



LECTURE 2

ACADEMIC SCIENCE + LAB CULTURE

A sunset over the ocean with a ship on the horizon. The sky is filled with vibrant orange and red clouds, and the water reflects the colors. A small ship is visible on the horizon line. The text is overlaid on the image within a dashed white border.

NOTE TO PRIYA:

RECORD
LECTURE



LECTURE 2

ACADEMIC SCIENCE + LAB CULTURE

RULES OF ENGAGEMENT

Be Open & Encouraging

Communicate Effectively & Respectfully

Contribute / Participate In Group Conversations

Step Up / Step Back: Give people
time/space to answer



MAKE A PLAN TO VOTE

<https://makeaplantovote.com/>




Undergraduate Research Week

Save the date:

**OCTOBER
12-16, 2020**

<https://urc.ucdavis.edu/URWeek-Schedule>

MENTORSHIP PROGRAM

An aerial photograph of a beach with golden sand and turquoise ocean waves crashing onto the shore. The image is framed by a white border.

Would you like the support of a
peer or graduate student
mentor?

<https://airtable.com/shrVKInxWoa0E8dwp>

Demystifying Undergraduate Research Experiences

[Home](#) > [Blog](#) > [Demystifying Undergraduate Research Experiences](#)



October 02, 2020

by MCS Lead Mentor Priya Shukla

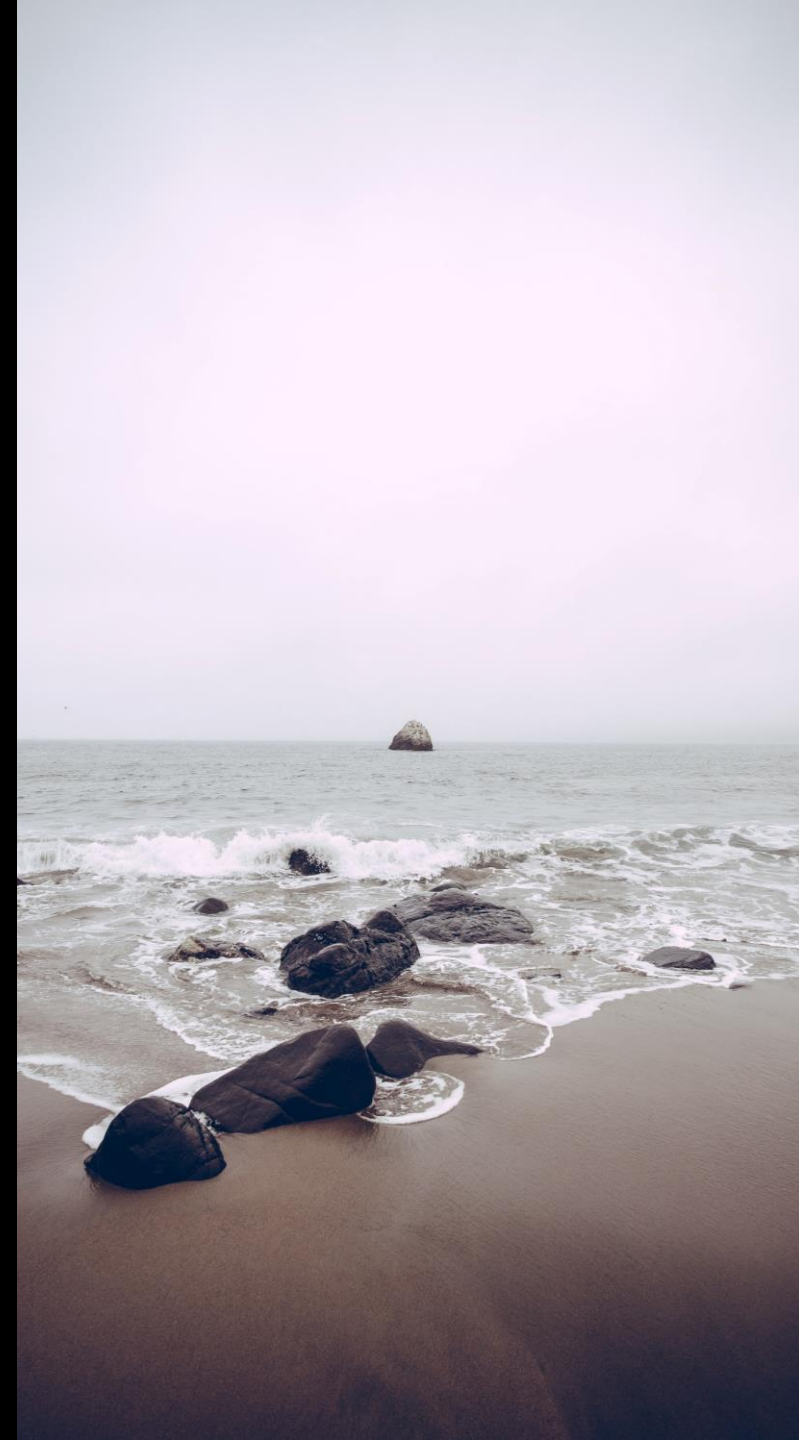
<https://marinescience.ucdavis.edu/blog/demystifying-undergraduate-research-experiences>

BML SEMINAR SERIES

Wednesdays, 1-2pm PT

Opportunity to learn about
cutting-edge research

<https://marinescience.ucdavis.edu/events>



ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...



Share a ~~fun~~ **boring** fact about yourself

Share something you're hoping to get out of this class

ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...



