Outline

Course overview

- Lecture notes for each section will be available the afternoon before you need them
  - Check AtL frequently for announcements and new information
  - All info will also be on the course resource page
    - `http://bio3ss.github.io/`
- The professor is Jonathan Dushoff
  - `dushoff@mcmaster.ca`
  - Ask questions on facebook group
    - Bio 3SS Winter 2018

Expectations of professor

- Start and end on time
- Focus on conceptual understanding
- Make clear what terminology and facts must be learned
- Open to questions – both in class (within reason) and at office hours
- Responsive to questions on class forums (Facebook and AtL)

Expectations of students

- Start and end on time
- Don't talk while other students are talking, or while I am responding to student questions
- If you must talk at other times, be unobtrusive
- Don't use the internet for non-class activities
- Attend the lecture, and the mandatory tutorials

Texts

- The primary text for this course is the lecture notes
- You will be given readings, which will be posted to AtL
- You are required to have an Ecology textbook
  - Molles and Cahill, Second Canadian edition is recommended
  - If you would like to use a different textbook, let your TA know, so we can attempt to provide readings.

Structure of presentation

- Required material will be clearly outlined in the notes
  - * This is an answer: it was omitted from the notes for discussion purposes, you should probably write it in
  - *This is a comment: I omitted from the notes because I thought it wasn't necessary for you to study. If you write it in, make a note to yourself that it's a comment.*
- Required terminology will be presented in **bold**
- General ideas and approaches presented in class may also be required; you should take notes on these in your own words

Taking notes

- You will do best if you take notes
  - You should know by now what works for you
  - Or else that you need to keep working on it
- If a new concept is making sense to you right now, write something that will help you remember
- If there's something specific I think you all need to write down, I will write it for you (or mark it as an answer)

Polling

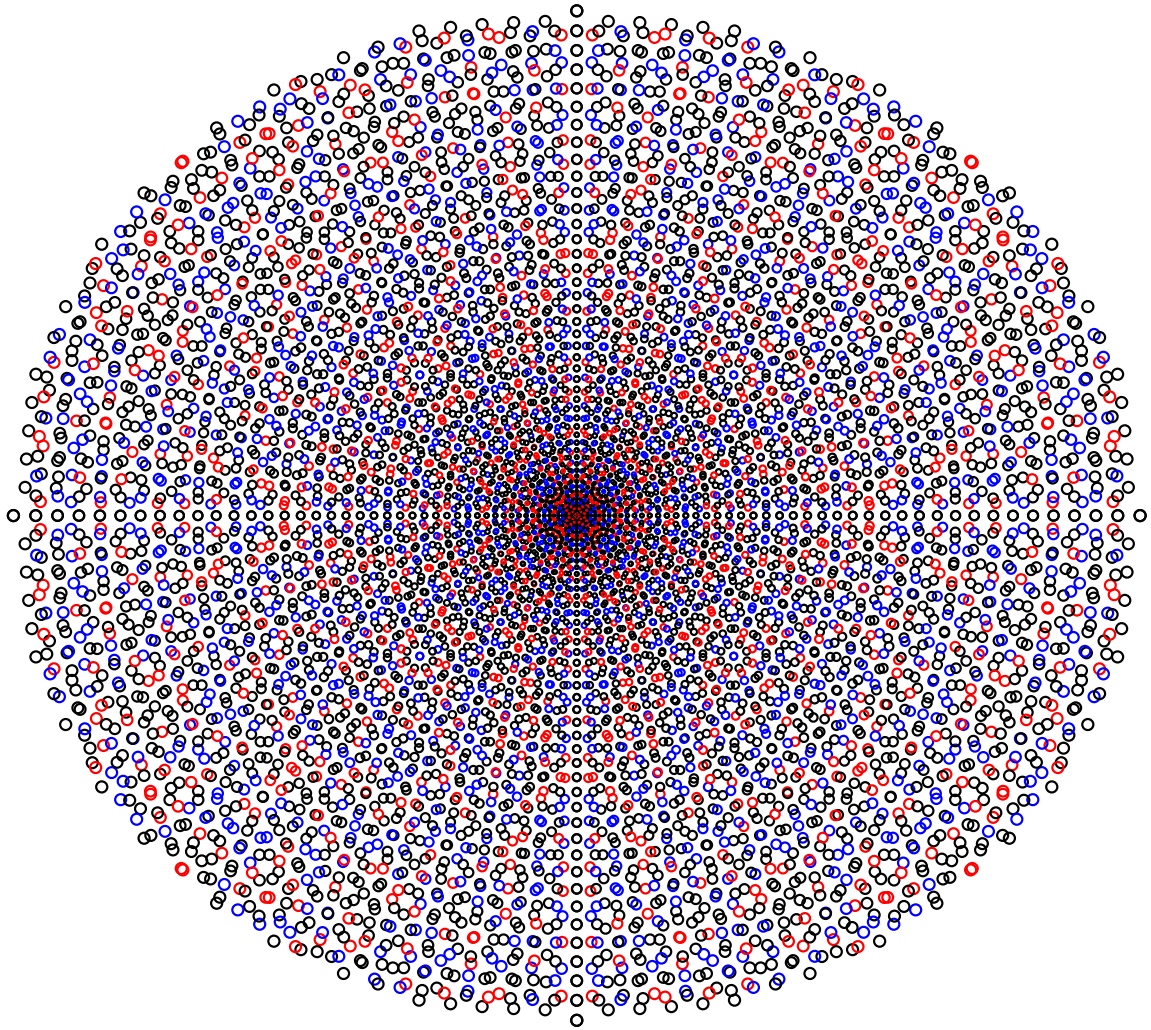
- You can obtain extra credit by responding to in-class polls
  - Text from your cell phone, or answer on the web
- Outdated poll!: Why are you taking this class?

