

# The Molecular Biology Database Collection: an updated compilation of biological database resources

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## ABSTRACT

**The Molecular Biology Database Collection is an online resource listing key databases of value to the biological community. This Collection is intended to bring fellow scientists' attention to high-quality databases that are available throughout the world, rather than just be a lengthy listing of all available databases. As such, this up-to-date listing is intended to serve as the initial point from which to find specialized databases that may be of use in biological research. The databases included in this Collection provide new value to the underlying data by virtue of curation, new data connections or other innovative approaches. Short, searchable summaries of each of the databases included in the Collection are available through the Nucleic Acids Research Web site, at <http://www.nar.oupjournals.org>.**

With the advent of the new millennium, the scientific community marked a significant milestone in the study of biology—the completion of the 'working draft' of the human genome (1). Amongst much fanfare, the completion of the working draft was announced by President Clinton at a White House ceremony on June 26, 2000 (<http://www.whitehouse.gov/WH/New/html/20000626.html>). This announcement signaled that the majority of biological and biomedical research would now be conducted in a 'sequence-based' fashion. This new approach, long-awaited and much-debated, promises to quickly lead to advances not just in the understanding of basic biological processes, but in the prevention, diagnosis and treatment of many genetic and genomic disorders. While the fruits of sequencing the human genome may not be known or appreciated for another hundred years, the implications to the basic way in which medicine will be practised in the future is staggering.

At the time of writing of this paper, the International Human Genome Sequencing Consortium had fully finished 24.7% of the human sequence, with another 66.2% of the sequence being available in draft form. In the course of this sequencing, two of the human chromosomes have been finished, namely chromosomes 21 and 22 (2,3). Even with most of the chromosomes incomplete, some interesting insights have already been made into the structure of the human genome, such as a decided down-estimate in the number of genes actually in the human genome. While most of the attention of the scientific

community and the public at large has focused on the human sequence, a number of model organisms have also been sequenced, including that of the fruit fly (*Drosophila melanogaster*) in 2000 (4); the complete genomes of organisms such as the rat and the mouse will quickly follow over the next several years. Efforts are also focused on sequence variation, with the SNP Consortium anticipating the identification of a million single nucleotide polymorphisms (SNPs) by the end of 2000, far ahead of the initial goal of discovering 100 000 SNPs by 2003 (1).

Database efforts have kept pace with the furious rate at which this sequence data is being generated, providing investigators access to all public data in a practically instantaneous fashion (5). While most biologists are familiar with the databases comprising the International Nucleotide Sequence Database Collaboration (DDBJ, EMBL and GenBank), numerous other specialized databases have emerged. These specialized databases often arise out of a particular need, whether it be to address a particular biological question of interest or to better serve a particular segment of the biological community. This journal has devoted its first issue over the last several years to documenting the availability and features of these specialized databases in order to better serve its readership and to promote the use of these resources in the design and analysis of experiments. These reviewed databases are collectively listed in the Molecular Biology Database Collection.

The databases included in the current version of the Collection are shown in Table 1. This year, 55 new entries have been added, bringing the total number of databases listed to 281. While this number may seem large for a 'curated collection', these databases distinguish themselves by their approach to presenting the underlying data—for example, by adding new value to the underlying data by virtue of curation, by providing new types of data connections or by implementing other innovative approaches facilitating biological discovery. The individual entries are classified by type, but the reader should recognize that the distinctions between these classes are often arbitrary, and that many of these databases provide more than one type of information to the user.

In addition to the list presented in this paper, an electronic version of the Database Issue and Collection can be accessed online and is freely available to everyone, regardless of subscription status, at <http://www.nar.oupjournals.org>. While the list contains the databases described in the papers comprising the current issue, it should be immediately apparent to the reader that there are simply not enough pages in

this journal to accommodate full-length, printed descriptions of all 281 of the databases featured here. To address this, the online version of the Collection now includes short summaries of many of the databases, the summaries having been provided directly by the investigators responsible for the individual databases. It is hoped that this approach will provide the reader with an additional source of information that will facilitate finding and selecting the sources of data that would be of most value in addressing a specific biological problem. Contributors will be encouraged to keep their entries up-to-date, as the online descriptions will be updated on a regular basis.

Suggestions for the inclusion of additional database resources in this Collection are encouraged and may be directed to the author (andy@nhgri.nih.gov).

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Table 1. Molecular Biology Database Collection

<b>Major Sequence Repositories</b>		
DNA Data Bank of Japan (DDBJ)	<a href="http://www.ddbj.nig.ac.jp">http://www.ddbj.nig.ac.jp</a>	All known nucleotide and protein sequences; International Nucleotide Sequence Database Collaboration
EMBL Nucleotide Sequence Database	<a href="http://www.ebi.ac.uk/embl.html">http://www.ebi.ac.uk/embl.html</a>	All known nucleotide and protein sequences; International Nucleotide Sequence Database Collaboration
GenBank	<a href="http://www.ncbi.nlm.nih.gov/">http://www.ncbi.nlm.nih.gov/</a>	All known nucleotide and protein sequences; International Nucleotide Sequence Database Collaboration
Genome Sequence Database (GSDB)	<a href="http://www.ncgr.org/research/sequence/">http://www.ncgr.org/research/sequence/</a>	All known nucleotide and protein sequences
STACK	<a href="http://www.sanbi.ac.za/Dbases.html">http://www.sanbi.ac.za/Dbases.html</a>	Non-redundant, gene-oriented clusters
TIGR Gene Indices	<a href="http://www.tigr.org/tdb/index.html">http://www.tigr.org/tdb/index.html</a>	Non-redundant, gene-oriented clusters
UniGene	<a href="http://www.ncbi.nlm.nih.gov/UniGene/">http://www.ncbi.nlm.nih.gov/UniGene/</a>	Non-redundant, gene-oriented clusters
<b>Comparative Genomics</b>		
Clusters of Orthologous Groups (COG)	<a href="http://www.ncbi.nlm.nih.gov/COG/">http://www.ncbi.nlm.nih.gov/COG/</a>	Phylogenetic classification of proteins from 21 complete genomes
XREFdb	<a href="http://www.ncbi.nlm.nih.gov/XREFdb/">http://www.ncbi.nlm.nih.gov/XREFdb/</a>	Cross-referencing of model organism genetics with mammalian phenotypes
<b>Gene Expression</b>		
ASDB	<a href="http://cbcg.nersc.gov/asdb">http://cbcg.nersc.gov/asdb</a>	Protein products and expression patterns of alternatively-spliced genes
Axeldb	<a href="http://www.dkfz-heidelberg.de/abt0135/axeldb.htm">http://www.dkfz-heidelberg.de/abt0135/axeldb.htm</a>	Gene expression in <i>Xenopus</i>
BodyMap	<a href="http://bodymap.ims.u-tokyo.ac.jp/">http://bodymap.ims.u-tokyo.ac.jp/</a>	Human and mouse gene expression data
EpoDB	<a href="http://www.cbil.upenn.edu/epodb/">http://www.cbil.upenn.edu/epodb/</a>	Genes expressed in vertebrate RBC
FlyView	<a href="http://pbio07.uni-muenster.de/">http://pbio07.uni-muenster.de/</a>	<i>Drosophila</i> development and genetics
Gene Expression Database (GXD)	<a href="http://www.informatics.jax.org/searches/gxdindex_form.shtml">http://www.informatics.jax.org/searches/gxdindex_form.shtml</a>	Mouse gene expression and genomics
Interferon Stimulated Gene Database	<a href="http://www.lerner.ccf.org/labs/williams/xchip-html.cgi">http://www.lerner.ccf.org/labs/williams/xchip-html.cgi</a>	Genes induced by treatment with interferons
Kidney Development Database	<a href="http://www.ana.ed.ac.uk/anatomy/database/kidbase/kidhome.html">http://www.ana.ed.ac.uk/anatomy/database/kidbase/kidhome.html</a>	Kidney development and gene expression
MAGEST	<a href="http://star.scl.kyoto-u.ac.jp/magest/">http://star.scl.kyoto-u.ac.jp/magest/</a>	Ascidian ( <i>Halocynthia roretzi</i> ) gene expression patterns
MethDB	<a href="http://www.methdb.de">http://www.methdb.de</a>	DNA methylation data, patterns and profiles
Mouse Atlas and Gene Expression Database	<a href="http://genex.hgu.mrc.ac.uk">http://genex.hgu.mrc.ac.uk</a>	Spatially-mapped gene expression data
PEDB	<a href="http://chroma.mbt.washington.edu/PEDB/">http://chroma.mbt.washington.edu/PEDB/</a>	Normal and aberrant prostate gene expression
RECODE	<a href="http://recode.genetics.utah.edu">http://recode.genetics.utah.edu</a>	Genes using programmed translational recoding in their expression
Stanford Microarray Database	<a href="http://genome-www.stanford.edu/microarray">http://genome-www.stanford.edu/microarray</a>	Raw and normalized data from microarray experiments
TRIPLES	<a href="http://ygac.med.yale.edu/triples/triples.htm">http://ygac.med.yale.edu/triples/triples.htm</a>	TRansposon-Insertion Phenotypes, Localization, and Expression in <i>Saccharomyces</i>
Tooth Development Database	<a href="http://bite-it.helsinki.fi/">http://bite-it.helsinki.fi/</a>	Gene expression in dental tissue
<b>Gene Identification and Structure</b>		
AllGenes	<a href="http://www.allgenes.org">http://www.allgenes.org</a>	Human and mouse gene index integrating gene, transcript and protein annotation
Ares Lab Intron Site	<a href="http://www.cse.ucsc.edu/research/compbio/yeast_introns.html">http://www.cse.ucsc.edu/research/compbio/yeast_introns.html</a>	Yeast spliceosomal introns
AsMamDB	<a href="http://166.111.30.65/ASMAMDB.html">http://166.111.30.65/ASMAMDB.html</a>	Alternatively-spliced mammalian genes
COMPEL	<a href="http://compel.bionet.nsc.ru/">http://compel.bionet.nsc.ru/</a>	Composite regulatory elements
CUTG	<a href="http://www.kazusa.or.jp/codon/">http://www.kazusa.or.jp/codon/</a>	Codon usage tables
DBTBS	<a href="http://elmo.ims.u-tokyo.ac.jp/dbtbs/">http://elmo.ims.u-tokyo.ac.jp/dbtbs/</a>	<i>Bacillus subtilis</i> binding factors and promoters
EID	<a href="http://mcb.harvard.edu/gilbert/EID/">http://mcb.harvard.edu/gilbert/EID/</a>	Protein-coding, intron-containing genes