SHARE SOMEONE ELSE'S ~~FUN~~
BORING FACT

SHARE SOMETHING SOMEONE ELSE
IS HOPING TO GET OUT OF THIS
CLASS

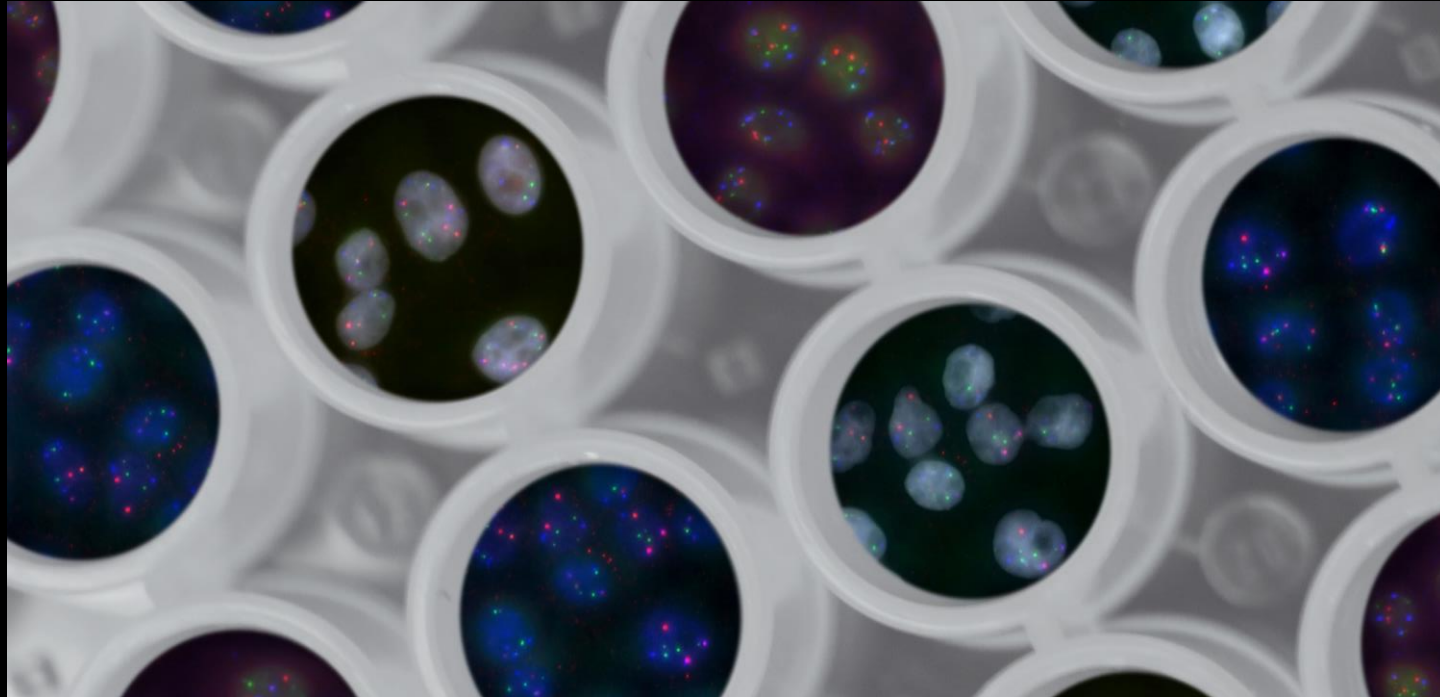
ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...



***In the future, these “ice breakers”
will be used to share the resource
you found to better your
understanding of that week’s topic!***

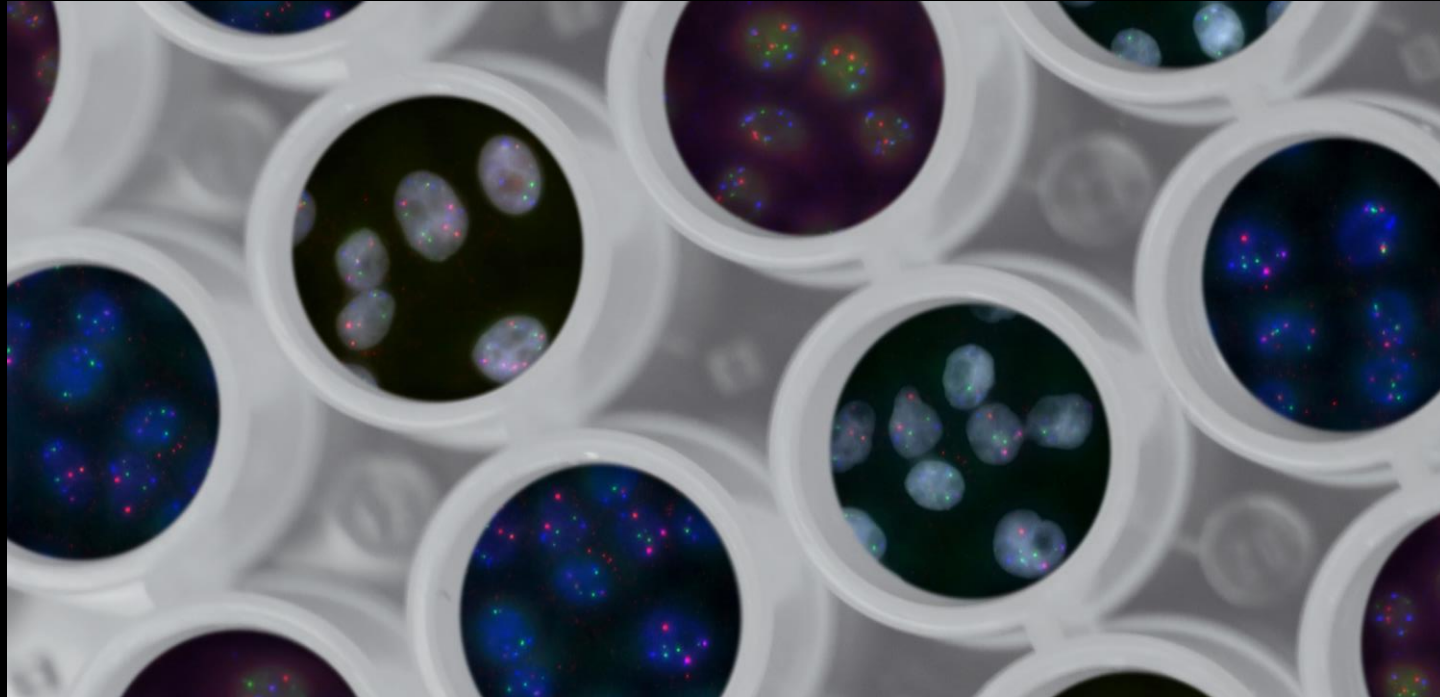
ACADEMIC SCIENCE & LAB CULTURE



WARM-UP IN GOOGLE JAMBOARD!

https://jamboard.google.com/d/1b719lhST642KeNzR0AcRism51yq9os7gdVaL_AkuYUCc/edit?usp=sharing

ACADEMIC SCIENCE & LAB CULTURE



ACADEMIC SCIENCE & LAB CULTURE



ABOUT PRIYA



Effects of an eelgrass bed (*Zostera marina*) on seawater pH and alkalinity



ABOUT PRIYA



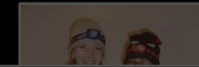
Bodega Ocean Acidification
Research Technician

Bodega Ocean Acidification Research (BOAR)

ACADEMIC SCIENCE & LAB CULTURE



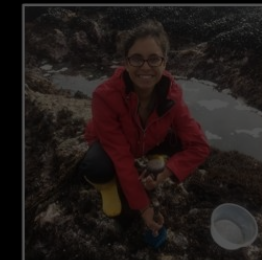
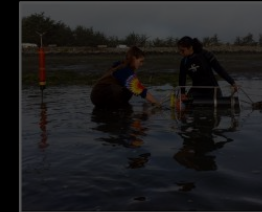
ABOUT PRIYA



