



**CAMBRIDGE**  
**CARES** CAMBRIDGE CENTRE  
FOR ADVANCED RESEARCH AND  
EDUCATION IN SINGAPORE LTD.

# **Pen, Paper and Lab Book: Understanding Research Success**

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**How do you do**  
**40 years**  
**of work in**  
**1 hour?**



# Spot the losers

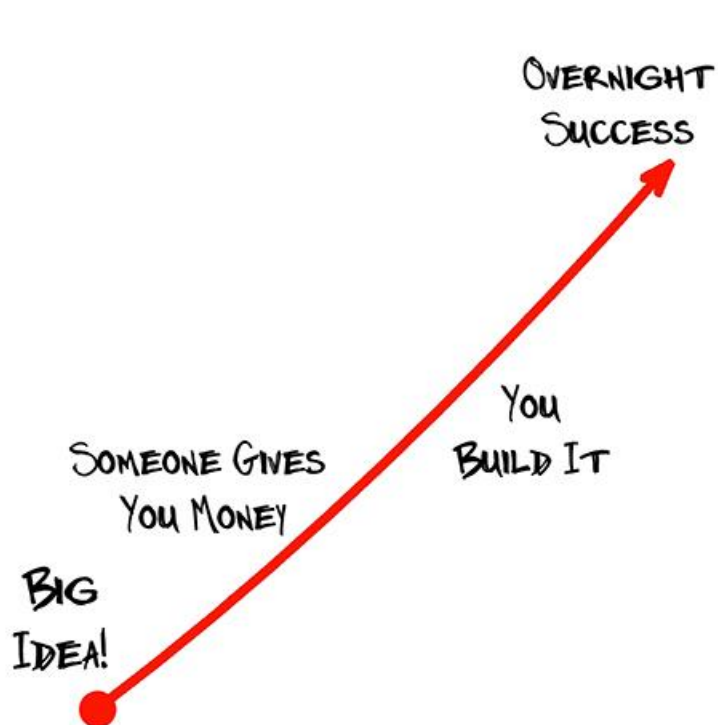




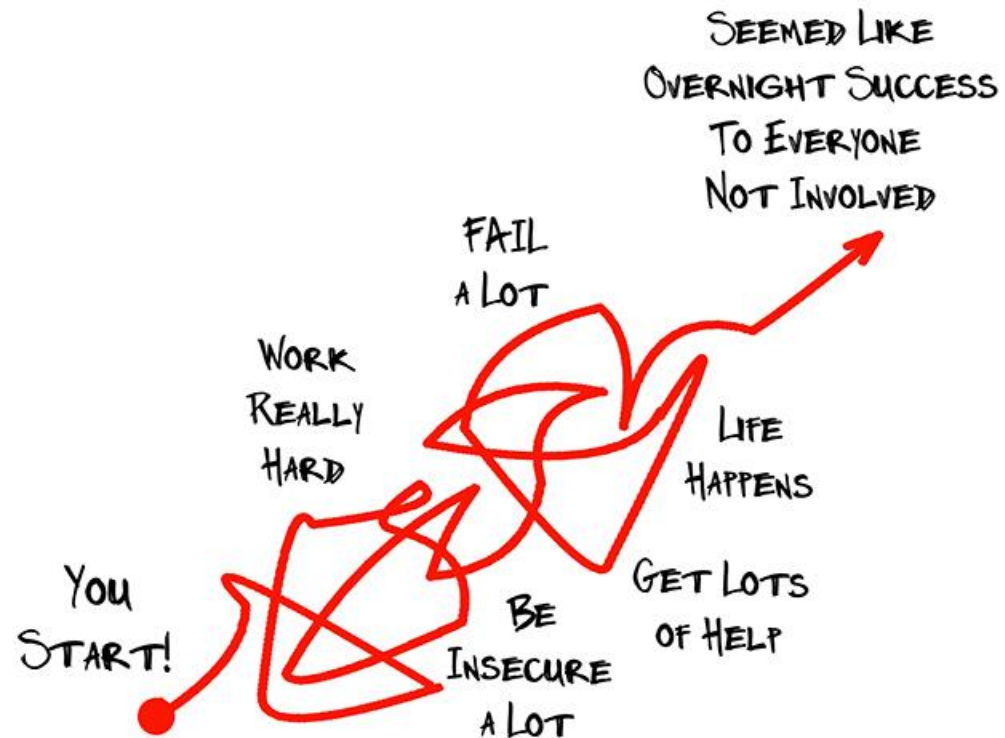
# Spot the losers







WHAT PEOPLE THINK  
IT LOOKS LIKE...



WHAT IT REALLY  
LOOKS LIKE...



## Systems vs Goals

A **goal** is something you achieve once.

A **system** is something you achieve  
every single day.



# Goals

- Limited
- Tunnel-vision
- Stressful
- Fragile
- Everyday failure

# Systems

- Open-ended
- Expansive
- Energising
- Anti-fragile
- Everyday success



## Gassman and Meyers letters

Gassman and Meyers were American chemists who gave the following guidelines to their students:

