Microbial Biotechnology

FUNDAMENTALS OF APPLIED MICROBIOLOGY, 2ND EDITION

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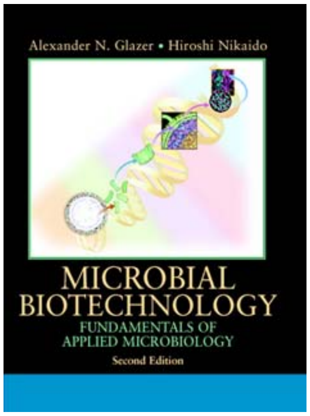

Update

Chapter 1 Microbial Diversity Update *01-23-12*

Knowledge relevant to the field of microbial biotechnology is growing exponentially. Major improvements in DNA sequencing, coupled with development of powerful approaches to DNA sequence assembly, have allowed rapid, low cost sequencing of complete microbial genomes and provisional assignment (annotation) of functions to over half of the genes. The complete sequences of 340 archaeal, 9700 bacterial, and 2230 eukaryal genomes were available in databases (see below) as of January 17, 2012. In parallel, advances in biogeochemistry and in paleontology have provided new insights into the evolutionary history of microorganisms. Applications of new computational methods, based on the availability of large number of sequences of complete genomes, to the elucidation of microbial phylogenies, have largely displaced classical approaches.

Several comprehensive databases that include information on bacterial and fungal genomes are listed below along with references and URLs. This update concludes with recent references that provide global lists of culture collections of bacteria, fungi, and viruses.

National Center for Biotechnology Information (NCBI)

http://www.ncbi.nlm.nih.gov/About/index.html

Video: *A Program Celebrating NCBI's 20th Anniversary*

http://www.ncbi.nlm.nih.gov/About/20thAnniv/index.html

This video describes the history of NCBI and introduces its capabilities.

GOLD Genomes Online Database V. 4.0

http://www.genomesonline.org/cgi-bin/GOLD/bin/gold.cgi

Pagani, I., Liolios, K., Jansson, J., Chen I.M., Smirnova, T., Nosrat, B., Markowitz, V.M., and Kyrpides, N.C. (2012). The Genomes OnLine Database (GOLD) v.4: status of genomic and metagenomic projects and their associated metadata. *Nucleic Acids Research*, 40(D1), D571-D579. doi: 10.1093/nar/gkr1100

Comprehensive Microbial Resource

http://cmr.jcvi.org/tigr-scripts/CMR/CmrHomePage.cgi

Comprehensive Prokaryotic Genome Free Annotation Service

http://www.jcvi.org/cms/research/projects/annotation-service/overview/

Anyone with a prokaryotic genome sequence may submit it to the JCVI Annotation Service completely free-of-charge.

Peterson, J.D., Umayam, L.A., Dickinson, T.M., Hickey, E.K., and White. O. (2001). The Comprehensive Microbial Resource. *Nucleic Acids Research*, 29, 123-125.

Prokaryote Phylogeny

Bergey's Manual of Systematic Bacteriology, 2nd Edition, Springer, New York

http://www.bergeys.org/pubinfo.html

With an institutional subscription, access to Volumes 1-4 is available on-line at:

http://www.springer.com/life+sciences/microbiology/book/978-0-387-98771-2

Jun, S.R., Sims, G.E., Wu, G.A., and S.H. Kim, S.H. (2010) Whole-proteome phylogeny of prokaryotes by feature frequency profiles: An alignment-free method with optimal feature resolution.

Proceedings of the National Academy of Sciences, 107, 133-138.

http://www.pnas.org/cgi/doi/10.1073/pnas.0913033107

This seminal paper presents a new method of constructing whole-proteome phylogeny of prokaryotes and compares the results with those based on other methods of constructing such phylogenies.

Fungal Phylogeny

The search for the fungal tree of life

McLaughlin, D.J., Hibbett, D.S., Lutzoni, F., Spatafora, J.W., and Vilgalys, R. (2010) *Trends in Microbiology*, 488-497; doi:10.1016/j.tim.2009.08.001

Hibbett, D.L. et al. (2007). A higher-level phylogenetic classification of the fungi. *Mycological Research* 17, 509-547.

Culture Collections: Bacteria, Fungi, Viruses

Plant Pathology Internet Guide Book (PPIGB)

A list of web links to the world's culture collections:

http://www.pk.uni-bonn.de/ppigb/culcol.htm

Yeast culture collections of the world: meeting the needs of industrial researchers.

K. Bounty-Mills (2012) *Journal of Industrial Microbiology & Biotechnology*

DOI 10.1007/s10295-011-1078-5.