Effects of an eelgrass bed (*Zostera marina*) on seawater pH and alkalinity



ABOUT PRIYA



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Research Technician

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HISTORY OF ACADEMIC SCIENCE

HISTORY OF ACADEMIC SCIENCE

JEDI MIND TRICKS



Justice

JEDI MIND TRICKS

Equity

Diversity

Inclusion

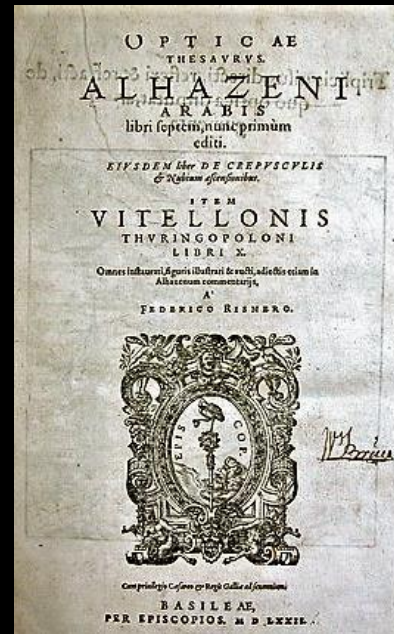




HISTORY OF ACADEMIC SCIENCE



Polynesian
Navigation



Middle Eastern
Experiments



Mesopotamian
Engineering



HISTORY OF ACADEMIC SCIENCE



Musaeum of Alexandria
367 – 283 BC



Nanjing University
258 - Present



Takshashila
Destroyed in the 400s

HISTORY OF ACADEMIC SCIENCE



Historic road to “Akademy”

The term **academy** originates from Plato’s “Akademy”, a school of philosophy north of Athens, Greece founded in ~ 385 BC.

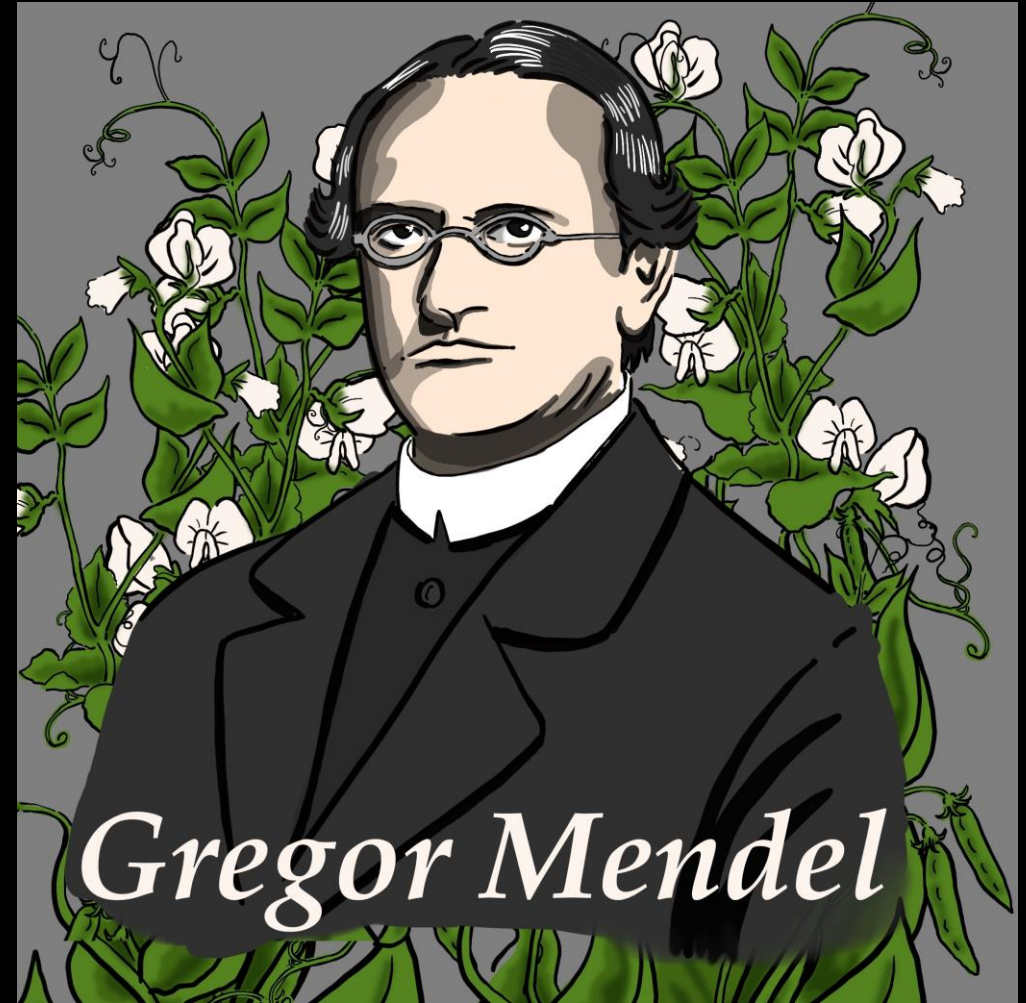
Academia today encompasses the idea of **accumulating and transmitting knowledge as well as practitioners of these activities**

HISTORY OF ACADEMIC SCIENCE

Many monks and priests established the very first schools of advanced study.

Attendees could receive an education without paying for it!

It's why Gregor (Johann) Mendel joined an Augustinian monastery & entered the Dept of Natural History & Agriculture.



Father of modern genetics

HISTORY OF ACADEMIC SCIENCE

Military academies were also important institutions of higher learning, where advancements in engineering and exercise physiology were made.



École militaire, Paris, France
Founded by King Louis XV in 1750

HISTORY OF ACADEMIC SCIENCE

The first European Academy of Science was the Italian “Accademia dei Lincei”, established in 1603.

Other academies – funded by the aristocracy – were established across Europe until ~1800.



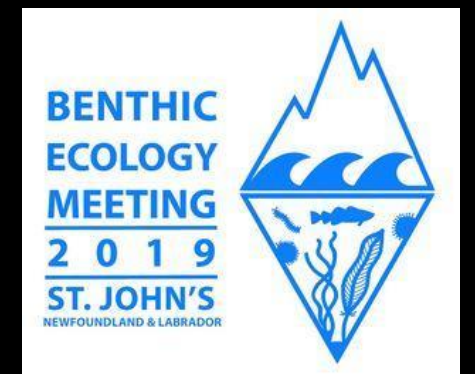
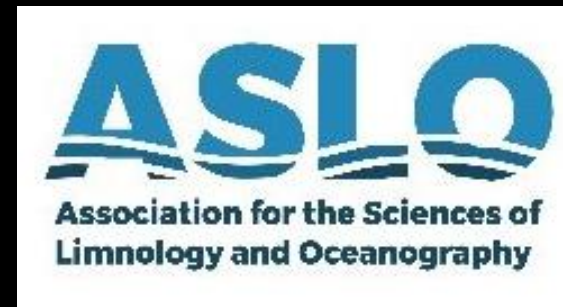
Accademia dei Lincei
Rome, Italy

HISTORY OF ACADEMIC SCIENCE

“Academies” were/are different than **Academic Societies**, which were members-only groups of researchers who studied the same subjects and would present their work to one another.



