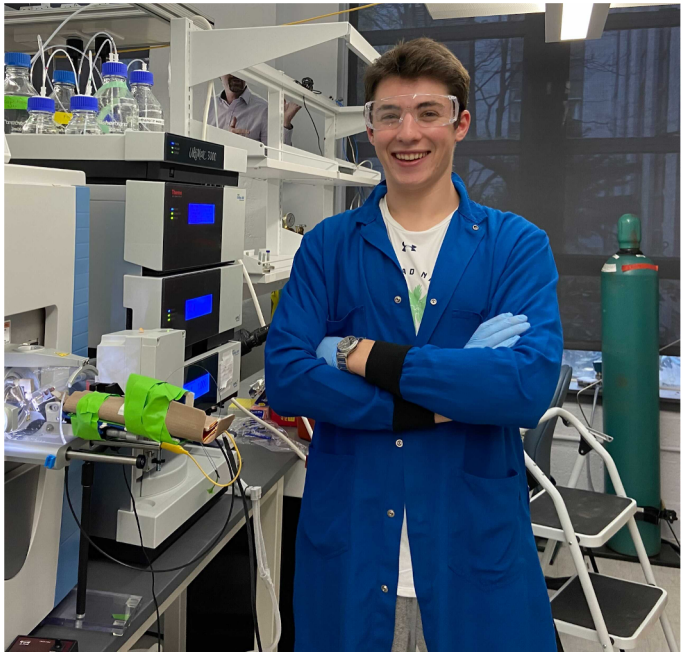
Skype a Scientist:

The Human Microbiome

With Andrew Leduc

Introduction:



Andrew Leduc

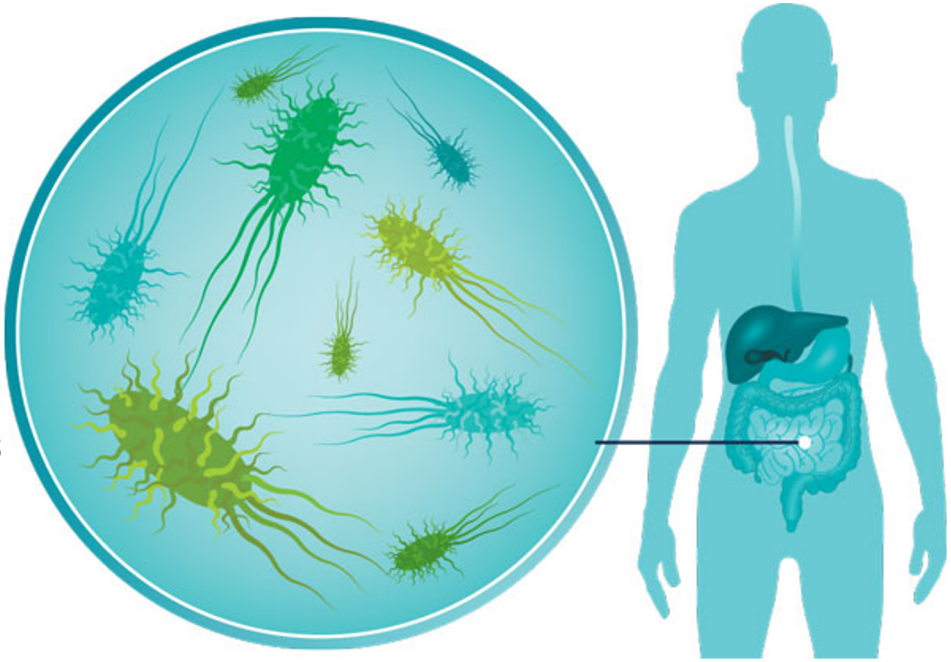
- Graduate Student Researcher at Northeastern University in Boston Massachusetts
- Member of the Slavov Laboratory

Research: Proteomics, the large scale study of proteins and their functions.

