

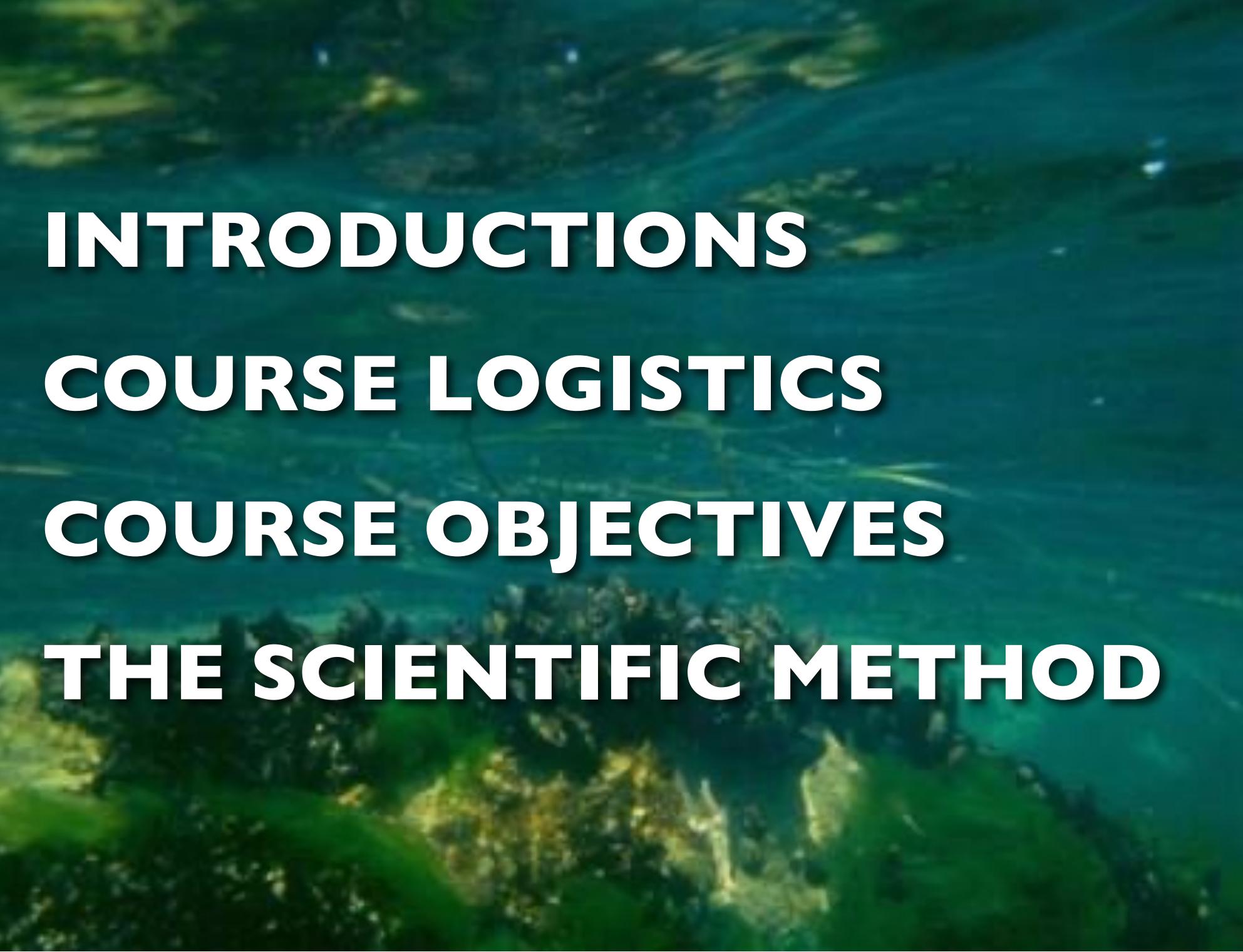


WELCOME

BISCI 20 General Biology:
Organismal Biology
and Evolution

Trond Sigurdsen
sigurdse@usc.edu

- Keep track of health requirements on Trojancheck
- Please keep mask on, and send us a notice if you develop COVID-19 symptoms
- New syllabus has been uploaded
- My office hours will be online, we can catch up then (Thurs. 1pm see announcement)