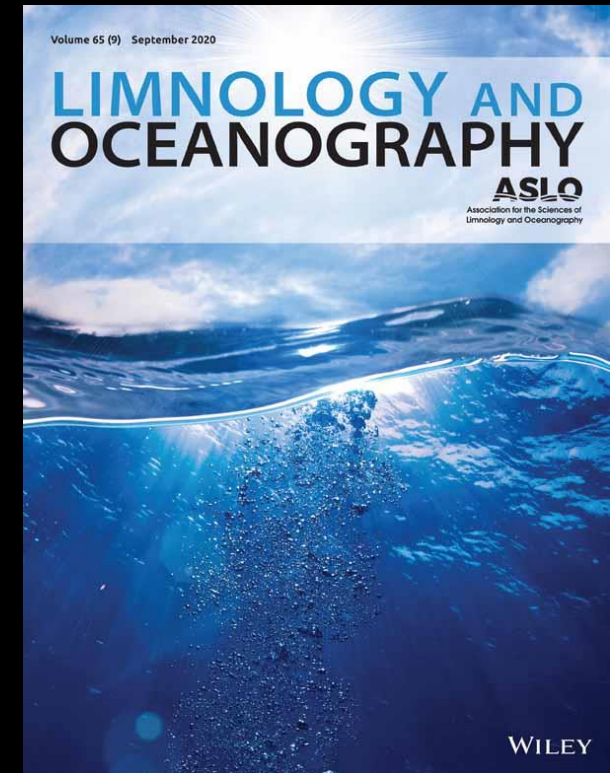
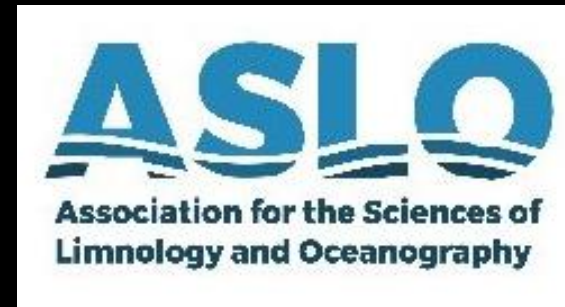
Royal Society, London



HISTORY OF ACADEMIC SCIENCE

“Academies” were/are different than **Academic Societies**, which were members-only groups of researchers who studied the same subjects and would present their work to one another.

Many societies also publish (niche) journals with novel, peer-reviewed research.

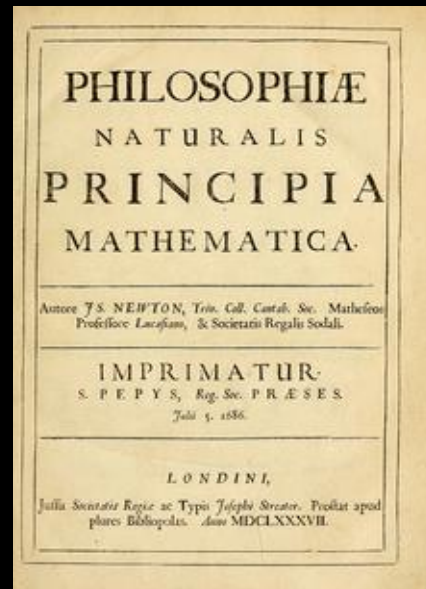


HISTORY OF ACADEMIC SCIENCE

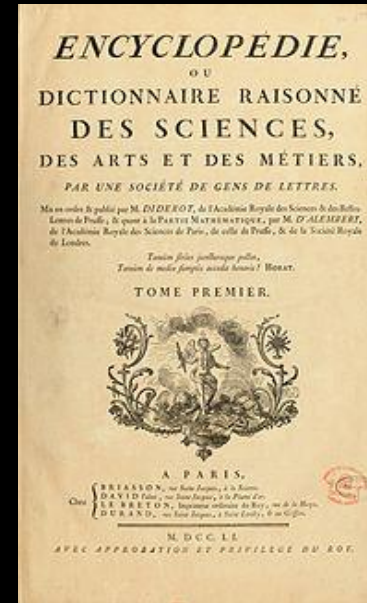
Publication has been and continues to be the main way that scientists disseminate information.



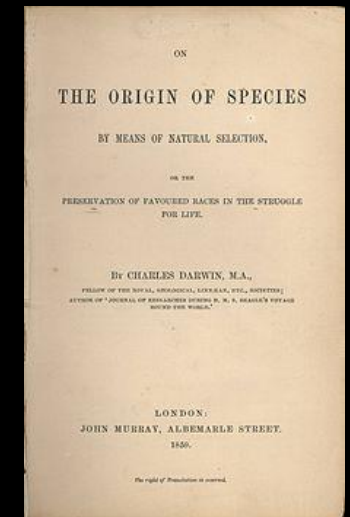
Copernicus' *On the Revolutions of the Heavenly Spheres* (1543)



Newton's *Principia* (1687)

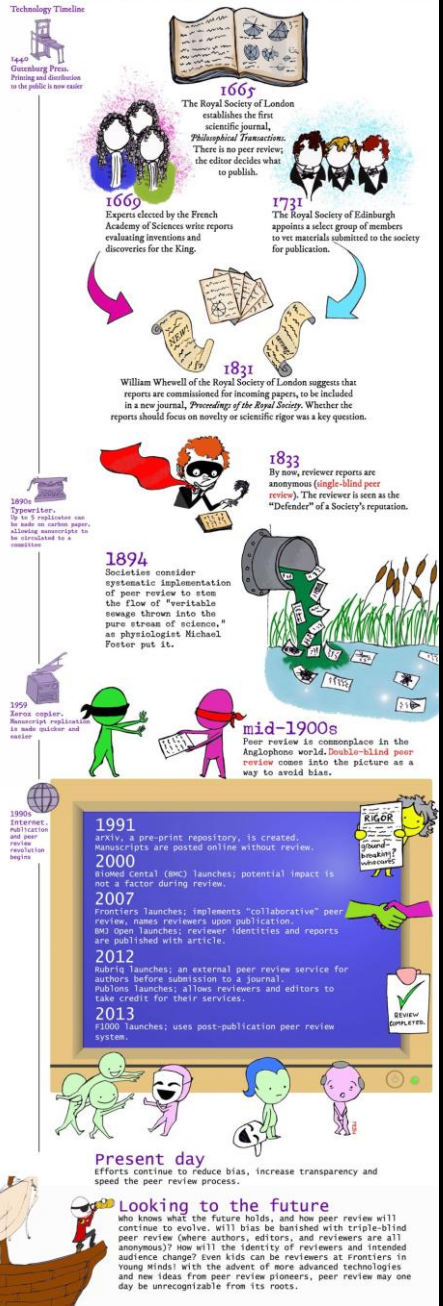


Diderot's *Encyclopédie* (1751)



Darwin's *On the Origin of Species* (1859)

