

What is Aquatic Toxicology?

What is an aquatic toxicant?

What constitutes a toxic effect?

How do you determine toxicity?

**How do you determine
sensitivity/susceptibility?**

How do you measure the toxicant?

In what?

Does the chemical/physical form matter?

How do you determine correct:

- identification,**
- quantification,**
- level of precision**
- detection limits of the methodology**

How do you determine cause-effect?

Is it important?

**Give me an example of a known
xenobiotic with an known
deleterious effect**

DDT and Eggshell Thinning in Raptors

**Is there a Cause-Effect Relationship
and how is that established?**

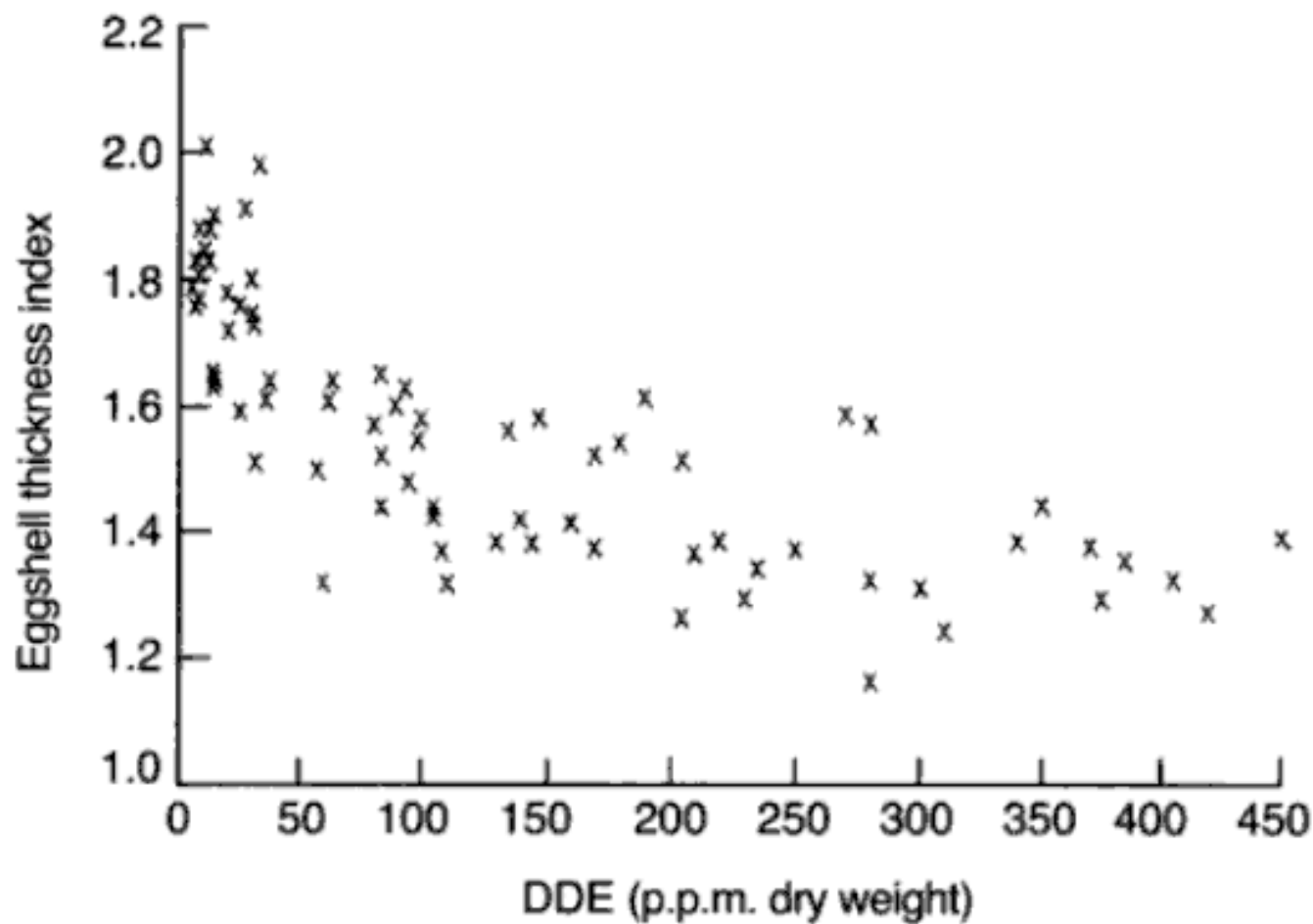


Figure 16.2

Relationship of eggshell thickness index to DDE residue levels in peregrine eggs collected from Alaska and northern Canada. (From Peakall, 1993, reprinted with permission from *Environmental Reviews*.)

