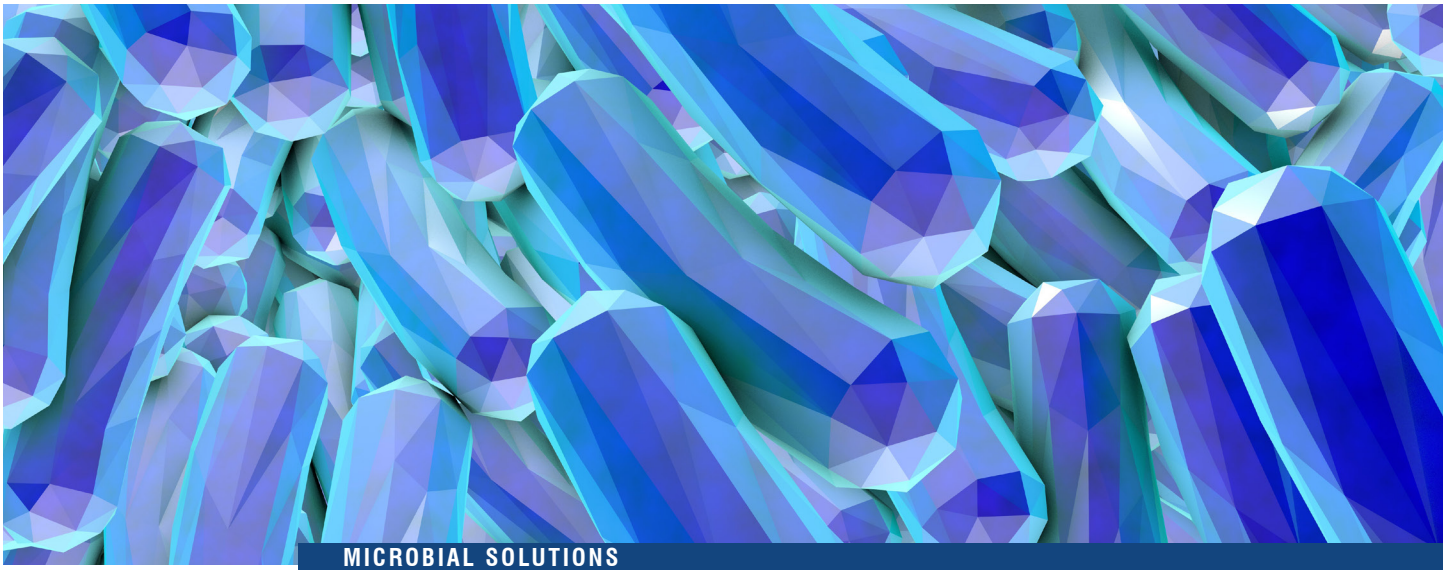
charles river

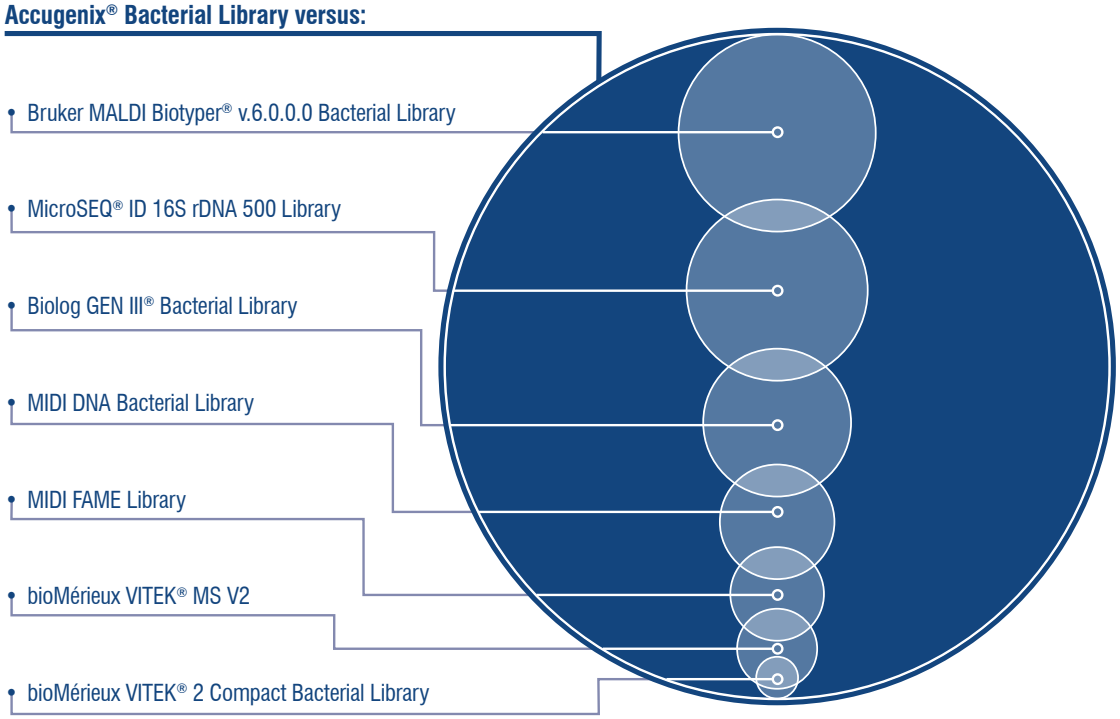


Bacterial Library Comparison

Note:

Circles in the Venn diagram at right are proportional to the size of the reference libraries.

Accugenix® Bacterial Library versus:



askcharlesriver@criver.com • www.criver.com

Introduction

As the world's leading laboratory for microbial identification, Charles River is committed to providing the most accurate identifications to the regulated industries we serve. This commitment requires that the Accugenix® services maintain relevant, accurate and compliant microbial libraries, enabling us to achieve the highest percentage of species-level identifications for our clients. Since 2006, we have identified hundreds of thousands of bacterial isolates, of which 95% were obtained from aseptic and non-sterile manufacturing environments. Having identified bacteria from over 1000 pharmaceutical, biotechnology, medical device and other manufacturing facilities worldwide, our company is highly aware of the species that are important to these industries. Charles River is committed to ensuring that all of these species are present in our validated bacterial library.

As an independent contract laboratory service provider offering multiple technology solutions, Charles River routinely compares differences in library performance for environmental isolates. We analyzed the bacterial databases of six commercially available identification systems and compared them to our proprietary bacterial 16S library for coverage. These commercially available systems include three phenotypic systems (the bioMérieux VITEK®2 Compact, MIDI FAME and Biolog GENIII®), two proteotypic MALDI-TOF systems (the Bruker Biotyper®, bioMérieux VITEK® MS) and two genotypic systems (the MIDI DNA and MicroSEQ® ID 16S rDNA 500 Library). By sharing the results of this study, our goal is to provide you with a confirmation that the Charles River solution continues to be the superior choice for microbial identifications. When you consider coverage, accuracy and compliance, Charles River provides identification services that surpass all other identification systems.

Relevant library coverage

The Accugenix® Bacterial Library contains substantially more unique library entries than any other commercially available identification system. The current gold standard for microbial identification is DNA sequencing. However, the accuracy of genotypic systems is highly dependent on library coverage. For phenotypic and biochemical systems, gaps in library coverage are a considerable source of misidentifications. Charles River is continually expanding our library coverage to ensure our customers will receive accurate, species-level identifications that are not otherwise attainable using commercially available systems.