A Succinct History of Academic Peer Review



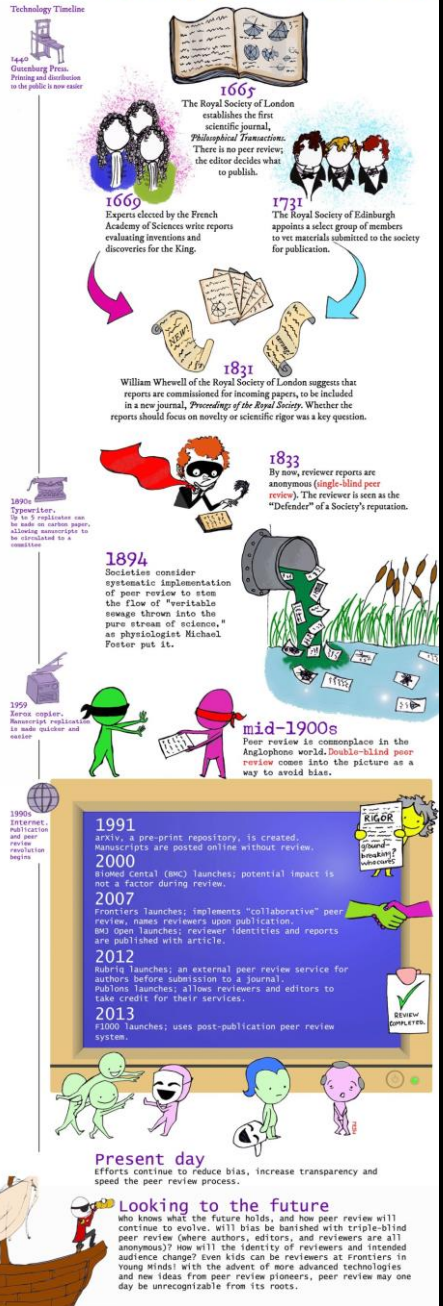
Frontiers Open Science & Peer Review

HISTORY OF ACADEMIC SCIENCE

Peer Review

1665: The editor of the Royal Society of London's scientific journal chooses what to publish.

A Succinct History of Academic Peer Review



Frontiers Open Science & Peer Review

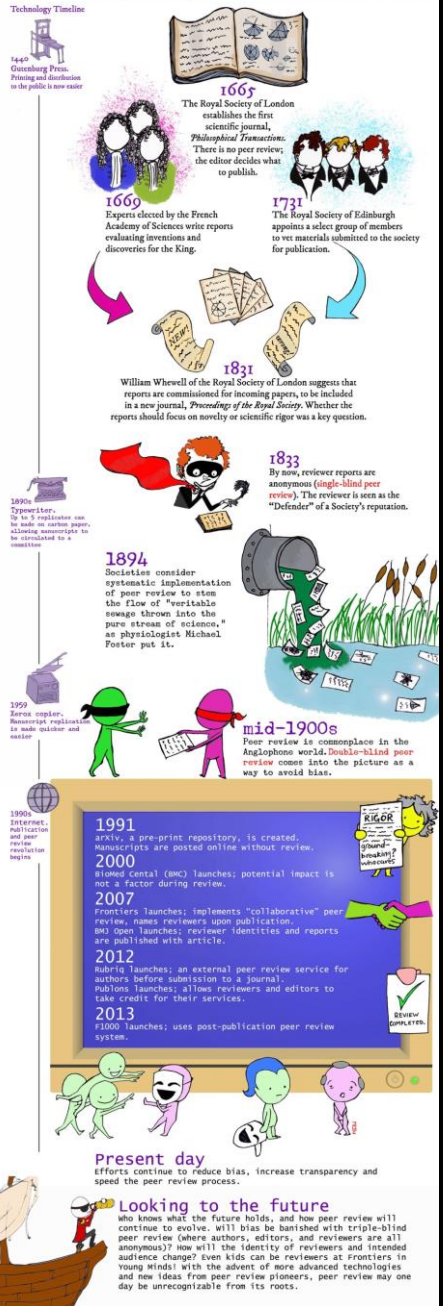
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A Succinct History of Academic Peer Review



Frontiers Open Science & Peer Review

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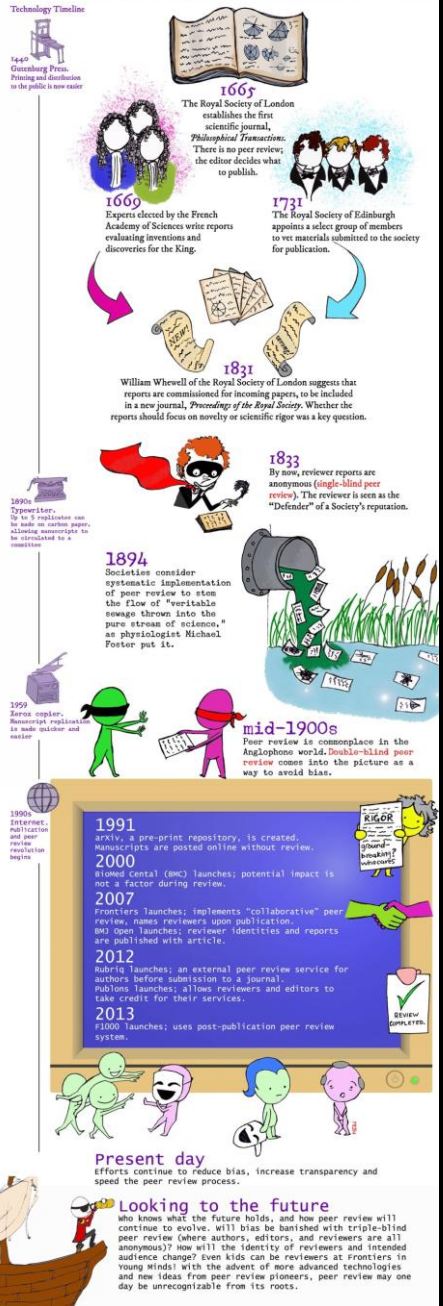
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1894: Peer Review becomes a systemic part of the scientific process to reduce the "sewage thrown into ... science"

A Succinct History of Academic Peer Review



Frontiers Open Science & Peer Review

HISTORY OF ACADEMIC SCIENCE

Peer Review

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1894: Peer Review becomes a systemic part of the scientific process to reduce the "sewage thrown into ... science"

Today: Still a work in progress – many efforts to reduce bias, improve transparency & speed up the process!

HISTORY OF ACADEMIC SCIENCE

The first European Academy of Science was the Italian “Accademia dei Lincei”, established in 1603.

Other academies – funded by the aristocracy – were established across Europe until ~1800.

In the 1800s, universities were tasked with performing experimental research, shuttering many academies.