- 60 hour work week
- 10 hours of reading journals

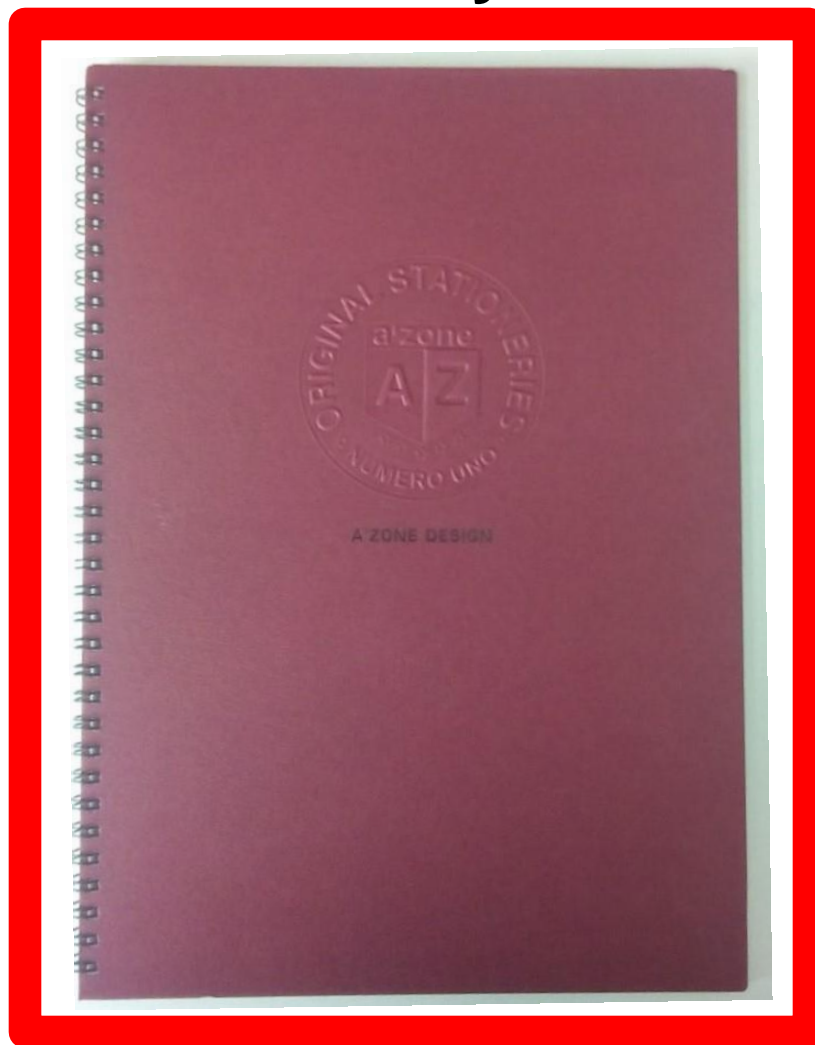
Efficient is much less important than effective

*The full Gassman and Meyers letters can be found [here](#).*





# The most important tool any scientist will ever have:





# Reasons to keep a lab book?

*Some ideas:*

- Complete record of procedures, reagents, data and thoughts to pass on to other researchers
- Explanation of why experiments were initiated, how they were performed, and the results
- Legal documents to prove patents and defend your data against accusations of fraud
- Scientific legacy in the lab

(US National Institute of Health)



# Reasons to keep a lab book?

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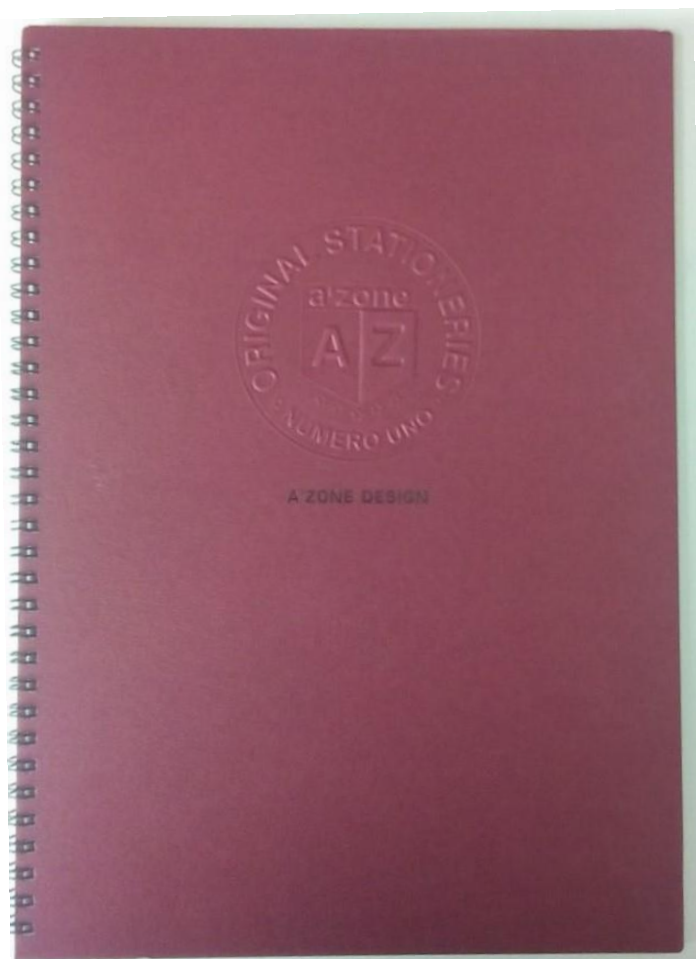