Table 1. Continued

EPD	<a href="http://www.epd.isb-sib.ch/">http://www.epd.isb-sib.ch/</a>	Eukaryotic POL II promoters with experimentally-determined transcription start sites
ExInt	<a href="http://intron.bic.nus.edu.sg/exint/exint.html">http://intron.bic.nus.edu.sg/exint/exint.html</a>	Exon-intron structure of eukaryotic genes
HUNT	<a href="http://www.hri.co.jp/HUNT">http://www.hri.co.jp/HUNT</a>	Annotated human full-length cDNA sequences
IDB/IEDB	<a href="http://nutmeg.bio.indiana.edu/intron/index.html">http://nutmeg.bio.indiana.edu/intron/index.html</a>	Intron sequence and evolution
PLACE	<a href="http://www.dna.affrc.go.jp/htdocs/PLACE">http://www.dna.affrc.go.jp/htdocs/PLACE</a>	Plant <i>cis</i> -acting regulatory elements
PlantCARE	<a href="http://sphinx.rug.ac.be:8080/PlantCARE/index.htm">http://sphinx.rug.ac.be:8080/PlantCARE/index.htm</a>	Plant <i>cis</i> -acting regulatory elements
PromEC	<a href="http://bioinfo.md.huji.ac.il/marg/promec">http://bioinfo.md.huji.ac.il/marg/promec</a>	<i>Escherichia coli</i> mRNA promoters with experimentally identified transcriptional start sites
RRNDB	<a href="http://rrndb.cme.msu.edu">http://rrndb.cme.msu.edu</a>	Variation in prokaryotic ribosomal RNA operons
STRBase	<a href="http://www.cstl.nist.gov/div831/strbase/">http://www.cstl.nist.gov/div831/strbase/</a>	Short tandem DNA repeats
SpliceDB	<a href="http://genomic.sanger.ac.uk/spldb/SpliceDB.html">http://genomic.sanger.ac.uk/spldb/SpliceDB.html</a>	Canonical and non-canonical mammalian splice sites
TRRD	<a href="http://wwwmgs.bionet.nsc.ru/mgs/dbases/trrd4">http://wwwmgs.bionet.nsc.ru/mgs/dbases/trrd4</a>	Transcription regulatory regions of eukaryotic genes
TransTerm	<a href="http://uther.otago.ac.nz/Transterm.html">http://uther.otago.ac.nz/Transterm.html</a>	Codon usage, start and stop signals
VIDA	<a href="http://www.biochem.ucl.ac.uk/bsm/virus_database/VIDA.html">http://www.biochem.ucl.ac.uk/bsm/virus_database/VIDA.html</a>	Virus genome open reading frames
WormBase	<a href="http://www.wormbase.org">http://www.wormbase.org</a>	Guide to <i>Caenorhabditis elegans</i> biology
YIDB	<a href="http://www.EMBL-Heidelberg.DE/ExternalInfo/seraphin/yidb.html">http://www.EMBL-Heidelberg.DE/ExternalInfo/seraphin/yidb.html</a>	Yeast nuclear and mitochondrial intron sequences
rSNP Guide	<a href="http://wwwmgs.bionet.nsc.ru/mgs/systems/rsnp/">http://wwwmgs.bionet.nsc.ru/mgs/systems/rsnp/</a>	Single nucleotide polymorphisms in regulatory gene regions
<b>Genetic and Physical Maps</b>		
DRESH	<a href="http://www.tigem.it/LOCAL/drosophila/dros.html">http://www.tigem.it/LOCAL/drosophila/dros.html</a>	Human cDNA clones homologous to <i>Drosophila</i> mutant genes
G3-RH	<a href="http://www-shgc.stanford.edu/RH/">http://www-shgc.stanford.edu/RH/</a>	Stanford G3 and TNG radiation hybrid maps
GB4-RH	<a href="http://www.sanger.ac.uk/Software/RHserver/Rhserver.shtml">http://www.sanger.ac.uk/Software/RHserver/Rhserver.shtml</a>	Genebridge4 (GB4) human radiation hybrid maps
GDB	<a href="http://www.gdb.org">http://www.gdb.org</a>	Human genes and genomic maps
GenAtlas	<a href="http://www.citi2.fr/GENATLAS/">http://www.citi2.fr/GENATLAS/</a>	Human genes, markers and phenotypes
GenMapDB	<a href="http://genomics.med.upenn.edu/genmapdb">http://genomics.med.upenn.edu/genmapdb</a>	Mapped human BAC clones
GeneMap '99	<a href="http://www.ncbi.nlm.nih.gov/genemap/">http://www.ncbi.nlm.nih.gov/genemap/</a>	International Radiation Mapping Consortium human gene map
HuGeMap	<a href="http://www.infobiogen.fr/services/Hugemap">http://www.infobiogen.fr/services/Hugemap</a>	Human genome genetic and physical map data
IXDB	<a href="http://ixdb.mpimg-berlin-dahlem.mpg.de">http://ixdb.mpimg-berlin-dahlem.mpg.de</a>	Physical maps of human chromosome X
RHdb	<a href="http://www.ebi.ac.uk/RHdb">http://www.ebi.ac.uk/RHdb</a>	Radiation hybrid map data
Radiation Hybrid Database	<a href="http://www.ebi.ac.uk/RHdb">http://www.ebi.ac.uk/RHdb</a>	Radiation hybrid map data
<b>Genomic Databases</b>		
ACeDB	<a href="http://www.sanger.ac.uk/Software/Acedb/">http://www.sanger.ac.uk/Software/Acedb/</a>	<i>C.elegans</i> , <i>Saccharomyces pombe</i> , and human sequences and genomic information
AMmtDB	<a href="http://bio-www.ba.cnr.it:8000/BioWWW/#AMMTDB">http://bio-www.ba.cnr.it:8000/BioWWW/#AMMTDB</a>	Metazoan mitochondrial DNA sequences
ArkDB	<a href="http://www.thearkdb.org/genome_mapping.html">http://www.thearkdb.org/genome_mapping.html</a>	Genome databases for farm and other animals
Comprehensive Microbial Resource	<a href="http://www.tigr.org/tigr-scripts/CMR2/CMRHomePage.spl">http://www.tigr.org/tigr-scripts/CMR2/CMRHomePage.spl</a>	Completed microbial genomes
CropNet	<a href="http://ukcrop.net/">http://ukcrop.net/</a>	Genome mapping in crop plants
CyanoBase	<a href="http://www.kazusa.or.jp/cyano/">http://www.kazusa.or.jp/cyano/</a>	<i>Synechocystis</i> sp. genome
EMGlib	<a href="http://pbil.univ-lyon1.fr/emglib/emglib.html">http://pbil.univ-lyon1.fr/emglib/emglib.html</a>	Completely sequenced microbial genomes from bacteria, archaea, yeast
EcoGene	<a href="http://bmb.med.miami.edu/EcoGene/EcoWeb/">http://bmb.med.miami.edu/EcoGene/EcoWeb/</a>	<i>E.coli</i> K-12 sequences
FlyBase	<a href="http://www.fruitfly.org">http://www.fruitfly.org</a>	<i>Drosophila</i> sequences and genomic information
Full-Malaria	<a href="http://133.11.149.55">http://133.11.149.55</a>	Full-length cDNA library from erythrocytic-stage <i>Plasmodium falciparum</i>