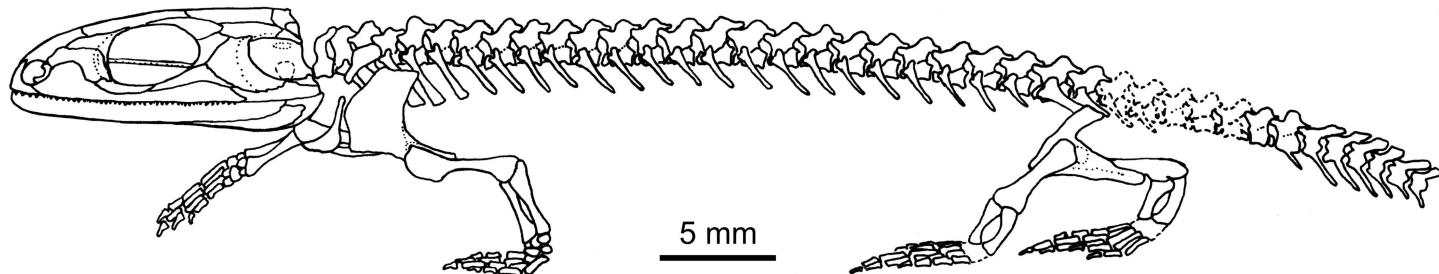
INTRODUCTIONS

COURSE LOGISTICS

COURSE OBJECTIVES

THE SCIENTIFIC METHOD

Trond's research: Evolution of amphibians



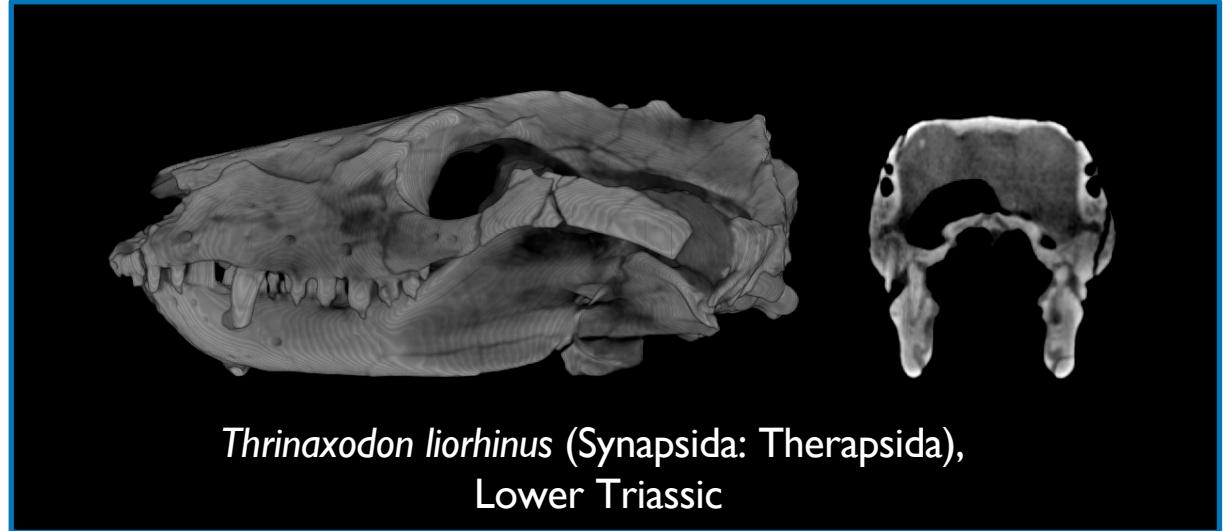
Doleserpeton annectens, Lower Permian (Sigurdsen & Bolt, 2010)