## Reasons to keep a lab book?

To help **you**,  
  
right **now**

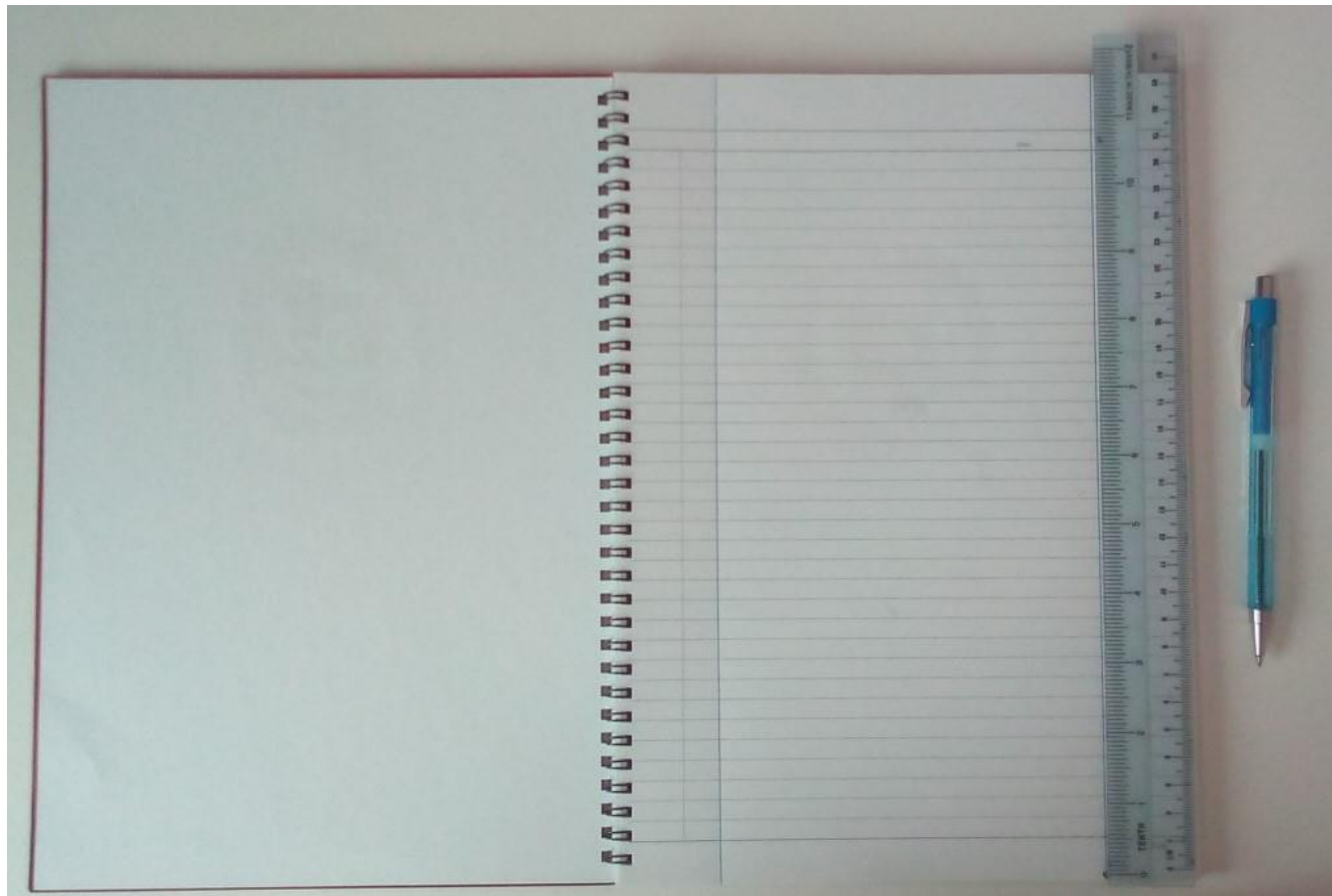


# Setting up your lab book





# Setting up your lab book



Rule margins on the left and right of the page





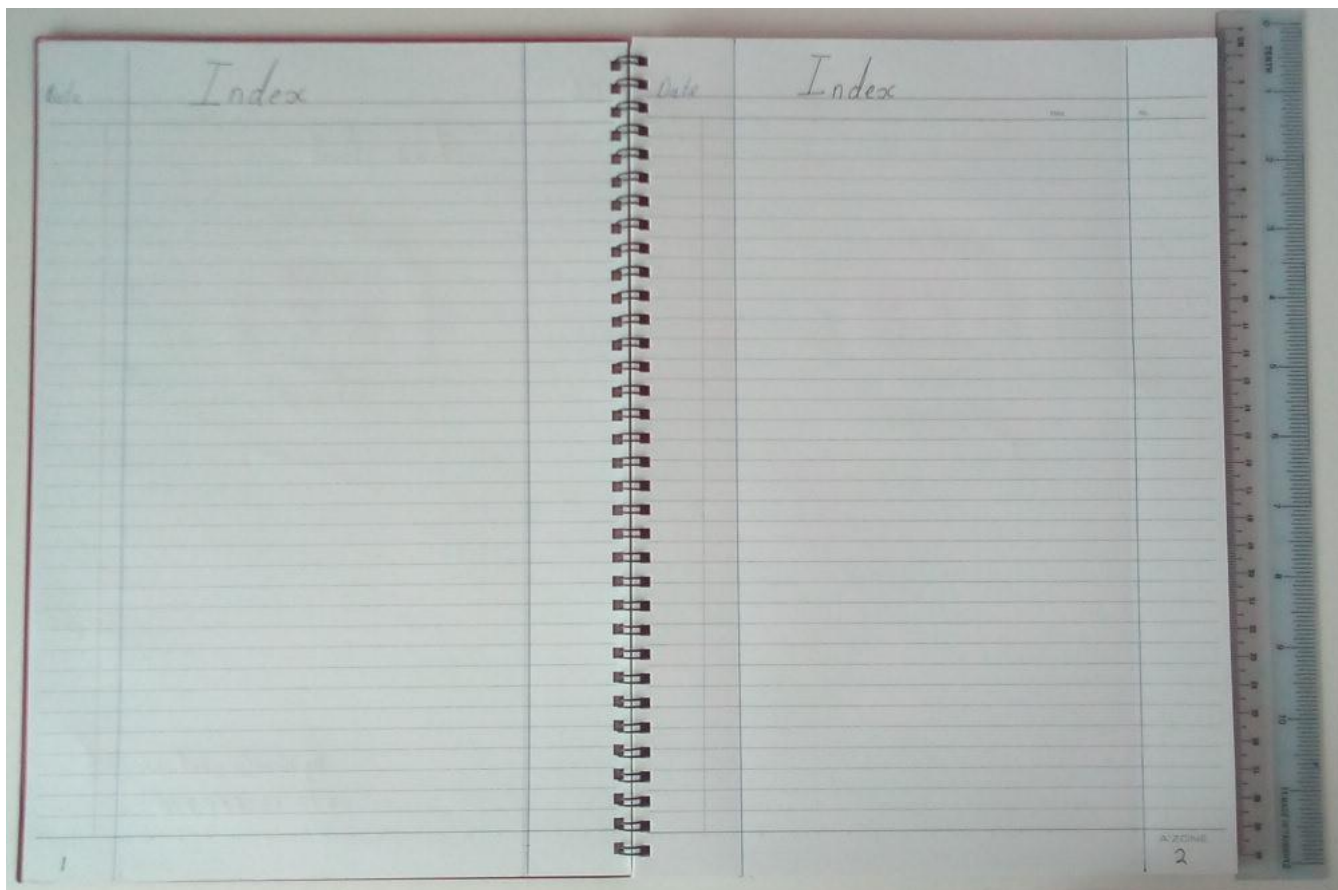
# Setting up your lab book



Add a title and date



