1. Online Databases and Libraries

1.1. Online databases and libraries definition

1.1.1. Biological Databases

Biological databases are libraries storing different aspects of life science information, it includes data related to biomolecules such us; DNA, RNA and proteins. These data are collected from various resources including scientific experiments, computer analyses, and published research papers, it can be raw data or measurements stored in digital form (files or databases). Creating biological databases is considered as one of the concerns of bioinformatics science, which is handled by bio-informaticien.

It can be defined as well as, a gathering of biological data organized in computer readable form that enhances the speed of search and retrieval and convenient to use, a good database must have updated information.

1.1.1.1. Biological data

Biological data is usually collected from various sources across different structural and functional frontiers. Biological data do not restrict to limited types of information, there is a wide range of data (**Table 01**).

Table 01. Biological data types

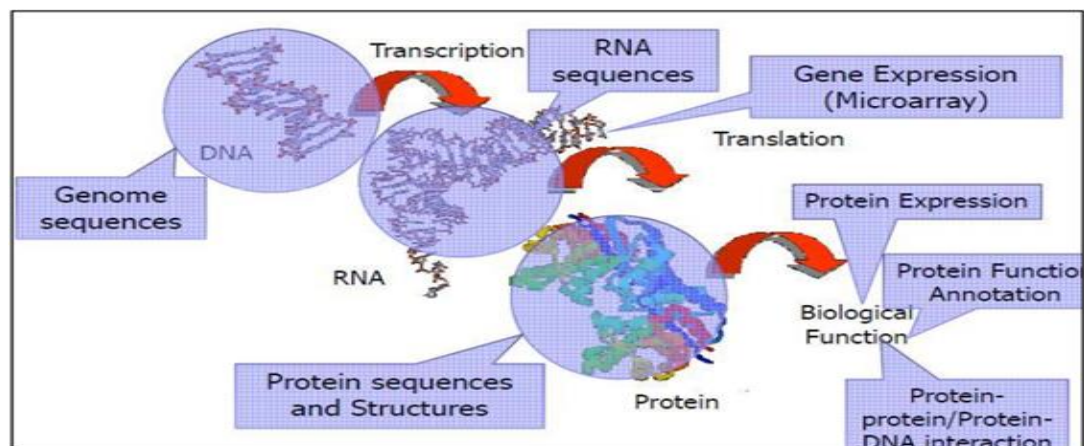| Biological data |
| --- |
| Sequences DNA RNA Protein |
| Structures of biological molecules |
| Gene expression profiles |
| Biochemical pathways |
| Chromosomes mapping |

Figure 01. Biological data types.

1.1.1.2. Databases

A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is designed to store, retrieve, and manage data**.**

1.1.1.2.1. Types of databases

a. Generalized databases

The database that has wide range of related information (data) is called generalized databases. They include Structural databases sequence.

- ✓ **Primary databases (Essential Online databases):** Store raw data about DNA, RNA, and Protein submitted by scientists.
- ✓ **Secondary databases (Advanced Online Resources):** issued from computationally processing or manually curetted of information based on primary data.

