My Lab Report

***A scientific communication is both an advertisement and a story (though one told with strict logic and evidentiary support). Your title needs to be informative, succinct, and (if at all possible) interesting so that your reader can decide whether to expend their precious time reading it.

By Bruce

***The author list should be accurate and complete. If you didn’t do all the work or thinking, other significant contributors must be in the author list, and names should be complete.

Introduction

***Automated spell checking has likely been around longer than you have; it’s no longer a novelty. A poorly organized, written, or spelled report communicates to your reader that their time is unimportant and that you have contempt for any impression they may form of you and your report. This sort of message is especially striking when one of the purposes of the report is to receive a grade...

Humans have long been curious about the affectiveness of the sunlight effect which can often effect the effective length of leaves.

***Just because there’s nobody in your dorm room telling you to ‘go look it up yourself’ doesn’t mean you’re free to invent the English language. Use words that you know the meanings of; when you need one you’re unsure of, get help from an authoritative source. Dictionary.com will often suffice! Here it tells us

effect (noun)
1. Something brought about by a cause or agent; a result.
2. The power to produce an outcome or achieve a result; influence: The drug had an immediate effect on the pain. The government's action had no effect on the trade imbalance.
3c A scientific law, hypothesis, or phenomenon: the photovoltaic effect.
affect (transitive verb)
1. To have an influence on or effect a change in: Inflation affects the buying power of the dollar.
2. To act on the emotions of; touch or move.
3. To attack or infect, as a disease: Rheumatic fever can affect the heart.
Source: http://dictionary.reference.com/

We wanted to know if our instructor’s idea was as crazy as it sounded.

***You may know who your instructor was, but your reader doesn’t—tell us who it was and, as relevant, her qualifications that lend weight to her idea-having. Similarly, you may know what the idea was, but your reader (probably) is not clairvoyant. Scientific communication is all about making sure your reader knows what you know, learns what you think, and is convinced of your correctness by the logic and completeness of your argumentation and the compelling presentation of your supporting data.

So we did some tests, and lo and behold, we found out she was right!
***You may find proving your instructor right/wrong a compelling context, but your reader needs to know why the topic area is important/interesting. If you haven’t interested your reader in the question, why do you think they’re going to stick around through the investigation and the answer? Imagine our surprise. In this Lab Report, we’re going to prove that she was right.***

You want to provide more of a signpost than this; tell us of your general approach—now that we understand the problem and its importance, what approach do you take to solving it? It’s also common to telegraph the findings, as in ‘Here we report that, contrary to previously published work, the world is indeed flat.’

**Methods**

We did what she told us to do and what the lab manual said, except that we used 400 ml. instead of 250.

The general principle behind a scientific write-up is that if you were abducted by aliens but your scientific publications were left behind, an interested party could step up and perform your experiments exactly as you had. More mundanely, a colleague who lacks time/funds to visit with should be able to do exactly as you did. If you are performing your experiments according to a published procedure, cite the source and any significant modifications (with sufficient detail that your reader knows where and how to apply them!). Even your lab manual is a legitimate reference and should be cited accurately.

When describing or altering a protocol, include sufficient detail that your reader can *execute it*. Here, we have no idea where the substitution of volume took place (‘in step 4 of the published protocol for pre-soaking the leaves, we used 400 ml. of bicarbonate buffer instead of the 250 ml. stated).”

**Results**

Here’s our data from the first experiment:

***BAD GRAPH AND POSSIBLY BAD TABLE GO HERE***

For the second experiment, well, first Jimmy dropped the flask, and it broke, so we cleaned that up. Then Sandra didn’t make the solution right, so we started over again. When we got everything going at last, we tried exposing the leaf disks to light for an hour, but when we got off the internet, they were all floating, so we decided that was too long. The next time, we stopped the experiment after 2 minutes, but nothing had happened. From all that, we decided to take a timepoint every minute, which pretty much proved to be perfect.

In general, particularly with regard to protocols, you focus primarily on what you did that was valid or properly executed. While you may be very, very proud of the fact that you tried 100 times before you developed the proper protocol, your
reader is more concerned with the experiments you performed that contribute directly to conclusions or provide information critical to thinking in your area.

Our third experiment kept giving the wrong results, so I’m not going to show them to you. Also, we decided to ignore them.
***Ummmm, no. If an experiment was not executed in a valid fashion, it may be discarded. Ditto if you later realize a flaw in the procedure or execution. If you did a series of similar experiments and wish to report only on a representative one, that, too is allowed (but should generally be clearly acknowledged). But it’s the essence of science that you accept the results of your experimental tests; they drive the conclusions, not vice-versa! If data and model disagree, it’s model that must die.