Table 1. Continued

GOBASE	<a href="http://megasun.bch.umontreal.ca/gobase/gobase.html">http://megasun.bch.umontreal.ca/gobase/gobase.html</a>	Organelle genome database
GOLD	<a href="http://figweb.integratedgenomics.com/GOLD/">http://figweb.integratedgenomics.com/GOLD/</a>	Information regarding complete and ongoing genome projects
HIV Sequence Database	<a href="http://hiv-web.lanl.gov/">http://hiv-web.lanl.gov/</a>	HIV RNA sequences
Human BAC Ends Database	<a href="http://www.tigr.org/tdb/humgen/bac_end_search/bac_end_intro.html">http://www.tigr.org/tdb/humgen/bac_end_search/bac_end_intro.html</a>	Non-redundant human BAC end sequences
ICB	<a href="http://www.mbio.co.jp/icb">http://www.mbio.co.jp/icb</a>	Identification and classification of bacteria using protein-coding
INE	<a href="http://rqp.dna.affrc.go.jp/giot/INE.html">http://rqp.dna.affrc.go.jp/giot/INE.html</a>	Rice genetic and physical maps and sequence data
MITOMAP	<a href="http://www.gen.emory.edu/mitomap.html">http://www.gen.emory.edu/mitomap.html</a>	Human mitochondrial genome
MITOP	<a href="http://websvr.mips.biochem.mpg.de/proj/medgen/mitop">http://websvr.mips.biochem.mpg.de/proj/medgen/mitop</a>	Mitochondrial proteins, genes, and diseases
Medicago Genome Initiative	<a href="http://www.noble.org/medicago/">http://www.noble.org/medicago/</a>	Model legume <i>Medicago truncatula</i> ESTs, gene expression and proteomic data
Mendel Database	<a href="http://jii06.jic.bbsrc.ac.uk/">http://jii06.jic.bbsrc.ac.uk/</a>	Database of plant EST and STS sequences annotated with gene family information
MitBASE	<a href="http://www3.ebi.ac.uk/Research/Mitbase/mitbase.pl">http://www3.ebi.ac.uk/Research/Mitbase/mitbase.pl</a>	Mitochondrial genomes, intra-species variants, and mutants
MitoDat	<a href="http://www-lecb.ncifcrf.gov/mitoDat/">http://www-lecb.ncifcrf.gov/mitoDat/</a>	Mitochondrial proteins (predominantly human)
MitoNuc/MitoAln	<a href="http://bio-www.ba.cnr.it:8000/srs6/">http://bio-www.ba.cnr.it:8000/srs6/</a>	Nuclear genes coding for mitochondrial proteins
Mouse Genome Database (MGD)	<a href="http://www.informatics.jax.org">http://www.informatics.jax.org</a>	Mouse genetics and genomics
Munich Information Center for Protein Sequences (MIPS)	<a href="http://www.mips.biochem.mpg.de/">http://www.mips.biochem.mpg.de/</a>	Protein and genomic sequences
NRSUB	<a href="http://pbil.univ-lyon1.fr/nrsub/nrsub.html">http://pbil.univ-lyon1.fr/nrsub/nrsub.html</a>	<i>B. subtilis</i> genome
PlasmoDB	<a href="http://PlasmoDB.org">http://PlasmoDB.org</a>	<i>Plasmodium</i> GENOME
RsGDB	<a href="http://www-mm.g.med.uth.tmc.edu/sphaeroides">http://www-mm.g.med.uth.tmc.edu/sphaeroides</a>	<i>Rhodobacter sphaeroides</i> genome
Saccharomyces Genome Database (SGD)	<a href="http://genome-www.stanford.edu/Saccharomyces">http://genome-www.stanford.edu/Saccharomyces</a>	<i>S. cerevisiae</i> genome
TIGR Microbial Database	<a href="http://www.tigr.org/tdb/mdb/mdbcomplete.html">http://www.tigr.org/tdb/mdb/mdbcomplete.html</a>	Microbial genomes and chromosomes
The Arabidopsis Information Resource (TAIR)	<a href="http://www.arabidopsis.org/">http://www.arabidopsis.org/</a>	<i>Arabidopsis thaliana</i> genome
ZFIN	<a href="http://www.zfin.org">http://www.zfin.org</a>	Genetic, genomic and developmental data from zebrafish
ZmDB	<a href="http://zmdb.iastate.edu/">http://zmdb.iastate.edu/</a>	Maize genome database
<b>Intermolecular Interactions</b>		
Biomolecular Interaction Network Database (BIND)	<a href="http://binddb.org">http://binddb.org</a>	Molecular interactions, complexes and pathways
DIP	<a href="http://dip.doe-mbi.ucla.edu/">http://dip.doe-mbi.ucla.edu/</a>	Catalog of protein-protein interactions
DPInteract	<a href="http://arep.med.harvard.edu/dpinteract/">http://arep.med.harvard.edu/dpinteract/</a>	Binding sites for <i>E. coli</i> DNA-binding proteins
Database of Ribosomal Crosslinks (DRC)	<a href="http://www.mpimg-berlin-dahlem.mpg.de/~ag_ribo/ag_brimacombe/drc/">http://www.mpimg-berlin-dahlem.mpg.de/~ag_ribo/ag_brimacombe/drc/</a>	Ribosomal crosslinking data
<b>Metabolic Pathways and Cellular Regulation</b>		
ENZYME	<a href="http://www.expasy.ch/enzyme/">http://www.expasy.ch/enzyme/</a>	Enzyme nomenclature
EcoCyc	<a href="http://ecocyc.pangeasystems.com/ecocyc/">http://ecocyc.pangeasystems.com/ecocyc/</a>	<i>E. coli</i> K-12 genome, gene products, and metabolic pathways
EpoDB	<a href="http://www.cbil.upenn.edu/EpoDB/">http://www.cbil.upenn.edu/EpoDB/</a>	Genes expressed during human erythropoiesis
FlyNets	<a href="http://gifts.univ-mrs.fr/FlyNets/FlyNets_home_page.html">http://gifts.univ-mrs.fr/FlyNets/FlyNets_home_page.html</a>	<i>Drosophila melanogaster</i> molecular interactions
Klotho	<a href="http://www.ibc.wustl.edu/klotho/">http://www.ibc.wustl.edu/klotho/</a>	Collection and categorization of biological compounds
Kyoto Encyclopedia of Genes and Genomes (KEGG)	<a href="http://www.genome.ad.jp/kegg">http://www.genome.ad.jp/kegg</a>	Metabolic and regulatory pathways
LIGAND	<a href="http://www.genome.ad.jp/dbget/ligand.html">http://www.genome.ad.jp/dbget/ligand.html</a>	Enzymatic ligands, substrates and reactions
RegulonDB	<a href="http://www.cifn.unam.mx/Computational_Biology/regulondb/">http://www.cifn.unam.mx/Computational_Biology/regulondb/</a>	<i>E. coli</i> transcriptional regulation and operon organization
UM-BBD	<a href="http://www.labmed.umn.edu/umbbd/">http://www.labmed.umn.edu/umbbd/</a>	Microbial biocatalytic reactions and biodegradation pathways

