

Chemicals, Health and the Environment

Urban & Environmental Policy & Planning
Instructor: S. Krimsky

UEP 281 Spring 2015
Tuesdays 1:30-4PM

Objectives:

- (1) To examine the scientific and historical development of a hypothesis (called the Environmental Endocrine Hypothesis) that links certain classes of environmental chemicals to developmental and reproductive abnormalities and disease in humans and wildlife and to discuss the significance of the pesticide DDT and the synthetic hormone DES to an understanding of endocrine disrupting chemicals.
- (2) To explore the health and environmental consequences of endocrine disrupting chemicals, and to assess the evidence (positive and negative) of their environmental and human health effects.
- (3) To study the public, media, industry, and policy responses (including the regulation of toxic substances) to the new theory of chemically induced disease and developmental anomalies.
- (4) To discuss the role of contested and limited knowledge, the Precautionary Principle, and science-based policy in developing federal responses to toxic chemicals.

The course will be run in a seminar format with active participation by students.

Readings for Class

Sheldon Krimsky, *Hormonal Chaos*. Johns Hopkins University Press, 2000 (pap).
Rachel Carson, *Silent Spring*. Houghton Mifflin, 1996 (pap)
T. Colborn, T. Dumanoski and J.P. Myers. *Our Stolen Future*. Dutton, 1997 (pap)
Reading packet with articles available at UEP office.

Important Websites

e.hormone Website, Tulane University: <http://e.hormone.tulane.edu>
Univ. of Ottawa, endocrine disruptors and human health: <http://www.emcom.ca/>
EPA Site on EDCs: <http://www.epa.gov/scipoly.oscpendo/index.htm>
Green Facts. Org: Global assessment of the state-of-the-science of endocrine disruptors by the International Programme on Chemical Safety:
http://www.greenfacts.org/studies/endocrine_disruptors/index.htm
Our Stolen Future Web Site: <http://www.ourstolenfuture.org>
Environmental Health News: <http://www.environmentalhealthnews.org>

Jan. 25: Sess. 1
Introduction

Overview of the course. Guiding questions; how does our society regulate and control chemicals? What criteria are used to prohibit chemicals from commerce; internalist and externalist roles of science in environmental policy; science, values and policy. Discussion of assignments and student research topics. Contributions of Rachel Carson. Student survey.

Video: Rachel Carson and her work. *The American Experience* series.
Discussion of video; queries about *Silent Spring*

Readings:

Reviews of *Silent Spring*:

I.L. Baldwin, "Chemicals and pests" *Science* 137:1042 (September 28, 1962);
William J. Darby, "Silence, Miss Carson. *Chem. & Eng. News* Oct. 1, 1962, pp. 62-63.

Feb. 1: Sess. 2.
Rachel Carson's Legacy

Impact of *Silent Spring*; culture of pesticide use in the 1950s; backlash against Carson;
Role of DDT in malaria control.

Readings:

Book: *Silent Spring* by Rachel Carson

H. Burlington and V. Lindeman, "Effect of DDT on Testes and Secondary Sex Characters of White Leghorn Cockerels," *Proceedings of the Society for Experimental Biology and Medicine* 74:48-51(1950).

John Wargo, Ch. 2. "The Urgency of Malaria" *Our Children's Toxic Legacy*. Yale 1996.

New York Times articles: John Tierney, "Public perceptions, international politics, and killers of mosquitoes, Sept. 16, 1999. Editorial, "Fighting malaria with DDT, Dec. 23, 2002; Sheryl Stolberg, "DDT, target of global ban, finds defenders in experts on malaria," Aug. 29, 1999.

Feb. 8: Sess. 3
The Diethylstilbestrol (DES) Story:I

Video: *A Health Baby Girl* Judith Helfand

Readings:

Our Stolen Future Intro: Chapters 1-3.

Ingar Palmlund, "Exposure to a xenoestrogen before birth: the diethylstilbestrol experience." *J. Psychosom. Obstet. Gynec.* 17(1996)71-84.

Susan D. Hadden, "DES and the Assessment of Risk, Ch. 5, *Controversy*, Dorothy Nelkin, ed. Sage, 1979.