- Focus on drug resistance in skin cancer

Human Gut Microbiome

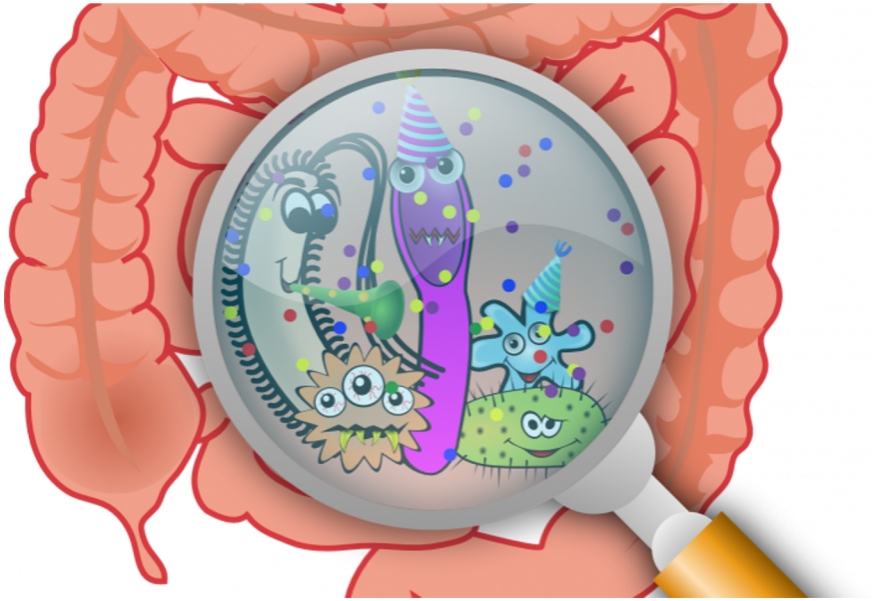
- Gut microbiota are the microorganisms that live in the digestive tracts of humans
  - Bacteria (99%)
  - Archaea
  - Fungi
- 3 times as many microorganisms as cells in our body
- Between 300 and 1000 different species



What do these Microorganisms do?

- Symbiotic cohabitation
  - Living inside us is essential to their survival as well!

- Impact Human health
  - Metabolism
  - Immune
  - Nervous System
    - Mood
    - Anxiety

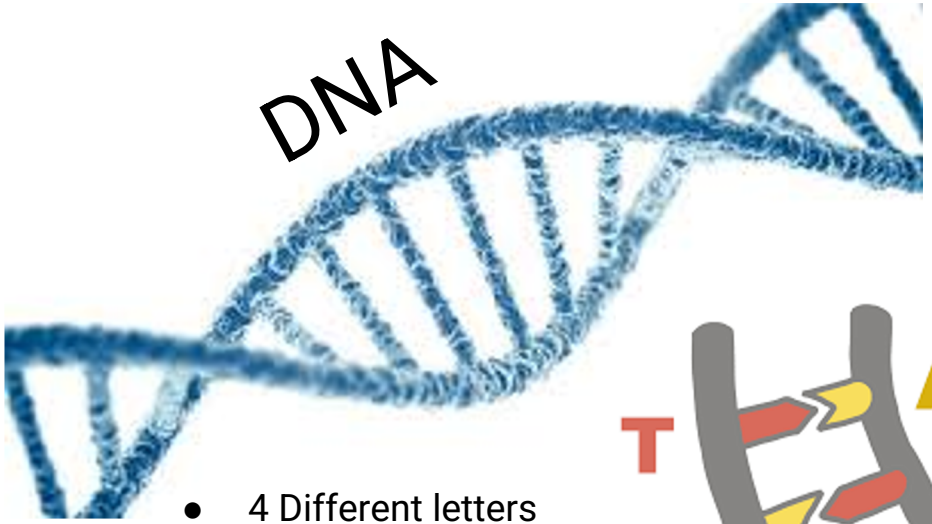


How do these Microorganisms affect us?

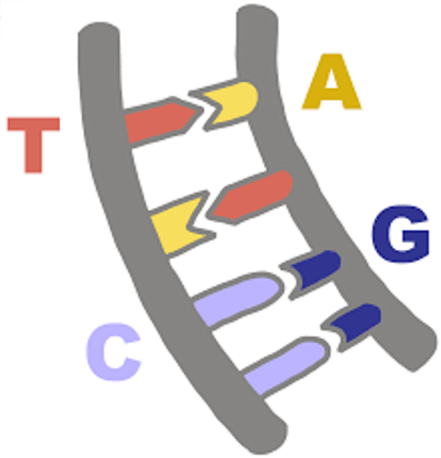
Let’s take a step back!

