. While useful for experimental purposes, reliance on that approach would pose a variety of technical and operational issues that would need to be factored into any long-term plans. In 2014, an alternative approach was taken to produce a complete "clean room" version of the Code that could be used to generate both print and electronic editions and rapidly compile revisions soon after the conclusion of (or even during) each Congress. Parker discusses the process used to produce the 2008 revision of the Code in the preface and details how that document was assembled, sequentially revised through the incorporation of changes introduced

during each Congress since 1990, and prepared for publication using modern methods for distribution in a variety of formats (XML, HTML, PDF, eBook, and printed), fulfilling the goals of: (1) communicating the actions of the Judicial Committee to the public in a more transparent way; and (2) producing a new edition of the code in both print and electronic formats. Draft versions of the *Code* (2008 Revision) will be distributed to members of the Judicial Commission and the ICSP during the Congress in Montreal. Discussions are currently underway with the SGM to determine the best approach for publishing the *Code*. Earlier problems regarding copyright issues (Labeda & Oren, 2008, 2011) have since been resolved.

Revision of the Statutes of the International Committee on Systematics of Prokaryotes

There is an intricate linkage between the *Code* and the Statutes of the ICSP. Whereas the former establishes the governance of nomenclature of *Bacteria* and *Archaea*, the latter establishes governance of the committees and members that are responsible for maintaining and implementing that system. Like the *Code*, the Statutes have not been updated since they were amended in 1973. Changes have been introduced in the intervening time through the actions of the ICSP and posed some obstacles to revision of *Code*, as the Principles, Rules and Recommendations must be interpreted in the context of the current Statutes.

The Publications Committee of the ICSP began discussions about revising the Statutes in 2008. Drafting commenced in September 2011 and culminated in a revision that was submitted for publication in the IJSEM in September 2013. Publication of the Statutes occurred in November 2013 (Publications Committee of the ICSP, 2013). Major changes in the Statutes include a change of the name of the *International Committee on Systematic Bacteriology* (ICSB) to the *International Committee on Systematics of Prokaryotes* (ICSP) and a change of the *International Journal of Systematic Bacteriology* (IJSB) to the *International Journal of Systematic and Evolutionary Microbiology* (IJSEM). These decisions were voted on by the ICSB in 1999 and went into effect on publication in 2000. The option of electronic publication of the Statutes and electronic ballots was approved during the Congress in Istanbul in 2008 and went into effect on publication of the minutes in 2011. On careful review of the Statutes, numerous inconsistencies were uncovered in the manner in which members of the Executive Board were elected and appointed to serve. The newly proposed statutes allow for co-opted members to be eligible for office. Other key changes proposed in the revised statutes include: abolishment of the Editorial Secretary to reflect changes in the way in which the editorial process is currently conducted; abolishment of the Publications Committee and replacement with an *ad hoc* committee to assume its duties, including periodic updating of the Statutes; changes in the way in which Subcommittees on Taxonomy are formed and function, including a means of automatically disbanding such subcommittees when their intended purpose may no longer be relevant; and changes to the way in which the Editor and Associate Editors of the IJSEM are appointed to coincide with modern publishing practices.

Publishing activities of the International Journal of Systematic and Evolutionary Microbiology

Nomenclatural acts covered under the ICNP

During the time period between the close of the 2008 Congress in Istanbul and the opening of the 2014 Congress in Montreal, a total of 3,700 articles were published in the IJSEM, of which 3,056 included novel proposals for 4,687 species, subspecies and higher taxa of *Bacteria* and *Archaea* (Table 1). An additional 1,043 effectively published names, appearing in articles outside the

IJSEM, were reviewed by the List Editors and found to conform to the rules of the ICNP and deemed validly published on 37 Validation Lists. There were 867 emendations of validly named taxa, of which 680 affected names that came into use prior to 2008 (Table 2). There were also 460 instances of synonymy established during this time period (Tables 3 and 4), the majority of which were basonym/new combination pairs arising from the revision of previously existing genera and creation of new genera. However, there were also 157 assertions of homotypic and heterotypic synonymy of validly published named species and 20 synonymies arising through the unification of higher taxa. Selection of the correct name for use in such instances requires a careful review of priority. When these same data are viewed in light of the date of valid publication of the earlier name in a synonym pair (regardless of the synonym type), 20% of affected names were first published during the inter-Congress time period.