Evolution of Mesozoic birds



Trond Sigurdsen, E-mail: sigurdse@usc.edu

Trond's research: Evolution of mammals



Thrinaxodon liorhinus (Synapsida: Therapsida),
Lower Triassic

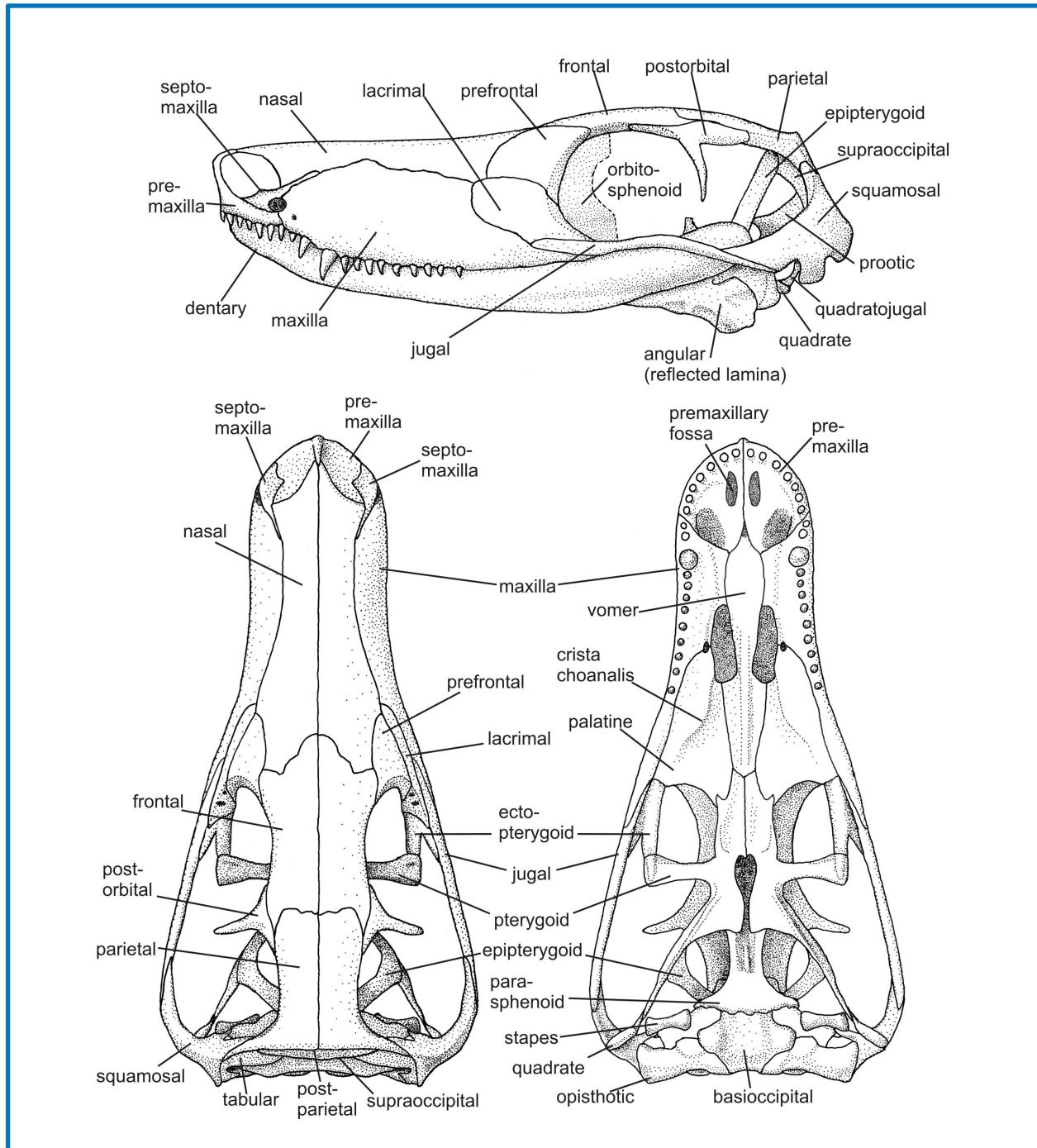


Monodelphis domestica (Synapsida: Mammalia)

Trond Sigurdsen

E-mail: sigurdse@usc.edu

Skull reconstruction of a therapsid (“mammal-like reptile”)



BISC I20 General Biology

- MWF 9:00 AM Trond Sigurdsen
- MWF 6:30 PM Trond Sigurdsen
- MWF 10:00 AM Andrew Gracey
- T/TH 2:00 PM Oliver Rizk
- T/TH 3:30 PM Oliver Rizk