Central Dogma (How Cell's function)

- DNA stores all the information inside a cell
- Each series of base pairs, or gene, codes for a different protein

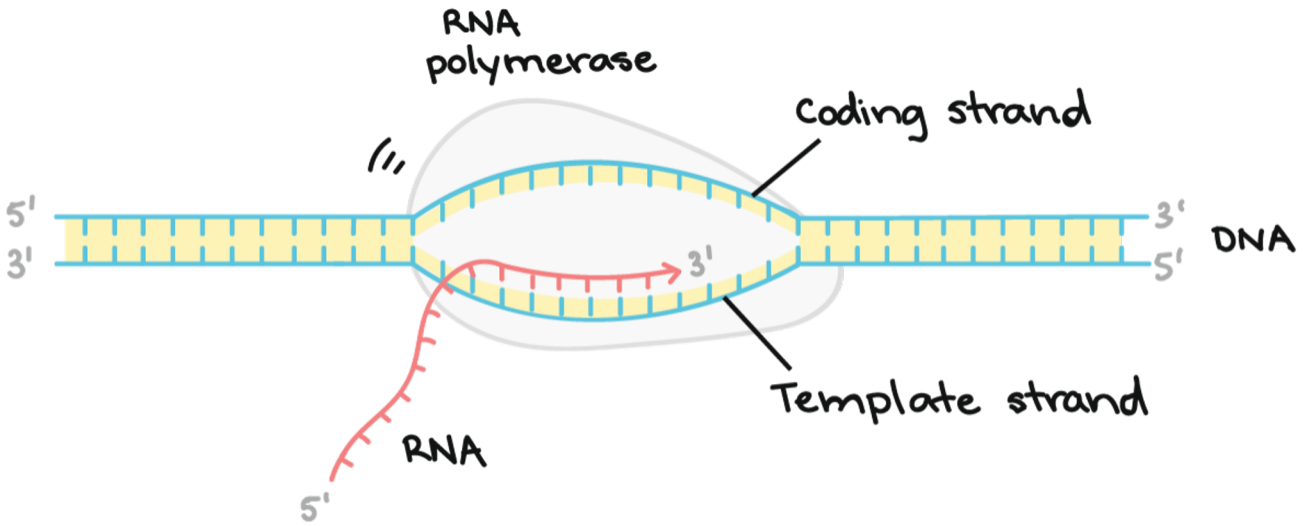


- 4 Different letters
- 2 types of base pairs
  - A and T
  - G and C



Central Dogma (How Cell's function)

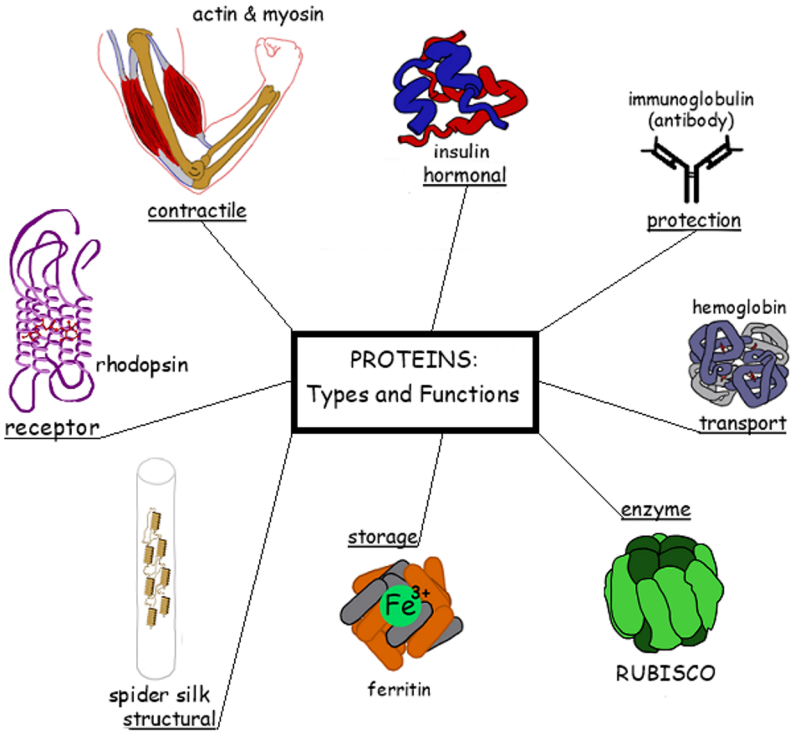
RNA: copies certain genes from the DNA in process called transcription



