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RESOURCE REVIEW

Web Resources for Model Organism Studies



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Abstract An ever-growing number of resources on model organisms have emerged with the continued development of sequencing technologies. In this paper, we review 13 databases of model organisms, most of which are reported by the National Institutes of Health of the United States (NIH; <http://www.nih.gov/science/models/>). We provide a brief description for each database, as well as detail its data source and types, functions, tools, and availability of access. In addition, we also provide a quality assessment about these databases. Significantly, the organism databases instituted in the early 1990s—such as the Mouse Genome Database (MGD), Saccharomyces Genome Database (SGD), and FlyBase—have developed into what are now comprehensive, core authority resources. Furthermore, all of the databases mentioned here update continually according to user feedback and with advancing technologies.

Introduction

Model organisms were placed at the forefront of biomedical research by the end of the 20th century [1]. Defining the etymology of the term *model organism* is relatively difficult; however, the development of molecular biology technologies during the 1960s and 1970s led to its materialization. The key rationale for the study of model organisms in biomedical

research is to examine fundamental mechanisms that may be shared by many or all living entities.

Some model organisms—such as *Drosophila*, mouse, and maize—have long histories of use, whereas others have been developed more recently. Since the common conception of a model organism is changing along with technological advances in genome sequencing and editing, it is difficult to provide a complete list of model organisms; therefore, here we mainly focus on the canonical set of model organisms defined by the National Institutes of Health (NIH) during the 1990s. The available web resources for the 13 covered model organisms are listed in Table S1, and we also provide a quality assessment for each resource (Table 1) based on five aspects: (1) webpage esthetics, (2) system performance, (3) data sources, (4) software and tools, and (5) data availability. If all aspects are covered, a full score of 5 points is given.

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Table 1 Major web resources for model organism studies

Name	Link	Main features	Rating	Refs.
MGD	http://www.informatics.jax.org	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★★	[2-4]
RGD	http://rgd.mcw.edu/	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★★	[5]
SGD	http://www.yeastgenome.org/	Some browser limitation such as Firefox v35 under Win7 system; low access speed for data; data uploading not supported; abundant effective tools; web page downloading accepted	★★★★☆	[6,7]
dictyBase	http://dictybase.org/	Well-designed webpage; standard access speed for data; data uploading not supported; abundant effective tools; web page downloading accepted	★★★★☆	[8]
WormBase	http://www.wormbase.org	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★★	[9]
FlyBase	http://flybase.org/	Well-designed webpage; standard access speed for data; data uploading not supported; abundant effective tools; FTP accepted	★★★★☆	[10]
ZFIN	http://zfin.org/	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; web page downloading accepted	★★★★★	[11]
Xenbase	http://www.xenbase.org	Well-designed webpage; some problems exist such as wild word search 12*; data uploading supported; abundant effective tools; FTP accepted	★★★★☆	[12]
TAIR	http://www.arabidopsis.org/	Well designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★★	[13]
BeetleBase	http://www.beetlebase.org	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★☆	[14]
MyMpn	http://mympn.crg.eu	Well-designed webpage; standard access speed for data; data uploading not supported; abundant effective tools; web page downloading accepted	★★★★☆	[15]
MaizeGDB	http://www.maizegdb.org/	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; FTP accepted	★★★★★	[16]
ASAP	https://asap.genetics.wisc.edu/asap/home.php	Well-designed webpage; standard access speed for data; data uploading supported; abundant effective tools; web page downloading accepted	★★★★★	[17]

Note: The assessment evidence covers 5 aspects: webpage esthetics, system performance, data sources, software and tools, and data availability. The details are as follows: whether webpage is well designed; whether the accessing speed is acceptable; whether data uploading is supported; whether there are abundant effective tools, and whether instant downloading is supported.

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