Deborah Cadbury, *The Feminization of Nature*. Hamish-Hamilton, London, pp. 41-50.

Robert Meyers. *D.E.S.: The Bitter Pill*. Seaview/Putnam, New York, 1983. Ch. 15, "DES on the Dinner Table," pp. 189-202.

Dorothy Cottrell. "The Price of Beef." *Environment* 13(6):44-50(1971).

Assignment for Week 4.

By using the Internet, investigate one of the following issues:

- 1) Use of growth promoters other than DES in beef or poultry.
- 2) Effects of DES on male offspring of pregnant mothers who had taken it.
- 3) Current concerns of DES offspring and others connected by DES self-help groups.
- 4) Other current uses of DES
- 5) The use of Recombinant Bovine Somatotropin (BST) in cows for milk production also known as bovine growth hormone (BGH).
- 6) Use of growth hormones on adults for maintaining youthful vigor.

Begin by posing one or more questions to guide your search; list the search engines that you used for your investigation. Write a 2-3 page memorandum on the results of your investigation. A question might be: Is there any evidence that DES affected male offspring and if so how strong? Another question: Are humans exposed to hormones in the food supply?

Feb. 15: Sess. 4 The DES Story: II

Video: *Tall Girls*

Readings:

Our Stolen Future, Chapters 4 & 5..

Hormonal Chaos, Preface, pp. 1-15.

Ingar Palmlund. 1996. To cell from environment. *Cellular and Molecular Mechanisms of Hormonal Carcinogenesis: Environmental Influences*. J. Huff, J. Boyd, and J.C. Barrett, eds. Wiley-Liss.

Howard A. Bern. "The Fragile Fetus." *Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection*. T. Colborn and C. Clement, eds. Princeton Scientific Publishing Co., 1992, pp. 9-15.

John A. McLachlan and Retha R. Newbold. "Estrogens and Development." *Env. Hlth. Persp.* 75:25-27 (1987).

Feb. 22: Sess. 5

Theo Colborn's Contributions

Video on Theo Colborn, World Wildlife Fund

Readings:

Our Stolen Future, Chapters 6 & 7.

Hormonal Chaos, pp. 15-54.

Wapner, Kenneth. 1995. "Chemical Sleuth." *The Amicus Journal* 17(1):18-21(Spring 1995).

E.F. Keller. *Reflections on Gender and Science*. Yale, 1985, pp. 129-138.

E.F. Keller. *A Feeling for the Organism*. W.H. Freeman & Co., 1983, pp. 187-207.

H. Patricia Hynes. Ch. 1 The Broad Margins of Life. *The Recurring Silent Spring*. Pergamon Press, 1989.

Theo Colborn, "Pesticides--How research has succeeded and failed to translate science into policy: endocrinological effects on wildlife." *Environmental Health Perspectives* 103:81-86 (Supplement 6), September 1995.

Mar. 1: Sess. 6

Basic Ideas of Endocrinology: Chemical Messengers: Hormones & Development

Readings:

GBPSR & MASS PIRG. 1996. *Generations at Risk*. Ch. 1 "The Reproductive System," and Ch. 7 "Endocrine Disrupters."

John A. McLachlan and Steven F. Arnold. 1996. "Environmental Estrogens." *American Scientist* 84:452-461

F. S. Vom Saal. 1995. "Environmental Estrogenic Chemicals: Their Impact on Embryonic Development." *Human Ecological Risk Assessment (HERA)* 1(2):3-15.

Colborn, T. Vom Saal, F.S. and Soto, A.M. "Developmental effects of endocrine disrupting chemicals in wildlife and humans." *Environmental Health Perspective*. 101:378-384 (1993).

Mar. 8: Sess. 7

Sexual Differentiation and Endocrine Disruptors (in Wildlife and Humans)

Readings

Louis Guilette. Statement before the Subcommittee on Health and the Environment, Committee on Energy and Commerce, U.S. House of Representatives. *Health Effects of Estrogenic Pesticides*. Hearing on October 21, 1993. USGPO, 1994, pp. 39-49.

Janet Raloff. 1994. "The Gender Benders." *Science News* 145:24-27(January 8); 145:56-59(January 22).