BISC I20 General Biology

- Lab Manager Brett Spatola E-mail: spatola@usc.edu
- Lab Instructors

BISCI120 General Biology

- Your Friday 2pm Quiz section is for your midterm exams
- We plan to give exams in person, but look for announcements before each midterm in case of changes

Where to go for help

- First, read through the syllabus, and any announcements on Blackboard
- Don't forget Supplemental Instruction & the SI leader
- For remaining questions about...
 - Lecture content: Trond Sigurdsen
 - Course administration (illness, missed labs, logistics, etc.), contact Lab Manager Brett Spatola
 - Lab content/Lab reports: contact your Lab Instructor

BISC I20 General Biology

- **Supplemental Instruction (SI) Leader**

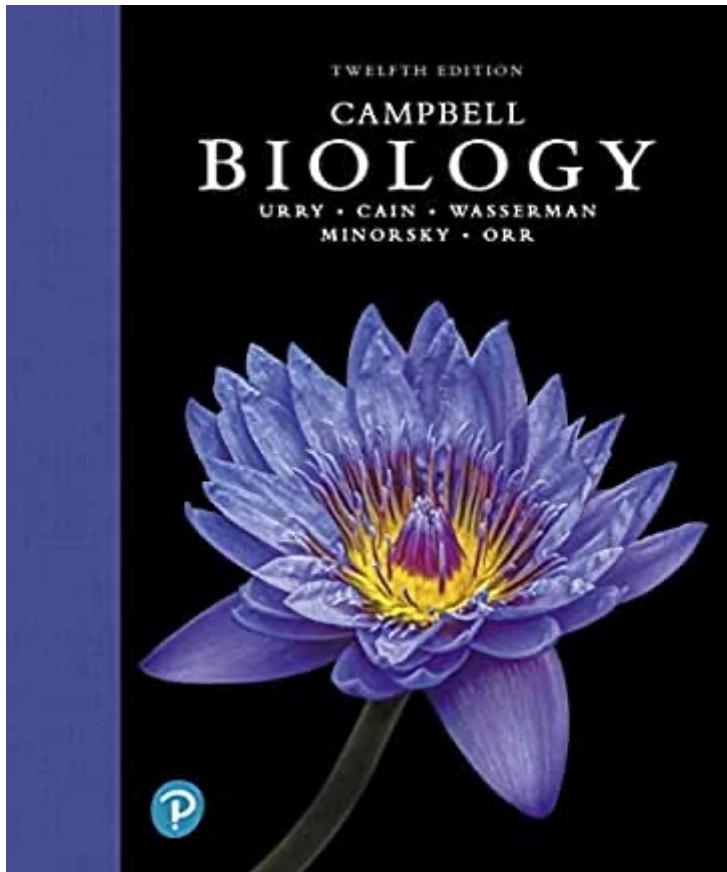
Covering my lectures:

Shaliz Aflatooni (**morning lectures**)
saflatoo@usc.edu

Hilary Kim (**evening lectures**)
hilaryki@usc.edu

BISC120 General Biology

Main Book



- Campbell Biology
12th edition (11th
edition is OK)

BISC120 General Biology

Fall 2018

• Grading:	
• Midterm Exam 1	150
• Midterm Exam 2	150
• Midterm Exam 3	150
• Final Exam (not cumulative)	150
• Lecture Quizzes	72
• <u>Laboratory Assignments</u>	<u>328</u>
• TOTAL POINTS IN COURSE	1000

Advice for BISC 120

- Don't forget quizzes!
- Manage your time carefully
- Look up topics in the book for clarification and additional examples (for most people reading the whole thing will not work)
- Get to know your **Lab Instructor** and **SI leaders**
- Come to office hours (on Zoom, will be announced)
- Check Blackboard regularly
- Attend class!