Technology[1]	Unique Bacterial Species Entries[2]	Relevant Bacterial Species Entries[3]	Excluded Bacterial Species Entries[4]
Accugenix®	6949	3721	0
Biotyper®	2034	1446	2275
MicroSEQ®	1865	1415	2306
Biolog	1532	1190	2531
MIDI DNA	1184	942	2779
MIDI FAME	969	808	2913
VITEK® MS	834	722	2999
VITEK®2	428	409	3312

Library Coverage by Commercial System. The Accugenix® Bacterial library provides superior coverage compared to any other commercially available system. At best, the latest Biotyper® and MicroSEQ® databases contain 29% of the bacterial species in the Accugenix® Library. At Charles River, our libraries are continually updated to reflect taxonomic changes and include newly described species. Our customers benefit directly from having access to the most relevant, up-to-date and validated library in the industry.

- Insufficient library coverage impacts the number of reportable results.
- Employing multiple commercial identification systems increases the cost but will not guarantee a higher rate of species-level identifications.
- Library coverage must be reflective of the organisms observed in your environment.
- The Accugenix® libraries are built in a quality environment and validated to ensure consistent performance and accuracy.
- The Accugenix® libraries contain the most recent taxonomic names. If you find that your organism of interest is not included in our library, consult the List of Prokaryotic Names with Standing in Nomenclature (LPSN) website at www.bacterio.net. It is likely that the species is in the library, but listed under a more recent taxonomic name.

[1] Library versions compared in this document: Accugenix 14 Jun 2017, Biotyper 6.0.0.0, MicroSEQ 2013, Biolog 2013, MIDI DNA 2011, MIDI FAME 2011, VITEK MS 2013, VITEK2, 2009

[2] Total number of taxonomically distinct bacterial species in a library. The type strain is considered for each species when present in the library. This number excludes redundant species entries which do not increase performance.

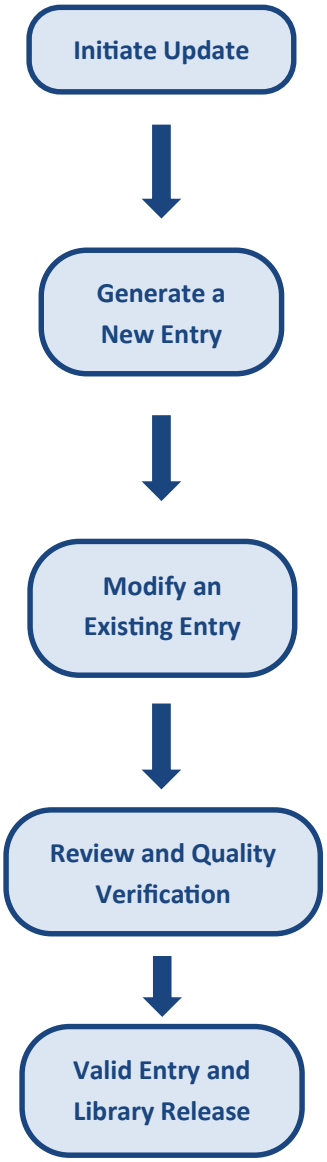
[3] Total number of bacterial species in a library that are considered to be important to FDA-regulated industries. Since 2006, Accugenix, Inc. has identified hundreds of thousands of isolates from manufacturing facilities worldwide, giving us the visibility to know what bacterial species are encountered in these environments.

[4] Number of unique species entries considered to be important to FDA-regulated industries that are not included in commercially available identification systems listed.

Maintaining Validated, cGMP Compliant Microbial Sequencing Libraries

Recognizing that a reference library is a key component for microbial identification, Charles River gives utmost priority to routinely maintain and annually re-validate the Accugenix® microbial DNA libraries with the goal of providing the highest percentage of accurate species-level IDs for bacteria and fungi. Superior performance, reliability and relevancy of microbial ID systems require libraries that are continuously curated and updated to reflect taxonomic changes and inclusion of novel organisms encountered in manufacturing environments. Continuous maintenance also requires evaluation of sequences that do not provide identification to the species-level. These analyses are essential to building libraries with a broad range of relevant coverage. Serving as a contract laboratory for highly regulated manufacturing environments dictates that Charles River follows a rigorous cGMP compliant program which encompassed our original library validation procedures and continues to drive the development of our libraries. We have controlled processes which maintain a validated state through change control and Quality Assurance (QA) approval for all entries.