Retha R. Newbold. 1993. "Gender-related Behavior in Women Exposed Prenatally to Diethylstilbestrol." *Environmental Health Perspective* 101(3):208-213(August).

Fry, D., Toone, C. , Speich, S., Peard, R. 1987. "Sex ratio skew and breeding patterns of gulls: demographic and toxicological considerations. *Studies in Avian Biology* 10:26-43.

Michael R, Conover and George L. Hunt, Jr. 1984. Female-female pairing and sex ratios in gulls: an historical perspective. *The Wilson Bulletin* 96(4):619-623(December).

Greene, R. , Burrill, M. And Ivy, A. 1939. "Experimental intersexuality: Masculinization of female rats by postpartum treatment with anterior-pituitary-like hormone. *Proc. Society for Experimental Biology and Medicine* 40:514-516.

Mendola, P. et. Al. 1997. Consumption of PCB-contaminated freshwater fish and shortened menstrual cycle length. *Amer. J. Epidemiology* 146:5-10(December 1).

Macarolli, Paolo et al. "Paternal concentrations of dioxin and sex ratio of offspring." *The Lancet* 395:1858-1839 (May 27, 2000).

Assignment for Week 8.

Prepare a brief essay on the critics of the Environmental Endocrine Hypothesis and/or *Our Stolen Future*. You may select one component of the EEH (e.g., sperm decline, breast cancer). Discuss the nature of the contesting evidence.

Mar. 15: Sess. 8

Emergence of a Public Hypothesis

Readings

Our Stolen Future, Chs. 8, 9 & 10; Appendix: Wingspread Consensus Statement

Hormonal Chaos, Ch. 2 and Ch. 3.

Safe, Stephen H. 1995. "Environmental and dietary estrogens and human health: Is there a problem?" *Environmental Health Perspectives* 103(4):346-351(April).

Theo Colborn. 1996. From *Silent Spring* (1962) to *Wingspread* (1991). *Comments on Toxicology* 5(4-5):319-328.

Ana Soto and Carlos Sonnenschein. 1996. Environmental sex hormone mimics and antagonists. *Comments on Toxicology* 5(4-5):329-346

Student reports on critics of *Our Stolen Future*.

Mar. 23: Spring Break-No classes

Mar. 29: Sess. 9 Sperm Decline

Video: *Assault on the Male*. British Broadcasting Co.

Readings:

Wright, Lawrence. 1996. "Silent sperm." *The New Yorker* Jan. 15. pp. 42-55.

Richard M. Sharpe and Niels E. Skakkebaek. 1993. Are Estrogens Involved in Falling Sperm Counts and Disorders of the male Reproductive Tract? *The Lancet* 341:1392-1395(May 29).

Carlsen, E., Giwercman, A. Keidings, N. Skakkebaek, N. 1992. "Evidence for decreasing quality of semen during past 50 years." *British Medical Journal* 305:604-13(September 12).

S. Irvine, E. Cawood, D. Richardson, E. McDonald, J. Aitken. 1996. Evidence of deteriorating semen quality in the United Kingdom: birth cohort study in 577 men in Scotland over 11 years. *British Medical Journal* 312:467-471(February).

J. Auger et al. 1995. Decline in semen quality among fertile men in Paris during the past 20 years. *New England Journal of Medicine* 332(5):281-285(February 2).

Larry I. Lipshultz. Editorial. 1996. The debate continues. *Fertility and Sterility* 65(5):209(May).

Harry Fisch et al. 1996. Semen Analysis in 1,283 men from the United States over a 25-year period: No decline in quality. *Fertility and Sterility* 65(5):1009-1014.

Finnish study reporting alterations in testicular characteristics and sperm quality over the past 50 years. *British Medical Journal* Jan. 1997 (To be distributed).

C. A. Paulsen, N. G. Berman, C. Wang. 1996. Data from men in greater Seattle area reveals no downward trend in semen quality: further evidence that deterioration of semen quality is not geographically uniform. *Fertility and Sterility* 65(5):1015-1020(May).