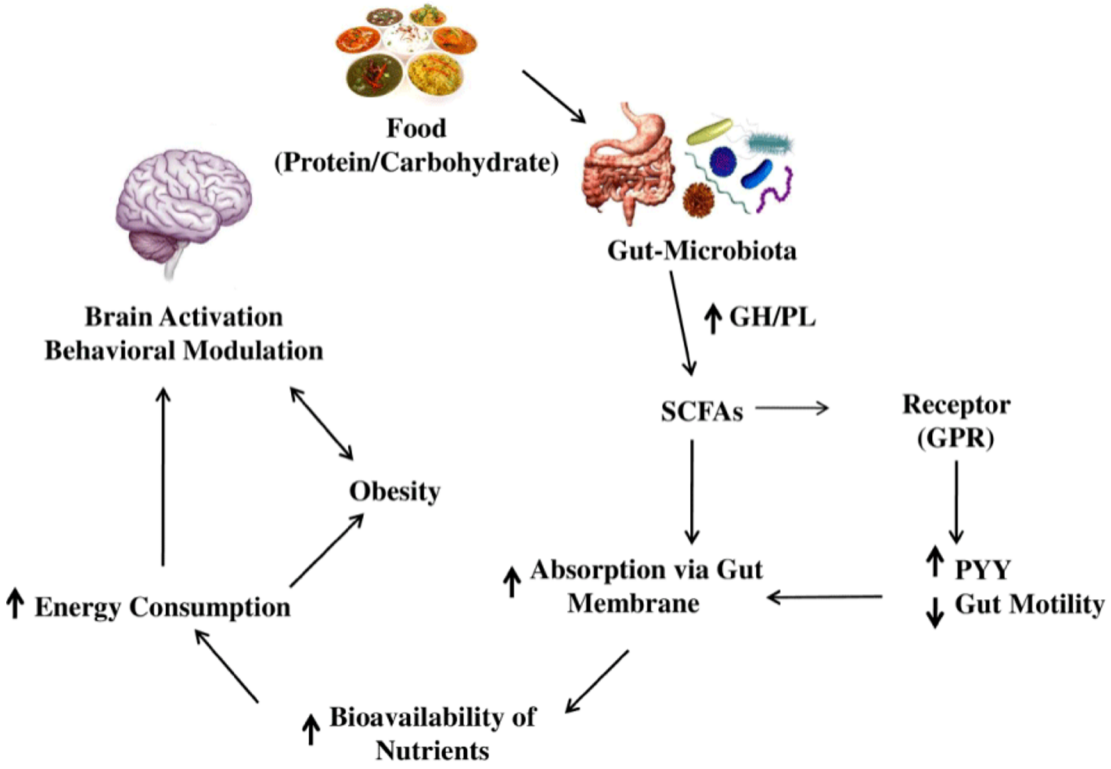
Central Dogma (How Cell's function)

- **Proteins:** carry out all of cell's functions!
  - Movement
  - Growth and maintenance
  - Determines structure
  - Enzymes:
    - Break down other molecules
    - Perform chemical reactions

- RNA is translated to proteins at the ribosome



How does the Gut Microbiome affect us?



- Help break down food we eat by producing enzymes
- Transforms food into other molecules via proteins
  - Neurotransmitters that affect your mood
  - Minerals you need
- Attacks foreign bacteria to help our immune system

Active Science On Gut Microbiome

- Identification - We still don’t know all the organisms that live inside us!

- Function - The gut microbiome could affect us in ways we still don’t understand

