



How to Do Research That Actually Matters

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The Brutal Truth

97% of scientific papers are never cited.

Your paper will likely join them...

...UNLESS you tell a story people can't ignore.

How the pick a good scientific story?

Finding a scientific project that matter



❑ **Most projects are easy but unimportant!**
...Please don't waste your time

✓ **Ideal : Relatively easy and important!**
GO for this one!

✓ **Career project: Very important but difficult...**
May require new technology

✗ **Career killer: Unimportant and difficult**
Never ever do this science !

My story of developing the Nano ChIP-Seq technology

NATURE METHODS | VOL.7 NO.8 | AUGUST 2010

Genome-wide chromatin maps derived from limited numbers of hematopoietic progenitors

Mazhar Adli¹⁻³, Jiang Zhu¹⁻³ & Bradley E Bernstein¹⁻³

NATURE PROTOCOLS | VOL.6 NO.10 | 2011

PROTOCOL

Whole-genome chromatin profiling from limited numbers of cells using nano-ChIP-seq

Mazhar Adli¹⁻⁴ & Bradley E Bernstein¹⁻⁴

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Broad Team Tailors ChIP-seq Method for Low Cell Numbers, Limited DNA Volumes

October 11, 2011

Broad Team Tailors ChIP-seq Method for Low Cell Numbers, Limited DNA Volumes

How do we know what is important?

Three rules:

1. Read primary research articles in high impact journals!
2. Read primary research articles in high impact journals!
3. Read primary research articles in high impact journals!

You found an important question, how do you know how to study it?

Find the right master to learn from



You have train with the right “master”
to learn “how” to do the science!



