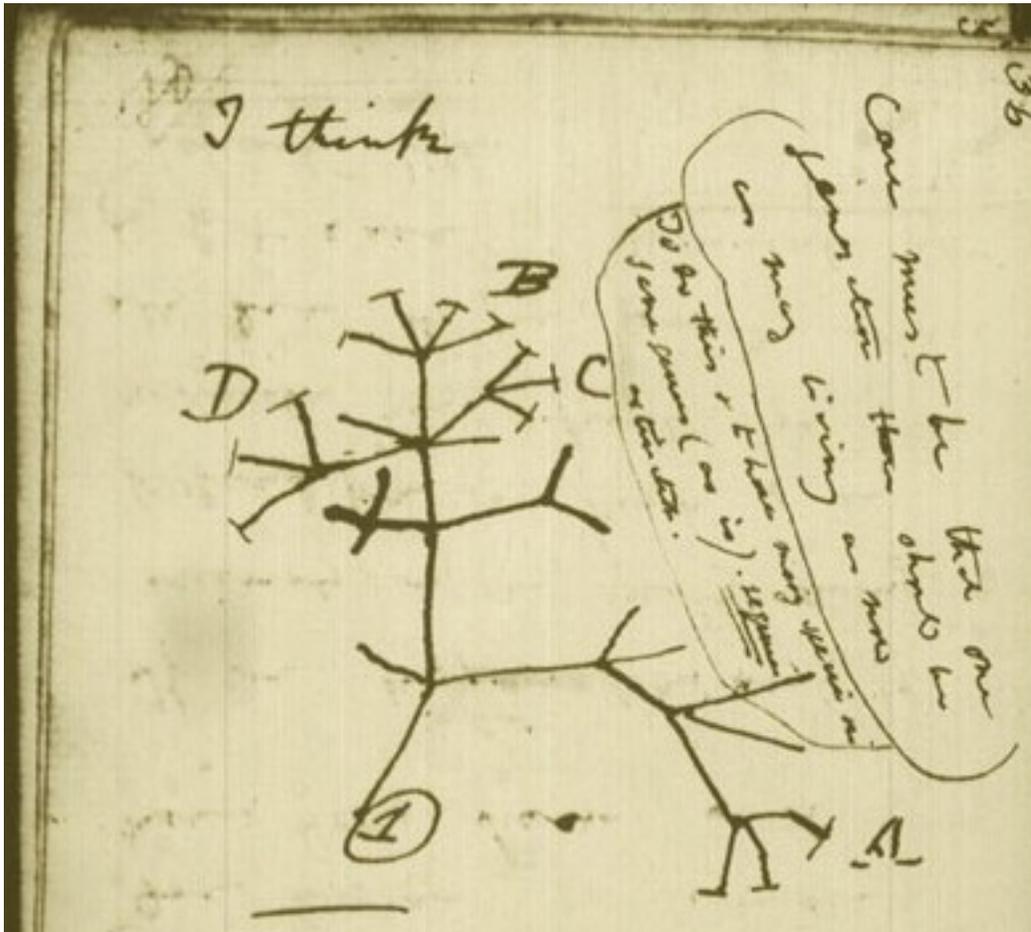


Medina Lab LABORATORY NOTEBOOK PROCEDURES



Charles Darwin opened a notebook in 1837 and began to record his emerging ideas on 'the species question'. He labeled this notebook, Transmutation of Species. On page 36 he sketched a Tree of Life with 'I think' written above it.

Make sure that in the cover of your Laboratory Notebook have to appear the following information:

Notebook Number

Year

First name and last name of the user (s)

Start date, End date

Institutional Affiliation of the Research Unit

Project

No sticky notes! A pile of loose paper or sticky notes won't work for a lab notebook. Use a good quality "bound" notebook, so that pages can't be lost, shuffled out of order, or pulled loose. Medina Lab provided this quality laboratory notebooks.

Page numbers help. Use the notebook with pre-numbered pages or number the pages yourself. This allows you to easily reference data on other pages via page number.

Why Use The Laboratory Notebook?

- To guarantee research results traceability: identification of the date and authorship of research results.
- To benefit from the laboratory's expertise and facilitate in-house knowledge transfer.
- To adapt to international research requirements.

What Should be Documented in the Laboratory Notebook?

- The title and date of experiments.
- Specific descriptions of each stage of experiments as they are carried out.
- Measurements taken and conditions in which they were obtained.
- Any new (clearly formulated) working hypotheses.
- Links between the different stages of an experiment.
- Ideas for improving and completing the results.
- Reference to any relevant documents which cannot be included in the laboratory notebook (CD's, electronic data, etc).

How to use the Laboratory Notebook?

- Have each page signed and dated by the user and a witness able to understand the content.
- Use permanent ink, and avoid ink erasers and correction fluid. Carefully put a line through any corrections so that they are still legible.
- Indicate, date and sign any alterations or additions.
- Do not tear out any pages.
- Indicate every intentional page break or blank page by drawing a line across the page.
- Do not skip lines.
- Note down any references made to standardized procedures used in the experiment; any variation on a standardized procedure must be described.
- Date and paste results in the form of photos, computer data, graphics, or other results into notebook. Sign across the documents pasted into the notebook and the page in the laboratory notebook.
- Clearly define any acronyms.

