Isolation of Viruses Collected from the South Shore Waters of Oahu

Sarah Chang

Advisors:

Alexander Culley

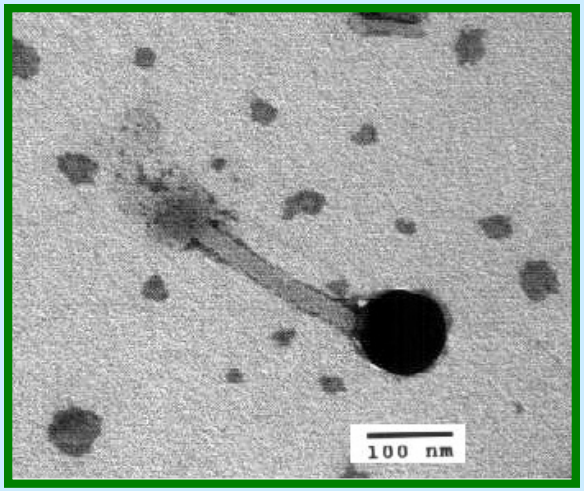
Grieg Steward

Outline

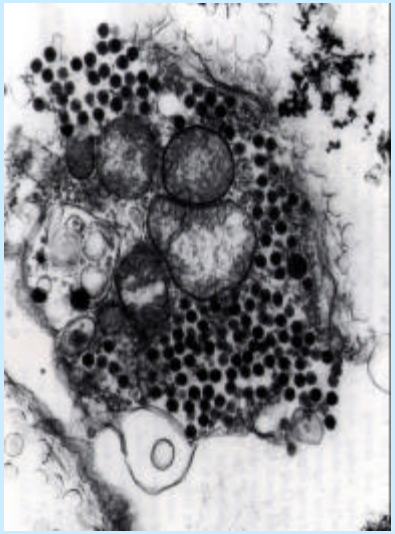
- Introduction
  - What is a Virus?
  - What is a Diatom?
  - Objective
- Materials and methods
- Data/results
- Conclusions
- Acknowledgements

What is a Virus?

- Microscopic particles of genetic material, surrounded by a protein coat
- Incapable of autonomous reproduction
- Three types of viral reproduction
  - **Lytic**, Lysogenic, Chronic infection



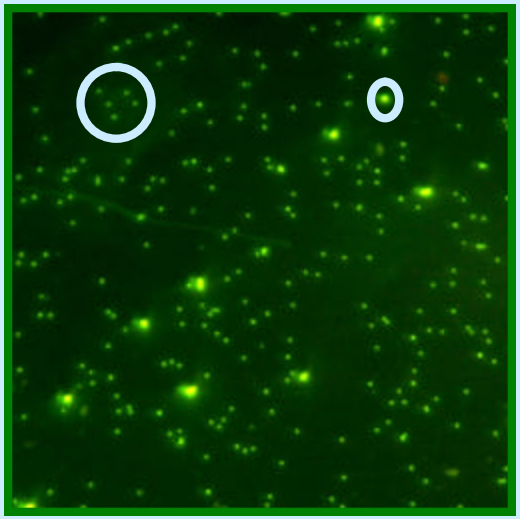
Virology.net



Suttle

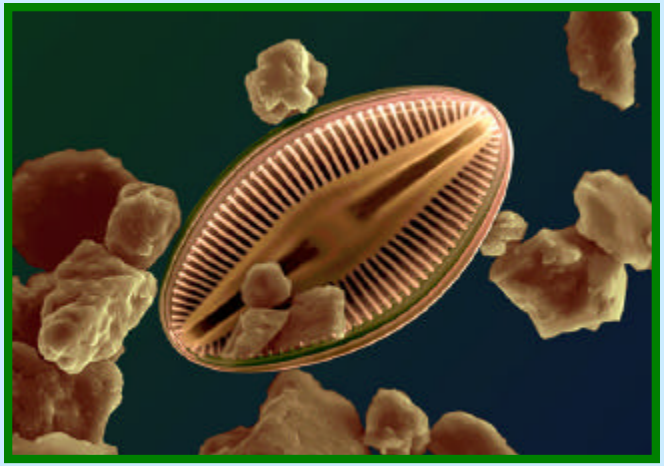
Viruses in the Ocean

- Marine viruses are abundant (billions per liter)



Culley

- Infect a diversity of marine life.