Albert Baldwin
PhD Advisor



Bradley Bernstein
Postdoc Advisor



Eric Lander
President of the Broad



HARVARD
MEDICAL SCHOOL



BROAD
INSTITUTE

PhD Committee Members



Albert Baldwin



Aziz Sancar

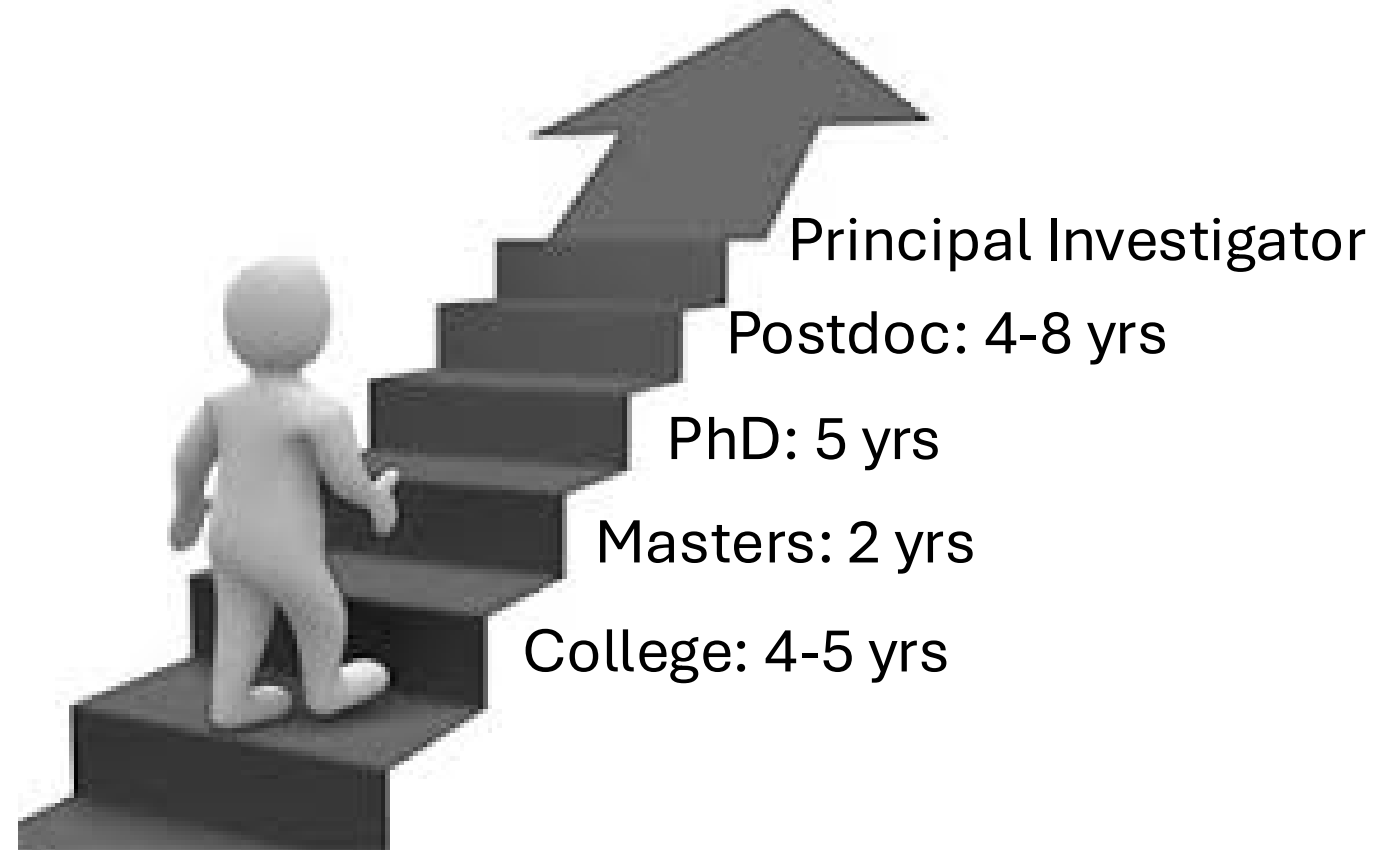


Brian Strahl

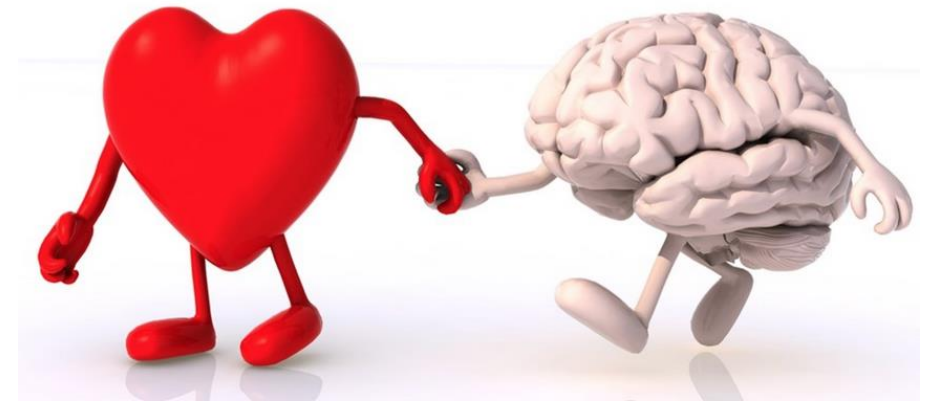


Academic life is a long journey!

You have to be patient, respect the process!