Advice for BISC 120

- Don't miss lectures (attend and ask questions): Students who simply download the files but don't attend lectures are significantly more likely to fail

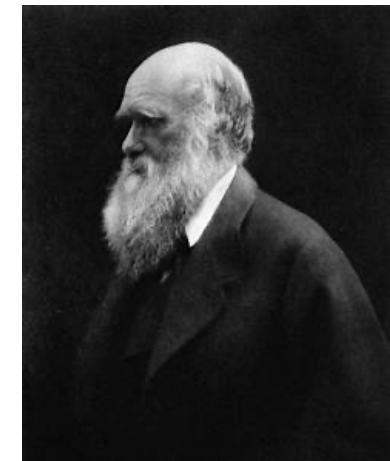
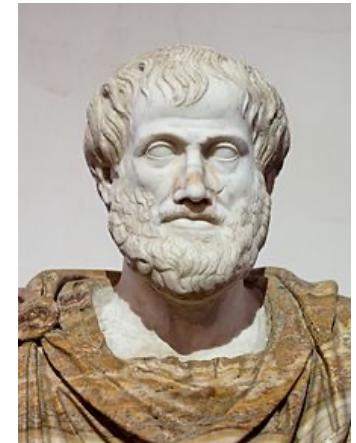
Advice for BISC 120

- Don't misspell *Homo sapiens*



What will you learn from this class?

- Scientific method; applied to biology
- A brief introduction to genetics and the cell (more in BISC 220)
- Evolution; Darwin, natural selection, speciation
- Overview of the evolution of life
- Biological diversity; prokaryotes, protists, plants, animals
- Basics of ecology and conservation



Laboratory portion

- Design and conduct scientific investigations
- Learn how experimental evidence answers a scientific question
- Learn about biological laboratory techniques
- Write a “scientific paper” (lab report)

Today:

The Scientific Method

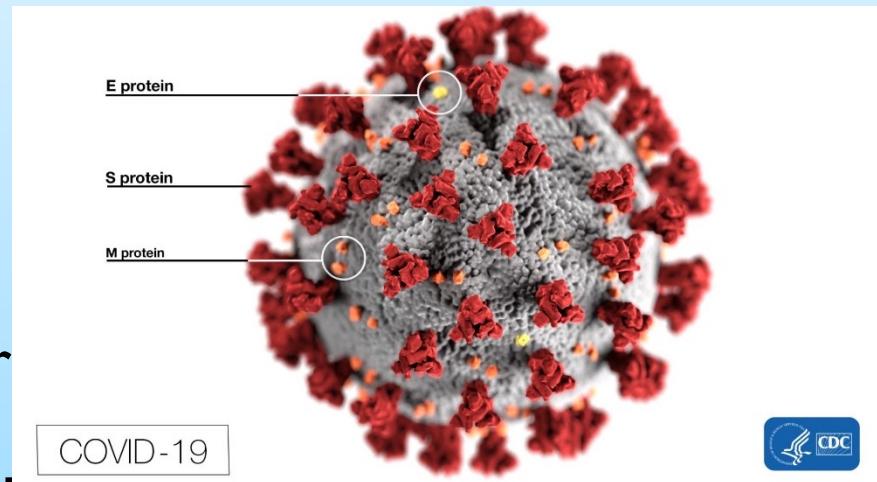
- What is science?
- How to differentiate science from e.g. pseudoscience?
- Hypothesis testing



In general: develop an open but skeptical mindset, learn to find scientific sources

Covid-19 in the news:

- “We already have a cure; it’s called hydroxychloroquine”
- “Not a single scientific study shows any positive results from hydroxychloroquine”
- Hydroxychloroquine has shown some antiviral properties in vitro, but is no miracle drug. One study showed that it reduces mortality, but others have failed to replicate this