Active Science On Gut Microbiome

Article | Open Access | Published: 11 November 2020

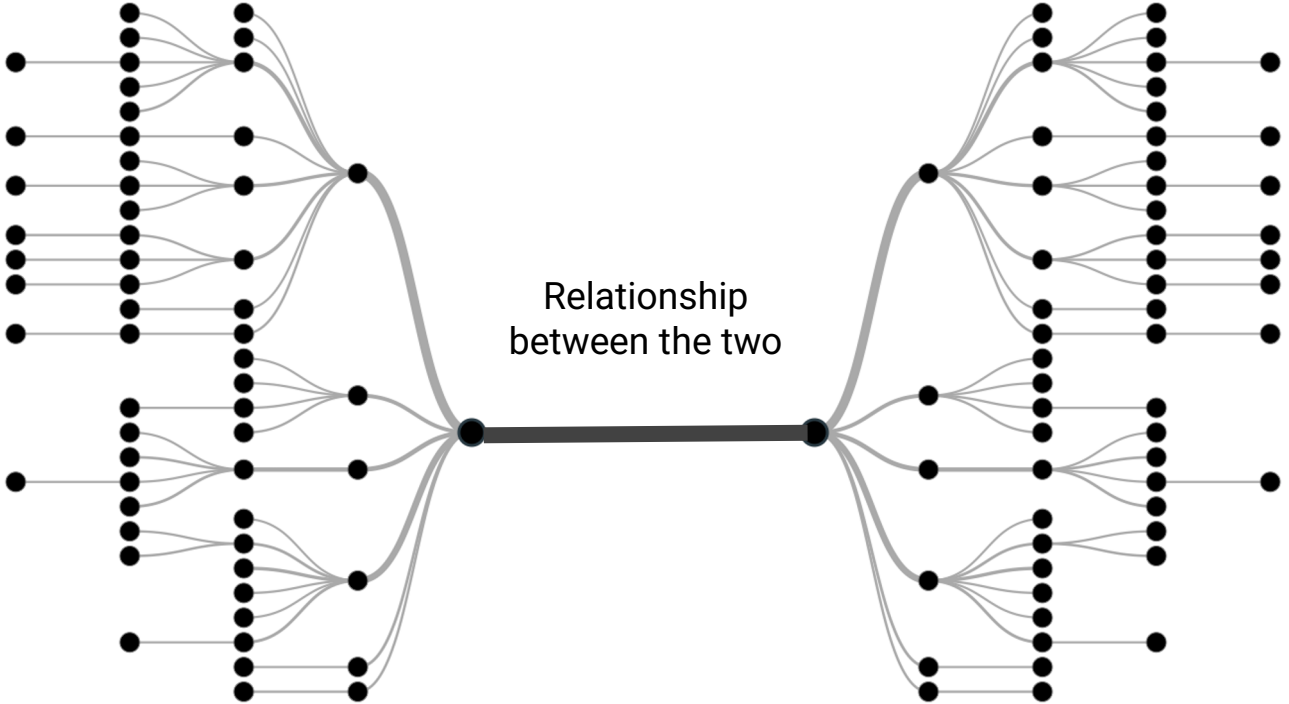
Gut microbiota depletion by chronic antibiotic treatment alters the sleep/wake architecture and sleep EEG power spectra in mice

Yukino Ogawa, Chika Miyoshi, Nozomu Obana, Kaho Yajima, Noriko Hotta-Hirashima, Aya Ikkyu, Satomi Kanno, Tomoyoshi Soga, Shinji Fukuda ✉ & Masashi Yanagisawa ✉