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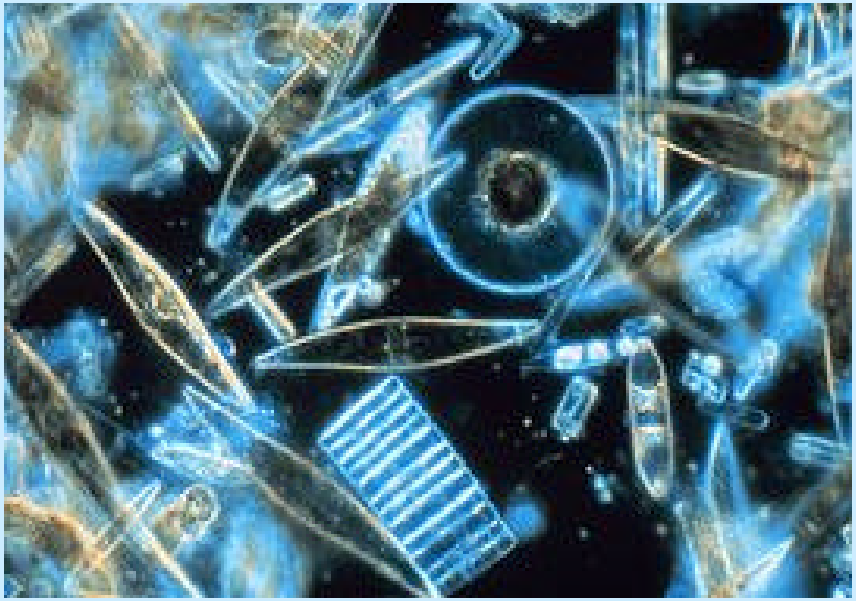
yoto98.noaa.gov

What is a Diatom?

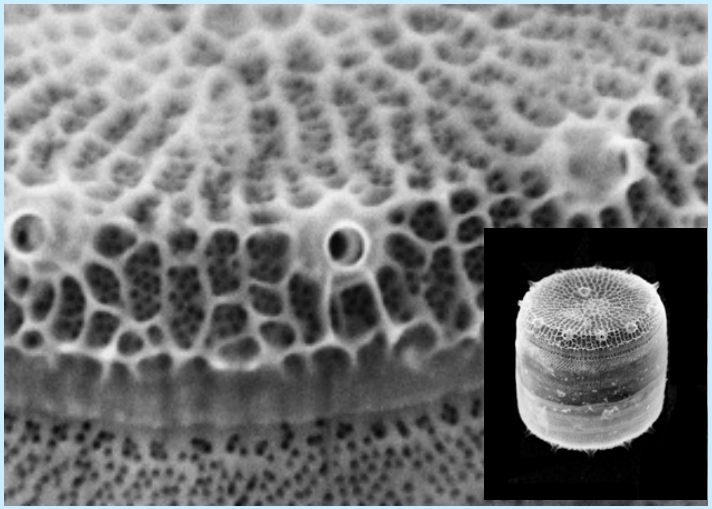
- Unicellular eukaryotic phytoplankton
- Have frustules composed of silica
- May be solitary or chain-forming; pennate or centric



NSF Polar Programs

Why are diatoms important???