-List each experiment in the table of contents.

How to manage the Laboratory Notebook

-The research unit manager sets out rules for allocating the notebooks.

-The contents of the notebook cannot be reproduced without the written consent of the PI. Only photocopies for personal use of notebook users are authorized without permission.

-The notebook can be consulted as long as confidentiality is respected.

-The notebooks must be stored in a safe place.

Extra Rules and Policies:

-The laboratory notebook is the property of Dr. Monica Medina and her laboratory.

-The results recorded in the laboratory notebook are the property of Dr. Medina.

-In the event of joint projects with partners, data and results ownership is outlined in the contract drawn up between the establishment(s) and their partner(s).

-It is an important aspect of quality management: a laboratory notebook is a basic research tool for scientists. It is one of the tools that ensures that all results are traceable according to international quality standards. It constitutes a record of documentary system, which serves to bring proof of the research process "I write what I have done and how I did it".

-It is important for patenting: a laboratory notebook is the fundamental element offering proof of the identity of the inventor and the date of the invention. This proof is needed by patent offices especially the US patent office for the interference procedure. It is also an important element of proof which can be used in a court of law, particularly to settle disputes over intellectual property or to justify prior ownership.

WHAT SHOULD BE INCLUDED IN THE NOTEBOOK?

Essentially everything you do in the laboratory should be in your notebook. The notebook should be organized by experiment only and should not be organized as a daily log. Start each new experiment on a new page. The top of the page should contain the title of the experiment, the date, and the page number. The page number is important for indexing, referring to previous experiments, and for labeling materials used in a given experiment. If an experiment spans more than one page, note the page on which the experiment continues if it's not on the next page. Each experiment should include the following:

-Title/Purpose: Every experiment should have a title and it should be descriptive. An example would be "Large-scale plasmid preparation of plasmid pXGH-5 for transfection into mouse L cells".

When starting a new project, it is a good idea to introduce the overall strategy prior to beginning the first experiment. This serves two purposes. First, it forces you to think about what you are doing and why and sometimes things look differently when written down than they do in your head. Second, ideas can be patented, and a thorough description of your hypothesis and experimental strategy with appropriate documentation can be helpful for any future intellectual property issues.

Many experiments should also describe the purpose of the experiment and include any information that is pertinent to the execution of the experiment or to the interpretation of the results. For example, if it is a repeat experiment, state what will be done differently to get the experiment to work. If it's a cloning experiment, include what the strategy is and how the recombinants will be screened. A simple drawing of the plasmid map can be helpful. This is not like the introduction to a paper. Include anything that will be helpful in carrying out the experiment and deciphering the experiment at a later date. For the most part, notebooks are not written for today but for the future.

-Background information: This section should include any information that is pertinent to the execution of the experiment or to the interpretation of the results. For example, if it is a repeat experiment, state what will be done differently to get the experiment to work. If it's a cloning experiment, include what the strategy is and how the recombinants will be screened. A simple drawing of the plasmid map can be helpful. This is not like the introduction to a paper. Include anything that will be helpful in carrying out the experiment and deciphering the experiment at a later date. For the most part, notebooks are not written for today but for the future.