Editorial issues

As the Statutes were undergoing revision, it became apparent to members of the Executive Board that the operation of the IJSEM was no longer consistent with Article 11b, either during the 2008–2014 time or for an undetermined number of prior congresses. Notably, the record is unclear with regard to the manner in which transition of the editorship of the journal occurred in 2002. Also, it is equally unclear as to when the role of the Chairman of the ICSP as the Chairman of the Editorial Board of the IJSEM changed, however, that is presumed to have occurred in 1999, when the Editor became the Chairman of the ICSP, an action that appears to contravene Article 11b (3). Restoration of the duties of the Chairman of the ICSP as the Chairman of the Editorial Board of the IJSEM was restored in 2011, as were the duties of the Executive Board of the ICSP in nomination of new editors. The appointment of Aharon Oren as Editor of the IJSEM in 2012 followed this procedure and replacement of Associate Editors of the IJSEM is now done with the advice and consent of the Executive Board. The Chairman of the ICSP has also acted as liaison with the publisher of the IJSEM and the Society for General Microbiology, a step that serves to restore the customary separation of editorial and financial aspects of scholarly publishing. In collaboration with the Editor, the Chairman has also sought to keep members of the Executive Board who do not serve as editors apprised of the publishing activities of the IJSEM.

Ethical issues

On two occasions, the Chairman of the ICSP was advised of issues of potential ethical misconduct relating to the publishing activities of the IJSEM. In both instances, COPE (Committee on Publishing Ethics) guidelines for investigation of misconduct in publishing were followed. The first case involved the fabrication and falsification of data (mandatory certificates of deposits provided to the editorial office as proof of availability of type strains in two or more separated culture collections in two or more different countries, in keeping with Rules 27 and 30). The matter was satisfactorily addressed by the Editor of the IJSEM (Kampfer, 2010) and the editorial office of the Society for General Microbiology. The manuscripts in question were retracted. The names, which were deemed validly published, have since been deemed illegitimate and not validly published.

In the second case, a reviewer for the IJSEM was accused of a conflict of interest in the discharge of his/her duties. The Chairman, the Editor and the Managing Editor investigated the matter and, following review of the data and interview of the participants, found no evidence to support the claim. The parties involved were informed of these findings and exonerated.

Web Site of the ICSP
The SGM had maintained the official ICSP web site (the-icsp.org) for several years, but as a result of the organizational restructuring of SGM and no clear responsibility for the activity, the maintenance of the site was neglected for several years. This was reported in the Minutes of Subcommittees on Taxonomy during previous sessions. In February 2013, the Managing Editor of the ICSP (Senior Staff Editor of IJSEM) requested that the Chairman of the ICSP delegate the responsibility of maintenance of the site to another party. CT Parker was co-opted by the Publications Committee to take over this responsibility. Transferring the original domain name required several obstacles to be overcome within SGM (including the death of the administrator, who was sole individual who could authorize the transfer), the original web host (Portland Group) and the registrar (Ascio/NetNames). In the meantime, a new domain name was secured (icsp.org) and a new ICSP web site with up-to-date information on the Committee has been available at that domain since August 2013. In June 2014, the original domain (the-icsp.org) was successfully transferred, and the site is now available via both addresses. Published links to the site from earlier literature resolves to the appropriate locations.

The van Niel International Prize for Studies in Bacterial Systematics
The recipient of the 2008 Award was Professor Matthew David Collins of the University of Newcastle (UK) for his seminal work on the chemotaxonomy of Gram-positive bacteria. Although Professor Collins was invited to deliver a plenary lecture on his work and to receive his award at the Congress, he was unable to attend the meeting (International Committee on Systematics of Prokaryotes, 2008).

The recipient of the 2011 Award was Professor George M. Garrity of Michigan State University in recognition of his work in publishing and bioinformatics; notably the development of automated methods for annotating electronic text (e.g., bacterial names) with correct and up-to-date information about the status of a name and introduce persistent links that tie together the taxonomic literature. Professor Garrity received his award following a plenary lecture to the Congress (International Committee on Systematics of Prokaryotes, 2011).
The recipient of the 2014 Award will be Dr. Nikos A. Kyrpides of Lawrence Berkeley National Laboratories and the DOE Joint Genome Institute for his seminal work in prokaryotic genomics and his key role in developing the Genomic Encyclopedia of *Bacteria* and *Archaea*. As announcement of the award was delayed, it is uncertain at this time if Dr. Kyrpides will be able to attend the Congress and receive the Award as notification/confirmation of the award took place in the last two weeks (submitted for publication).