Scientific Reports **10**, Article number: 19554 (2020) | Cite this article

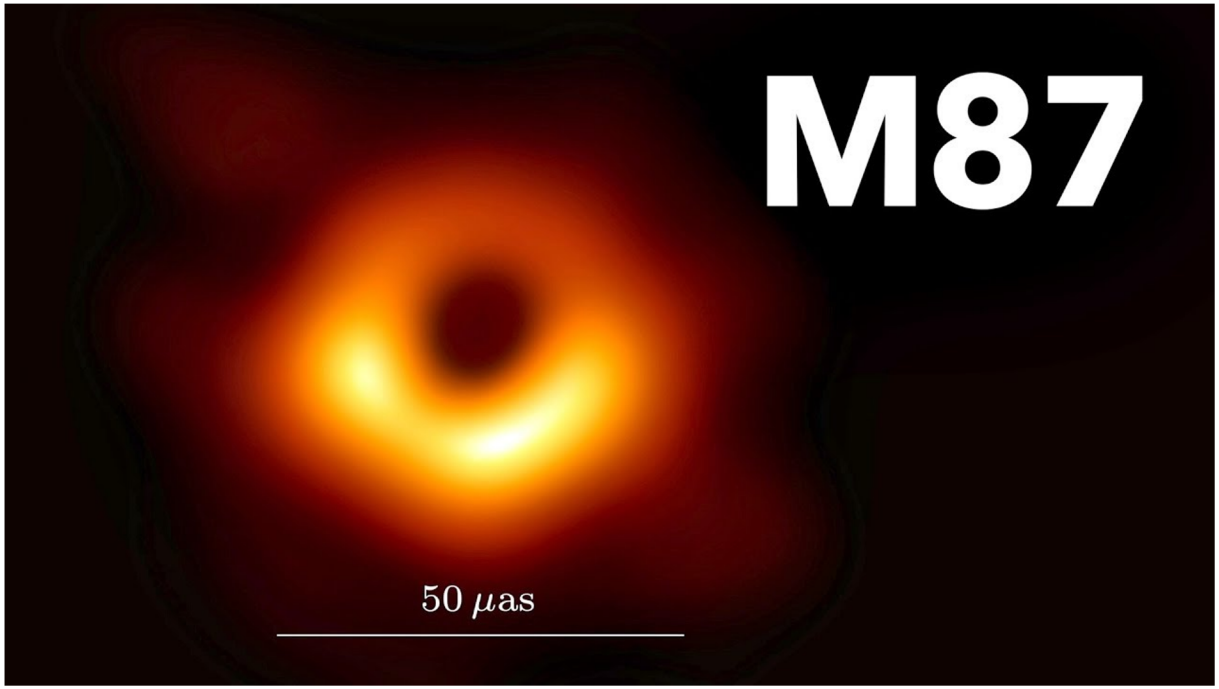
Metrics

Complexity in the Gut Microbiome

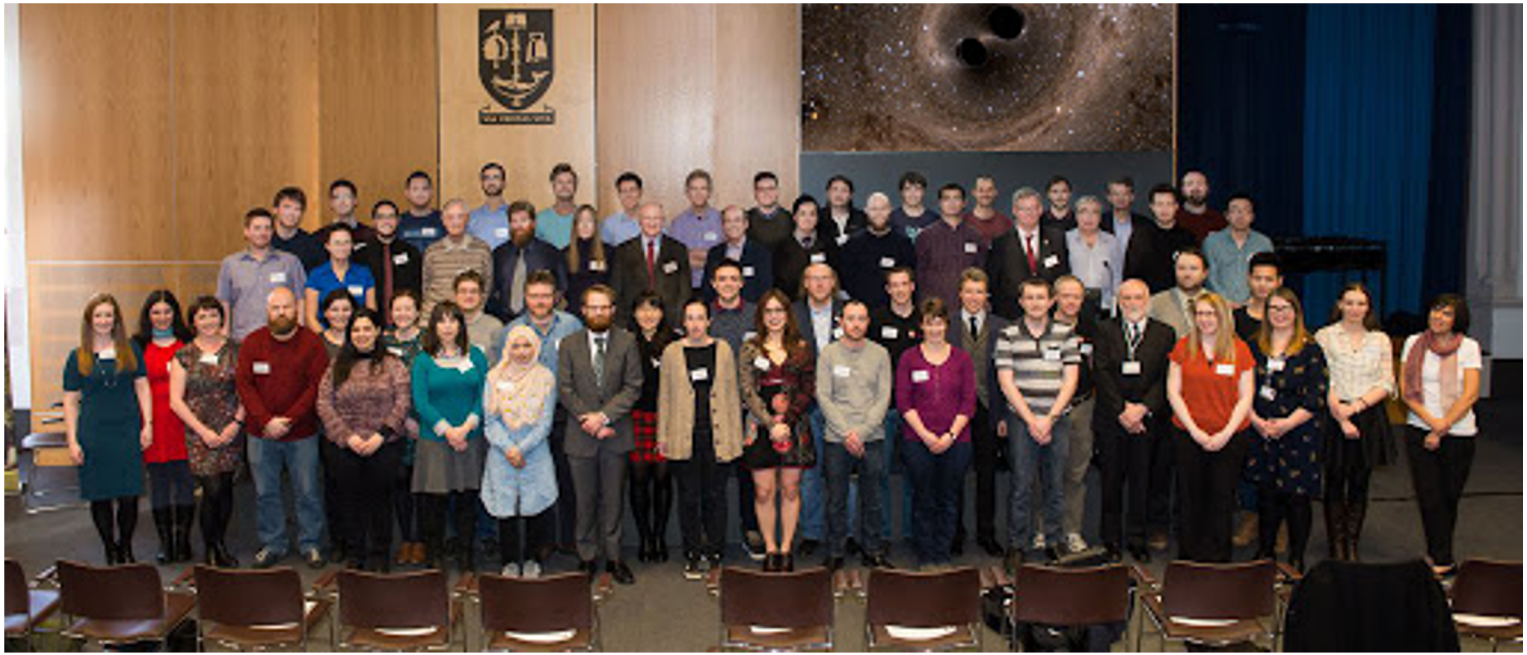


Why Become A Scientist?