Your heart and mind needs to be there

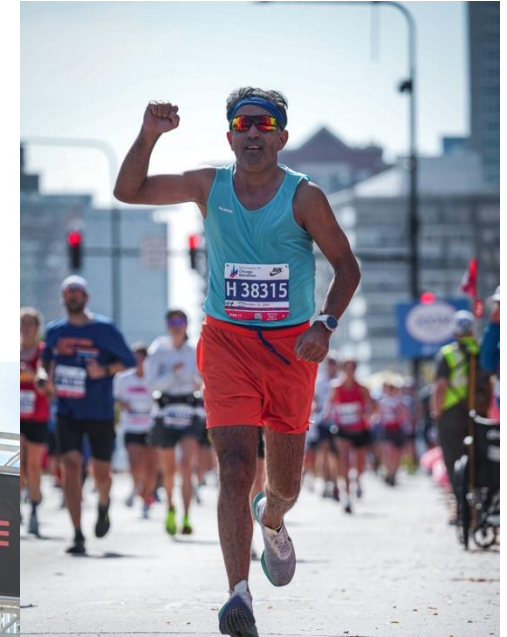


Academic journey is a marathon not a sprint run

Marathon requires patience, grit and endurance

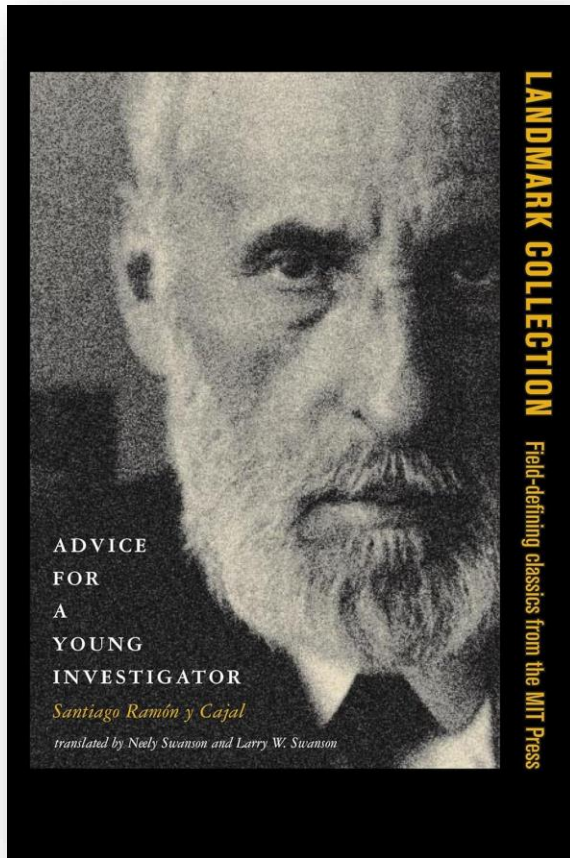
- Most people have sufficient enthusiasm.....
- Most people have sufficient intellect....
- But few have the persistence and grit!

You just have to wake up and run....
You just have to do that experiment!



Advice for a Young Investigator

by Santiago Ramón y Cajal



- Written in 1897 by a Nobel laureate.
- Still the most honest and inspiring guide to doing great science.
- Timeless wisdom that actually matters.

The Four Types of Scientists according to Cajal



1. The Contemplators

Read everything, know everything, discover nothing
"Bibliographers who never open a laboratory"



2. The Megalomaniacs

Chase impossible problems to look important
Fail spectacularly, blame bad luck



3. The Instrument Addicts

Obsessed with new techniques, no real questions



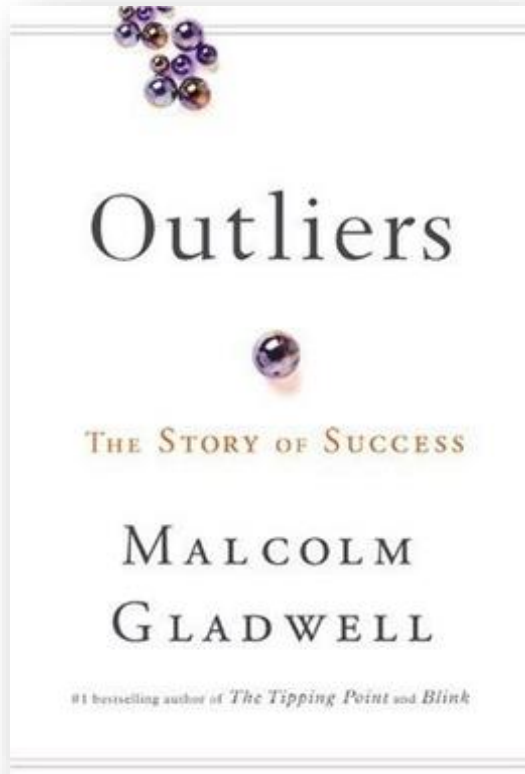
4. The Persistent Workers ★

Choose tractable problems, Work systematically, ignore criticism
Be this person.

“Talent and intellect is overrated... Persistence is everything”

“Genius is one percent inspiration and ninety-nine percent perspiration”

Thomas Edison



Psychologist Anders Ericsson's study

Music Academy of Berlin



10,000 hours rule



→ WHY?

Answer: Practice time

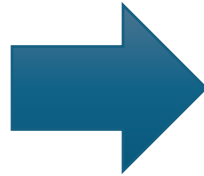
“10,000 hours rule”

High IQ is not a guarantee of a success in life



Longitudinal genetic studies of genius

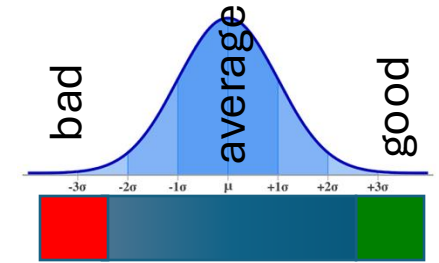
75,000
students



~1500
IQ (>130)



Followed for
30-50 yrs



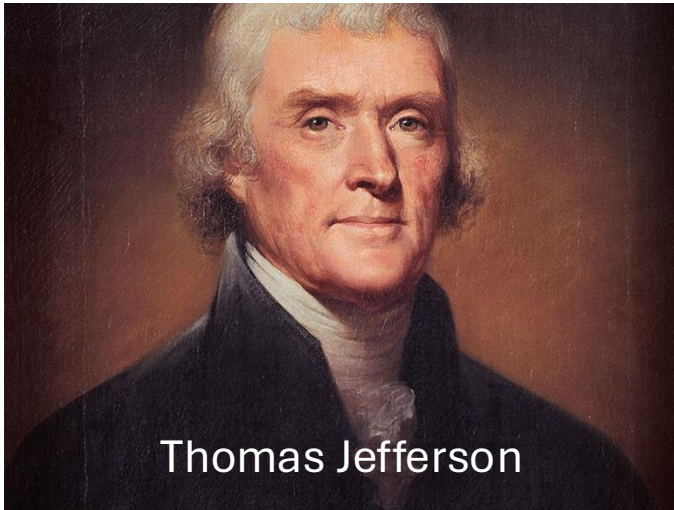
Their success in life

"It's not that I'm so smart, it's just that I stay with problems longer."