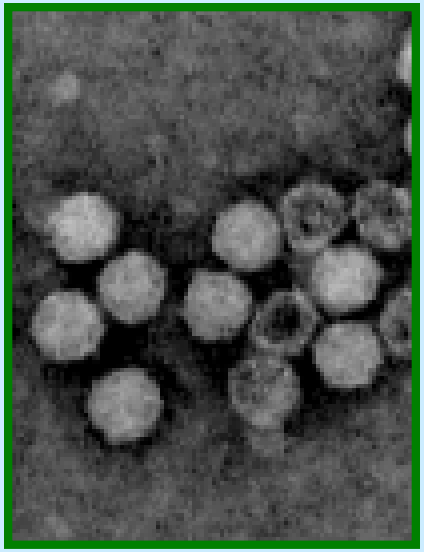
- Lowest trophic level and act as the food source for many higher organisms.
- Make a major contribution to global primary productivity
- Viruses can affect the transfer of material through the food web.
- Diatoms are used in:
  - Nanotechnology: Harvest silica
  - Insulating materials
  - Explosives
  - Filters and more.



Kroger

Diatom Viruses

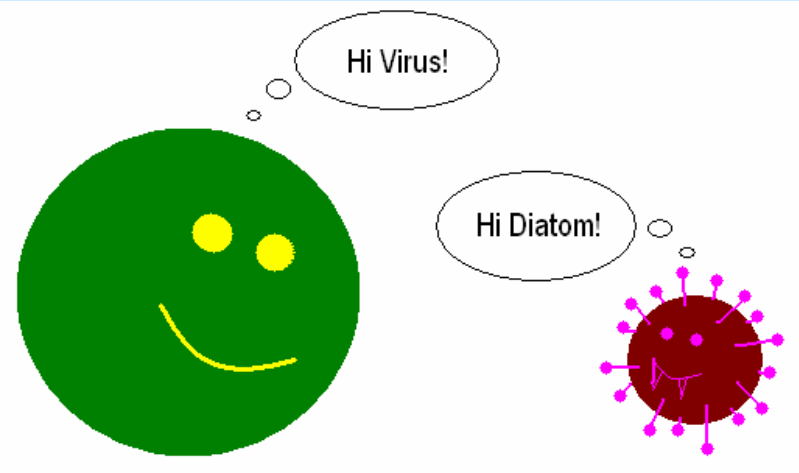
- Thought for some time that diatoms might not have viruses (protected by frustule)
- But no, they are not immune
- Just took a long time to find the first one; only a few diatom viruses have been isolated so far