Science is Cool! And Humans are Naturally Curious



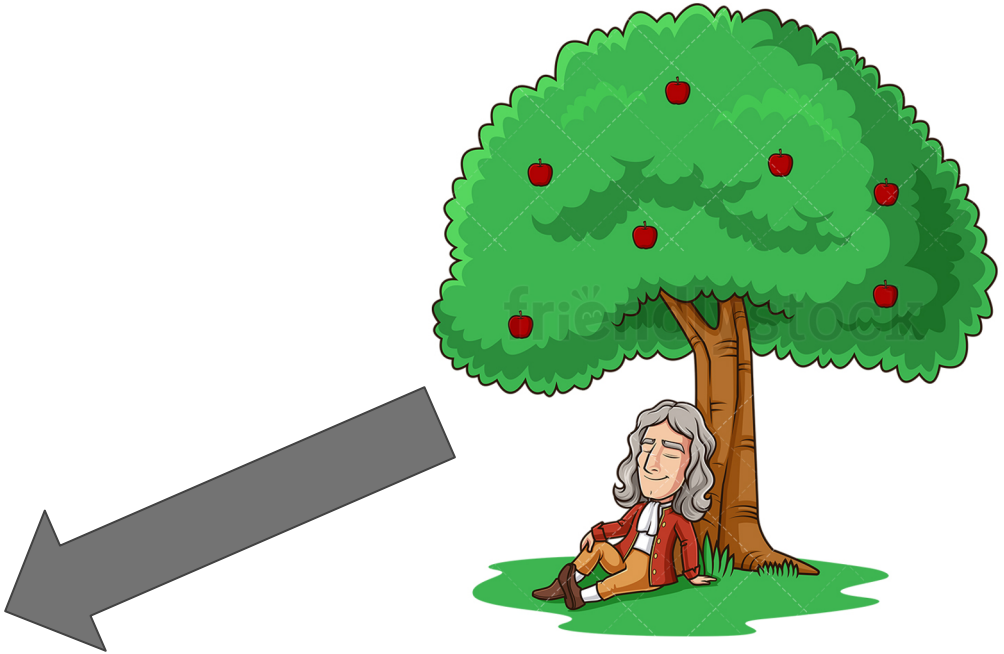
At its best, Science is Collaborative, Fair, and Objective



The World Runs on Science!

- Your Computer, your TV
- Medicine
- Agriculture
- Our understanding of the world

You Have a Chance to leave your mark on history!



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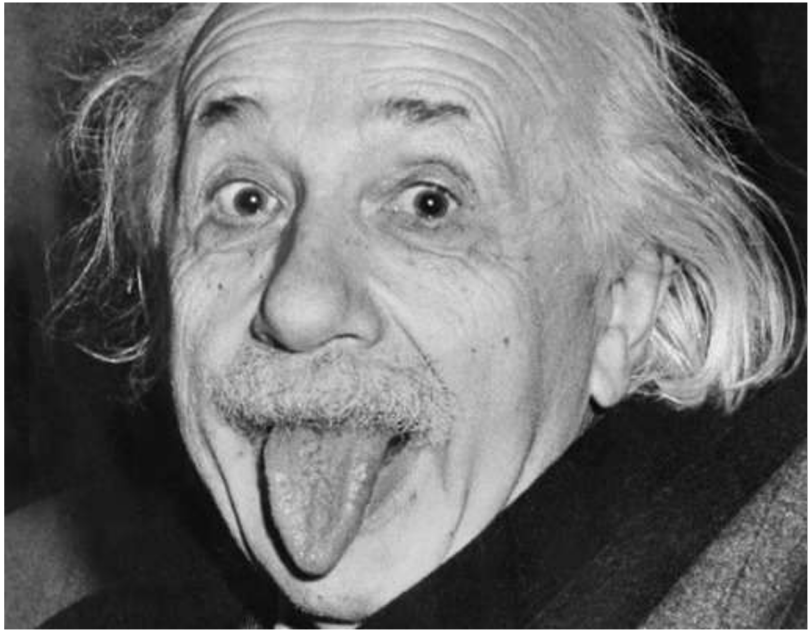

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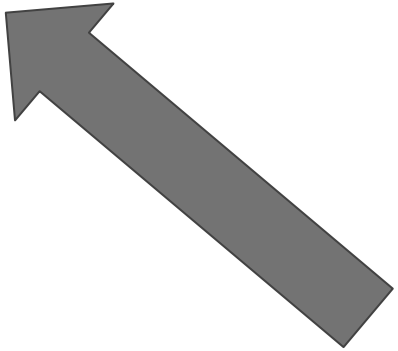


Who Can Become A Scientist?