Albert Einstein

“They say I am lucky, I do believe in luck, but the harder I work, the luckier I get”

Thomas Jefferson



Founding father
Writer of the declaration of Independence
3rd President of USA

Founder and 1st president of
University of Virginia



How to be a productive scientist?

..and overcome with depressive negative results



“Doing science is like fishing....”

One bait may or may not get you a fish...

But 5-10 baits will most likely get you a fish

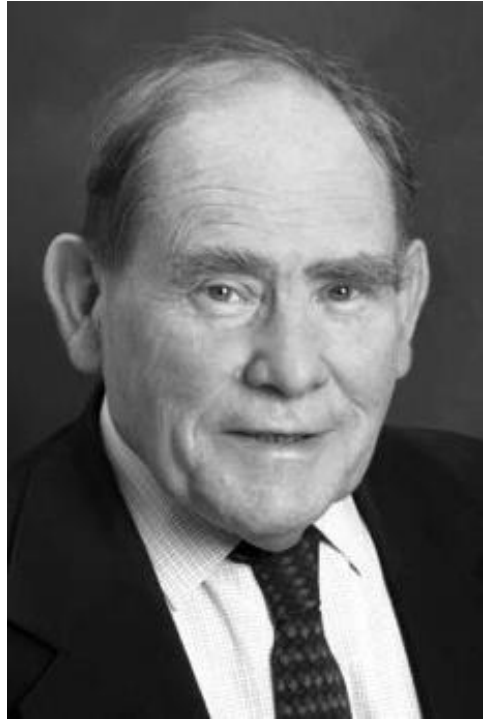
Cure for depressive moments:

Read **cool** primary research articles in high impact journals!

Don't be afraid to try “new” things

- ❑ Stop doing the same thing!
- ❑ “Don't do incremental science”!
- ❑ Ask yourself “What is the **next big experiments** I need to do?”
 - ✓ Learn and employ new technologies.
 - ✓ Create your own unique model system and assay that distinguishes you from the rest.





Sydney Brenner
1927-1919

***“The progress in science depends on
new techniques,
new discoveries &
new ideas,
probably in that order!”***

- Pioneered the discovery of mRNA
- Significantly contributed to the genetic code
- Established *C. Elegans* as a model system
- Pioneered the molecular biology of organ development and apoptosis
- Nobel Prize in 2002

Be kind !, be nice !



- ☐ You will fail or feel like failing along the journey!
- ☐ You will need friends to pick you up and support you.
- ☐ Or promote and advocate for you when you are not there...
- ☐ ...you have no idea when you will need it...

Surround yourself with smart and “good” people



If you are the smartest person in the room,
then you are in the wrong room.

- Confucius

How to write a good story?

Every Great Paper is a Detective Story

 **The Mystery:** Something doesn't make sense

 **The Obstacle:** Why no one solved it

 **The Experiment:** Your clever approach

 **The Twist:** What you discovered

 **The Impact:** Why everything changes

Your First Paragraph IS Your Whole Paper

If you can't explain your story in 5 sentences, you don't have a story.

Sentence 1: Here's a big unsolved problem

Sentence 2: Here's what's missing

Sentence 3: Here's what we did

Sentence 4: Here's what we found (the surprise!)

Sentence 5: Here's why you should care

How to Murder Your Story

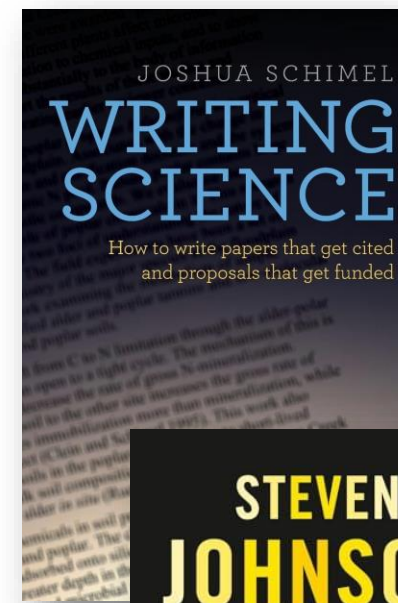
- ✗ "We optimized conditions..." (who cares?)
- ✗ "Figure 5 shows an interesting finding..." (buried the lead)
- ✗ "This protein does... something" (no clear message)
- ✗ Starting with methods (I'm already asleep)
- ✗ Missing the "SO WHAT?" (why am I reading this?)