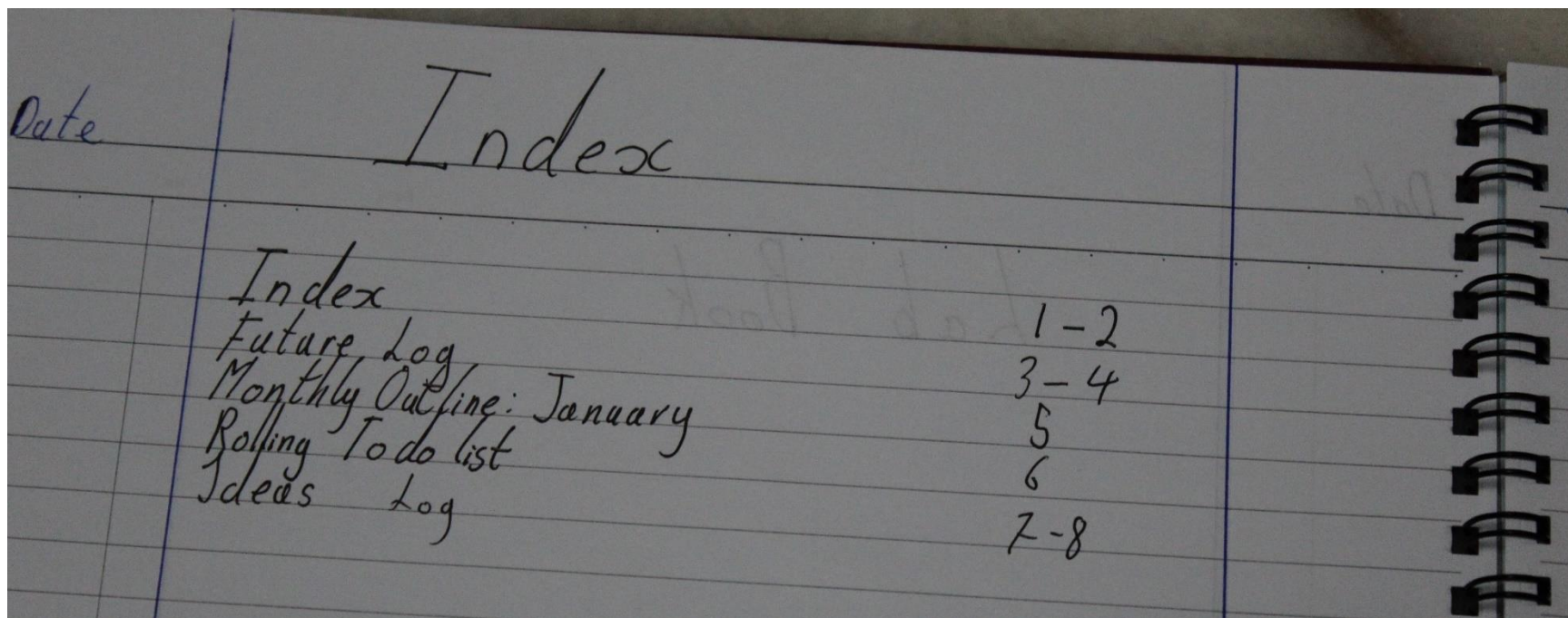
# Setting up your lab book



Include an index at the beginning to keep track of your work

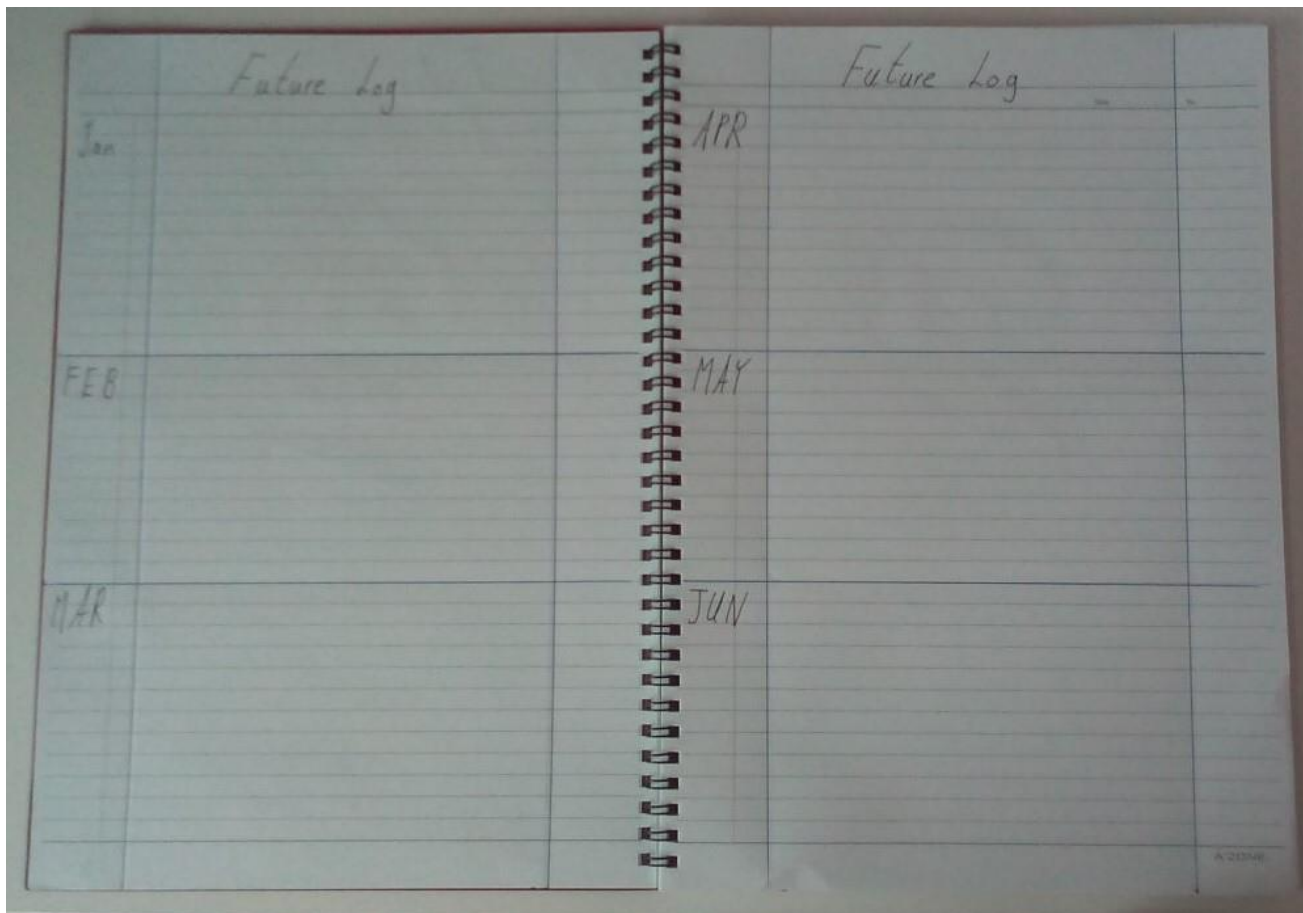


# Setting up your lab book





# Setting up your lab book

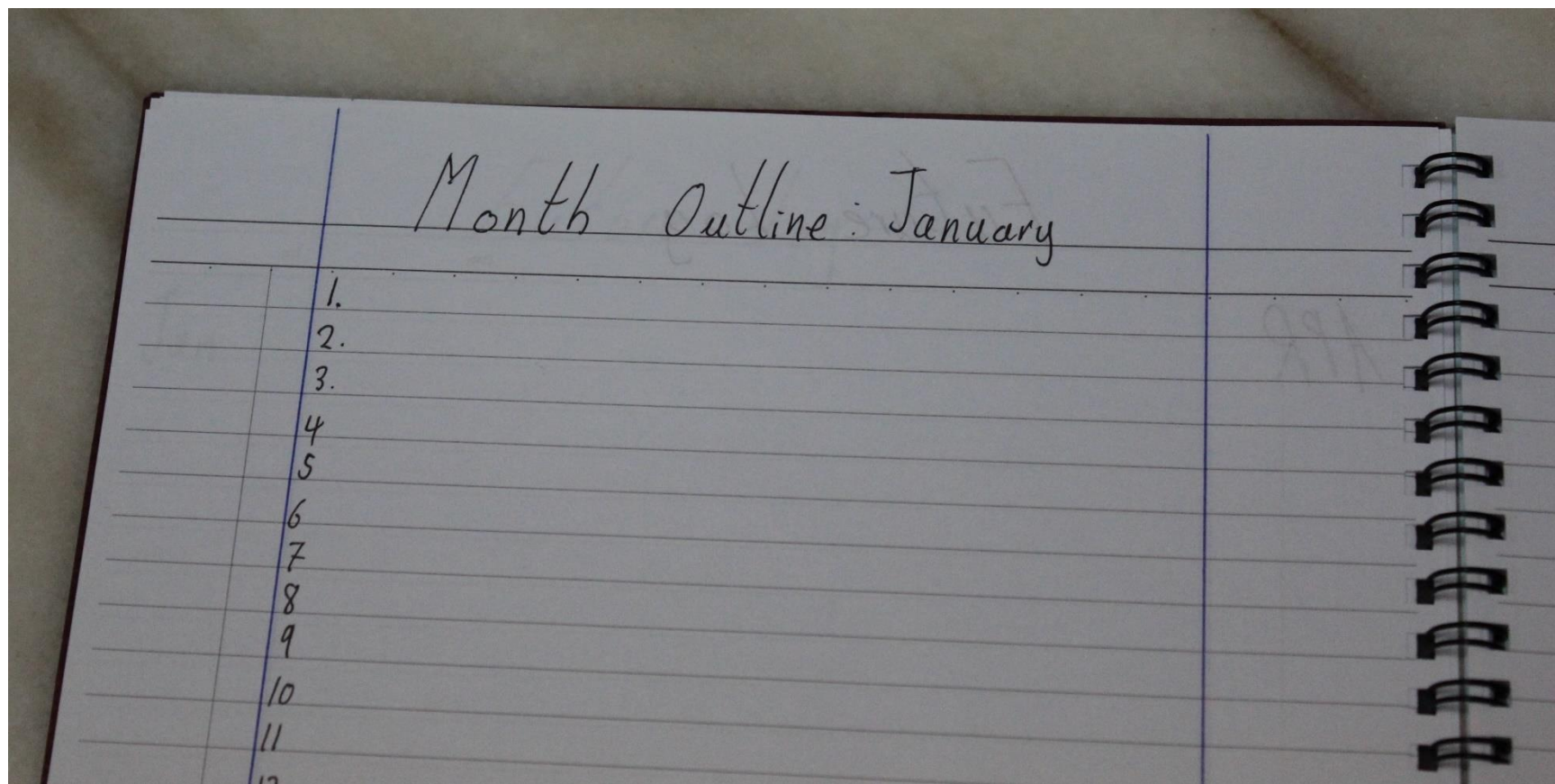


Future log: for planning ahead





# Setting up your lab book



Month outline: for planning your main tasks and processes each month



# The rolling to-do list – the last to-do list you'll ever need

☒ Read paper > ☒ Make notes on paper protocol > ☒ Write up  
protocol > ☐ Get prof. to proof read protocol



