Texas A&M University-Corpus Christi
CHEM4402 Biochemistry II Laboratory
Laboratory 1 - Literature Review

Please bring a laptop computer or portable memory drive to laboratory
Please do not perform this exercise prior to your scheduled laboratory

Most of the general public receives their science information through the popular press and media. In the majority of cases, this information is more or less accurate, but details are often scant and sources of information may or may not be reported. College students, especially those in the sciences, receive most of their factual knowledge through textbooks and their instructors. Textbook information, however, is distilled by the authors from the primary literature and recent reviews. The most recent and accurate information on any given subject will be found in the primary literature. Indeed, for some fields (bioinformatics, for example), by the time such information has been put into textbook form it will already be out of date.

The primary literature is the forum where scientists communicate the results of their research. Frequent review of the primary literature is a necessity for any scientist who wishes to remain current in their field. Communicating research results through this forum is also an obligation a scientist has to his profession. There are hundreds, perhaps thousands, of journals dedicated to communication of research results, and usually dozens for any given subject area. While for any given field there may be a half-dozen or so "premier" journals (where scientific work deemed most immediately relevant is published) any publication which refers submitted articles through an independent "peer review" process is usually considered a reliable source of information. "Peer review" is a process where a manuscript is sent out, prior to publication, to specialists in the field for comment on the author's experimental procedures, results and conclusions. These independent reviewers judge the scientific merit and make recommendations on the suitability of the article for publication. Most often, specific improvements are recommended, which must be completed by the authors before an article is accepted for publication. This process maintains the integrity of the work published in the journal and benefits the field by defining the improvements required in research reported to the scientific community.

Most research reports found in scientific journals (commonly referred to as "papers") are organized according to a similar format, though the sections may have slightly different names: title, abstract, introduction, experimental methods and materials, research results, discussion, and references (bibliography). Title is self-explanatory. The abstract is a one or two paragraph summary of the work performed. Its purpose is to provide a short explanation of the research to the reading audience so that they can make a quick decision of whether to study the entire paper in more detail. It also serves as a tool for indexing the work according to subject area and keywords. The introduction describes the nature of the problem in more detail, often in context of similar or past work on the problem, and may summarize the results. The experimental methods and materials section can go by many names, but its purpose is to describe how the authors performed

the work, in enough detail that interested scientists could repeat the experiments, if so desired. The results section is the heart of the paper. It describes and shows the experimental results in a variety of forms, including graphics, tables, graphs, equations, etc. The discussion examines the meaning of the results, their validity, importance and relationship to the larger questions being addressed. The reference section lists the material (often other research papers) cited in the article as the contributions of other scientists to the problem as a whole and to the article's subject in particular. It is more than a tool for assigning credit. It serves as a "mini-index" related to the specific problem, and can serve as a valuable source of additional information on the subject.

Reading a research paper from the primary literature, however, is not the same as reading a chapter from a textbook. Because journal articles are written for a particular audience in a specialized field, and because of page number limitations set by the publishers, they can be dense (much information), terse, and contain a lot of jargon and technical terminology specific to the field. Being able to quickly read and interpret a research article is an acquired skill, and depends to a large extent on familiarity with the subject area. It is, however, a skill important to scientists, even those at the bachelor's level, and can serve one well when there is a need for specific information which has not been distilled or filtered by a third party (textbook author, popular press, professors, etc.). In other words, don't expect to fully understand an article after one reading. You will probably have to read through it several times before gaining insight into the problem, procedure and results. You will also probably need a biochemistry, genetics or other reference work handy for help with unfamiliar terms.

Procedure

We will be using the library's databases to select an original research paper from the database, review it, and answer a number of questions related to the work. Though you will be participating in teams of two during the search steps, everyone (not lab teams) will select their own paper. The only requirement is that the paper somehow involves the green fluorescent protein.

1. Go to the Mary & Jeff Bell Library home page (http://rattler.tamucc.edu/). Select the ***Find Articles*** icon. If you are using an off-campus computer, select the *Remote Access* link under the *Services* tab to find instructions on how to access the university's databases from off campus.

2. Selecting the ***Find Articles*** icon will bring you to the ***A-Z Resource List*** page. You should notice a list of *Resources by Subject* on the right hand side of the page. Select either *Biology* or *Chemistry* as a resource. We'll use the *Chemistry* option as an example resource.

3. A new page will open that lists several databases, including *American Chemical Society Publications, Science Direct, Web of Science, etc*. Select one of these. We will use *Web of Science* for our example.

4. After the *Web of Science* page opens, enter the term *Green Fluorescent Protein* into the first search box. Be sure *Topic* is listed as the area to be searched in the associated drop-down box. By itself, this will return too many results, so narrow your search by adding a qualifier term in the second, or even third search boxes. These additional terms might relate to an area or personal interest (e.g. "insects", "vibrio", "disease", "dentistry", etc.) or perhaps a scientist (author) that you're familiar with. Be sure to check the appropriate additional area to be searched (*Topic, Title, Author*, etc.) in the associated drop-down box.

5. To further limit the number of articles returned, you may also wish to limit the number of years (*Timespan*) searched. Do this by selecting the desired range in the drop-down boxes below the *Search* area.

6. Select "Search". If too many results are returned, restrict your search by limiting the results to only one year, or by being more selective in your original search terms (*Title, Topic, Author*, etc.)

7. Browse through the titles and examine the abstracts of those that look interesting. When you find one that you like, select the *Search for FT* (full text)@ *TAMUCC* link. If the university has access to the full text article a copy of it should open. Be sure the article reports some experimental work. These should include a section titled *Materials and Methods, Experimental Procedure,* or something similar. When you have found an online, full-text version of an appropriate article, save a PDF copy to your computer, a portable memory device or email the file to yourself.

8. Once you have decided upon an article, write down it's title, the name of the journal in which it is published, and the journal issue and date. No two individuals from the same laboratory section may select the same paper.

9. Homework: review the article and answer the questions on the attached worksheet. Turn in your completed worksheet along with a copy of the article at your next laboratory meeting. Keep a copy of the article as a reference for preparing your own figures, tables and laboratory report at the end of the semester. Note especially the level and type of detail reported in the figure and table legends as well as the *Materials & Methods* or *Experimental Procedures* section.

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(12 pts total)

1. Attach a copy of your article to this report. (2 pts)

2. What is the institutional address of the primary (first) author? (1 pt)

3. How many references are cited? (1 pt)

4. Referring to the introduction, why do the authors feel this particular investigation was warranted? i.e why was this study done? (2 pt)

5. What role did the green fluorescent protein have in the work? (2 pt)

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6. List & identify each figure and table presented as a research result. (2 pt)

7. Referring to the discussion section of the paper, what is (are) the major conclusion(s) the authors draw from the work? Why are they significant? (2 pt)