This volume is dedicated to our colleagues
James T. Staley and George M. Garrity,
who retired from the Board of Trustees of Bergey’s Manual Trust
during preparation of this volume.
We deeply appreciate their efforts as editors, authors and officers of the Trust.
They have devoted many years to helping
the Trust meet its objectives.
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A number of important changes occurred at Bergey’s Manual Trust during the preparation of this volume. In 2006, George Garrity retired from the Trust, and the Trust moved its offices from Michigan State University to the University of Georgia. We are deeply indebted to Professor Garrity, under whose supervision much of this volume was prepared. James T. Staley’s wise council guided this transition until he retired from the Trust in 2008 after 32 years of service.

The officers of the Trust have also changed during this time. Barny Whitman became Treasurer and Director of the Editorial Office in 2006. Michael Goodfellow succeeded Professor Staley as Chair in 2008 and Peter Kämpfer succeeded Professor Goodfellow as Vice-Chair in 2008. The Trust was also fortunate to acquire the services of Dr Aidan Parte as Managing Editor in 2007.

Much as things have changed, prokaryotic systematics has remained a vibrant and exciting field of study, one of challenges and opportunities, great discoveries and gradual advances. To honor the leaders of our field, the Trust presented the Bergey Award in recognition of outstanding contributions to the taxonomy of prokaryotes to Jean Paul Euzéby (2005), David P. Labeda (2006), and Jürgen Wiegel (2008). In recognition of life-long contributions to the field of prokaryotic systematics, the Bergey Medal was presented to Richard W. Castenholz (2005), Kazau Komagata (2005), Klaus P. Schaal (2006), Fergus Priest (2008), and James T. Staley (2008).

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William B. (Barny) Whitman
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Citation

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Arrangement of the Manual

As in the previous volumes of this edition, the Manual is arranged in phylogenetic groups based upon the analyses of the 16S rRNA presented in the introductory chapter “Revised road map to the phylum Firmicutes”. These groups have been substantially modified since the publication of volume 1 in 2001, reflecting both the availability of more experimental data and a different method of analysis. Since volume 3 includes only the phylum Firmicutes, taxa are arranged by class, order, family, genus and species. Within each taxon, the nomenclatural type is presented first and indicated by a superscript T. Other taxa are presented in alphabetical order without consideration of degrees of relatedness.

Articles

Each article dealing with a bacterial genus is presented wherever possible in a definite sequence as follows:

a. Name of the genus. Accepted names are in boldface, followed by “defining publication(s)”, i.e. the authority for the name, the year of the original description, and the page on which the taxon was named and described. The superscript AL indicates that the name was included on the Approved Lists of Bacterial Names, published in January 1980. The superscript VP indicates that the name, although not on the Approved Lists of Bacterial Names, was subsequently validly published in the International Journal of Systematic and Evolutionary Microbiology (or the International Journal of Systematic Bacteriology). Names given within quotation marks have no standing in nomenclature; as of the date of preparation of the Manual they had not been validly published in the International Journal of Systematic and Evolutionary Microbiology, although they may have been “effectively published” elsewhere. Names followed by the term “nov.” are newly proposed but will not be validly published until they appear in a Validation List in the International Journal of Systematic and Evolutionary Microbiology. Their proposal in the Manual constitutes only “effective publication”, not valid publication.

b. Name of author(s). The person or persons who prepared the Bergey’s article are indicated. The address of each author can be found in the list of Contributors at the beginning of the Manual.

c. Synonyms. In some instances a list of some synonyms used in the past for the same genus is given. Other synonyms can be found in the Index Bergeyana or the Supplement to the Index Bergeyana.

d. Etymology of the name. Etymologies are provided as in previous editions, and many (but undoubtedly not all) errors have been corrected. It is often difficult, however, to determine why a particular name was chosen, or the nuance intended, if the details were not provided in the original publication. Those authors who propose new names are urged to consult a Greek and Latin authority before publishing in order to ensure grammatical correctness and also to ensure that the meaning of the name is as intended.

e. Salient features. This is a brief resume of the salient features of the taxon. The most important characteristics are given in boldface. The DNA G+C content is given.