Table 1. Continued

WIT2	<a href="http://wit.mcs.anl.gov/WIT2/">http://wit.mcs.anl.gov/WIT2/</a>	Integrated system for functional curation and development of metabolic models
<b>Mutation Databases</b>		
16S and 23S Ribosomal RNA Mutation Databases	<a href="http://ribosome.fandm.edu">http://ribosome.fandm.edu</a>	16S and 23S ribosomal RNA mutation database
ALFRED	<a href="http://alfred.med.yale.edu/alfred/index.asp">http://alfred.med.yale.edu/alfred/index.asp</a>	Allele frequencies and DNA polymorphisms
Androgen Receptor Gene Mutations Database	<a href="http://www.mcgill.ca/androgendb/">http://www.mcgill.ca/androgendb/</a>	Mutations in the androgen receptor gene
Asthma Gene Database	<a href="http://cooke.gsf.de/asthmagen/main.cfm">http://cooke.gsf.de/asthmagen/main.cfm</a>	Linkage and mutation studies on the genetics of asthma and allergy
Asthma and Allergy Database	<a href="http://cooke.gsf.de/asthmagen/main.cfm">http://cooke.gsf.de/asthmagen/main.cfm</a>	
Atlas of Genetics and Cytogenetics in Oncology and Haematology	<a href="http://www.infobiogen.fr/services/chromcancer/">http://www.infobiogen.fr/services/chromcancer/</a>	Chromosomal abnormalities in cancer
BTKbase	<a href="http://www.uta.fi/laitokset/imt/bioinfo/BTKbase/">http://www.uta.fi/laitokset/imt/bioinfo/BTKbase/</a>	Mutation registry for X-linked agammaglobulinemia
CASRDB	<a href="http://data.mch.mcgill.ca/casrdb/">http://data.mch.mcgill.ca/casrdb/</a>	CASR mutations causing FHH, NSHPT and ADH
Cytokine Gene Polymorphism Database	<a href="http://www.pam.bris.ac.uk/services/GAI/cytokine4.htm">http://www.pam.bris.ac.uk/services/GAI/cytokine4.htm</a>	Cytokine gene polymorphisms, <i>in vitro</i> expression and disease-association studies
Database of Germline p53 Mutations	<a href="http://www.lf2.cuni.cz/win/projects/germline_mut_p53.htm">http://www.lf2.cuni.cz/win/projects/germline_mut_p53.htm</a>	Mutations in human tumor and cell line p53 gene
GRAP Mutant Databases	<a href="http://tinyGRAP.uit.no/GRAP/">http://tinyGRAP.uit.no/GRAP/</a>	Mutants of family A G-Protein Coupled Receptors (GRAP)
HGBASE	<a href="http://hgbase.cgr.ki.se">http://hgbase.cgr.ki.se</a>	Intragenic sequence polymorphisms
HIV-RT	<a href="http://hivdb.stanford.edu/hiv/">http://hivdb.stanford.edu/hiv/</a>	HIV reverse transcriptase and protease sequence variation
Haemophila B Mutation Database	<a href="http://www.umds.ac.uk/molgen/haembdatabase.htm">http://www.umds.ac.uk/molgen/haembdatabase.htm</a>	Point mutations, short additions and deletions in the Factor IX gene
Human Gene Mutation Database (HGMD)	<a href="http://www.uwcm.ac.uk/uwcm/mg/hgmd0.html">http://www.uwcm.ac.uk/uwcm/mg/hgmd0.html</a>	Known (published) gene lesions underlying human inherited disease
Human PAX2 Allelic Variant Database	<a href="http://www.hgu.mrc.ac.uk/Softdata/PAX2/">http://www.hgu.mrc.ac.uk/Softdata/PAX2/</a>	Mutations in human PAX2 gene
Human PAX6 Allelic Variant Database	<a href="http://www.hgu.mrc.ac.uk/Softdata/PAX6/">http://www.hgu.mrc.ac.uk/Softdata/PAX6/</a>	Mutations in human PAX6 gene
Human Type I and Type III Collagen Mutation Database	<a href="http://www.le.ac.uk/genetics/collagen/">http://www.le.ac.uk/genetics/collagen/</a>	Human type I and type III collagen gene mutations
HvrBase	<a href="http://db.eva.mpg.de/Hvrbase/">http://db.eva.mpg.de/Hvrbase/</a>	Primate mtDNA control region sequences
KMDB	<a href="http://mutview.dmb.med.keio.ac.jp/mutview3/kmeyedb/index.html">http://mutview.dmb.med.keio.ac.jp/mutview3/kmeyedb/index.html</a>	Mutations in human eye disease genes
KinMutBase	<a href="http://www.uta.fi/imt/bioinfo/KinMutBase/">http://www.uta.fi/imt/bioinfo/KinMutBase/</a>	Disease-causing protein kinase mutations
MmtDB	<a href="http://www.ba.cnr.it/~areamt08/MmtDBWWW.htm">http://www.ba.cnr.it/~areamt08/MmtDBWWW.htm</a>	Mutations and polymorphisms in metazoan mitochondrial DNA sequences
Mutation Spectra Database	<a href="http://info.med.yale.edu/mutbase/">http://info.med.yale.edu/mutbase/</a>	Mutations in viral, bacterial, yeast and mammalian genes
NCL Mutations	<a href="http://www.ucl.ac.uk/ncl/">http://www.ucl.ac.uk/ncl/</a>	Mutations and polymorphisms in neuronal ceroid lipofuscinoses (NCL) genes
Online Mendelian Inheritance in Man	<a href="http://www.ncbi.nlm.nih.gov/Omim/">http://www.ncbi.nlm.nih.gov/Omim/</a>	Catalog of human genetic and genomic disorders
PAHdb	<a href="http://www.mcgill.ca/pahdb/">http://www.mcgill.ca/pahdb/</a>	Mutations at the phenylalanine hydroxylase locus
PHEXdb	<a href="http://data.mch.mcgill.ca/phexdb">http://data.mch.mcgill.ca/phexdb</a>	Mutations in PHEX gene causing X-linked hypophosphatemia
PMD	<a href="http://pmd.ddbj.nig.ac.jp/">http://pmd.ddbj.nig.ac.jp/</a>	Compilation of protein mutant data
PTCH1 Mutation Database	<a href="http://www.cybergene.se/PTCH/ptchbase.html">http://www.cybergene.se/PTCH/ptchbase.html</a>	Mutations and SNPs found in PTCH1
RB1 Gene Mutation Database	<a href="http://www.d-lohmann.de/Rb/">http://www.d-lohmann.de/Rb/</a>	Mutations in the human retinoblastoma (RB1) gene
Ribosomal RNA Mutational Database	<a href="http://ribosome.fandm.edu/">http://ribosome.fandm.edu/</a>	16S and 23S ribosomal RNA mutation database
SV40 Large T-Antigen Mutant Database	<a href="http://bigdaddy.bio.pitt.edu/SV40/">http://bigdaddy.bio.pitt.edu/SV40/</a>	Mutations in SV40 large tumor antigen gene
dbSNP	<a href="http://www.ncbi.nlm.nih.gov/SNP/">http://www.ncbi.nlm.nih.gov/SNP/</a>	Single nucleotide polymorphisms
iARC p53 Database	<a href="http://www.iarc.fr/p53/">http://www.iarc.fr/p53/</a>	Missense mutations and small deletions in human p53 reported in peer-reviewed literature
p53 Databases	<a href="http://metalab.unc.edu/dnam/mainpage.html">http://metalab.unc.edu/dnam/mainpage.html</a>	Mutations at the human p53 and hprt genes; rodent transgenic lacI and lacZ mutations