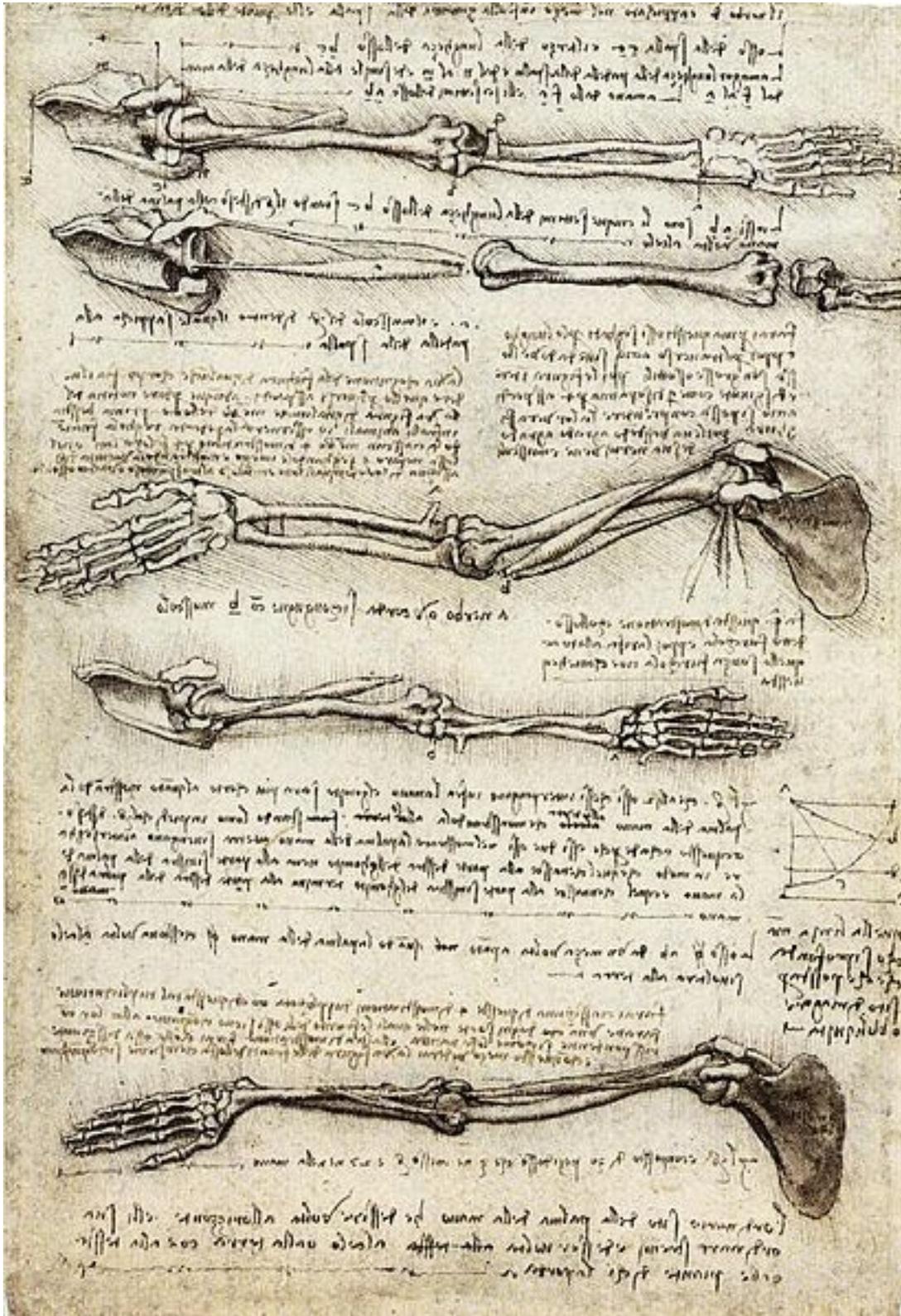
-Materials: This section should include the key materials, i.e., solutions or equipment, that will be needed. It is not necessary to include every piece of lab equipment required, i.e. vortexer, pipetman, etc, but you should include any

specialized equipment and the manufacturer, i.e, a phosphoimager or real-time PCR instrument. Composition of all buffers should be included unless they are standard or are referenced. Pre-packaged kits should be identified as to the name of the kit, the vendor, and the catalog number. Biological samples should be identified by genus and species, strain number, tissue type, and/or genotype with the source of the material identified. Enzymes should be identified by name, vendor, and concentration. DNA samples should be identified as to 1: type of DNA, i.e., chromosomal, plasmid, etc, 2: purity (miniprep, gel purified, PCR product) 3: concentration, if known, and 4: source, (include prior experiment number if the DNA was isolated in a previous experiment). Include all calculations made in preparing solutions. The sequence of all oligonucleotides must be included or referenced. Agarose gels should be identified by percentage and buffer used. If any of these materials were used in previous experiments, include only the reference to that earlier experiment, do not repeat the information again.

-Procedure: Write down exactly what you are going to do before you do it and make sure you understand each step before you do it. In general, Xerox copies alone of procedures are not acceptable for several reasons: 1. You should include everything you do including all volumes and amounts; many protocols are written for general use and must be adapted for a specific application. 2. Writing a procedure out helps you to remember and to understand what it is about. It will also help you to identify steps that may be unclear or that need special attention. 3. Some procedures can be several pages long and include more information than is necessary in a notebook. However, it is good laboratory practice to have a separate notebook containing methods that you use on a regular basis (this is not required for this course). If an experiment is a repeat of an earlier experiment, you do not have to write down each step but refer to the earlier experiment by page or experiment number. If you make any changes, note the changes and why. Flow charts are sometimes helpful for experiments that have many parts. Tables are also useful if an experiment includes a set of reactions with multiple variables. It is good practice to check off steps as they are completed or reagents as they are added to prevent you from losing your place or for forgetting to add something. All procedures should be referenced.

-Results: This section should include all raw data, including gel photographs, printouts, colony counts, autoradiographs, etc. All lanes on gel photographs must be labeled and always identify the source and the amount of any standards. This section should also include your analyzed data, for example, transformation efficiencies, calculations of specific activities or enzyme activities.

-Conclusions/Summary: This is one of the most important sections. You should summarize all of your results, even if they were stated elsewhere and state any conclusions you can make. If the experiment didn't work, what went wrong and what will you do the next time to try to trouble shoot?



Studies of the Arm showing the Movements made by the Biceps. Leonardo da Vinci notebook.