

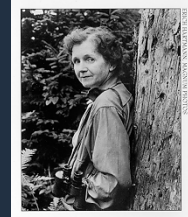
## The Environmental History of DDT and "Silent Spring"

Principles of Environmental Toxicology  
Instructor: Gregory Möller, Ph.D.

## Silent Spring

"Over increasingly large areas of the United States spring now comes unheralded by the return of birds, and the early mornings are strangely silent where once they were filled with the beauty of bird song."

Rachael Carson, 1962, *Silent Spring*



2

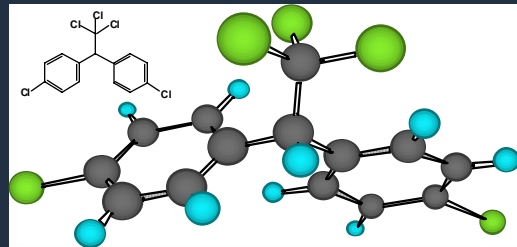
## Environmental History

Adapted from the review of G. Dewey, *Keck Graduate Institute for Applied Life Sciences, Claremont, CA.*

3

## DDT

- World Health Organization credits DDT with saving 50,000,000 lives.
- Dichlorodiphenyltrichloroethane



4

## Success of DDT in Controlling Malaria

Country	Year	Cases
Venezuela	1943	8,171,115
	1958	800
India	1935	10,000,000
	1969	285,962
Italy	1945	411,602
	1968	37
Taiwan	1945	1,000,000
	1969	9



5

## The "Glory Years" for DDT

- 1945-1960, used to control agricultural pests as well as disease-carrying insects.
- Other chlorinated insecticides discovered.
  - Chlordane, dieldrin, mirex, lindane, methoxychlor, etc.
- Massive insect-control projects undertaken.
  - Gypsy moth (4 million acres sprayed '54-'58) Dutch elm disease, Fire ant.
- Growth in DDT production.
  - 1953 38 million pounds; 1957 84 million pounds; 1959 125 million pounds.

6

## Publication of "Silent Spring"

- "Silent Spring" published in 1962.
- Written by Rachel Carson, a respected marine biologist.
- An expose of the damage to the environment from indiscriminate use of chlorinated pesticides.



7

## Impact of "Silent Spring"

- A plea for less harmful methods of insect control and a changed attitude toward nature.
  - We must abandon the idea of "conquering" nature and seek instead to work with its processes.
- Book quickly became a best-seller.
  - Chemical and pesticide industry alarmed by book's success and attacked it.
- Congressional hearings; Presidential Scientific Advisory Committee study.

8

## Impact of "Silent Spring", 2

### Key points:

- A technology that seems harmless may have serious long-term effects on the environment.
- Actions of humans have become the dominant environmental influence on the health and well-being of the planet.

9

## Impact of "Silent Spring", 3

- Birth of environmental movement in America can be traced to the publication of Silent Spring.
- (1992) Picked as the "most influential book" published in past 50 years.

10

## Chemical Industry Response

- Pesticides essential for public health and modern agriculture.
  - No humans had died from DDT, so it was safe (for people, anyway).
  - Tales regarding DDT and wildlife were exaggerated.
- In their view, Rachel Carson was
  - "a simplistic nature worshipper intent on subverting the continuing progress of science that was central to the development of the nation".

11

## Chemical Industry Response, 2



- Defense of DDT became defense of a civilization based on scientific and technological "control" of nature.

12

## Scientific Advisory Committee

- Convened by the President.
- DDT not a hazard to human health.
- Chemical control of insects necessary,
  - but, environmental problems associated with indiscriminate use of pesticides.
- Need to reduce hazards associated with use.
- Need stronger regulation and control of pesticide use.
- Should phase out use of “persistent” pesticides like DDT.

13

## The Case Against DDT

### The Madison Conference (1965)

- Birds whose problems with DDT most easily studied = peregrine falcons.
  - Occupy same nests each year.
  - Population normally stable; species is widespread.
  - Raptor at top of food chain.
- Population began declining in 1950's due to failure to reproduce.
  - Were laying infertile, thin-shelled eggs.



14

## Studies Suggested

- Were chlorinated insecticides responsible?
- Conferees decided information needed on following:
  - Levels of pesticides and their metabolites in species.
  - Distribution of such compounds in environment.
  - How (if at all) pesticides cause reproductive failure.
- Bioconcentration of DDT found to be widespread.

15

## Madison Conference Results

- Change in average weight of egg shells.
  - 1900-1946 (pre DDT) 3.8 grams.
  - 1950-1967 (post DDT) 3.1 grams.
- Study of kestrels at USFWS Patuxent lab shows correlation of reduced shell weight with level of DDE (degradation product of DDT) fed to birds.
- Only some species of birds have reproductive success adversely influenced by DDT or DDE.

16

## EDF: Role in Banning DDT

- Environmental Defense Fund (EDF), 1967.
- Objective: To preserve environment by legal action backed by scientific evidence.
- Approach to DDT:
  - Every citizen has right to a clean environment.
  - Use of persistent pesticides destructive to environment.
  - Detail scientific evidence proving this.
  - Other equally good, environmentally benign methods of insect control available.

17

## Legal Actions by EDF

- First legal action: Injunction to stop use of DDT for mosquito control in Suffolk County, NY.
  - County stops using DDT before court renders decision.
- Landmark legal case: Suit to ban use of DDT for insect control in Wisconsin (1968).
  - Through media coverage of trial EDF got facts about DDT before nation.
  - Industry did poor job of “defending” DDT.
- EDF won the case.

18

## EDF Petitions Federal Ban

- 1969, Initial petition is to Secretaries of HEW and Agriculture.
  - When they take no action, EDF files petitions in Federal court to try to force action.
- Congress creates EPA in 1969 and makes it responsible for decisions on pesticide use.
  - Courts rule that EPA should act on EDF petition.
- After long legal battle, and lengthy series of hearings, the EPA bans DDT in 1972.

19

## Retrospective 28 Years Later

- What were faults of DDT?
- Too great persistence in environment.
- Bioaccumulation and biomagnification in food chain.
- Lack of toxicity of DDT to humans no guarantee of safety for other species (such as birds).
- Long-term use leads to development of DDT resistance in insects.

20

## Impact of "Silent Spring"

Greatest contribution:

- Call for a new attitude toward nature.
  - a recognition of the possibly destructive effects of humanity's actions on the environment.



21