Outline

Dushoff

- Loves math
- Lived in four countries
- Studies evolution and spread of infectious diseases
  - HIV, rabies, ebola, influenza, ...
  - See notes for more info.

Pythagorean triples



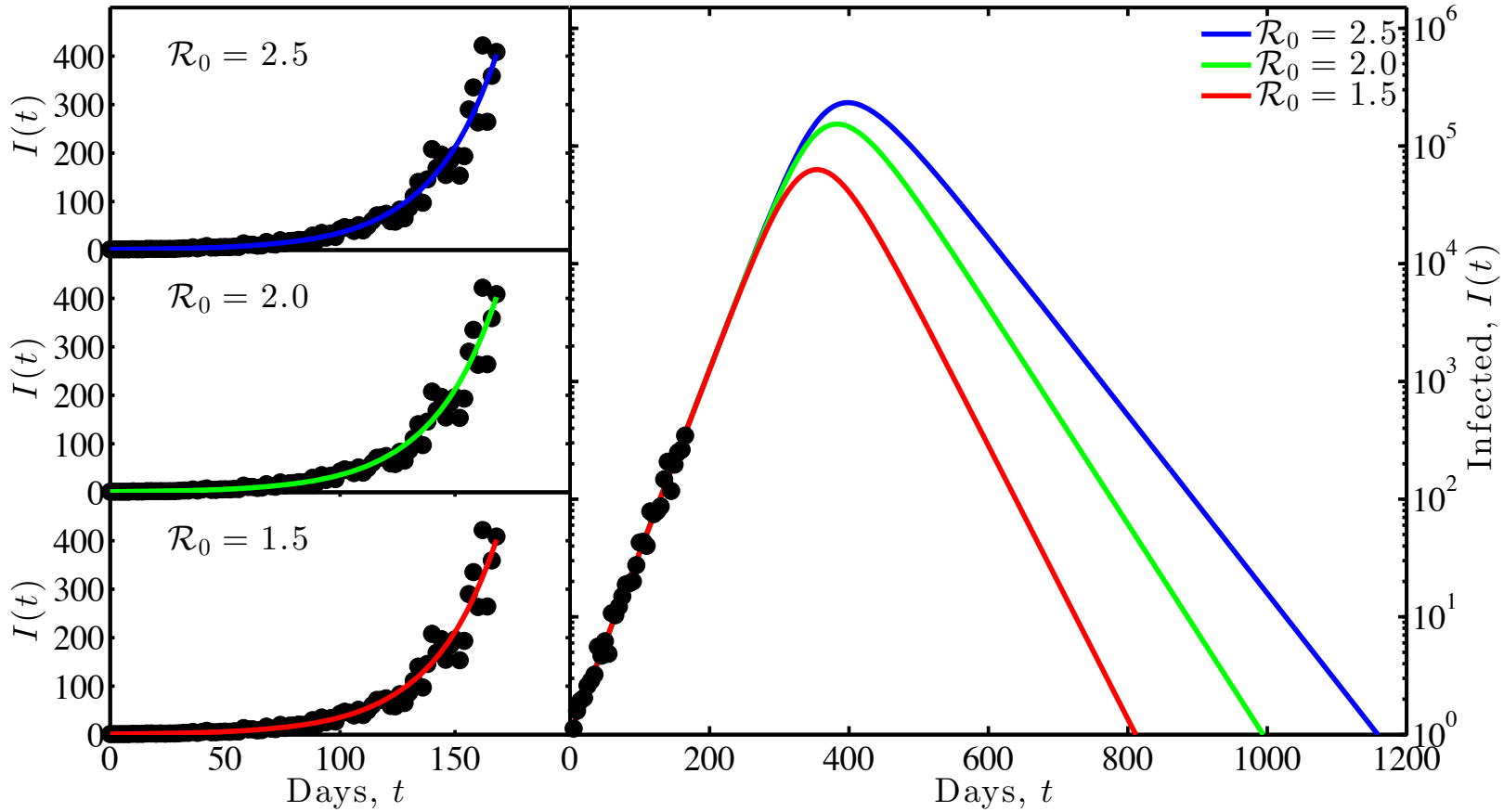
Which country?