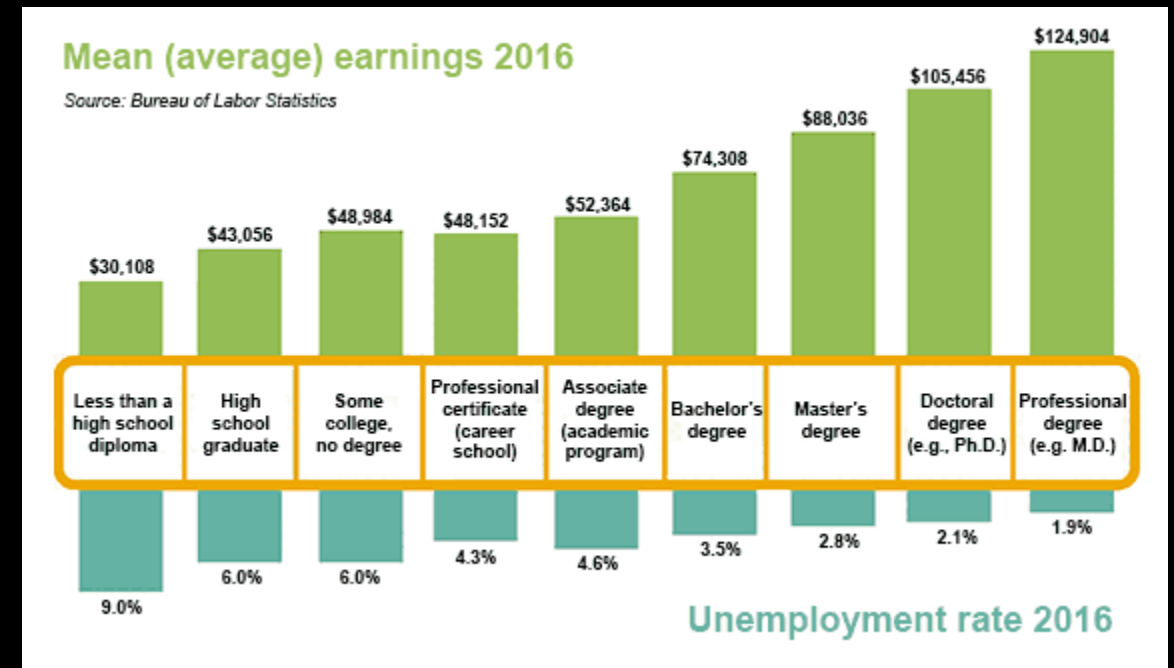


Accademia dei Lincei
Rome, Italy

HISTORY OF ACADEMIC SCIENCE

The granting of Bachelor's, Master's, and Doctorate degrees dates back to medieval Europe.

“Doctor” became the highest possible degree awarded for those in Law & Medicine in the 1300s.



ACADEMIC SCIENCE TODAY

Universities roughly fall into two categories:

RESEARCH INSTITUTIONS



PRIMARILY TEACHING INSTITUTIONS



ACADEMIC SCIENCE TODAY

Universities roughly fall into two categories:

RESEARCH INSTITUTIONS

Institutions that grant PhDs



Tiers of research* :



** established by the Carnegie Classification of Institutions of Higher Education*

WHAT TIER DO YOU
THINK UC DAVIS IS?

WHAT TIER DO YOU THINK UC DAVIS IS?



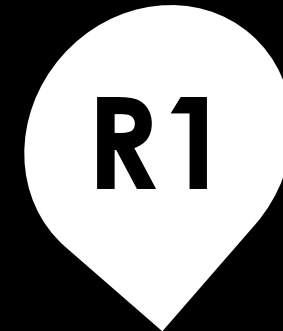
**THIS SLIDE
INTENTIONALLY LEFT
BLANK**

WHAT TIER DO YOU THINK UC DAVIS IS?



102 UNDERGRADUATE MAJORS

101 GRADUATE PROGRAMS



“Highest
Research
Activity”

ACADEMIC SCIENCE & LAB CULTURE



ABOUT PRIYA



Effects of an eelgrass bed (*Zostera marina*) on seawater pH and alkalinity



ABOUT PRIYA



Bodega Ocean Acidification
Research Technician

Bodega Ocean Acidification Research (BOAR)

7-MINUTE BREAK

ACADEMIC SCIENCE & LAB CULTURE



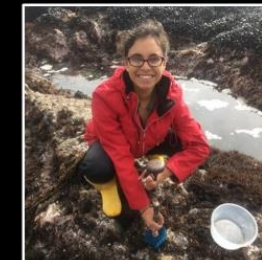
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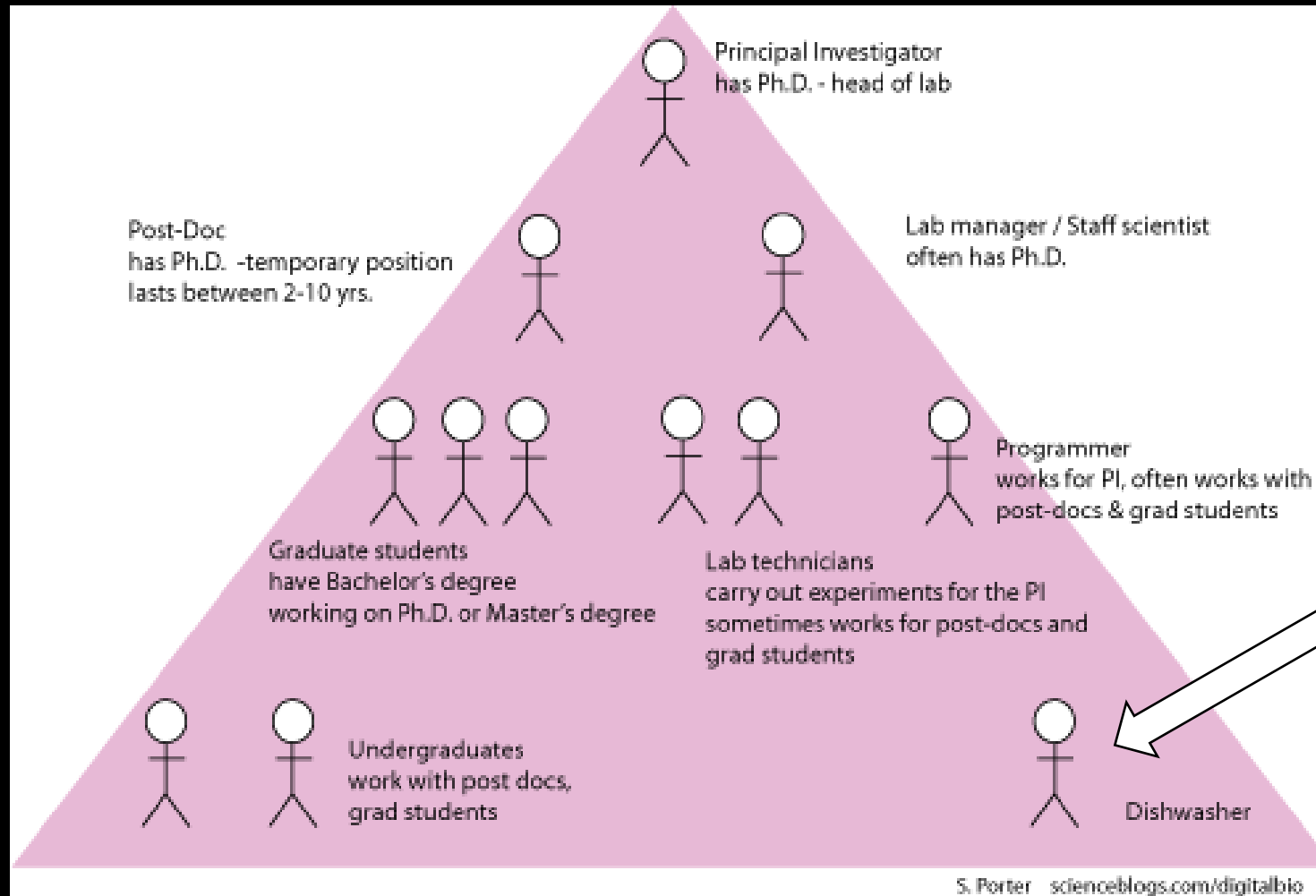
ABOUT PRIYA