Nagasaki et al. 2004

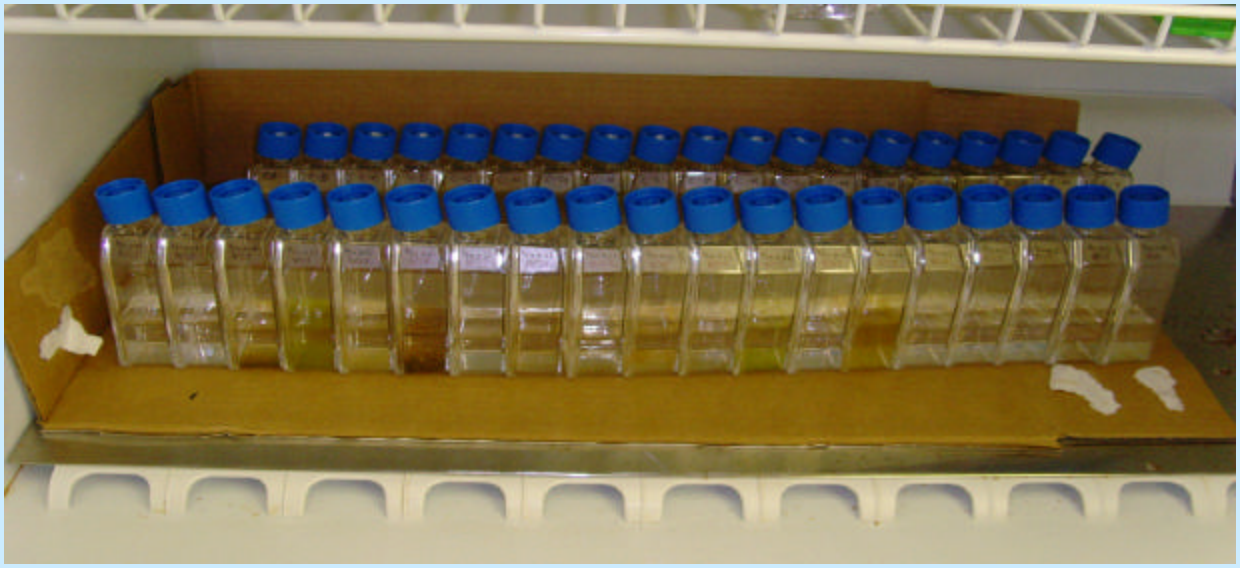
Objective

To isolate viruses infecting representative diatoms from coastal waters of Oahu that could be useful as model systems to study virus-diatom interactions



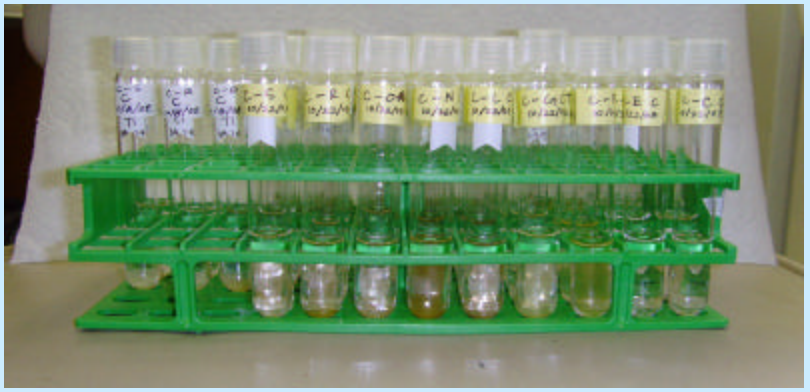
Materials and Methods

- 19 strains of diatoms isolated from coastal waters by Dr. Susan Brown
- Growth of the cultures was monitored by measuring chlorophyll fluorescence
- Nine cultures were chosen to be challenged with viruses