Which country?

Which country?

Which country?

Ebola research



TAs

- Morgan Kain
  - Talks to angels
  - Walks down the street
- Michael Li
  - 23 acquittals
  - 0 convictions

Students

- Outdated poll!: What year are you in?
- Outdated poll!: What kind of career are you aiming for?

Outline

Outline

Learning goals

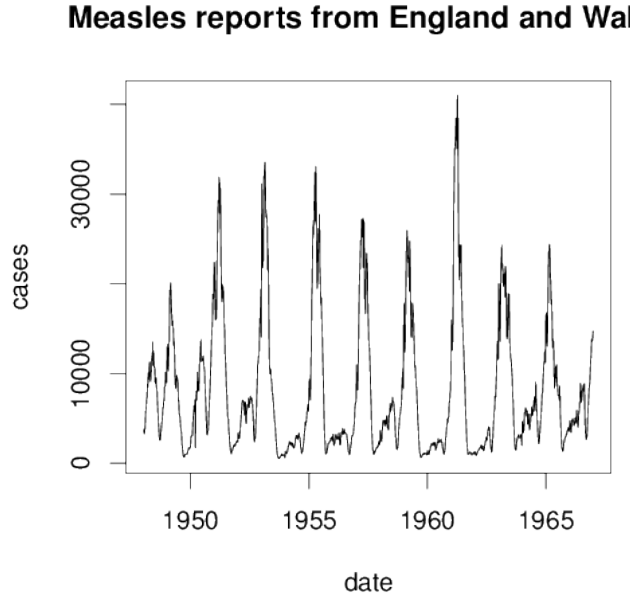
- Ecology and population ecology
- Quantitative thinking
- Dynamical modeling

- Outdated poll!: What is ecology?
- My answer
  - * The study of how organisms interact with each other and with the environment
  - * Ecology is not environmentalism

- Outdated poll!: What is population ecology?
- My answer
  - * The study of how organisms interact with each other and with the environment at the population scale
  - * Larger spatial scale, longer temporal scale
  - * We use *dynamical models* to link from the individual level to the population level

Dynamical modeling

- Investigates the links between local, short-term processes, and large-scale, long-term outcomes
- Allows us to explore what assumptions we're making, and how assumptions affect the link



Math

- Population ecology uses math
  - Math is a critical tool for linking processes to outcomes
  - Math will play a central role in the course
- We will keep it *simple*
  - But we understand that simple does not always mean easy
- Review the math supplement

