

### Writing the Laboratory Notebook

The skill of writing the Laboratory Notebook is a vital part of industrial and academic research. It is a difficult but important part of science. It is required by law to establish intellectual and patent rights. The lab notebook is the property of the lab, not the property of the person doing the work.

The objective of a laboratory notebook is to record:

- \* **what** was done,
- \* **why** it was done,
- \* **where** it was done,
- \* **how** it was done (step by step),
- \* **who** did it;
- \* **you** should be able to recreate your work process.
- \* **someone** else should be able to do the same.
- \* Laboratory notebooks should be hardback bound books with numbered pages.
- \* Writing must be done in durable ink.

### ORGANIZING YOUR NOTEBOOK

- \* **Contact information.** The hard cover should include your name, address and a brief indication of the book's purpose (e.g. "Introductory Biology Spring 2008")
- \* **Table of contents.** Every page should be accounted for in the table of contents.
- \* **Number the pages.** Tedious but essential. Do it when the notebook is new.

### The Daily Introduction.

- \* **The date.** INCLUDE THE YEAR !!!!! The date should be on every page.
- \* A **title** of the experiment.
- \* A **statement** of the problem or task - short and to the point.
- \* If it is your goal to test a hypothesis, state that **hypothesis**.

### The Daily Plan.

This is not a long detailed research program plan. It is written before you start into your lab work.

It might include a "to do" list, a brief outline or flow chart to **plan** your experimental design. This plan is based upon reading the lab handout before coming to lab.

This is the part of the account that tells what you think you are going to do.

**THIS DOES NOT SUBSTITUTE FOR RECORDING WHAT YOU DO AS YOU DO IT**

- \* Use simple, direct statements or a numbered list of instructions.
- \* Account for solutions etc. that need to be prepared.
- \* **Safety!** Make note of any chemicals or practices that may be dangerous and know how to deal with problems that may arise.

### The Daily Execution.

This is the part of the account that tells what **you actually did**.

It is not equal to the ideal protocol, or plans you made.

It includes any mistakes, missed steps, pipetting errors etc.

- \* Identify precisely what equipment was used.
- \* Describe or diagram settings, adjustments or calibrations.

- \* Record exactly what you do. If the protocol says “wait 15 minutes” and you find that you waited 21 minutes, then write “21 minutes” or better write “start wait 3:56” and when you are done waiting, write “stop wait 4:17”.
- \* Record lot#, expiration dates, identifying characteristics of organisms, etc...
- \* Record what parts of the experiment you do and what parts someone else does.
- \* Do not erase. Do not tear out pages. Do not doodle in your lab notebook.

### Observations and Data.

- \* Record honestly and completely, without bias.
- \* Record as you go along, in the notebook, in ink, immediately.
- \* Do not trust valuable information or data to memory, even for a minute
- \* Do not use odd scraps of paper or the edge of your lab coat to record data, or make calculations. Only if your data is in a notebook will it be available for future analysis. Only if the calculations are in your notebook will you later be able to detect errors.
- \* Use good penmanship. Take care with numbers.
- \* Never over-write, always cross out mistakes with a single line and re-write the correct data.
- \* If errors are found, or notes are added at a future date, indicate the date that change is made.
- \* When data are recorded directly into a computer, note the name and location of the file.
- \* When data are recorded in another notebook, indicate, in your own notebook, the location of those data.

### Graphs

- \* Do not underestimate the value of even a hand drawn graph to summarize data.
- \* Each graph should have the title and labeled axes, with units.
- \* Each graph should indicate the data that are included in the graph.
- \* Any graphs produced on a computer should be attached to the notebook. The name and location of the computer file must be recorded in the lab notebook.

### Conclusion

- \* Write any calculations out clearly, showing all the steps and units.
- Record which statistical tests were applied to the data, stating which factors were analyzed. Record what computer program was used for the statistical analysis as well as the name of any computer files generated in the process.
- \* Briefly state your results.
  - \* Briefly, interpret your results in relation to your hypothesis.
  - \* If results were not as expected, explain how were they different, and propose an explanation for why they are different?
  - \* State your conclusions clearly.
  - \* Include brief suggestions for improvement in experimental design.
  - \* Include brief suggestions for future experiments.
  - \* Record any ideas you have, however brief - if you don't write them down, you'll forget them, and no one will know you had them.

### Specific Bio342 Instructions

**Gray highlighting in the handouts indicates steps to be recorded in your lab notebook. This is the minimal information that should be there, it is meant as a guide.**