Sparrowhawk

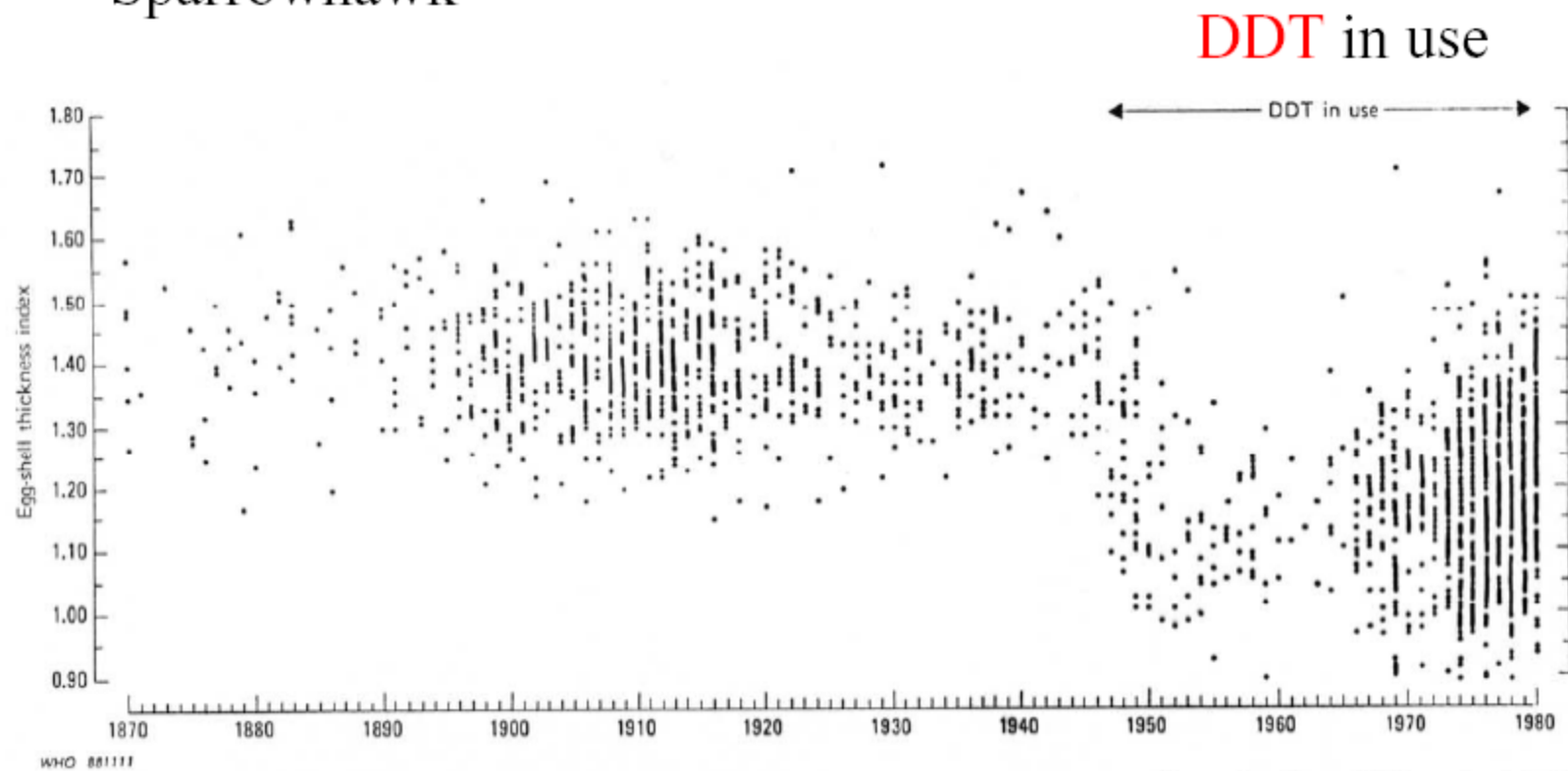


Fig. 2: Shell thickness index of British sparrowhawks, 1870-1980. Shells become thin abruptly from 1947, coincident with the widespread introduction of DDT in agriculture. Each spot represents the mean shell-index of a clutch, and more than 1000 clutches have been represented from all regions of Britain. Shells were made available for measurement from museums and private collections. From: Newton & Hass (1984).

Year

What is the Molecular Basis of Action?

▶ According to the most current hypothesis, *p,p'*-DDE exposure of the adult bird inhibits prostaglandin synthesis in the shell gland mucosa and, as a consequence, calcium and bicarbonate transport across the mucosa is reduced ([Lundholm 1993](#), [1997](#)).

Embryonic exposure to *o,p'*-DDT causes eggshell thinning and altered shell gland carbonic anhydrase expression in the domestic hen. [Holm L](#), [Blomqvist A](#), [Brandt I](#), [Brunström B](#), [Ridderstråle Y](#), [Berg C](#)

Biomarkers at Different Organizational Levels

Organizational Level	Example of Biomarker
Binding to a receptor	TCDD binding to Ah receptor Nonylphenols binding to estrogen receptor
Biochemical response	Induction of monooxygenases Vitellogenin formation
Physiological alterations	Eggshell thinning Feminization of embryos
Effect on individual	Behavioral changes Scope for growth