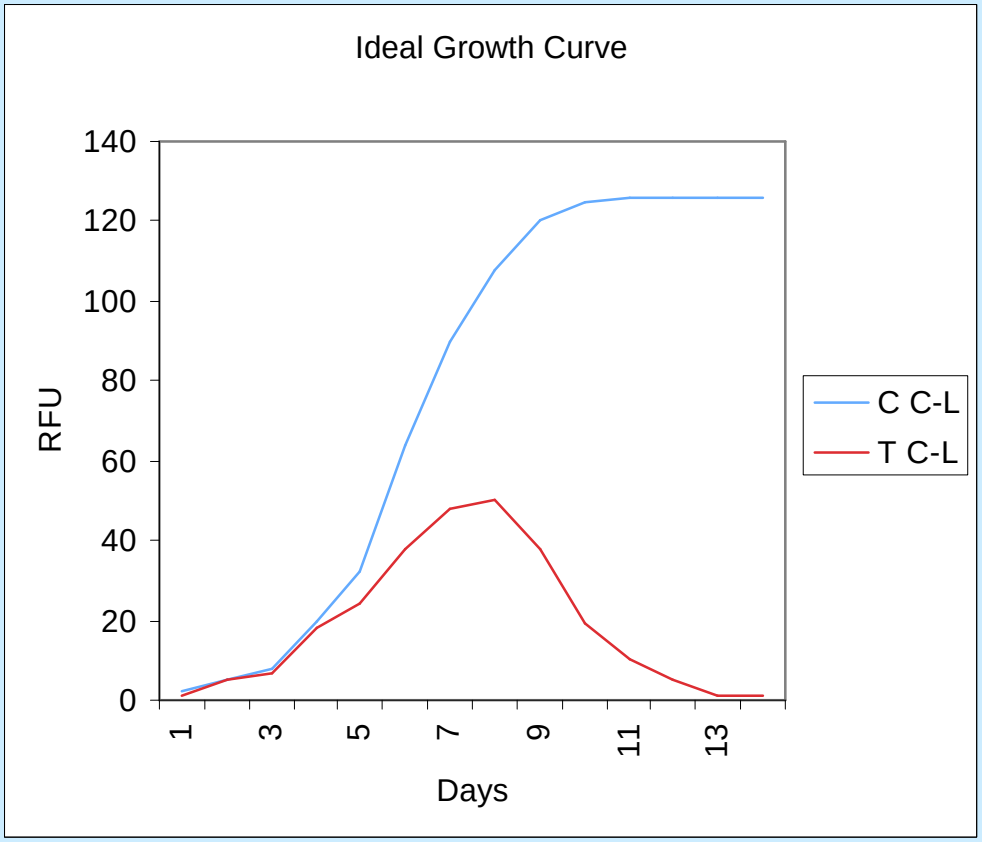
forum.hardware.fr

- Water was filtered through 0.22 µm filters
- The filtrate was transferred into tubes of diatom cultures (control tubes received no addition)
- Growth was monitored over time in treated and control tubes



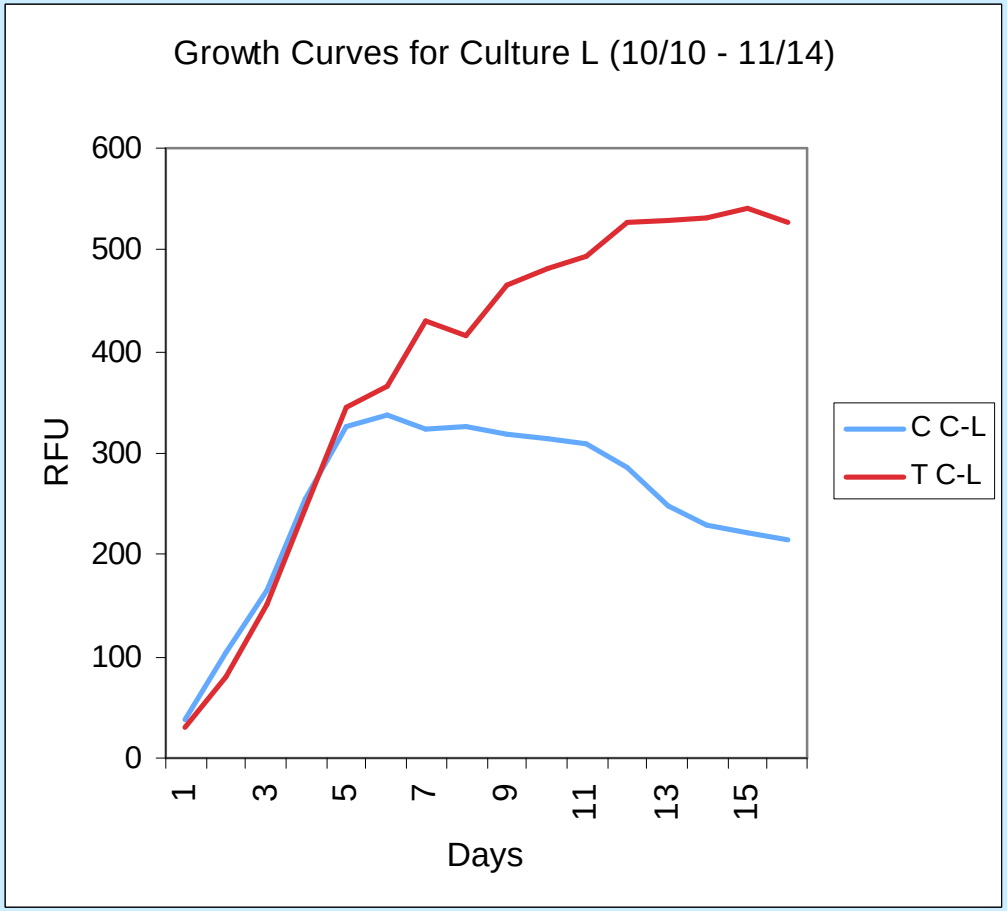
- Idealized results:
  - Exponential growth in Control tubes
  - Exponential growth in Treated tubes, followed by severe decline