Other matters pertaining to the International Committee on Systematics of Prokaryotes
During the 2011 Congress, members of the US National Committee were convened in a meeting by Dr. Jason Rao, (representative of the American Society for Microbiology). We were informed that support for our activities had been discontinued by the US National Science Foundation. We were also informed that there were other issues between the ASM and IUMS pertaining to society dues and the 2005 Congress. Subsequently, representatives of the IUMS and member societies participated in a number of teleconferences and a face-to-face meeting in Denver in May 2013 to seek a resolution of the outstanding issues and to restore US participation in the IUMS. Representatives of member societies were advised to obtain credentials to forward to the appropriate committee chairs, as needed.

Judicial Commission

The Judicial Commission is the regulatory body that primarily deals with all matters involving the International Code of Nomenclature of Bacteria (superseded by the International Code of Nomenclature of Prokaryotes). It is set up in a fashion consistent with the BAM constitution covering the operation of commissions. The core of the Judicial Commission comprises 3 classes, each consisting of 4 elected commissioners. Any one class serves a term of 9 years, with retirement and election being staggered to maintain the maximum degree of continuity in expertise over a long period of time. The system has proven to be an indispensable element of the Judicial Commission. An underlying requirement of membership in one of the classes of commissioners is a thorough working knowledge of the *Code*, its implementation and also resolving aspects of the wording that may either be ambiguous or have simply been misinterpreted. As a consequence all matters dealing with alterations to the wording or implementation of the *Code*, as well as uncertainties in the interpretation or even breaches in the application of the *Code* are initially dealt with by the Judicial Commission before being ratified by the ICSP.

Although the Judicial Commission may operate in an almost autonomous fashion, it is also desirable to promote interactions with organizations with common interests. Interactions with those responsible for other Codes of Nomenclature have been particularly fruitful. In this context the International Committee on Bionomenclature (founded in 1995 as a joint IUBS-IUMS organization) has provided an extremely useful forum for the discussion of common problems. One of the last meetings in Berlin (2012) resulted in the formulation of two important documents of general relevance to all Codes of Nomenclature: (1) a new version of the Draft BioCode 2011 (Greuter *et al.,* 2011) and (2) a revised glossary of technical terms used across all Codes of Nomenclature (David *et al.*, 2012). That these are not trivial documents can be deduced by their relevance to a recent report written by the German National Science Academy (Nationale Akademie der Wissenschaften Leopoldina, 2014) as well as a resolution drawn up at ICSEB VII in Berlin, 2011.

Other matters pertaining to the Judicial Commission

Members of the Judicial Commission are routinely called upon to provide assistance in the formation and application of names to new taxa and to interpret the *Code*. In some instances their contributions are sufficient to warrant co-authorship (Gerritsen *et al.*, 2014; Yarza *et al.*, 2013) or to be formally recognized as nomenclature editors for journals, but more frequently their contributions are noted in the acknowledgements. However, there are also instances in which their expertise is sought only after problems come to light, often for many years. A list of issues to be addressed by the Judicial Commission is available as an appendix together with other discussion documents that directly impinge on the work of the commission.

Concluding Remarks

The importance of the work done by members of the ICSP is critically important not only to microbiologists, but to knowledge workers in many other fields that ultimately touch on the lives of all of us. *Bacteria* and *Archaea* play vital roles in many different natural phenomena and depending on perspective, either harmful or beneficial. Effective communication about these organisms is largely mediated by the names that are used by practitioners, because those names

can encapsulate virtually all that is known about an organism in an extraordinarily small amount of text. However, those same names, when misapplied, can just as easily convey the wrong information and elicit the wrong responses. Names matter. This fact is highlighted in General Consideration 8 of the Code, which states, “The International Code of Nomenclature of Prokaryotes is an instrument of scientific communication. Names have meaning only in the context in which they were formed and used.”