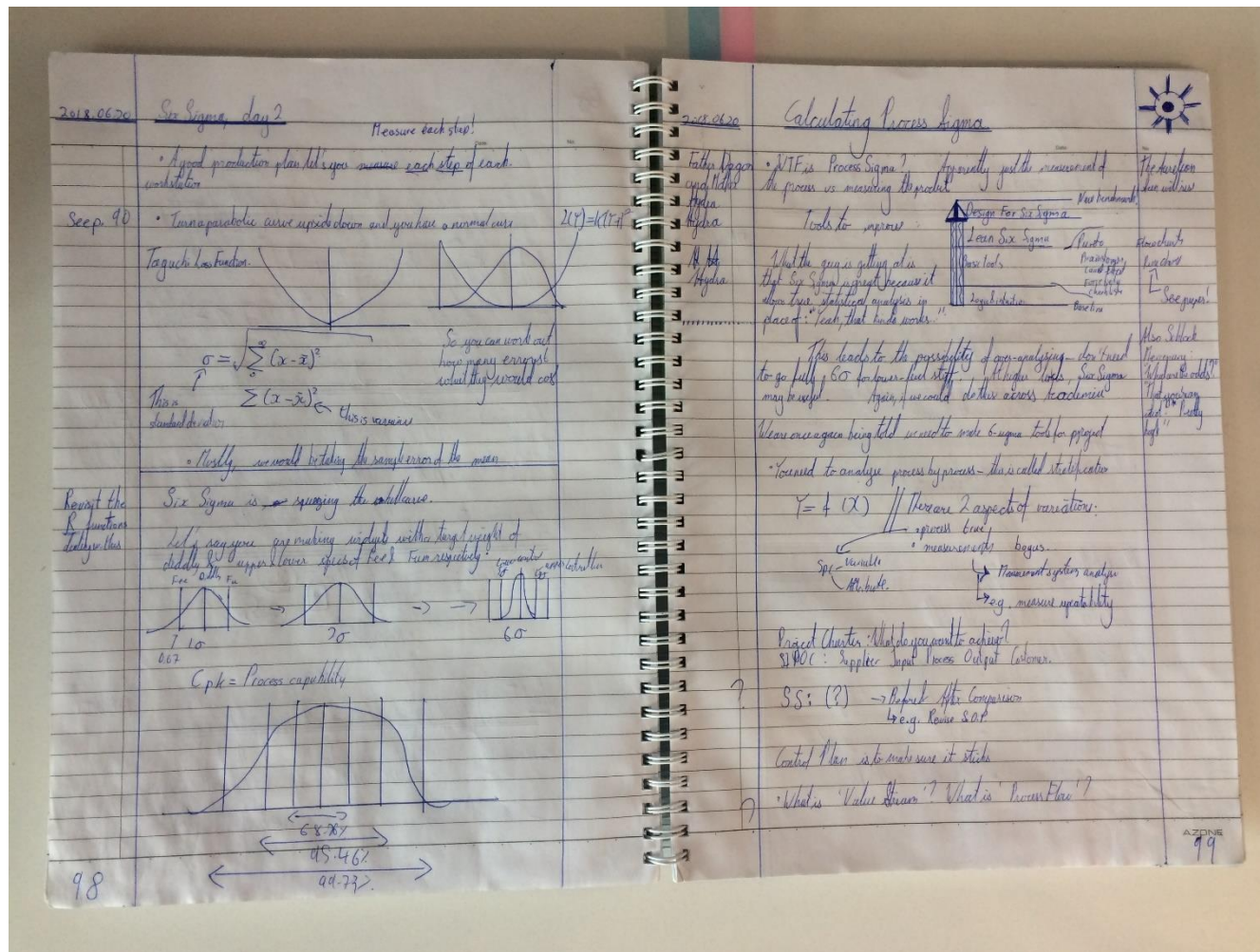
☐ Get prof. to proof read protocol

*Check off tasks as you complete them. Any unfinished tasks can go onto your next list.*



