The Bridge Program: Teaching Modules Summary Page

Topic: Gender Benders: Endocrine Disrupting Chemicals

Bridge Students: Kelly Bush & Glenys Webster

Proposed Faculty Advisors: Ray Copes, Gail Belward? Stelvio Bandiera? Pierre Berube?

Background:
In 1962, Rachel Carson's book, "Silent Spring" warned that pesticides and other synthetic chemicals could affect the health of wildlife populations. At the time, her claims were widely dismissed in scientific communities. Thirty years later, Theo Colborn's book "Our Stolen Future" (1996) drew similar disdain by proposing that low levels of chemicals could interfere with hormonal systems, leading to reproductive and developmental health effects across multiple generations. These pioneering women rocked the foundation of toxicology and spurred the field of endocrine disruption research, one of the hottest and most controversial fields of scientific research today.

Endocrine disrupting chemicals (EDCs) are natural and synthetic compounds which interfere with the normal control of hormone systems. EDCs are found in everyday products such as plastics, food packaging, soaps, shampoos, cosmetics, perfumes, home electronics, paints, glues, furniture foams, and carpets. In wildlife populations, EDCs have been linked to the eggshell thinning in cormorants, the feminization of fish populations, hermaphroditic snails, and deformed sex organs in alligators and polar bears, among many other effects. Although the evidence is less strong in humans, decreasing sperm counts, increasing miscarriage rates, impaired learning in children, and early puberty all have proposed links to EDCs. This course will introduce you to this fascinating field of research, including the hot topics, challenges and pitfalls, and potential policy solutions to this complex environmental health problem.

Who should take this course? Undergraduate students from Environmental Science, Civil Engineering, Biological and Chemical Engineering, Biology, Pharmaceutical Sciences, Chemistry, Geography, Earth and Ocean Sciences and more….

Why should you take this course? To enhance your understanding of the environmental and potential human health impacts of many commonly used chemicals, specifically EDCs.

Module Duration: ~ 2 weeks (3 hrs per week)

Module Contents

- **Intro to EDCs**: History (Rachel Carson, Theo Colborn), Early evidence in Wildlife, Significance
- **EDCs around us**: What chemicals, Uses, Sources to the environment (e.g. sewage)
- **Environmental Fate**: Chemical properties, Partitioning, Bioaccumulation
- **EDCs & Humans**: Routes of exposure, Body burden, Health effects, Research challenges
- **Risk Assessment**: Define Risk, Dose-response, Low dose effects, timing of exposure
- **Policy Solutions**: Precautionary principal, EU REACH legislation, Approaches in Canada & the US, sewage treatment etc.

Delivery Mode: Lectures, Web CT

Evaluation:
- 2 page written assignment (TBA)
- Mini oral presentation (~5-10 minutes), in partners?
- Some participation marks

EDC List for Assignment / Oral Presentation

- Ethynyl estradiol (synthetic estrogen)
- PCBs
- Dioxins
- Furans
- Phthalate esters
- PBDEs
- Organochlorines (e.g. PCP)
- Phytoestrogens (soy etc)
- PFOS / PFOA