Nobody cares what you did.... But WHY you did it?

Book recommendations

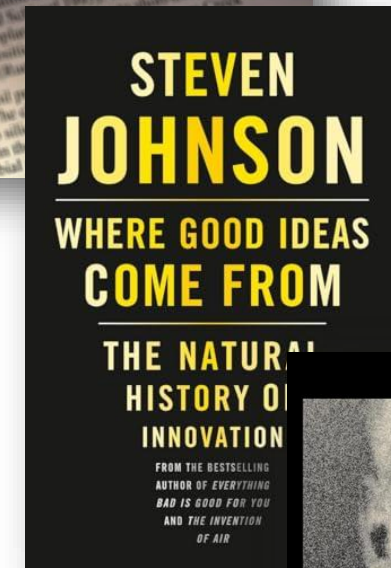
1. "Writing Science" — Joshua Schimel

Treats scientific papers as stories, not data dumps. This book will transform how you write every abstract, paper, and grant.



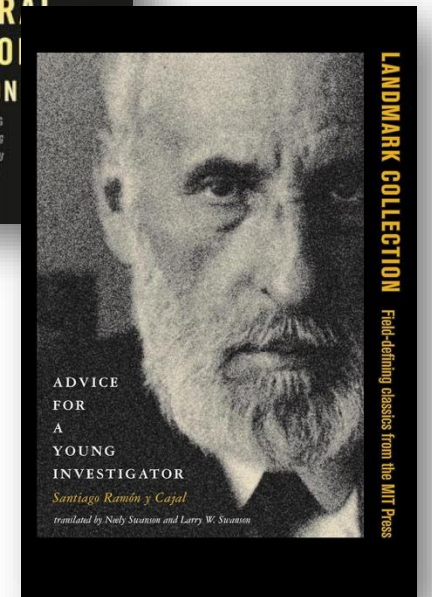
2. "Where Good Ideas Come From" — Steven Johnson

Reveals the patterns behind innovation: adjacent possible, liquid networks, slow hunches. You'll never think about breakthroughs the same way.



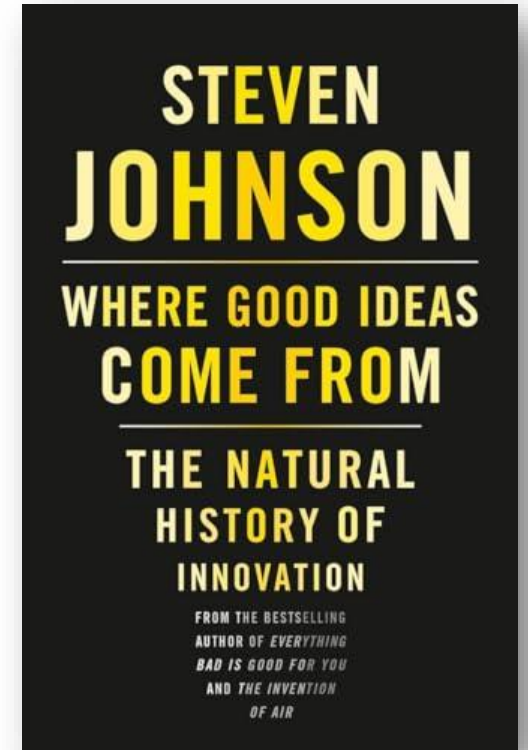
3. "Advice for a Young Investigator" — Santiago Ramón y Cajal

Written in 1897 by a Nobel laureate, still the most honest and inspiring guide to doing great science. Timeless wisdom that actually matters.



WHERE GOOD IDEAS COME FROM

- ✓ **The Adjacent Possible** - Ideas build on what's already available; innovation happens at the edge of what's currently possible
- ✓ **Liquid Networks** - The best ideas emerge from environments where different perspectives and information can collide and connect
- ✓ **The Slow Hunch** - Most breakthroughs don't come as sudden "aha!" moments but develop gradually over time
- ✓ **Serendipity** - Accidental discoveries and unexpected connections drive innovation
- ✓ **Error** - Mistakes and failures often lead to important discoveries
- ✓ **Exaptation** - Ideas developed for one purpose often find unexpected new uses
- ✓ **Platforms** - Building blocks that enable others to create new innovations



Thank you