b. Specialized databases: are designed to store and manage information about a specific topic or domain.
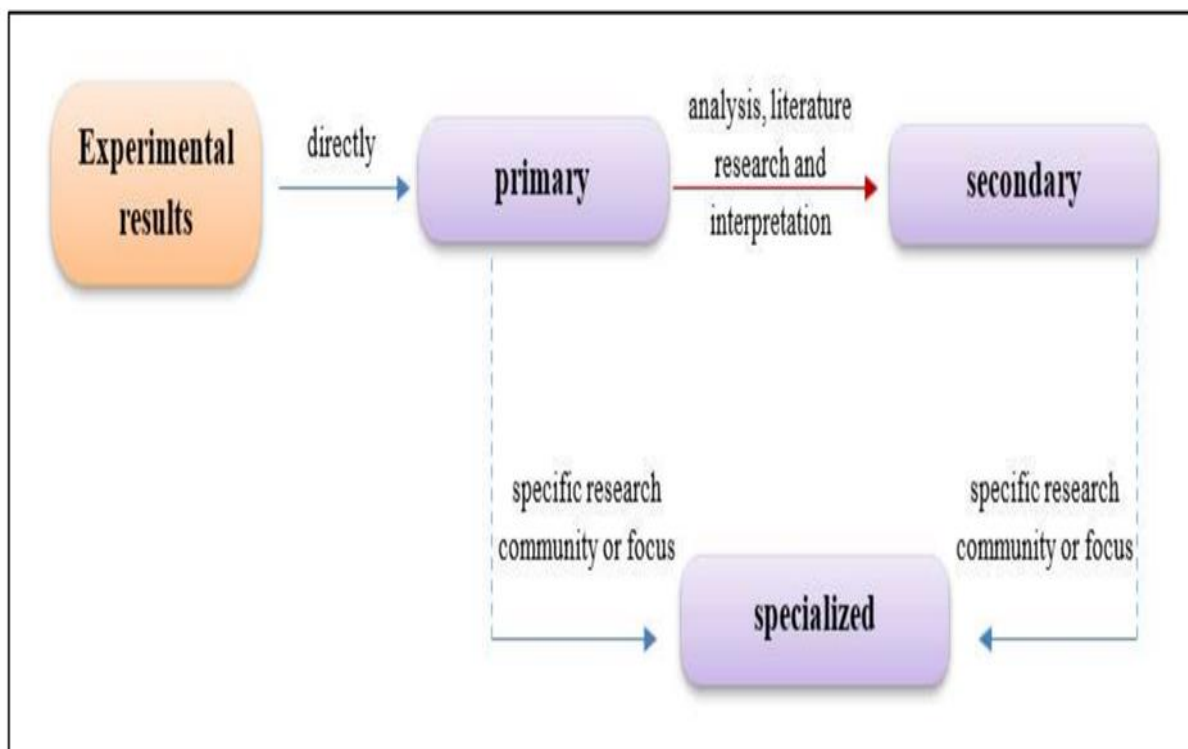