It was generally the case that the experiment was performed in such a way that the results were taken by the one who was named fourth in our author list. When the time came to execute an experiment, it was the case that there was one of the scientific team who was available to record the data, which was recorded by the use of a graphite-cored writing device, wherein the graphite was exposed and sharpened to a radially-symmetric point, the rest being encapsulated by a wooden sheath and topped by an aluminum-encased rubber cylinder which provided erasure functionality.
***Thankfully, use of the passive voice, wherein the presenter acts like some disembodied entity, is passing away. Similarly, needlessly stilted grammar is dying. While scientific writing remains generally crisp and formal, presentations such as ‘We performed the following controls…’ or ‘We observed that…’ are usually acceptable. Nonetheless, always consult with the style information provided by your target journal.

In the leaf-floating test, we found that the leaves floated more quickly in the presence of light than its absence. From this we conclude that our initial hypothesis, that light is a key component of photosynthesis, is correct. It also implies that even if we landed on Pluto with dirt, fertilizer, and a warm dome with air in it, we would not be able to grow plants there.
***Most scientific writing is still compartmentalized into Results (which contains…results!) and Discussion (which contains conclusions derived from results and discussion of the implications of the work). Unless your journal or instructor indicates otherwise, obey these conventions so your reader will know where to look for different components of your work!

Discussion

First off, I don’t buy this whole ‘we really landed on the moon’ story. I mean, c’mon, did you see the shoes on the guy that reported it? And nobody every believed anybody who had a comb-over like that!
***As much as you would like to share your views on anything and everything, in the Discussion, you deal with issues raised and addressed by your work. If it has broader implications than simply those addressed in your work, you are by all means welcome to show how you have illuminated whole fields of research, destroyed theories from other researchers and other areas, etc.***

***Scientific argumentation is, of course, limited to valid logical deductions. Identify your premises and walk your reader through the logic that leads them inevitably to your conclusion. Any other form of persuasion doesn’t belong here.***

As to the floating leaf disks, our data clearly support that Pyrex, light, and sodium bicarbonate solution are essential components of photosynthesis.

***Your conclusions must be strictly limited to what you actually observed or concluded from your actual work or by including cited works of others. If you didn’t do a ‘No pyrex beaker’ control, it’s damn near impossible to comment on the role of the pyrex beaker (on the other hand, you may reasonably leave the pyrex beaker out of your discussion of unaddressed controls or confounding factors unless you posit a specific role for it that needs to be addressed). Further, it is useful in the discussion to justify the conclusions you are drawing, especially when you are reasoning beyond a simple statement of your observations.***

Furthermore, as with dead people, we have conclusively shown that spinach leaf disks ‘go to the light’. From this we conclude that there is a ‘better place’ for spinach leaf disks, and that it would be really cruel to dispose of them by putting them down the sink, where it is dark and smelly.

***There’s a huge difference between observation and interpretation. Always make sure you are aware of the distinction, and very sensitive to how you report the latter in your writing. Interpretation is allowed, but should always be accompanied by a clear disclaimer (identifying it as interpretation), as well as supported by whatever arguments/evidence support its reasonableness.***

Everyone knows that bicarbonate is a source of CO$_2$. We took advantage of this in our studies to show that without CO$_2$, the leaf disks floated only after very long periods of time.

***’Everyone knows’ is a great cover, and generally substitutes for the phrases ‘I’m pretty sure that…’ or ‘I hope, but cannot justify, the following:’. In scientific writing, only the common knowledge of your field can be blithely stated (and even that often bears some introspection!). Important observations and conclusions from others must be justified by logical argument or by citation of a relevant reference.***

<blah blah blah, blah blah. Blah blah blah blah blah blah blah>
Your lab report will be graded on the basis of succinctness, clarity, and effectiveness of presentation. There is no bonus for surpassing the 10,000 word limit. In general, someone who knows what they’re talking about can express themselves in fewer words than someone who does not; someone who understands the argument they are making can organize it into a tighter, less redundant structure than someone who does not. Your brilliance is lost on me if I have fallen asleep.

References

To Add
2) Either not italicizing or underlining species names (like Dictyostelium)

3) Using colloquial language in their lab reports (like calling it Dicty instead of Dictyostelium or writing in a style that sounds like they're having a conversation with their friends)