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Research Technician

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KEY PLAYERS IN A LAB



Everybody washes dishes, but this is a cynical joke. "Dishwasher" is not a real position!

WHAT DRIVES THE
RESEARCH IN A LAB?

WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS



Brian
Gaylord



WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS



Brian
Gaylord



Evolutionary change during experimental ocean acidification MH Pespeni, E Sanford, B Gaylord, TM Hill, JD Hoffelt, HK Jaris, ... Proceedings of the National Academy of Sciences 110 (17), 6937-6942	284	2013
Mechanical control of ocean acidification B Gaylord, CA Blum, ... Ecological monographs 64 (1), 1-15	OCEAN ACIDIFICATION	1994
Functional impacts of ocean acidification in an ecologically critical foundation species B Gaylord, TM Hill, E Sanford, EA Lenz, LA Jacobs, KN Sato, AD Russell, ... Journal of Experimental Biology 214 (15), 2586-2594	230	2011
Ocean acidification through the lens of ecological theory B Gaylord, KJ Kroeker, JM Sunday, KM Anderson, JP Barry, NE Brown, ... Ecology 96 (1), 3-15	228	2015
Persistent carry-over effects of planktonic exposure to ocean acidification in the Olympia oyster A Hettinger, E Sanford, TM Hill, AD Russell, KNS Sato, J Hoey, M Forsch, ... Ecology 93 (12), 2758-2768	192	2012

WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS



Brian
Gaylord

Modulation of wave forces on kelp canopies by alongshore currents

*Brian Gaylord*¹

Marine Science Institute, University of California, Santa Barbara, California 93106

FUNDING

Kelp Recovery Research Program: Request for Proposals



- A multi-pronged approach to kelp recovery along California's north coast

Brian Gaylord, Marissa Baskett, Aurora Ricart (UC Davis), Matt Edwards (San Diego State University), Mackenzie Zippay, Brent Hughes, Sean Place (Sonoma State University), Jason Hodin (University of Washington)

WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS



FUNDING



WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS

FUNDING



WHO FUNDS RESEARCH?

FEDERAL



Ocean Sciences (OCE) Active Awards

All Awards > California > University of California-Davis

University of California-Davis

Click on an award number in the table to view the award details.

Award Number	Award Title	Award Amount
1409815	Collaborative research on the evolution of performance and	\$703,262
1636191	Trophic interactions between green prey	\$307,642
1629978	Coastal upwelling and its impact on marine	\$216,456
1629992	Coastal upwelling and its impact on marine	\$231,246
1632812	Coastal upwelling and its impact on marine	\$196,205
1640542	Coastal upwelling and its impact on marine	\$309,120
1651462	Coastal upwelling and its impact on marine	\$419,628
1648962	Linking Surface Deflection and Subduction Zone through 3D	\$241,686
2023287	Evolutionary and ecological dynamics of a temporary climate-driven range expansion	\$943,994
2023664	Collaborative Research: The effects of marine heatwaves on reproduction, larval transport and recruitment in sea urchin metapopulations	\$254,937

Basic & applied research depending on agency

STATE



Applied research for regional management needs

PHILANTHROPIC



Widely varying, but topic-dependent

PRIVATE



Depends on organization's needs/goals

WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS

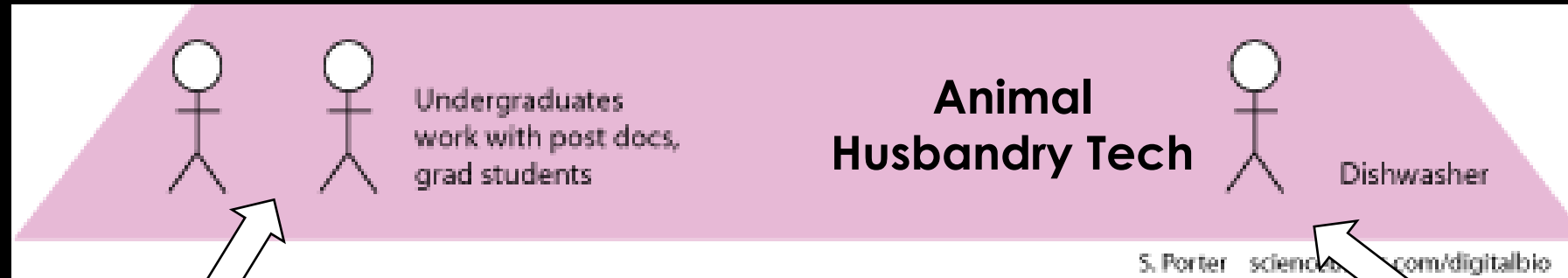
FUNDING



*But you don't
generally start off with
an immersive
research experience*

...

STARTING OUT IN A LAB



You will be given tasks that are directly related to the research!

OVER TIME ...

You might, in fact, start here (or doing some other mundane task).

Not because you & your skills are not valued, but because **it takes time to build trust.**

STARTING OUT IN A LAB

You may be intimidated,
and that's okay!

No matter what you're
doing, always try to
remember how it connects
to the research project.

Listen to the work
happening around you so
that you can figure out the
lab dynamic.

Start keeping a lab notebook –
even if it's just to record how
you're spending your time at first.

Be a team player (offer to
help when you reasonably
can).

Ask questions!

**Start reading relevant
scientific papers (ask your
mentor what these are).**

STARTING OUT IN A LAB

Why am I working with grad students & post-docs if it's the Principal Investigator's lab?



DOING RESEARCH

... can be exciting & intimidating too!

Undergrad:
Jackie

ME!



DATA ENTRY /
DATA ANALYSIS



LAB WORK



FIELD WORK

DOING RESEARCH

... can be exciting & intimidating too!