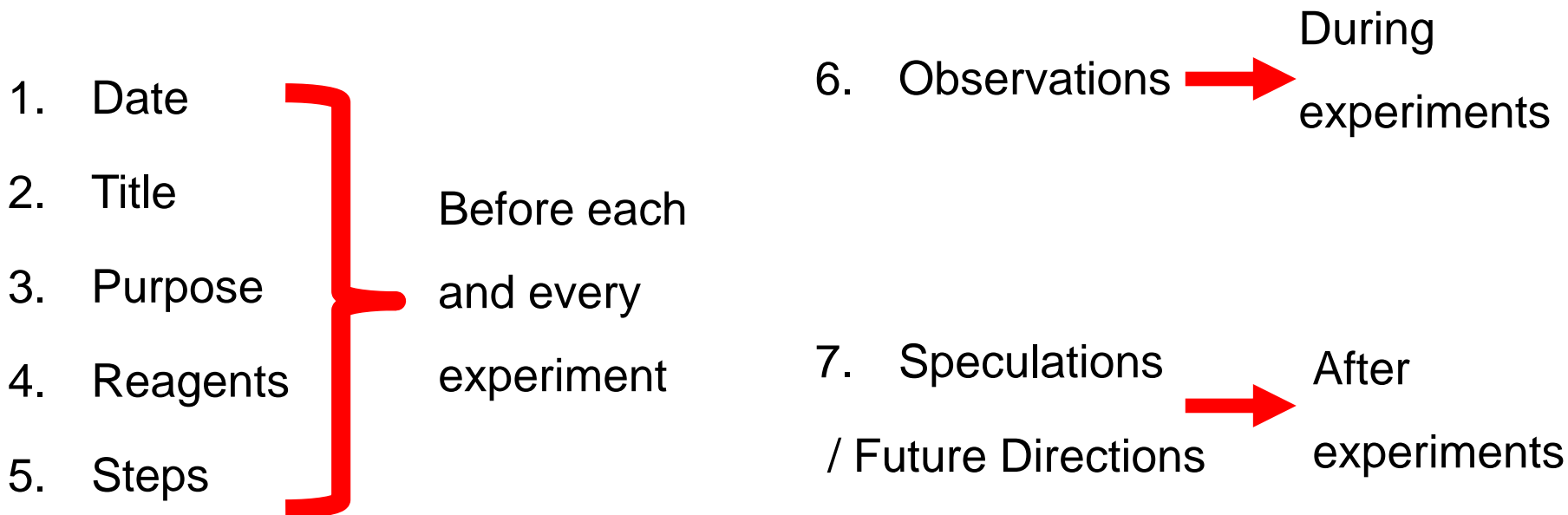


# Keep your literature notes in your lab book



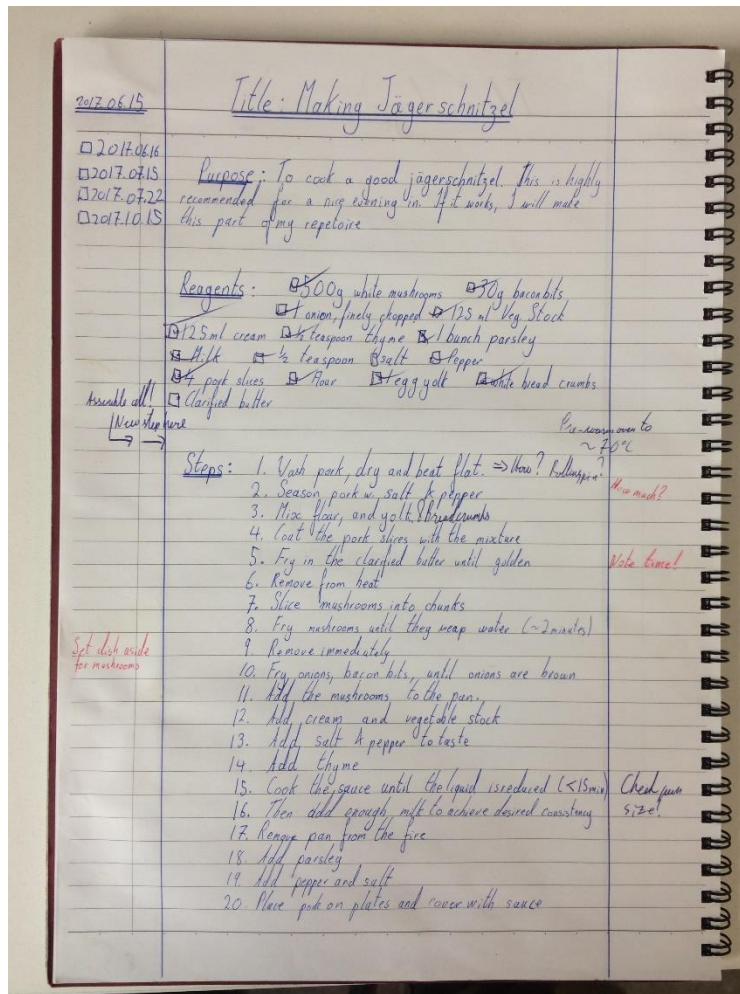


# Experimental Record example





# Proofread your experimental protocol

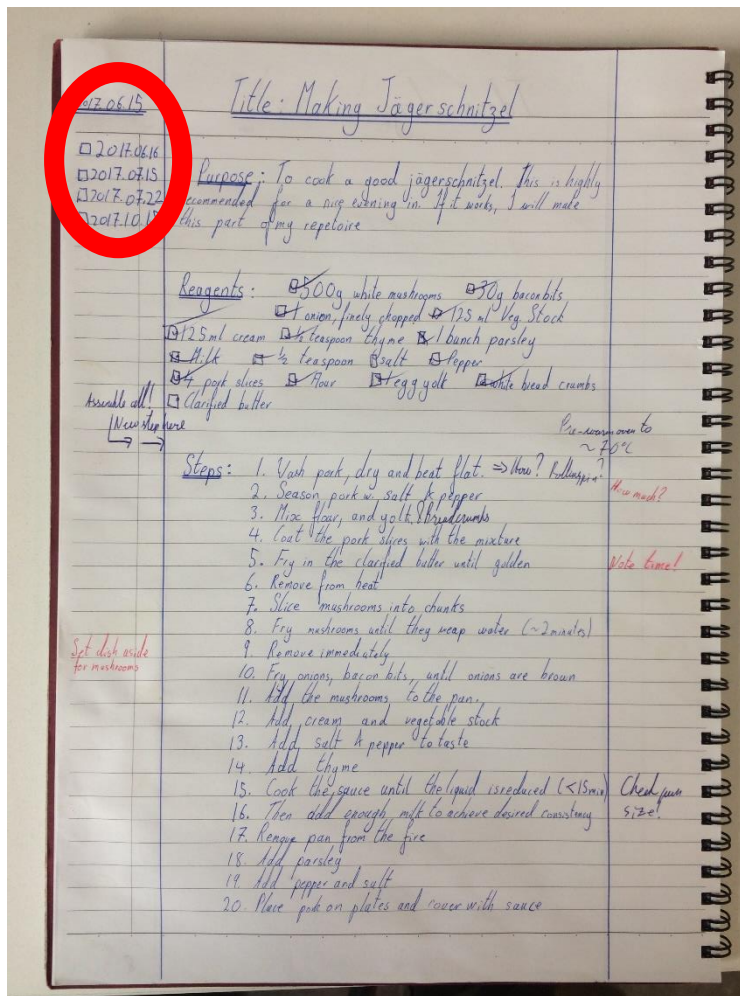


Read through your entire experiment beforehand to ensure you have everything you need and are familiar with the process. Make notes as necessary.



# Review, review, review!

Keep a note of  
your review dates



Go back over the sections  
you've done already. This  
will help you to cement  
what you've learned,  
which you can easily  
draw on when writing  
your paper.