Table 1. Continued

<b>Pathology</b>		
FIMM	<a href="http://sdmc.krdl.org.sg:8080/fimm/">http://sdmc.krdl.org.sg:8080/fimm/</a>	Functional molecular immunology data
HCFforum	<a href="http://hcforum.imag.fr/welcome_eng.html">http://hcforum.imag.fr/welcome_eng.html</a>	Human cytogenetics database
Mouse Tumor Biology Database (MTB)	<a href="http://tumor.informatics.jax.org">http://tumor.informatics.jax.org</a>	Mouse tumor names, classification, incidence, pathology, genetic factors
Oral Cancer Gene Database	<a href="http://www.tumor-gene.org/Oral/oral.html">http://www.tumor-gene.org/Oral/oral.html</a>	Cellular, molecular and biological data for genes involved in oral cancer
PEDB	<a href="http://chroma.mbt.washington.edu/PEDB/">http://chroma.mbt.washington.edu/PEDB/</a>	Sequences from prostate tissue and cell type-specific cDNA libraries
Tumor Gene Family Databases (TGDBs)	<a href="http://www.tumor-gene.org/tgdf.html">http://www.tumor-gene.org/tgdf.html</a>	Cellular, molecular, and biological data about genes involved in various cancers
<b>Protein Databases</b>		
AARSDB	<a href="http://rose.man.poznan.pl/aars/index.html">http://rose.man.poznan.pl/aars/index.html</a>	Aminoacyl-tRNA synthetase sequences
ABCdb	<a href="http://ir2lcb.cnrs-mrs.fr/ABCdb/">http://ir2lcb.cnrs-mrs.fr/ABCdb/</a>	ABC transporters
DAtA	<a href="http://luggagefast.Stanford.EDU/group/arabprotein/">http://luggagefast.Stanford.EDU/group/arabprotein/</a>	Annotated coding sequences from <i>Arabidopsis</i>
DExH/D Family Database	<a href="http://www.columbia.edu/~ej67/dbhome.htm">http://www.columbia.edu/~ej67/dbhome.htm</a>	DEAD-box, DEAH-box and DExH-box proteins
ESTHER	<a href="http://www.ensam.inra.fr/cholinesterase/">http://www.ensam.inra.fr/cholinesterase/</a>	Esterases and alpha/beta hydrolase enzymes and relatives
Endogenous GPCR List	<a href="http://www.biomedcomp.com/GPCR.html">http://www.biomedcomp.com/GPCR.html</a>	G protein-coupled receptors; expression in cell lines
FUNPEP	<a href="http://www.gpcr.org/FUNPEP/db">http://www.gpcr.org/FUNPEP/db</a>	Low-complexity or compositionally-biased protein sequences
GPCRDB	<a href="http://swift.embl-heidelberg.de/7tm/">http://swift.embl-heidelberg.de/7tm/</a>	G protein-coupled receptors
GenProtEC	<a href="http://genprotec.mbl.edu">http://genprotec.mbl.edu</a>	<i>Escherichia coli</i> K-12 genome, gene products and homologs
HIV Molecular Immunology Database	<a href="http://hiv-web.lanl.gov/immunology/">http://hiv-web.lanl.gov/immunology/</a>	HIV epitopes
HUGE	<a href="http://www.kazusa.or.jp/huge/">http://www.kazusa.or.jp/huge/</a>	Large (50 kDa) human proteins and cDNA sequences
Histone Database	<a href="http://genome.nhgri.nih.gov/histones/">http://genome.nhgri.nih.gov/histones/</a>	Histone and histone fold sequences and structures
Homeobox Page	<a href="http://copan.bio.unibas.ch/homeo.html">http://copan.bio.unibas.ch/homeo.html</a>	Information relevant to homeobox proteins, classification and evolution
Homeodomain Resource	<a href="http://genome.nhgri.nih.gov/homeodomain">http://genome.nhgri.nih.gov/homeodomain</a>	Homeodomain sequences, structures, and related genetic and genomic information
IMGT	<a href="http://imgt.cines.fr:8104/">http://imgt.cines.fr:8104/</a>	Immunoglobulin, T cell receptor and MHC sequences from human and other vertebrates
IMGT/HLA	<a href="http://www.ebi.ac.uk/imgt/hla/">http://www.ebi.ac.uk/imgt/hla/</a>	Human major histocompatibility complexes
InBase	<a href="http://www.neb.com/neb/inteins.html">http://www.neb.com/neb/inteins.html</a>	Intervening protein sequences (inteins) and motifs
Kabat Database	<a href="http://immuno.bme.nwu.edu/">http://immuno.bme.nwu.edu/</a>	Sequences of proteins of immunological interest
LGICdb	<a href="http://www.pasteur.fr/recherche/banques/LGIC/LGIC.html">http://www.pasteur.fr/recherche/banques/LGIC/LGIC.html</a>	Ligand-gated ion channel subunit sequences
MEROPS	<a href="http://www.merops.co.uk">http://www.merops.co.uk</a>	Proteolytic enzymes (proteases/peptidases)
MHCPEP	<a href="http://wehiih.wehi.edu.au/mhcpep/">http://wehiih.wehi.edu.au/mhcpep/</a>	MHC-binding peptides
Membrane Protein Database	<a href="http://biophys.bio.tuat.ac.jp/ohshima/database/">http://biophys.bio.tuat.ac.jp/ohshima/database/</a>	Membrane protein sequences, transmembrane regions and structures
MetaFam	<a href="http://metafam.ahc.umn.edu/">http://metafam.ahc.umn.edu/</a>	Integrated protein family information
Nuclear Receptor Resource	<a href="http://nrr.georgetown.edu/nrr/nrr.html">http://nrr.georgetown.edu/nrr/nrr.html</a>	Nuclear receptor superfamily
Olfactory Receptor Database	<a href="http://ycmi.med.yale.edu/senselab/ordb/">http://ycmi.med.yale.edu/senselab/ordb/</a>	Sequences for olfactory receptor-like molecules
PKR	<a href="http://pkr.sdsc.edu">http://pkr.sdsc.edu</a>	Protein kinase sequences, enzymology, genetics, and molecular and structural properties
PPMdb	<a href="http://sphinx.rug.ac.be:8080/ppmdb/index.html">http://sphinx.rug.ac.be:8080/ppmdb/index.html</a>	<i>Arabidopsis</i> plasma membrane protein sequence and expression data
PROMISE	<a href="http://bioinf.leeds.ac.uk/promise/">http://bioinf.leeds.ac.uk/promise/</a>	Prosthetic centers and metal ions in protein active sites
Peptaibol	<a href="http://www.cryst.bbk.ac.uk/peptaibol/welcome.html">http://www.cryst.bbk.ac.uk/peptaibol/welcome.html</a>	Peptaibol (antibiotic peptide) sequences
PhosphoBase	<a href="http://www.cbs.dtu.dk/databases/PhosphoBase/">http://www.cbs.dtu.dk/databases/PhosphoBase/</a>	Protein phosphorylation sites
PlantsP	<a href="http://PlantsP.sdsc.edu">http://PlantsP.sdsc.edu</a>	Plant protein kinases and protein phosphatases
Prolysis	<a href="http://delphi.phys.univ-tours.fr/Prolysis/">http://delphi.phys.univ-tours.fr/Prolysis/</a>	Proteases and natural and synthetic protease inhibitors
Protein Information Resource (PIR)	<a href="http://pir.georgetown.edu">http://pir.georgetown.edu</a>	Comprehensive, annotated, non-redundant protein sequence database