But as the great Mick Jagger said…

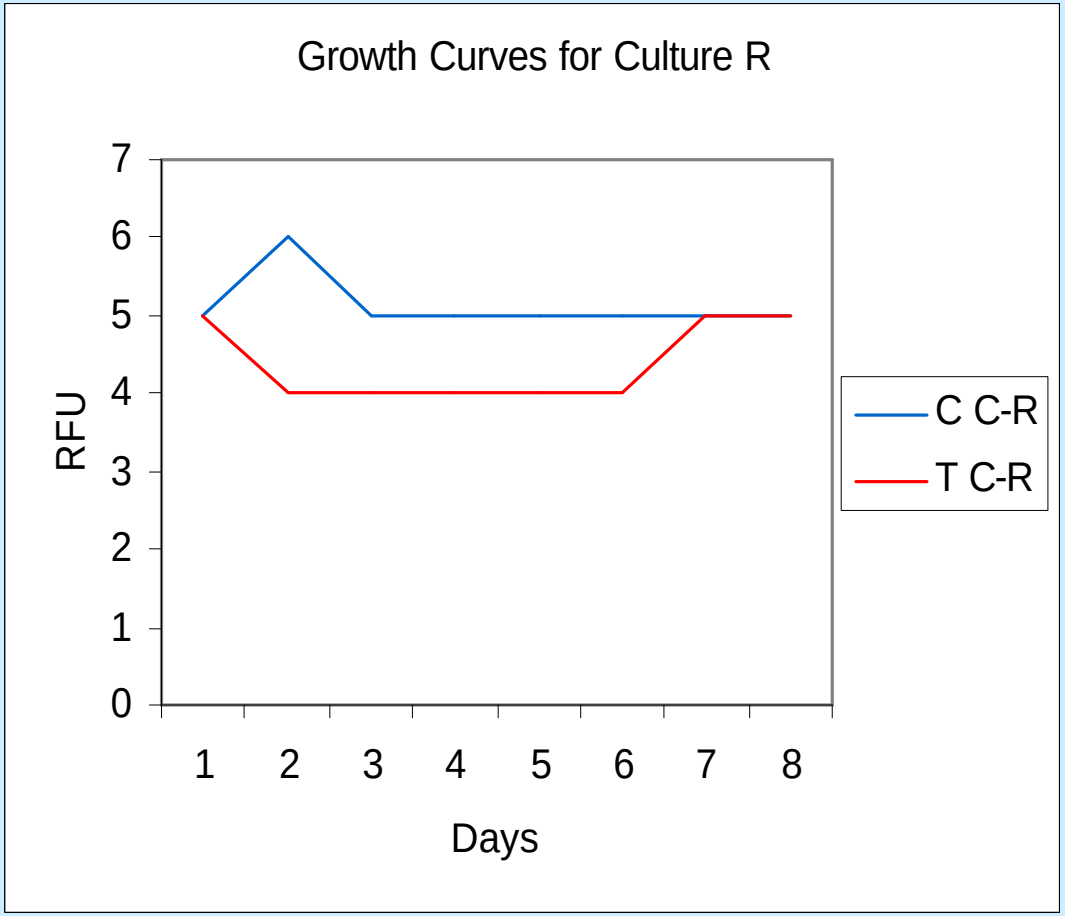


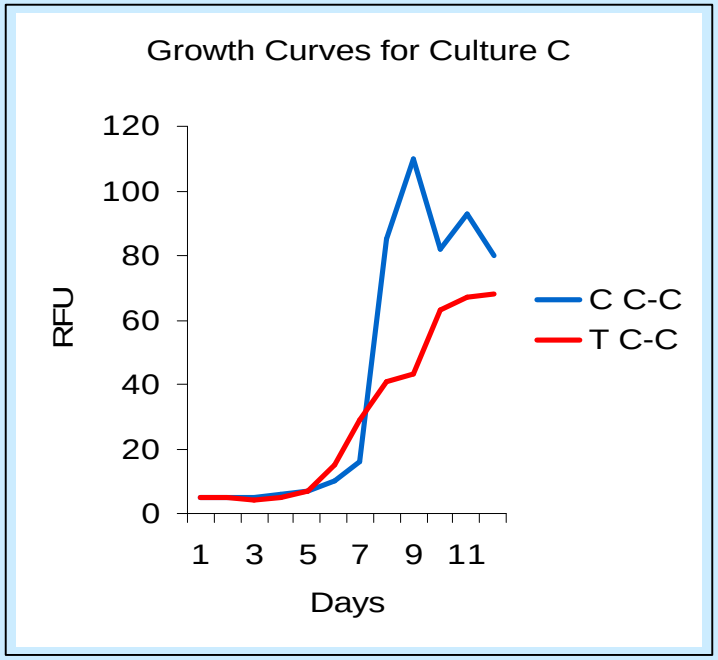
Data/Results

Fluorescence measurements showed consistent growth in Treated tubes and decline in the Control.

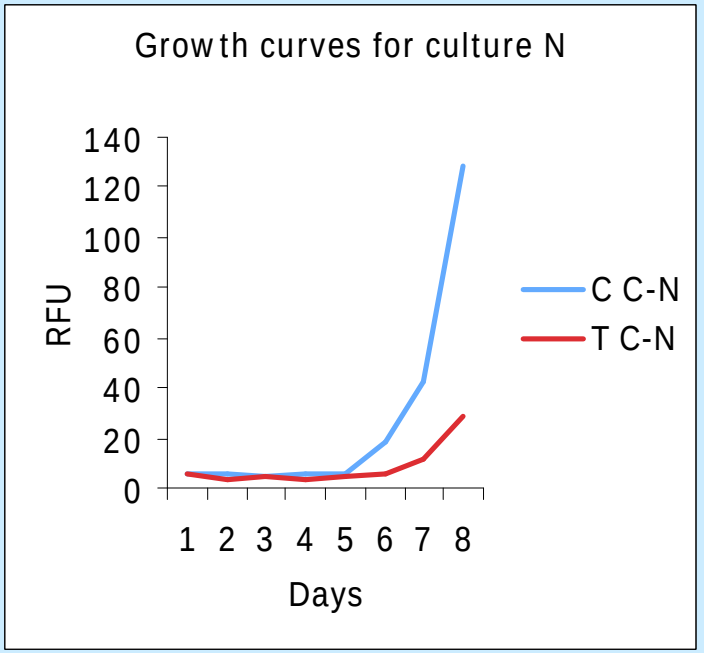


Little growth in control and treated cultures





11/3/08



11/12/08

Conclusions

- Documented the growth patterns of diatoms
- Challenged diatom cultures with viral communities from various locations on the island
- Found a few cultures showing inhibition in treatment relative to the control, but no crashes

Future Research

1. Set up the second round of infection to see if inhibitory effect can be propagated
2. Continue experiments challenging with additional virus sources and new cultures of diatoms
3. Developing higher-throughput screening
4. If a virus is found, it will be isolated and characterized

Thank you

- The National Science Foundation
- C-MORE

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Thanks!