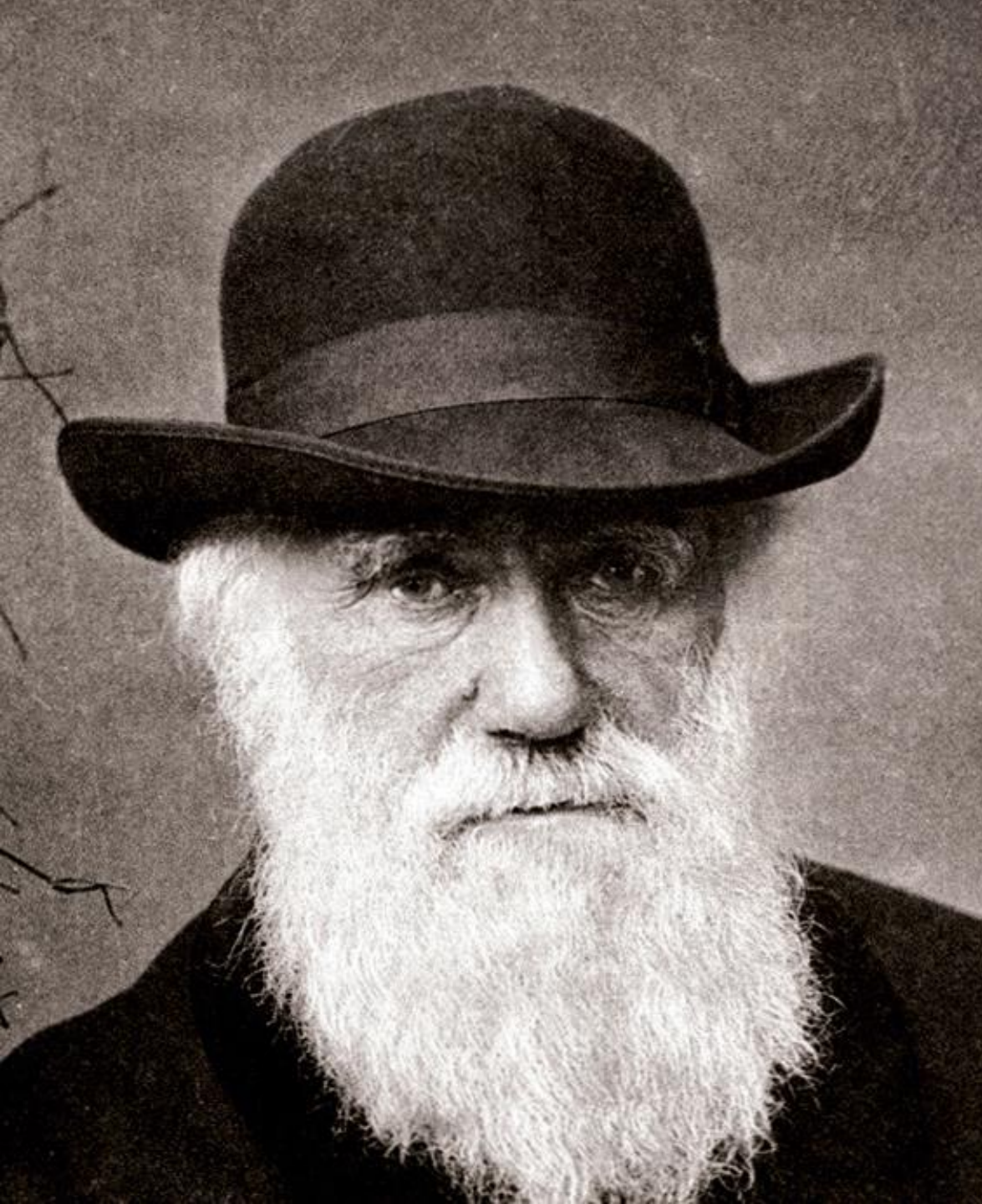
# Improved Gassman and Meyers process

- 60 hour work week
- 10 hours of reading journals
- Keep a first rate lab book



**Where you can get help from... anywhere!**





"If any man wants to gain a good opinion of his fellow men, he ought to do what I am doing: pester him with letters."

- *Charles Darwin*



# Getting the most from your help

1. Lead with a detailed email
2. Pay attention during the meeting
  - a) Mirror
  - b) Encourage
  - c) Summarise and ask
3. Summarise and follow up



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ENZYME MECHANISMS: FAST REACTION AND COMPUTATIONAL APPROACHES

## An end to 40 years of mistakes in DNA–protein association kinetics?

*Stephen E. Halford*

Biochemical Society Transactions

Apr 01, 2009,

37

(2)

343-348;

DOI: 10.1042/BST0370343

*This researcher discovered a mistake in a paper published 40 years ago.*



If it takes **1 hour** for you to **find and prevent** a mistake...

It'll take **1 month** for you to correct **after** making it...

And **1 year** if your boss finds it....

And **10+ years** if the scientific community finds it.



*Effective*  
beats  
*Efficient*





# Finally, from the **what** to the **how**...





## Finally, from the **what** to the **how**...

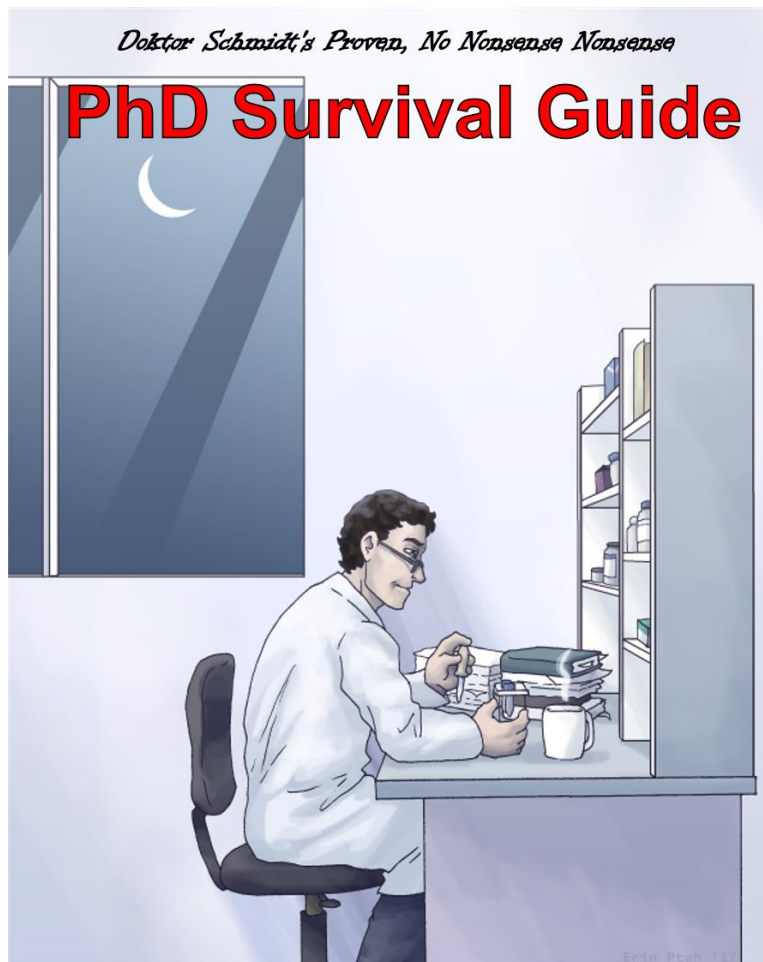
- Make bets

*(If you know you have trouble sticking to systems, give some money to friend to hold on to. You can only get it back if you follow your system for a certain length of time.)*

- Form a workgroup
- Start small
- Get your PI to check your lab book daily



## Further reading...



[www.nobsphd.com](http://www.nobsphd.com)



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