**Table 1. Continued**

Ribonuclease P Database	<a href="http://www.mbio.ncsu.edu/RNaseP/home.html">http://www.mbio.ncsu.edu/RNaseP/home.html</a>	RNase P sequences, alignments and structures
SENTRA	<a href="http://wit.mcs.anl.gov/WIT2/Sentra/HTML/sentra.html">http://wit.mcs.anl.gov/WIT2/Sentra/HTML/sentra.html</a>	Sensory signal transduction proteins
SWISS-PROT/TrEMBL	<a href="http://www.expasy.ch/sprot">http://www.expasy.ch/sprot</a>	Curated protein sequences
TIGRFAMs	<a href="http://www.tigr.org/TIGRFAMs">http://www.tigr.org/TIGRFAMs</a>	Protein family resource for the functional identification of proteins
TRANSFAC	<a href="http://transfac.gbf.de/TRANSFAC/index.html">http://transfac.gbf.de/TRANSFAC/index.html</a>	Transcription factors and binding sites
Wnt Database	<a href="http://www.stanford.edu/~rnusse/wntwindow.html">http://www.stanford.edu/~rnusse/wntwindow.html</a>	Wnt proteins and phenotypes
ooTFD	<a href="http://www.ifti.org/">http://www.ifti.org/</a>	Transcription factors and gene expression
trEST, trGEN and Hits	<a href="http://hits.isb-sib.ch">http://hits.isb-sib.ch</a>	Predicted protein sequences
<b>Protein Sequence Motifs</b>		
BLOCKS	<a href="http://blocks.fhrc.org/">http://blocks.fhrc.org/</a>	Conserved sequence regions of protein families
CluSTr	<a href="http://www.ebi.ac.uk/clustr/">http://www.ebi.ac.uk/clustr/</a>	Automatic classification of SWISS-PROT+TrEMBL proteins into related groups
InterPro	<a href="http://www.ebi.ac.uk/interpro/">http://www.ebi.ac.uk/interpro/</a>	Integrated documentation resource for protein families, domains and sites
O-GLYCBASE	<a href="http://www.cbs.dtu.dk/databases/OGLYCBASE/">http://www.cbs.dtu.dk/databases/OGLYCBASE/</a>	Glycoproteins and O-linked glycosylation sites
PIR-ALN	<a href="http://www-nbrf.georgetown.edu/pirwww/dbinfo/piraln.html">http://www-nbrf.georgetown.edu/pirwww/dbinfo/piraln.html</a>	Protein sequence alignments
PRINTS	<a href="http://www.bioinf.man.ac.uk/dbbrowser/PRINTS/">http://www.bioinf.man.ac.uk/dbbrowser/PRINTS/</a>	Hierarchical gene family fingerprints
PROSITE	<a href="http://www.expasy.ch/prosite/">http://www.expasy.ch/prosite/</a>	Biologically-significant protein patterns and profiles
Pfam	<a href="http://www.sanger.ac.uk/Software/Pfam/">http://www.sanger.ac.uk/Software/Pfam/</a>	Multiple sequence alignments and hidden Markov models of common protein domains
ProClass	<a href="http://pir.georgeown.edu/gfserver/proclass.html">http://pir.georgeown.edu/gfserver/proclass.html</a>	Protein families defined by PIR superfamilies and PROSITE patterns
ProDom	<a href="http://www.toulouse.inra.fr/prodom.html">http://www.toulouse.inra.fr/prodom.html</a>	Protein domain families
ProtoMap	<a href="http://www.protomap.cs.huji.ac.il/">http://www.protomap.cs.huji.ac.il/</a>	Automated hierarchical classification of SWISS-PROT proteins
SBASE	<a href="http://www3.icgeb.trieste.it/~sbasesrv/">http://www3.icgeb.trieste.it/~sbasesrv/</a>	Annotated protein domain sequences
SMART	<a href="http://smart.embl-heidelberg.de/">http://smart.embl-heidelberg.de/</a>	Signaling domain sequences
SYSTEMS	<a href="http://www.dkfz-heidelberg.de/tbi/services/cluster/systemsform">http://www.dkfz-heidelberg.de/tbi/services/cluster/systemsform</a>	Classification of protein sequences into disjoint clusters with annotations from various other resources
eMOTIF	<a href="http://motif.stanford.edu/emotif">http://motif.stanford.edu/emotif</a>	Protein sequence motif determination and searches
iPROCLASS	<a href="http://pir.georgetown.edu/iproclass/">http://pir.georgetown.edu/iproclass/</a>	Annotated protein classification database
<b>Proteome Resources</b>		
AAindex	<a href="http://www.genome.ad.jp/dbget/">http://www.genome.ad.jp/dbget/</a>	Physicochemical properties of peptides
Proteome Analysis Database	<a href="http://www.ebi.ac.uk/proteome/">http://www.ebi.ac.uk/proteome/</a>	Online application of interpro and clustr for the functional classification of proteins in whole genomes
REBASE	<a href="http://rebase.neb.com/rebase/rebase.html">http://rebase.neb.com/rebase/rebase.html</a>	Restriction enzymes and associated methylases
SWISS-2DPAGE	<a href="http://www.expasy.ch/ch2d/">http://www.expasy.ch/ch2d/</a>	Annotated two-dimensional polyacrylamide gel electrophoresis database
Yeast Proteome Database (YPD)	<a href="http://www.proteome.com/databases/index.html">http://www.proteome.com/databases/index.html</a>	<i>S.cerevisiae</i> proteome
<b>RNA Sequences</b>		
5S Ribosomal RNA Database	<a href="http://biobases.ibch.poznan.pl/5SData/">http://biobases.ibch.poznan.pl/5SData/</a>	5S rRNA sequences
ACTIVITY	<a href="http://wwwmgs.bionet.nsc.ru/mgs/systems/activity/">http://wwwmgs.bionet.nsc.ru/mgs/systems/activity/</a>	Functional DNA/RNA site activity
ARED	<a href="http://rc.kfshrc.edu.sa">http://rc.kfshrc.edu.sa</a>	AU-rich element-containing mRNAs
Collection of mRNA-like Noncoding RNAs	<a href="http://biobases.ibch.poznan.pl/ncRNA/">http://biobases.ibch.poznan.pl/ncRNA/</a>	Non-protein-coding RNA transcripts
European Large Subunit Ribosomal RNA Database	<a href="http://rrna.uia.ac.be/lssu/index.html">http://rrna.uia.ac.be/lssu/index.html</a>	Alignment of large subunit ribosomal RNA sequences with secondary structure information
European Small Subunit Ribosomal RNA Database	<a href="http://rrna.uia.ac.be/ssu/index.html">http://rrna.uia.ac.be/ssu/index.html</a>	Alignment of small subunit ribosomal RNA sequences with secondary structure information