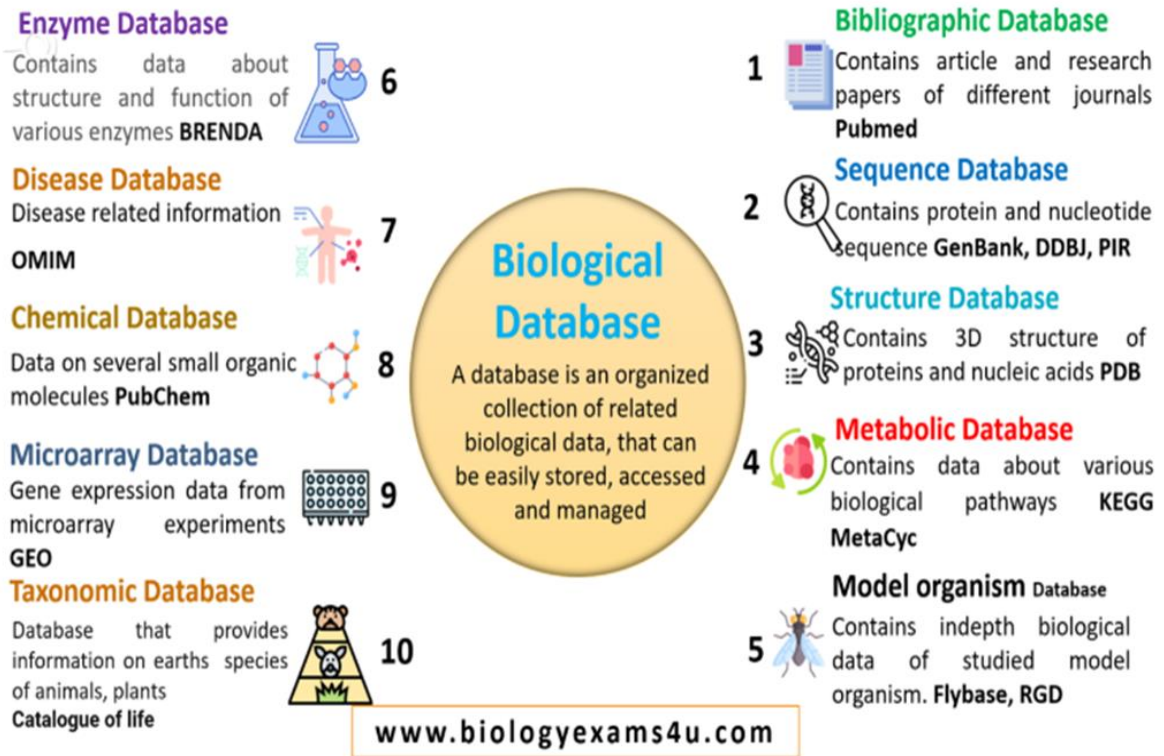**Figure 02. Relationships among the biological databases types.**
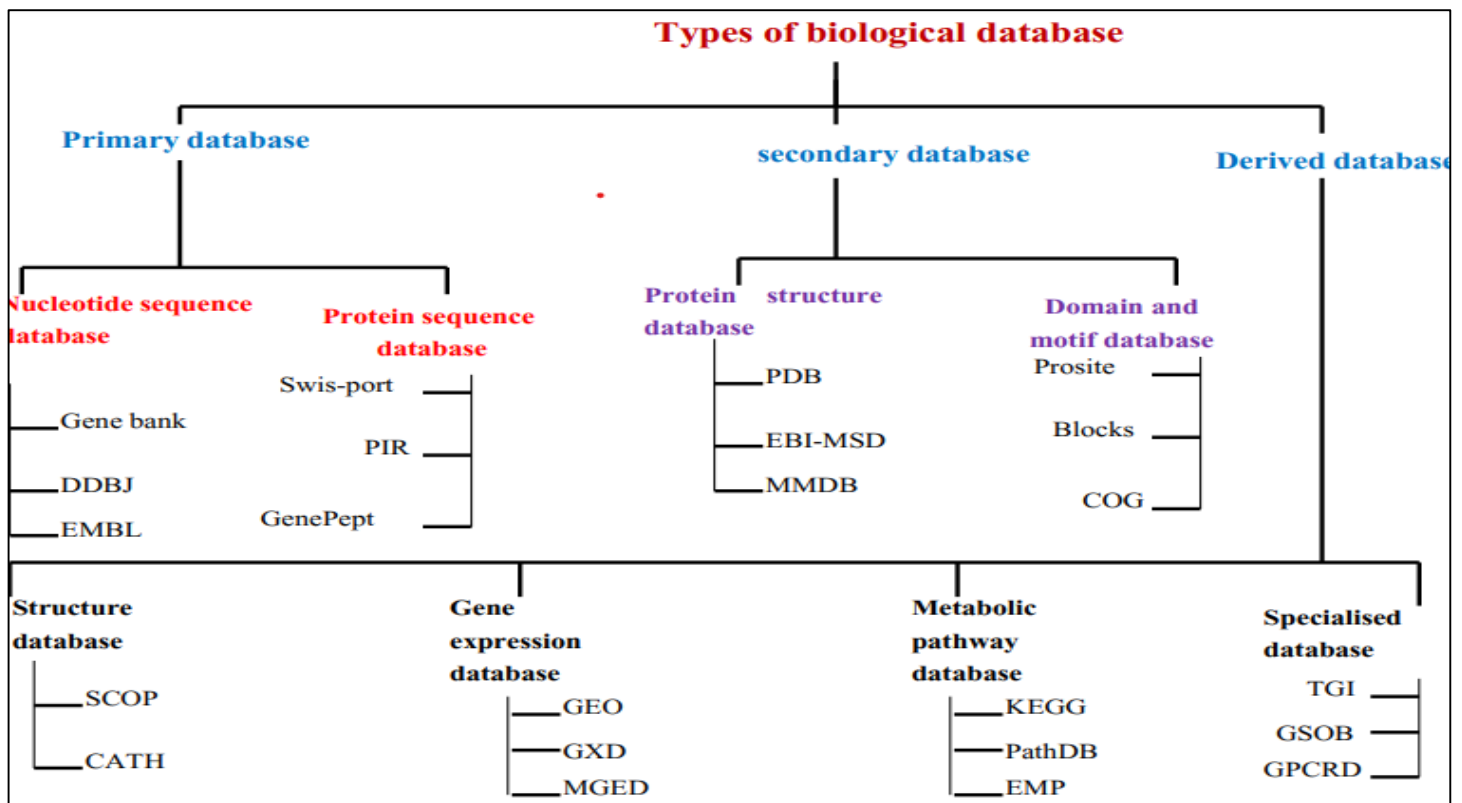
Figure 03. Types of biological database

Figure 04. Biological data bases nature.