Swan, Shanna, H. ; Elkin, Eric, P.; Fenster, Laura. "The question of declining sperm density revisited: An analysis of 101 studies published 1934-1996. *Env. Hlth. Persp.* 108:961-966 (2000).

Shanna H. Swan. Do environmental agents affect semen quality? *Epidemiology* 14:261-262 (May 2003).

April 5: Sess: 10

Cancer and Xenoestrogens

Video: Talk by Devra Davis

Readings:

Our Stolen Future Ch. 11

Davis, Devra Lee and Bradlow, Leon. 1995. "Can environmental estrogens cause breast cancer? *Scientific American* 273(4):166-172(October).

Janet Raloff. "EcoCancers." *Science News* 144:10-12(July 3, 1993).

Health & Environment. 1995. Xenoestrogens and Breast Cancer Risk. 8(1):77-81(February).

Public Health Reports. Mapping out a search for environmental causes of breast cancer. 3(6):495-507(Nov./Dec.)

Hunter et al. 1997. Plasma organochlorine levels and the risk of breast cancer. *NEJM* 337(18):1253-1258 (October 30).

Safe, Stephen H. 1997. Xenoestrogens and breast cancer. [editorial]. *NEJM* 337(18):1303-4 (October 30).

Sandra Steingraber. Ch.12 "Ecological Roots," *Living Downstream: An Ecologist Looks at Cancer and the Environment*. Addison Wesley, 1997, pp. 254-272.

April 12: Sess. 11

Brain and Behavior

Readings:

Jacobson, J.L. and Jacobson, S.W. 1996. "Intellectual impairment in children exposed to polychlorinated biphenyls in utero." *The New England Journal of Medicine* 335(11):783-789.

Susan Porterfield. 1994. Vulnerability of the developing brain to thyroid abnormalities: environmental insults to the thyroid system. *Environmental Health Perspectives* 102 (Supplement 2) June.

Erice Consensus Statement.

Helen B. Daly. 1993. Laboratory rat experiments show consumption of Lake Ontario salmon causes behavioral changes: support for wildlife and human research results. *J. Great Lakes Res.* 9(4):784-788.

Steve Sternberg. 1997. Tracking biological sabotage. *USA Today*. September 18.

F.S. vom Saal et al. 1995. Estrogenic pesticides: binding relative to estradiol in MCF-7 cells and effects of exposure during fetal life on subsequent territorial behavior in male mice. *Toxicology Letters* 77:343-350 (1995)..

P. Palanza, F. Morellini, S. Parmigiani, F.S. vom Saal. Prenatal exposure to endocrine disrupting chemicals: effects on behavioral development. *Neuroscience and Biobehavioral Reviews* 23:1011-27 (1999).

April 19: Sess. 12

Regulatory Responses to EDCs: Report of the National Academy of Sciences

Readings:

Our Stolen Future Ch.12, 13, & 14.

Hormonal Chaos, Ch. 4, epilogue.

S. Krimsky. 1996. Environmental Endocrine Hypothesis and Public Policy. *Comments on Toxicology* 5(4-5):487-502.

Executive Summary, Endocrine Disrupter Screening and Testing Advisory Committee, (EDSTAC), EPA, Final Report, August 1998.

April 26: Sess. 13

National Academy Report on Endocrine Modulators

Margie Patlak. 1996. A testing deadline for endocrine disrupters. *Environment Science & Technology* 30(12):540-544.

Selections from: National Research Council, *Hormonally Active Agents in the Environment*, July 1999, pp. 1-23.

Safe, Stephen H. "Endocrine disruptors and human health-Is there a problem? An update. *Environmental Health Perspectives* 108:487-493 (June 2000). (Not in packet).

Daland R. Juberg. Review with Conclusions: An Evaluation of Endocrine Modulators: Implications for Human Health. *Ecotoxicology and Environmental Safety* 45:93-105 (2000).

Student Reports

May 3: Student Reports

Assignments/grade points

1. Prospectus for semester paper with bibliography (10 pts)
2. Semester research paper: 20-25 pp. (50 pts)
3. Class presentation of research (10 pts)
4. Short essays (2 @ 10 pts)
5. Class preparedness, attendance and participation (10 pts).