Table 1. Continued

Guide RNA Database	<a href="http://www.biochem.mpg.de/~goeringe/">http://www.biochem.mpg.de/~goeringe/</a>	Guide RNA sequences
HyPaLib	<a href="http://bibiserv.techfak.uni-bielefeld.de/HyPa/">http://bibiserv.techfak.uni-bielefeld.de/HyPa/</a>	Structural elements characteristic for classes of RNA
Intronator	<a href="http://www.cse.ucsc.edu/~kent/intronator/">http://www.cse.ucsc.edu/~kent/intronator/</a>	RNA splicing and gene structure in <i>C.elegans</i> ; alignments of <i>Caenorhabditis briggsae</i> and <i>C.elegans</i> genomic sequences
Non-Canonical Interactions in RNA	<a href="http://prion.bchs.uh.edu/bp_type/">http://prion.bchs.uh.edu/bp_type/</a>	Non-standard base-base interactions in known RNA structure
PLMItRNA	<a href="http://bigarea.area.ba.cnr.it:8000/PLMItRNA/">http://bigarea.area.ba.cnr.it:8000/PLMItRNA/</a>	Mitochondrial tRNA genes and molecules in photosynthetic eukaryotes
Pseudobase	<a href="http://www.bio.leidenuniv.nl/~Batenburg/PKB.html">http://www.bio.leidenuniv.nl/~Batenburg/PKB.html</a>	Information on RNA pseudoknots
RISCC	<a href="http://ulises.umh.es/RISSC">http://ulises.umh.es/RISSC</a>	Ribosomal 16S-23S RNA gene spacer regions
RNA Modification Database	<a href="http://medlib.med.utah.edu/RNAmods/">http://medlib.med.utah.edu/RNAmods/</a>	Naturally modified nucleosides in RNA
Ribosomal Database Project (RDP)	<a href="http://rdp.cme.msu.edu/">http://rdp.cme.msu.edu/</a>	rRNA sequences, alignments and phylogenies
SELEXdb	<a href="http://www.mgs.bionet.nsc.ru/mgs/systems/selex/">http://www.mgs.bionet.nsc.ru/mgs/systems/selex/</a>	Selected DNA/RNA functional site sequences
SRPDB	<a href="http://psyche.uthct.edu/dbs/SRPDB/SRPDB.html">http://psyche.uthct.edu/dbs/SRPDB/SRPDB.html</a>	Signal recognition particle RNA, protein and receptor sequences
Small RNA Database	<a href="http://mbcr.bcm.tmc.edu/smallRNA">http://mbcr.bcm.tmc.edu/smallRNA</a>	Direct sequencing of small RNA sequences from prokaryote and eukaryotes
The tmRNA Website	<a href="http://www.indiana.edu/~tmrna">http://www.indiana.edu/~tmrna</a>	tmRNA sequences, foldings and alignments
UTRdb/UTRsite	<a href="http://bigarea.area.ba.cnr.it:8000/EmbIT/UTRHome/">http://bigarea.area.ba.cnr.it:8000/EmbIT/UTRHome/</a>	5' and 3' UTRs of eukaryotic mRNAs and relevant functional patterns
Viroids and viroid-like RNAs	<a href="http://nt.ars-grin.gov/subviral/">http://nt.ars-grin.gov/subviral/</a>	Viroids and viroid-like RNAs
Yeast snoRNA Database	<a href="http://www.bio.umass.edu/biochem/rna-sequence/Yeast_snoRNA_Database/snoRNA_DataBase.html">http://www.bio.umass.edu/biochem/rna-sequence/Yeast_snoRNA_Database/snoRNA_DataBase.html</a>	Yeast small nucleolar RNA
tRNA Sequences	<a href="http://www.uni-bayreuth.de/departments/biochemie/trna/">http://www.uni-bayreuth.de/departments/biochemie/trna/</a>	tRNA and tRNA gene sequences
tmRDB	<a href="http://psyche.uthct.edu/dbs/tmRDB/tmRDB.html">http://psyche.uthct.edu/dbs/tmRDB/tmRDB.html</a>	TmRNA (10Sa RNA) sequences
<b>Retrieval Systems and Database Structure</b>		
KEYnet	<a href="http://www.ba.cnr.it/keynet.html">http://www.ba.cnr.it/keynet.html</a>	Hierarchical list of gene and protein names for data retrieval
TESS	<a href="http://www.cbil.upenn.edu/tess">http://www.cbil.upenn.edu/tess</a>	Transcription element search system
Virgil	<a href="http://www.infobiogen.fr/services/virgil">http://www.infobiogen.fr/services/virgil</a>	Database interconnectivity
<b>Structure</b>		
ASTRAL	<a href="http://astral.stanford.edu/">http://astral.stanford.edu/</a>	Sequences of domains of known structure, selected subsets and sequence-structure correspondences
BioImage	<a href="http://www.embl.bioimage.org/">http://www.embl.bioimage.org/</a>	Searchable database of multidimensional biological images
BioMagResBank	<a href="http://www.bmrb.wisc.edu/">http://www.bmrb.wisc.edu/</a>	NMR spectroscopic data from proteins, peptides and nucleic acid
CATH	<a href="http://www.biochem.ucl.ac.uk/bsm/cath/">http://www.biochem.ucl.ac.uk/bsm/cath/</a>	Hierarchical classification of protein domain structures
CE	<a href="http://cl.sdsc.edu/ce.html">http://cl.sdsc.edu/ce.html</a>	CE: A Resource to Compute and Review 3-D Protein Structure Alignments
CKAAPs DB	<a href="http://cl.sdsc.edu/ckaap">http://cl.sdsc.edu/ckaap</a>	Structurally-similar proteins with dissimilar sequences
CSD	<a href="http://www.ccdc.cam.ac.uk/prods/csd/csd.html">http://www.ccdc.cam.ac.uk/prods/csd/csd.html</a>	Crystal structure information for organic and metal organic compounds
Database of Macromolecular Movements	<a href="http://bioinfo.mbb.yale.edu/MolMovDB/">http://bioinfo.mbb.yale.edu/MolMovDB/</a>	Descriptions of protein and macromolecular motions, including movies
Decoys 'R' Us	<a href="http://dd.stanford.edu/">http://dd.stanford.edu/</a>	Computer-generated protein conformations based on sequence data
HIC-Up	<a href="http://alpha2.bmc.uu.se/hicup/">http://alpha2.bmc.uu.se/hicup/</a>	Structures of small molecules (hetero-compounds)
HSSP	<a href="http://www.sander.ebi.ac.uk/hssp/">http://www.sander.ebi.ac.uk/hssp/</a>	Structural families and alignments; structurally-conserved regions and domain architecture
IMB Jena Image Library of Biological Macromolecules	<a href="http://www.imb-jena.de/IMAGE.html">http://www.imb-jena.de/IMAGE.html</a>	Visualization and analysis of three-dimensional biopolymer structures
ISSD	<a href="http://www.protein.bio.msu.edu/issd/">http://www.protein.bio.msu.edu/issd/</a>	Integrated sequence and structural information
LPFC	<a href="http://www.smi.stanford.edu/projects/helix/LPFC/">http://www.smi.stanford.edu/projects/helix/LPFC/</a>	Library of protein family core structures
MMDB	<a href="http://www.ncbi.nlm.nih.gov/Structure/">http://www.ncbi.nlm.nih.gov/Structure/</a>	All experimentally-determined three-dimensional structures, linked to NCBI Entrez