Anyone Interested! … You!

- Don’t get discouraged by a hard science or math class
  - ➢ You are all capable!
- All types of different skill sets are valuable in science
  - ➢ Everyone has a unique perspective to contribute

Anyone Interested! … You!

- Nobel Prize given for genetic editing to Jennifer Doudna and Emmanuelle Charpentier

Jennifer Doudna and Emmanuelle Charpentier share the 2020 Nobel chemistry prize for their discovery of a game-changing gene-editing technique. Credit: Alexander Heinel/Picture Alliance/DPA

How to Become A Scientist?

Get Inspired!

Podcasts:

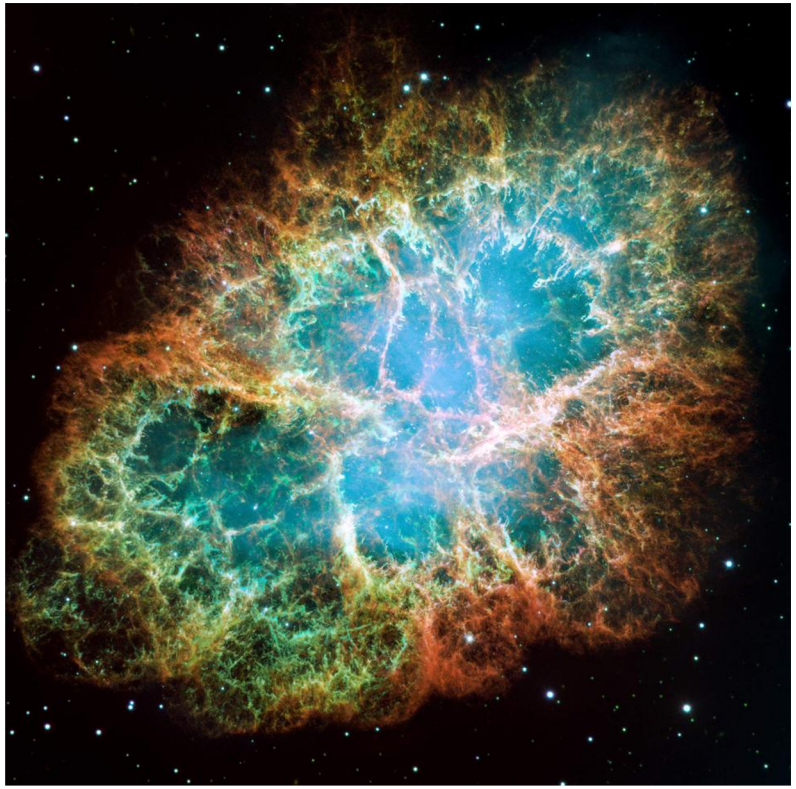
- Lex Friedman Podcast
- Mindscape: Sean Carroll

Books:

- Michio Kaku: Physics of the Future

Shows:

- Fabric of the Cosmos: Brian Green



Graduate School: Getting your PhD

- Training to become a scientist!
- Get to work on fascinating problems, conduct experiments, analyze data, and publish results!

- Something you can apply to after your Undergraduate degree
- 4-5 years
- It’s free and you are paid for your living expenses

Graduate School: Getting your PhD

AIChE JOURNAL
An Official Publication of the American Institute of Chemical Engineers
AIChE

Futures Issue: Soft Matter: Synthesis, Processing and Products

Rheological properties and structure of step- and chain-growth gels concentrated above the overlap concentration

Matthew D. Wehrman, Andrew Leduc, Holly E. Callahan, Michelle S. Mazzeo, Mark Schumm, Kelly M. Schultz ✉

First published: 18 December 2017 | https://doi.org/10.1002/aic.16062 | Citations: 5

Thanks!

Questions?

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