Responsibility for maintaining the infrastructure used to properly convey this information falls to the ICSP, and its members have diligently worked to ensure that the lexicon of names has remained up-to-date, is properly maintained and available for use. They have worked tirelessly in their efforts to maintain a system that is critical to the field, but is often overlooked or dismissed as being unimportant. A failure to adequately maintain any part of an infrastructure imposes a risk, which is generally borne by future generations. To a large extent, the activities of the ICSP during 2008-2014 have been focused on rectifying problems that were unaddressed for decades. Through the tireless work of the Executive Board and the Publications Committee of the ICSP the necessary improvements have been made and I am pleased to say that the system is in better condition than when we inherited it and the broader community will benefit from this effort. Even so, serious problems remain to be addressed in the future. Sustained support for the activities of the ICSP needs to be secured. The current model is exhibiting signs of distress, and not just in microbiology. The same has happened in zoology and botany. In both cases, it was only because of the financial and technical support of benefactors that much of the necessary work could continue. Technical and social changes have irrevocably altered the way in which science is conducted, especially the life sciences, and nomenclature will remain a central part of the infrastructure. The challenge in the future will be to secure a way to sustainably underwrite those costs and to ensure that the services developed meet the needs and expectations of the broader community of end-users.

Table 1. Validly published names of prokaryotic taxa (September 2008 – July 2014).

Rank		2008	2009	2010	2011	2012	2013	2014	Total
subspecies									
	VL	0	4	2	6	2	6	2	22
	VP	7	11	11	10	9	10	6	64
species									
	VL	56	75	71	103	166	168	140	779
	VP	542	593	550	517	502	765	394	3,863
genus									
	VL	14	13	14	16	21	27	30	135
	VP	103	100	91	91	80	125	70	660
family									
	VL	3	0	18	1	21	6	6	55
	VP	8	12	7	10	5	12	4	58
suborder									
	VL	0	0	0	0	0	2	0	2
	VP	0	2	0	1	0	0	0	3
order									
	VL	1	0	5	0	8	3	6	23
	VP	4	7	4	3	0	7	1	26
subclass									
	VL	0	0	0	0	0	0	0	0
	VP	0	0	1	0	0	0	0	1
class									
	VL	0	0	5	0	15	7	0	27
	VP	1	2	2	1	1	4	1	12
Total		739	819	781	759	830	1,142	660	5,730

VL – Effectively published names validated by way of the Validation Lists.
VP – Valid publication of names proposed in articles published in the IJSEM.
Source: NamesforLife database, 7/15/2014.

Table 2. Emendations of validly named prokaryotic taxa during (Sept 2008 – July 2014)

	2008	2009	2010	2011	2012	2013	2014	Total
1980–2007	73	150	64	75	93	139	86	680
2008	1	2	9	9	6	15	7	49
2009		1	4	8	11	17	1	42
2010			2	4	10	19	3	38
2011				0	7	18	4	29
2012					4	10	4	18
2013						4	5	9
2014							2	2
Total	74	153	79	96	131	222	112	867

Row date reflects the year valid publication, column date the year of emendation.
Source: NamesforLife database, 7/15/2014.

Table 3. Synonymy of validly named prokaryotic taxa by synonym type (Sept 2008 – July 2014)

	2008	2009	2010	2011	2012	2013	2014	Total
basonym	35	48	34	29	54	66	37	303
cs subsp.	2	1	0	0	0	1	1	5
heterotypic	16	7	30	7	9	7	6	82
homotypic	10	40	2	1	0	0	2	55
unification	2	10	3	1	3	1	0	20
	65	106	69	38	66	75	46	465

cs subspecies – coordinate status subspecies arising through the initial subdivision of species into subspecies.
unification – synonymies of higher taxa.
Source: NamesforLife database, 7/15/2014.

Table 4. Assertions of synonymy of validly named prokaryotic taxa (Sept 2008 – July 2014)

	2008	2009	2010	2011	2012	2013	2014	Total
1980–2007	64	96	65	26	50	37	34	372
2008	1	5	1	6	2	7	2	24
2009		5	2	2	7	9	0	25
2010			1	2	5	5	0	13
2011				2	2	8	1	13
2012					0	4	2	6
2013						5	6	11
2014							1	1

Row date reflects the year of valid publication of the earlier synonym, column the year of later synonym.
Source: NamesforLife database, 7/15/2014.

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Appendix

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