

# An STS Approach to teaching Biology

Ruthann Dyer, PhD  
York University  
rdyer@yorku.ca

## Bethune College 1800

- First year seminar course for science majors
- 25 student enrollment: self selected from among the upper ranks of incoming students
- Focus:
  - Building social cohort and learning community
  - Mentorship with a science scholar
  - Critical thinking about science
  - Information literacy for academic research

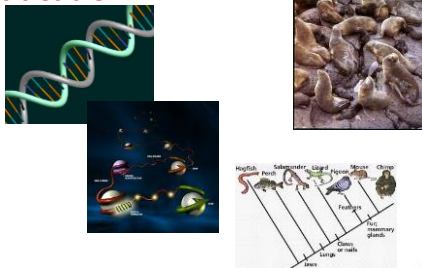
## Learning Outcomes

- The learner will be able to:
  1. retrieve, evaluate and compare sources of information related to the biological sciences;
  2. analyze readings from the history and philosophy of biology related to sex and human development;
  3. communicate conclusions effectively;
  4. participate effectively in oral discussions

## Science and Technology Studies (STS)

- Integrated and interdisciplinary examination of practice and production of science/technology using scholarship of:
  - Historiography
  - Philosophy
  - Social sciences

## Prevailing themes in Biology Education



## Sex Lives and Mistaken Ideas: Curriculum Threads

- Science as dynamic with changing paradigms
- Concepts of the organism and the individual
- Development and reproduction of organisms
- Evo-Devo concepts

## Methodology: First Year Seminar

- Mentorship re: first year concerns and navigating the bureaucracy of York University built into each class.
- Respect for the individual student's views emphasized; inclusive safe discussion fostered
- Small group work to build relationships
- Course website

## Methodology: Readings

- Primary sources eg.
  - *Upon Individuality* by T.H. Huxley
- Secondary sources from history of science and biology journals and books eg.
  - *This is Biology* by Ernst Mayer
  - *Genes and the Agents of Life: the Individual in the Fragile Sciences Biology* by Robert A Wilson
  - Maienschein, Jane (1984) What Determines Sex? *Isis* **75**, 3 pp 457-480

## Methodology: Concepts and Content

- Directed reading questions
- Reading response papers done in class
- Information literacy sessions taught for this specific class by, John Dupuis, science librarian
- Information literacy assignment on assigned topic of current interest to biologists
- Take home exam requiring demonstration of application and synthesis of ideas.

## Methodology: Concepts and Content

- Take home exam example:  
Write a 1500 word paper with standard APA or MLA citations on a discussion of the following concept:  
the concept of the individual  
The discussion will be in the form of a *conversation* between T.H. Huxley and Ernst Haeckel and may take any creative form.

## What are the strengths of this course? Student responses

- 'Gives the bigger picture'
- 'Intellectually stimulating-broadening our knowledge of science, interesting discussion questions, being able to voice our opinion and get feedback'
- 'The ability to understand the readings, learning to do literature reviews and write academically'
- 'The new perspective about science that was not obvious before'
- 'Using more than one discipline, eg. Applying geology to biology'
- 'Interfaced well with Bio 1010; helped me to think outside the box about science'

## Teaching challenges

- Open ended questions and discussions often tested my ability to relate material or experiences with the concept of the day!
- Finding papers and readings that were accessible
- Creating individual assignments for 20 x 2 students with no repetition
- Gaining the trust of the students for a course taught from an unfamiliar perspective
- Increased preparation time required when doing interdisciplinary teaching

## Discussion Questions

- What are the barriers if any to using such an approach in your courses?
- Should such courses be offered in first year or as a capstone course?
- Do students learn scientific concepts through an STS approach?
- Does the externalist view of STS separate the learner from their own identification as a scientist “in training”?