**Table 1. Continued**

ModBase	<a href="http://pipe.rockefeller.edu/modbase">http://pipe.rockefeller.edu/modbase</a>	Annotated comparative protein structure models
NDB	<a href="http://ndbserver.rutgers.edu/NDB/ndb.html">http://ndbserver.rutgers.edu/NDB/ndb.html</a>	Nucleic acid-containing structures
NTDB	<a href="http://ntdb.chem.cuhk.edu.hk">http://ntdb.chem.cuhk.edu.hk</a>	Thermodynamic data for nucleic acids
PALI	<a href="http://pauling.mbu.iisc.ernet.in/~pali">http://pauling.mbu.iisc.ernet.in/~pali</a>	Phylogeny and alignment of homologous protein structures
PDB	<a href="http://www.rcsb.org/pdb/">http://www.rcsb.org/pdb/</a>	Structure data determined by X-ray crystallography and NMR
PDB-REPRDB	<a href="http://www.rwcp.or.jp/papia/">http://www.rwcp.or.jp/papia/</a>	Representative protein chains, based on PDB entries
PDBsum	<a href="http://www.biochem.ucl.ac.uk/bsm/pdbsum">http://www.biochem.ucl.ac.uk/bsm/pdbsum</a>	Summaries and analyses of PDB structures
PRESAGE	<a href="http://presage.berkeley.edu/">http://presage.berkeley.edu/</a>	Protein structures with experimental and predictive annotations
ProTherm	<a href="http://www.rtc.riken.go.jp/jouhou/protherm/protherm.html">http://www.rtc.riken.go.jp/jouhou/protherm/protherm.html</a>	Thermodynamic data for wild-type and mutant proteins
RESID	<a href="http://www-nbrf.georgetown.edu/pirwww/dbinfo/resid.html">http://www-nbrf.georgetown.edu/pirwww/dbinfo/resid.html</a>	Protein structure modifications
SCOP	<a href="http://scop.mrc-lmb.cam.ac.uk/scop/">http://scop.mrc-lmb.cam.ac.uk/scop/</a>	Familial and structural protein relationships
SLoop	<a href="http://www-cryst.bioc.cam.ac.uk/~sloop/">http://www-cryst.bioc.cam.ac.uk/~sloop/</a>	Classification of protein loops
<b>Transgenics</b>		
Cre Transgenic Database	<a href="http://www.mshri.on.ca/nagy/cre.htm">http://www.mshri.on.ca/nagy/cre.htm</a>	Cre transgenic mouse lines
Transgenic/Targeted Mutation Database	<a href="http://tbase.jax.org/">http://tbase.jax.org/</a>	Information on transgenic animals and targeted mutations
<b>Varied Biomedical Content</b>		
BaliBASE	<a href="http://www-igbmc.u-strasbg.fr/BioInfo/BaliBASE2/index.html">http://www-igbmc.u-strasbg.fr/BioInfo/BaliBASE2/index.html</a>	Benchmark database for comparison of multiple sequence alignments
DBcat	<a href="http://www.infobiogen.fr/services/dbcat/">http://www.infobiogen.fr/services/dbcat/</a>	Catalog of databases
DrugDB	<a href="http://pharminfo.com/drugdb/db_mnu.html">http://pharminfo.com/drugdb/db_mnu.html</a>	Pharmacologically-active compounds; generic and trade names
END	<a href="http://www.ibr.wustl.edu/biognosis/agora_interface/html/agora_entrance.html">http://www.ibr.wustl.edu/biognosis/agora_interface/html/agora_entrance.html</a>	Enzyme nomenclature
Global Image Database	<a href="http://www.gwer.ch/qv/gid/gid.htm">http://www.gwer.ch/qv/gid/gid.htm</a>	Annotated biological images
GlycoSuiteDB	<a href="http://www.glycosuite.com">http://www.glycosuite.com</a>	N- and O-linked glycan structures and biological source information
HOX-PRO	<a href="http://www.mssm.edu/molbio/hoxpro/new/hox-pro00.html">http://www.mssm.edu/molbio/hoxpro/new/hox-pro00.html</a>	Clustering of homeobox genes
Imprinted Genes and Parent-of-Origin Effects	<a href="http://www.otago.ac.nz/IGC">http://www.otago.ac.nz/IGC</a>	Imprinted genes and parent-of-origin effects in animals
LocusLink/RefSeq	<a href="http://www.ncbi.nlm.nih.gov/LocusLink/">http://www.ncbi.nlm.nih.gov/LocusLink/</a>	Curated sequence and descriptive information about genetic loci
MPDB	<a href="http://www.biotech.ist.unige.it/interlab/mpdb.html">http://www.biotech.ist.unige.it/interlab/mpdb.html</a>	Information on synthetic oligonucleotides proven useful as primers or probes
Molecular Probe Database	<a href="http://srs.ebi.ac.uk/">http://srs.ebi.ac.uk/</a>	Synthetic oligonucleotides, probes and PCR primers
NCBI Taxonomy Browser	<a href="http://www.ncbi.nlm.nih.gov/Taxonomy/taxonomyhome.html">http://www.ncbi.nlm.nih.gov/Taxonomy/taxonomyhome.html</a>	Names of all organisms that are represented in the genetic databases with at least one nucleotide or protein sequence
PubMed	<a href="http://www.ncbi.nlm.nih.gov/PubMed/">http://www.ncbi.nlm.nih.gov/PubMed/</a>	MEDLINE and Pre-MEDLINE citations
Tree of Life	<a href="http://phylogeny.arizona.edu/tree/phylogeny.html">http://phylogeny.arizona.edu/tree/phylogeny.html</a>	Information on phylogeny and biodiversity
Vectordb	<a href="http://vectordb.atcg.com/">http://vectordb.atcg.com/</a>	Characterization and classification of nucleic acid vectors