Humans and abstract thought

- People are evolved to be concrete thinkers, not conceptual thinkers
- A goal of this course is to build conceptual thinking skills

value

energy | mass | speed of light

$$E = mc^2$$

J | kg | 299,792,458 m/s

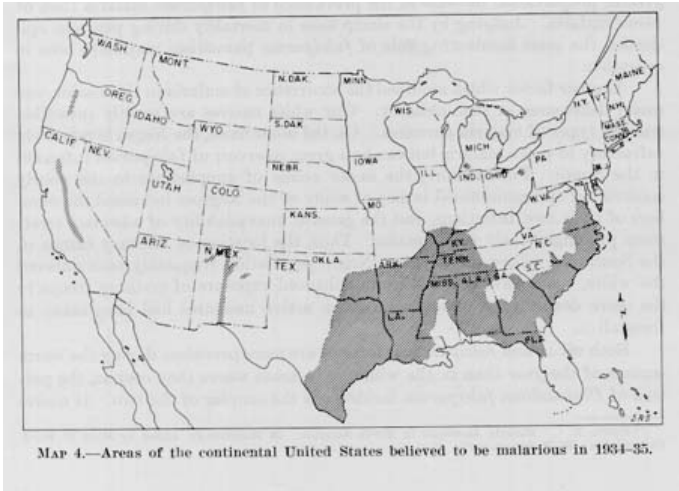
units

$c^2 = 89{,}875{,}517{,}873{,}681{,}800\ m^2/s^2$

Outline

Malaria

- A nasty, mosquito-borne disease
- In some places (e.g., the southeastern US), it has been eradicated almost by accident
  - Mosquitoes are still present
- In other places it persists at high levels despite concerted efforts at elimination
- *What factors determine when and where malaria spreads?*

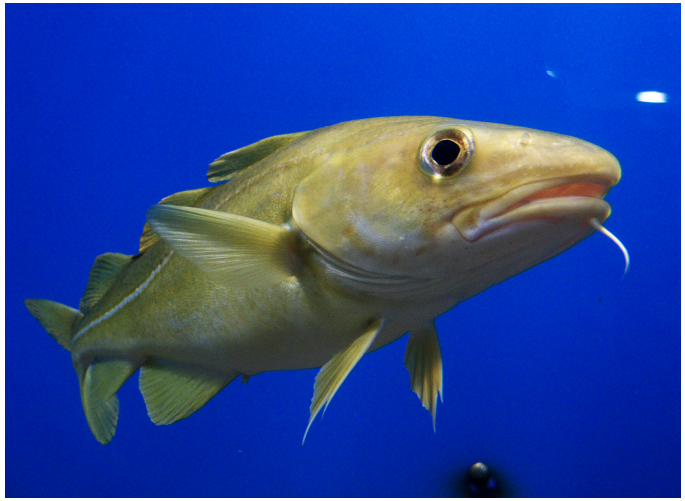


MAP 4.—Areas of the continental United States believed to be malarious in 1934–35.

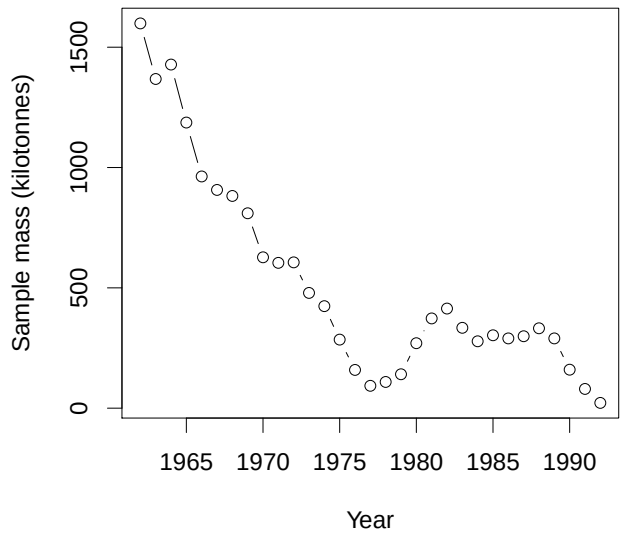
Red squirrels

- Red squirrels are rapidly disappearing from England
  - Loss of suitable habitat?
  - Competition from gray squirrels introduced from North America?
  - Diseases carried by gray squirrels?

Cod fisheries



- Is the ocean too big for people to affect?
- What happened to the cod?



Populations

- Outdated poll!: What population of organisms interests you?

Dandelions

- Start with one dandelion; it produces 100 seeds, of which only 4% survive to reproduce the next year.
  - How many dandelions after 3 years?
    - * 64?
    - * 125?