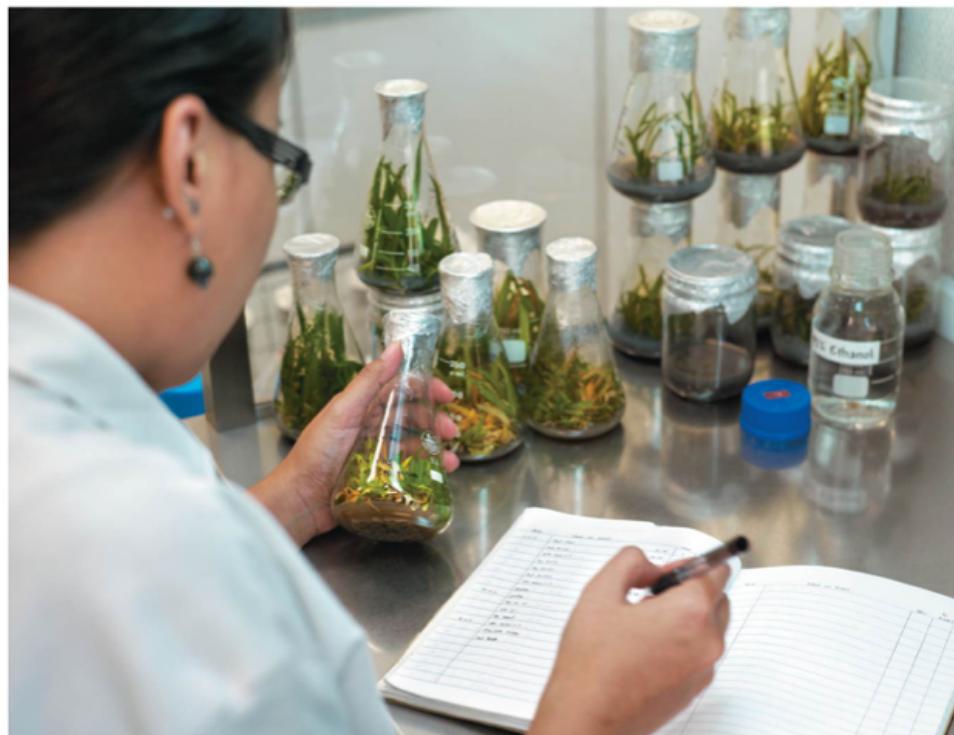
Science

- A body of knowledge about our universe that forms an interlinked web of information
- Every detail fits into a larger, integrated picture
- Based on the scientific method



The Scientific Method

- **Experimentation** – manipulate a variable (in nature or in lab) and observe the outcome



The Scientific Method

- **Observation** – without manipulation

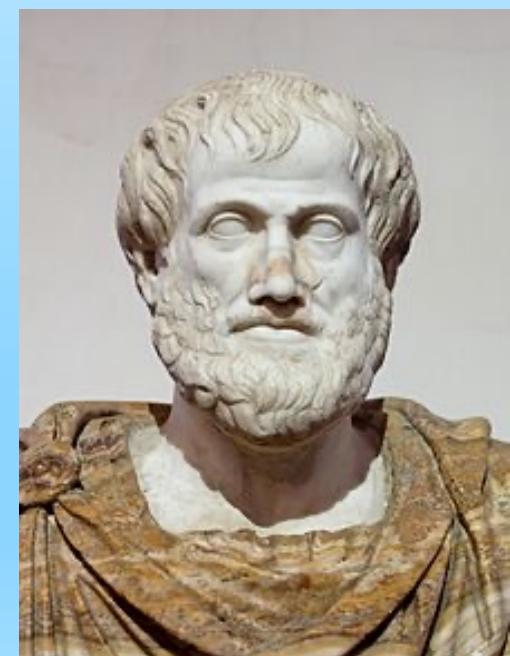


SCIENTIFIC METHOD: hypothesis testing

At the core (from Aristotle): based on BOTH **inductive** and **deductive** reasoning

- Ask a question (based on previous info and observations)
- Propose an explanation, a hypothesis, based on observations and current knowledge
- Design a procedure (observations/experiment); & make predictions
- Collect data in nature or from a lab experiment
- Analyze data and interpret results

Strongly supported hypotheses are included in the general **theory** on the subject , which is used in general applications and further scientific studies

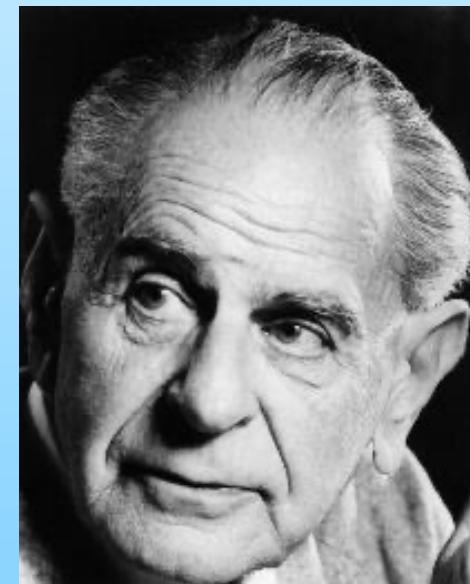


Aristotle

Modern Scientific Method: What is a proper SCIENTIFIC HYPOTHESIS?