DATA ENTRY /
DATA ANALYSIS



LAB WORK



FIELD WORK

DATA ENTRY / DATA ANALYSIS

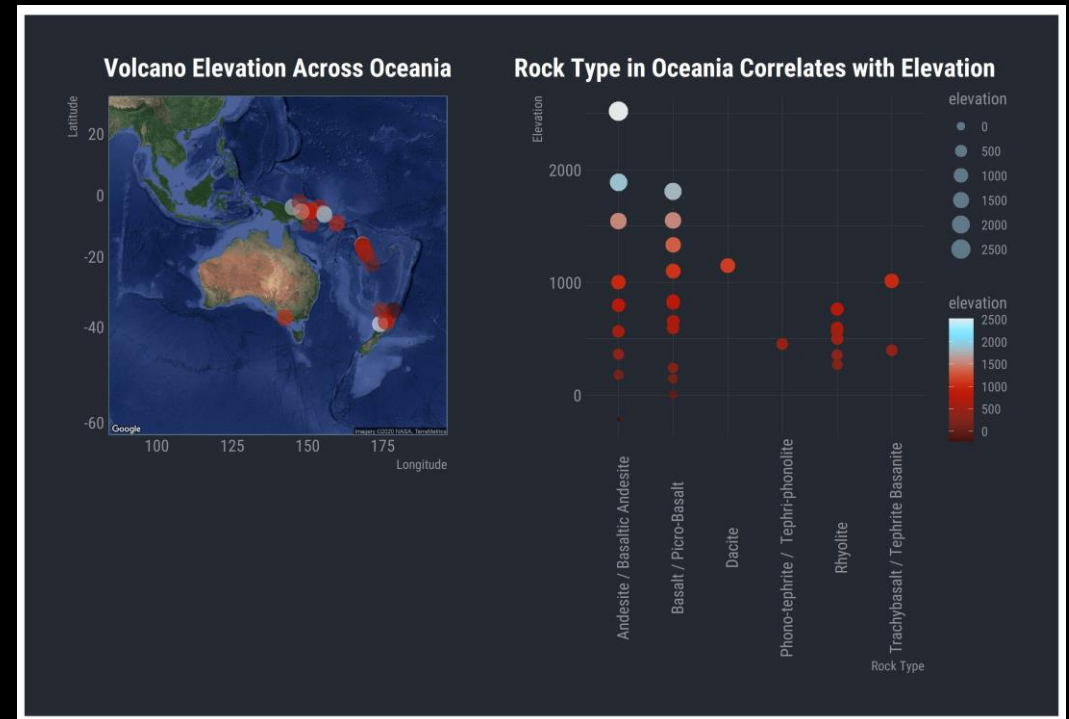
For some, this can seem like it's still pretty mundane ...

... but you are handling the raw materials of your research mentor's science!

This is a great opportunity to learn quantitative skills (coding, data visualization, statistics!)

So, be careful & double-check your work!

IT'S OKAY IF YOU MAKE MISTAKES!
Science is full of failure.



DOING RESEARCH

... can be exciting & intimidating too!



DATA ENTRY /
DATA ANALYSIS



LAB WORK



FIELD WORK

LAB WORK

This is the kind of work that takes patience and practice ...

... so be prepared to do several trial runs before you work with real samples!



These are marketable skills that can help you get a job / into grad school!

What's most important is YOUR SAFETY, then DATA QUALITY.

IT'S OKAY IF YOU MAKE MISTAKES!
Science is full of failure.

DOING RESEARCH

... can be exciting & intimidating too!



DATA ENTRY /
DATA ANALYSIS



LAB WORK



FIELD WORK

FIELD WORK

This is the kind of work that gets you out into the ocean (yay!) ...

... but it can seem scary and/or physically taxing!

Trust your gut – if you don't feel comfortable doing it, don't.

But also keep an open mind – fieldwork is very fun and builds skills in a different way.

Overall, **YOUR SAFETY IS MOST IMPORTANT.**



ONE LAST NOTE ON (DIS)COMFORT

You should feel comfortable going to the PI or grad student to let them know if something makes them feel uncomfortable!

Your mentor's goal is to help develop your passion.

Lab's are busy places with lots of backlog – there's always something else for you to help with!

DOING RESEARCH

... can be exciting & intimidating too!



DATA ENTRY /
DATA ANALYSIS



LAB WORK



FIELD WORK

DOING RESEARCH

If you end up being significantly involved in a project,
or even starting a project of your own ...

... ask about presenting that
research at a conference
as a talk or poster!

And, don't be afraid to ask
if the lab can help support
your attendance at the
conference!



RESEARCH IS COMMUNAL

Once you join a lab ...

... you will likely be invited to do more than just the tasks you have been assigned.

LAB MEETINGS: Where papers & ongoing research are discussed

Helping with experiments that have multiple components

Helping with a lab member's fieldwork

Attending research seminars

COLLABORATION IN SCIENCE



Brian Gaylord



Eric Sanford



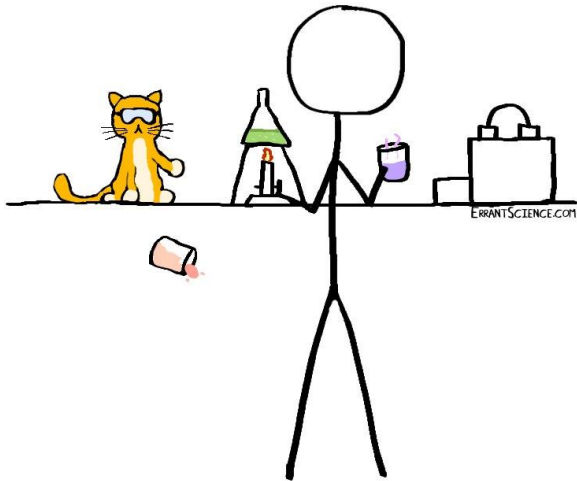
Tessa Hill

Bodega Ocean Acidification Research (BOAR)

COLLABORATION IN SCIENCE

**Science is the name but
collaboration is the game**

CATS GREAT PETS
TERRIBLE LAB PARTNERS



Partnership for Interdisciplinary Studies of Coastal Oceans



WHAT IF YOU DON'T LIKE WORKING IN A LAB?

**It's PERFECTLY NORMAL for you to decide that
research isn't for you!**

**I worked in 6 labs before figuring out what sort of
research I liked!**

**And, I enjoy my PhD research, but I don't want to
do it for a living!**

ACADEMIC SCIENCE & LAB CULTURE



ABOUT PRIYA



Effects of an eelgrass bed (*Zostera marina*) on seawater pH and alkalinity



ABOUT PRIYA



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Research Technician

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NEXT WEEK

SCIENCE WRITING

BEFORE CLASS NEXT WEEK

Complete
Assignment 2



A sunset over the ocean with the word "QUESTIONS?" in a dashed white box. The sky is filled with vibrant orange and red clouds, and the sun is low on the horizon, casting a golden glow. The water is dark and reflects the colors of the sky. The text "QUESTIONS?" is written in a bold, white, sans-serif font and is enclosed within a white dashed border that has rounded corners.

QUESTIONS?