Prior to including a new library entry, Charles River performs rigorous testing at each step of the maintenance process to ensure the accuracy of the entry's sequence and corresponding taxonomic nomenclature. There are defined steps to the compliant process: initiation of an update, verification of the correct sequence and validity of the new species name, strain acquisition, data confirmation, review and QA approval, designation as valid for use and new library release.



Initiate update through 1) a customer sample that has a genus, or higher, confidence level with the current library but that closely relates to a validly named organism not currently in the library 2) general library maintenance - if there is a significant change in an entry due to a retraction published in a peer reviewed journal, a change to current microbial taxonomy or a newly published species or if an error is discovered while investigating an incorrect ID.

Generate a new entry by 1) obtaining the sequence in question and searching public databases looking for potential species matches 2) identifying closely related sequences from a recently sequenced type strain of a new species published in the International Journal of Systematic and Evolutionary Microbiology (IJSEM) or other peer reviewed journal, or identifying a sequence of the highest quality 3) obtaining the published sequence 4) if there is no type strain, using a sequence for a strain that can be obtained from a qualified culture collection, such as ATCC or DSMZ, and published in a taxonomy journal 5) if the sequence is of low quality, or represents an organism with a high frequency of occurrence, purchasing the organism from a qualified culture collection and sequencing it in-house.

Modify an existing entry if the current entry is found to 1) have an old taxonomic name - correct the name to conform to the current published name 2) be no longer valid - if a species is shown to be synonymous with another earlier published species, the entry with the accepted nomenclature is retained and the entry for the synonym is marked not valid for use 3) have a spelling mistake - correct the name to conform with the published name 4) have a sequence error - correct the entry. In all cases, the IJSEM reference information or botanical code is included in the tracking forms.

Technical review and QA verification. 1) All new and modified entries are considered verified if their sequences are consistent with those taken directly from the IJSEM, the IJSEM list of approved species names or other peer reviewed journals which define the species in question. 2) Phylogenetic justification requires that the new species in question cluster with other species in the same genus at a genetic distance that is consistent with the genetic distance that separates other closely related species from one another. 3) Confirmation is made that the organism's name and published reference are correct and verified as being the currently accepted taxonomy for the species.

Valid for use designation and library release. After QA approval, the database entry is certified as valid for use. A new library version will be generated that includes all of the qualified, valid for use entries compiled since the last library version. All records are retained by QA.

As the leader in microbial identification, Charles River's Accugenix® services continues to provide superior performance and the best quality results to its valued customers.

Having an Identity Crisis? Contact us today!

Charles River Laboratories

NORTH AMERICA
614 Interchange Blvd.
Newark, DE 19711 USA
Phone: +1.302.292.8888
Toll Free: +1.800.886.9654
Email: Accugenix-CustomerSupport@crl.com

EUROPE
9 allée Moulin Berger
69130 Ecully, France
Phone: +33 437 50 29 15
Email: Accugenix-Lyon@crl.com

ASIA
M3003 Songdo Technopark IT Center
32 Songdogwahak-ro Yeonsu-gu Incheon 406-840 Korea
Phone: +82 32 209 8101
Email: CRLKAccugenix@crl.com

502, Lakhani's Centrium, Plot No. 27
Sector 15, CBD Belapur
Navi Mumbai 400 614 India
Phone: +91 22 41270504
Email: CRLIAccugenix@crl.com

33 Ubi Avenue 3, #06-14
Vertex (Tower B)
Singapore 408868
Phone: +65 6742 6007
Email: Sales_SG@crl.com

All Sales Inquiries:
askcharlesriver@crl.com

Product Information:
www.criver.com/accugenix

charles river | microbial solutions