f. Type species. The name of the type species of the genus is also indicated along with the defining publication(s).

g. Further descriptive information. This portion elaborates on the various features of the genus, particularly those features having significance for systematic bacteriology. The treatment serves to acquaint the reader with the overall biology of the organisms but is not meant to be a comprehensive review. The information is normally presented in the following sequence:

Colonial morphology and pigmentation
Growth conditions and nutrition
Physiology and metabolism
Genetics, plasmids, and bacteriophages
Phylogenetic treatment
Antigenic structure
Pathogenicity
Ecology

h. Enrichment and isolation. A few selected methods are presented, together with the pertinent media formulations.

i. Maintenance procedures. Methods used for maintenance of stock cultures and preservation of strains are given.

j. Procedures for testing special characters. This portion provides methodology for testing for unusual characteristics or performing tests of special importance.
k. Differentiation of the genus from other genera. Those characteristics that are especially useful for distinguishing the genus from similar or related organisms are indicated here, usually in a tabular form.

l. Taxonomic comments. This summarizes the available information related to taxonomic placement of the genus and indicates the justification for considering the genus a distinct taxon. Particular emphasis is given to the methods of molecular biology used to estimate the relatedness of the genus to other taxa, where such information is available. Taxonomic information regarding the arrangement and status of the various species within the genus follows. Where taxonomic controversy exists, the problems are delineated and the various alternative viewpoints are discussed.

m. Further reading. A list of selected references, usually of a general nature, is given to enable the reader to gain access to additional sources of information about the genus.

n. Differentiation of the species of the genus. Those characteristics that are important for distinguishing the various species within the genus are presented, usually with reference to a table summarizing the information.

o. List of species of the genus. The citation of each species is given, followed in some instances by a brief list of objective synonyms. The etymology of the specific epithet is indicated. Descriptive information for the species is usually presented in tabular form, but special information may be given in the text. Because of the emphasis on tabular data, the species descriptions are usually brief. The type strain of each species is indicated, together with the collection(s) in which it can be found. (Addresses of the various culture collections are given in the article in Volume 1 entitled Culture Collections: An Essential Resource for Microbiology.) The 16S rRNA gene sequence used in phylogenetic analysis and placement of the species into the taxonomic framework is given, along with the GenBank (or other database) accession number. Additional comments may be provided to point the reader to other well-characterized strains of the species and any other known DNA sequences that may be relevant.

p. Species incertae sedis. The List of Species may be followed in some instances by a listing of additional species under the heading “Species Incertae Sedis” or “Other organisms”. The taxonomic placement or status of such species is questionable, and the reasons for the uncertainty are presented.

q. References. All references given in the article are listed alphabetically at the end of the family chapter.

Tables
In each article dealing with a genus, there are generally three kinds of table: (a) those that differentiate the genus from similar or related genera, (b) those that differentiate the species within the genus, and (c) those that provide additional information about the species (such information not being particularly useful for differentiation). The meanings of symbols are as follows:

+: 90% or more of the strains are positive
d: 11–89% of the strains are positive
−: 90% or more of the strains are negative
D: different reactions occur in different taxa (e.g., species of a genus or genera of a family)
v: strain instability (NOT equivalent to “d”) w: weak reaction.
ND, not determined or no data.

These symbols, and exceptions to their use, as well as the meaning of additional symbols, are given in footnotes to the tables.

Use of the Manual for determinative purposes
Many chapters have keys or tables for differentiation of the various taxa contained therein. For identification of species, it is important to read both the generic and species descriptions because characteristics listed in the generic descriptions are not usually repeated in the species descriptions.

The index is useful for locating the articles on unfamiliar taxa or in discovering the current classification of a particular taxon. Every bacterial name mentioned in the Manual is listed in the index. In addition, an up-to-date outline of the taxonomic framework is provided in the introductory chapter “Revised road map to the phylum Firmicutes”.

Errors, comments, suggestions
As in previous volumes, the editors and authors earnestly solicit the assistance of all microbiologists in the correction of possible errors in Bergey’s Manual of Systematic Bacteriology. Comments on the presentation will also be welcomed as well as suggestions for future editions. Correspondence should be addressed to:

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