

# **BSC3402 (6): Experimental Biology — Comparative Genomics**

**Laboratory Section: Tuesdays from 1:00 to 3:00 PM.**

## **Literature Searching**

**Week 2, Tuesday, September 5, 2006**

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Lab covers: (1) Open-Access publishers; (2) PubMed; (3) Literature search assignment.

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Before starting out on any research project, it is essential to know what has been published in the scientific literature previously. The project is only meaningful if it can provide information on something that is currently unknown or poorly known. However, this is not sufficient. When you apply for funding, you will find that it is important to convince the granting agencies that your project will not only provide new knowledge but also that it will result in significant progress in your field. You can only do that successfully if you know the existing literature in your field well. Finally, when you publish the results of your research, you need to put your results into the proper context and argue for the importance and uniqueness of your contribution. Again, knowledge of the scientific literature is essential. If you are an established researcher, you will get much of the information about the research in progress and the existing literature through seminars you attend, meetings you go to, and colleagues you talk to. Even so, you still need to find information in the published literature that you might otherwise have missed. When you are new to a scientific field, you will have to rely more or less entirely on your ability to find the relevant literature using the library resources and other tools.

More and more of the primary research literature is now published electronically. Many scientific journals are published both in paper form and electronically, and a few journals now exist only in electronic format. To help researchers sort through the enormous primary literature, there is a number of journals that specialize in publishing review articles, such as the “Trends” journals. In addition, abstracts of scientific papers are collected in databases, such as Biological Abstracts and Cambridge Scientific Abstracts. Finally, there are many information sources on the web and elsewhere that try to popularize scientific findings.

Many of these literature sources are only available through subscription. Typically, a researcher has access to them through the library of her university. You have heard about the FSU library resources during the morning lecture and will use them when you work on your assignment in today’s lab.

A current trend in many areas of science, including comparative genomics / bioinformatics, is that more and more of the scientific literature is published in Open-Access journals. These journals make their entire material available on the web to anyone, free of charge. Unlike most traditional journals, you do not have to search these resources through a university library that subscribes to the journal. The most important Open-Access archive of abstracts and full-text articles is PubMed (through PubMed Central). PubMed is hosted by NCBI, an organization we will encounter repeatedly throughout this course. Among others, NIH and other funding agencies are pushing hard for research publishing to be Open Access. The main reason is that the funding agencies want the results of the research they fund to be freely available to the general public. They are also interested in saving the money that they currently give away to commercial publishers through funded research projects (page charges) and funded libraries (journal subscription charges).

## **1. Open Access Journals**

Go to the Public Library of Science web page (<http://www.plos.org>) and explore the information about this non-profit organization as well as some of the journals it publishes. When you are satisfied, surf over to

BioMed Central at (<http://www.biomedcentral.com>), which is a commercial publishing house specializing in Open Access and similar types of journals. After exploring this site, you might want to visit PubMed Central (<http://www.pubmedcentral.nih.gov>), which is the NIH's digital archive of articles published in Open Access journals and any other journal willing to deposit its papers there. Many commercial publishers now let their journals deposit older articles in PubMed through PubMed Central.

## **2. PubMed**

PubMed is the front end of PubMed Central. To access it, go to the home page of the National Center of Biotechnology Information (<http://www.ncbi.nlm.nih.gov>). As the URL clearly indicates, the NCBI is part of the National Library of Medicine at NIH. There are a number of tools here that we will explore later during the course. For now, just explore the links under Entrez PubMed. Useful pages include the overview and the tutorial (requires Macromedia Flash Player).

## **3. Assignment**

For your assignment, you will search for information on a comparative genomics topic of your choice (it does not have to be the same topic you did your previous assignment on). Use all of the resources we have covered during the lecture and in the lab. Find five information sources, at least three of which must be primary research papers. For each information source, give the full citation according to the format used by the journal *Molecular Biology and Evolution*. Then classify the information source as a primary research article, a review paper, or a popular science article. Describe the contents of the article in a few sentences and finally try to evaluate the quality and reliability of the information. In looking at the quality of the data, you can use the Journal Citation Reports (one of the databases available through the FSU Library). Search for the journal name in the database. If the journal is included, you will find information about the number of articles published per year, the cited half-life (a good measure of the novelty and quality of the papers), the immediacy index (a measure of how trendy the journal is), and the impact (a weighted combination of several factors). In general, a reliable journal will have a high impact factor and a long half-life compared to other journals in its field. Other factors that can be used to judge the quality of a research paper include the addresses of the authors (are they from respected institutions), the text of the abstract (does it seem authoritative, exciting and easy to follow?), and the history of the journal (how long has it existed, is it well spread, is it in the FSU Library?). Ultimately, of course, it is the quality of the ideas and research presented in a paper that determines its quality. Nevertheless, it is useful to make a preliminary evaluation of its quality based on these other factors mentioned here.

Recall that you need to turn in the assignment during the lab session next week. Make sure you include your name, the course name and the title of the lab on the report you hand in (one page maximum).