❖ **Importance of the online databases**

▪ Databases act as a store house of information.

▪ Databases are used to store and organize data in such a way that information can be retrieved easily via a variety of search criteria.

▪ It allows knowledge discovery, which refers to the identification of connections between pieces of information that were not known when the information was first entered. This facilitates the discovery of new biological insights from raw data.

▪ Secondary databases have become the molecular biologist's reference library over the past decade or so, providing a wealth of information on just about any gene or gene product that has been investigated by the research community.

▪ It helps to solve cases where many users want to access the same entries of data.

▪ Allows the indexing of data.

▪ It helps to remove redundancy of data.

2. Citation Styles and tools

❖ **Citation Definition**

    ▪ Is a way of giving recognition to individuals for their creative and intellectual works that you utilized to support your research.

    ▪ It can also be used to pinpoint particular sources and fight plagiarism.

    ▪ Typically, a citation can include the author's name, date, and location of the publishing company, journal title, or DOI (Digital Object Identifier).

❖ **Citation Styles**

A citation style dictates the information necessary for a citation and how the information is ordered, as well as punctuation and other formatting. Different disciplines use different citation styles to credit scholarly works.

The most common citation styles are APA, MLA, and Chicago/Turabian Styles. It is important to cite properly in order to avoid plagiarism and to give authors credit for their work.

a. APA (American Psychological Association) is used by Education, Psychology, and Sciences

APA 7th Citation Examples

Material Type	In-text Citation	Bibliography
A book	(Sapolsky, 2017)	Sapolsky, R. M. (2017). *Behave: The biology of humans at our best and worst*. Penguin Books.
Chapter in an edited book (If the chapter is from an authored book, use the book citation)	(Dillard, 2020)	Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115–129). Routledge.
An article in a print journal	(Weinstein, 2009)	Weinstein, J. (2009). "The market in Plato's Republic." *Classical Philology*, *104*(4), 439-458.
An article in an electronic journal	(Grady et al., 2019)	Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture*, *8*(3), 207–217. https://doi.org/10.1037/ppm0000185
A website	(Bologna, 2019)	Bologna, C. (2019, October 31). *Why some people with anxiety love watching horror movies*. HuffPost. https://www.huffpost.com/entry/anxiety-love-watching-horror-movies_1_5d277587e4b02a5a5d57b59e

b. MLA (Modern Language Association) style is used by the Humanities

Material Type	Works Cited
Book in print	Card, Claudia. *The Atrocity Paradigm: A Theory of Evil*. Oxford UP, 2005.
eBook	Gaither, Milton. *Homeschool: An American History.* Palgrave Macmillan, 2017. *SpringerLink*, doi-org.pitt.idm.oclc.org/10.1057/978-1-349-95056-0.
An article in a print journal	Doggart, Julia. "Minding the Gap: Realizing Our Ideal Community Writing Assistance Program." *The Community Literacy Journal,* vol. 2, no. 1, 2007, pp. 71-80.
An article in an electronic journal	Sherrard-Johnson, Cherene. "'A Plea for Color': Nella Larsen's Iconography of the Mulatta." *American Literature*, vol. 76, no. 4, 2004, pp. 833-869, doi:10.1215/00029831-76-4-833.
A encyclopedia entry	"Patanjali." *Benét's Reader's Encyclopedia*, edited by Bruce Murphy, 4th ed., HarperCollins Publishers, 1996, p. 782.