- proposed explanation for a scientific question
- must be testable; more specifically it should be falsifiable
- Other scientists should be able to reproduce the results by following the same procedure
- testing a hypothesis means that results can:
 1. support the explanation (evidence supports the hypothesis)
 2. falsify the explanation (evidence rejects the hypothesis)

NOTE: we do not “prove” our hypothesis, we support it or falsify it



Karl Popper emphasized that it should be possible to falsify a scientific hypothesis

Scientific Method: What is a scientific HYPOTHESIS?

- “Vaccines cause autism”

- Scientific hypothesis?

Scientific Method: What is a scientific HYPOTHESIS?

- “Experiments on animals are unethical”
- Scientific hypothesis?

Scientific Method: What is a scientific HYPOTHESIS?

- “Chimpanzees are more closely related to humans than to gorillas”
 - Scientific hypothesis?

The modern scientific process involves more than the “core” of the scientific method (hypothesis testing)



Maymester
BISC 445L

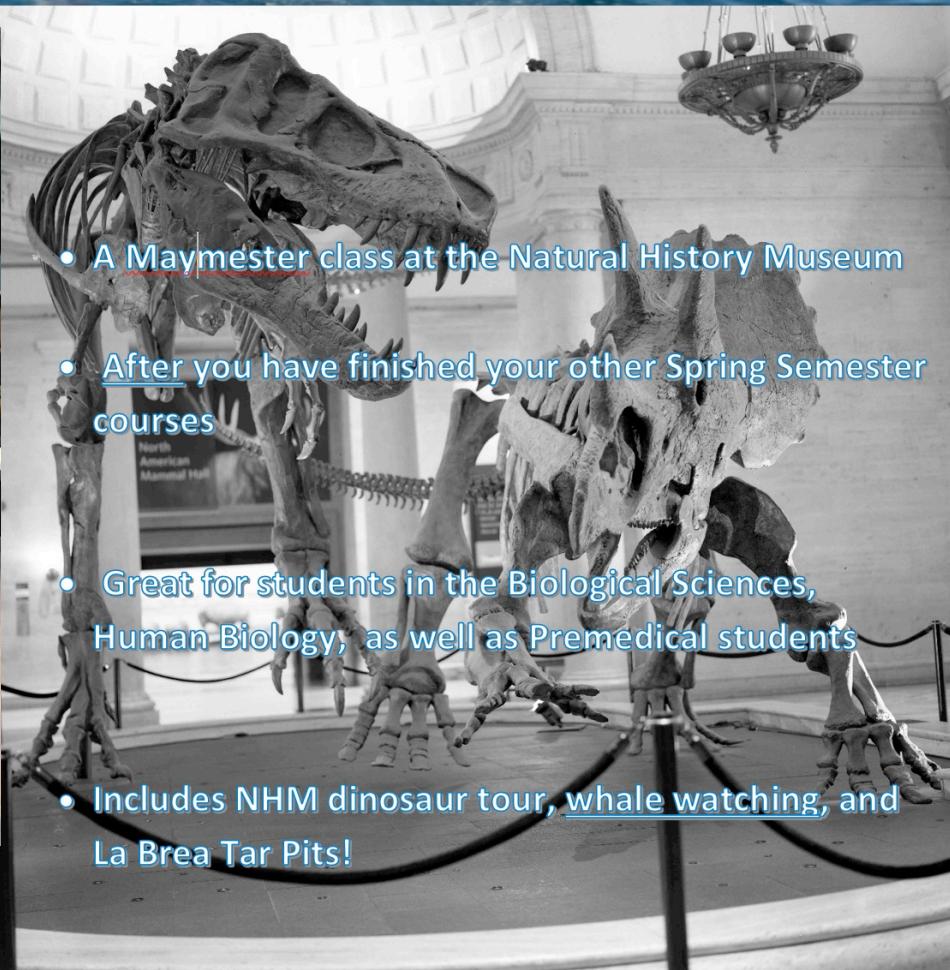
Maymester, Spring Semester



Maymester
BISC 445L



La Brea Tar Pits



Whale watching



Tell your friends 😊 (email me: sigurdse@usc.edu)