A government publication	United States, Federal Maritime Commission. *Hawaiian Trade Study: An Economic Analysis*. Government Printing Office, 1978.
An interview you conducted	Brandt, Deborah. Personal interview. 28 May 2008. (Note: List the interview under the name of the interviewee)
A Page on a Website with no author	"Stunning Lakeside View on Lake Erie." *VisitPA*, Commonwealth of Pennsylvania, 7 June 2018, www.visitpa.com/article/stunning-lakeside-views-lake-erie.
A Page on a Website with an author	Del Castillo, Inigo. "How Not to Kill Your Houseplants, According to Botanists." *Apartment Therapy,* 29 Jan. 2020, www.apartmenttherapy.com/houseplant-tips-botanists-36710191.
Artwork - from website	Sherald, Amy. *Former First Lady, Michelle Obama*. 2018. *National Portrait Gallery*, npg.si.edu/object/npg_NPG.2018.15.

c. **Chicago/Turabian style**: is generally used by Business, History, and the Fine, Arts.

Author/Date Style	In-text Citation	Bibliography
A book	(Pollan 2006, 99–100)	Pollan, Michael. 2006. *The Omnivore's Dilemma: A Natural History of Four Meals*. New York: Penguin.
An article in a print journal	(Weinstein 2009, 440)	Weinstein, Joshua I. 2009. "The Market in Plato's *Republic*." *Classical Philology* 104:439–58.
An article in an electronic journal	(Kossinets and Watts 2009, 411)	Kossinets, Gueorgi, and Duncan J. Watts. 2009. "Origins of Homophily in an Evolving Social Network." *American Journal of Sociology* 115:405–50. Accessed February 28, 2010. doi:10.1086/599247.
A website	(Google 2009)	Google. 2009. "Google Privacy Policy." Last modified March 11. http://www.google.com/intl/en/privacypolicy.html.

❖ **Citation Tools**

➢ **Definition**

Citation Tools (aka bibliography tools or citation managers) are software tools that allow you to collect, organize, cite, and share information about works relevant to your research.

The most important role of a citation consist of:

- Facilitating the processes of finding, tagging, and annotating sources by automating the set up processes for citations and bibliographies.

- Allow you to generate bibliographies and in-text citations.
- Some systems can even be configured to connect directly to journals and other online resources.

➢ **Types of citation tools**

Citation tools are the software's to create references or citations using the Computers. Several citation tools have been developed. They can be classified in to two types :

- **Online citation tools**: Online citation tools are those tools with which citations can be generated only when the user is connected to internet. The citation data gets stored in the user's account with service provider's database or is available for copying to user's document.
- **Desktop or standalone citation tools:** Desktop citation tools are those tools which can be downloaded and installed on the personal computers. There is no need to connect to the Internet to generate citations with these tools.

3. Organizing and Managing References

Scientific references are crucial for research and writing in biology. They provide evidence, credibility, and context for your work. However, managing references can be challenging, especially for large-scale projects.

Here are five key steps to effectively manage and organize your references:

Step 01. Choose a Reference Manager:

A reference manager is a software tool that helps you store, organize, cite, and share your references. Popular options for biology students include Zotero, Mendeley, and EndNote. Each has its own features and benefits, so choose one that aligns with your operating system, word processor, citation style, budget, and collaboration needs.

Step 02. Import and Organize:

Once you've chosen a manager, import your references from various sources like databases, websites, PDFs, or manual entries.

It is mandatory to :

- Verify their accuracy and completeness,

- Correcting any errors or inconsistencies.

- Organize your references into folders, groups, or tags based on your research topics, themes, or categories.

    (This helps you find and access them easily and quickly).

Step 03. Cite and Format:

While writing, cite and format your references according to your target journal or publisher's guidelines.

- Use your reference manager to insert citations and generate a bibliography in the chosen style.

- Ensure consistency and accuracy in your citations and bibliography, making necessary adjustments and corrections.

- Follow ethical citation principles, avoiding plagiarism, acknowledging sources, and crediting authors.

Step 04. Share and Update:

For collaborative projects, it is important to:

- Share and update your references with co-authors or colleagues.

- Utilize your reference manager's export, import, or synchronization features across different devices or platforms.

- Use Online platforms or cloud services like Google Drive, Dropbox, or ResearchGate to facilitate sharing.

- Regularly update your references by adding new sources, removing outdated ones, or revising existing ones.

Step 05. Backup and Archive:

To prevent data loss or corruption, backup and archive your references. Save copies of your reference manager files or databases in different locations or devices, such as external hard drives, USB drives, or online storage.