

Regulation and Exposure for Safe Pesticide Use

Bob Krieger
Personal Chemical Exposure Program
Department of Entomology
University of California, Riverside

Pleasanton: Target, 2007

- Our chemical world-It's about Use!
- Food and environmentalism
- Everything goes somewhere! (*Takehome*)
- **Safety evaluation**
- Biomonitoring: How little is *really* OK?

We live in a chemical world!

More than 31,500,000 known

- Origin

Natural and Synthetic

- Class

Organic and Inorganic

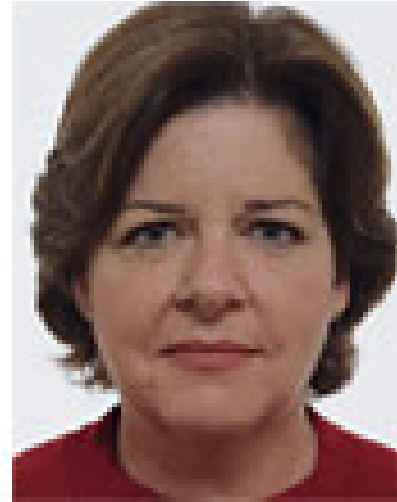
- Use

Process • ***Commercial Products*** • Pollutants

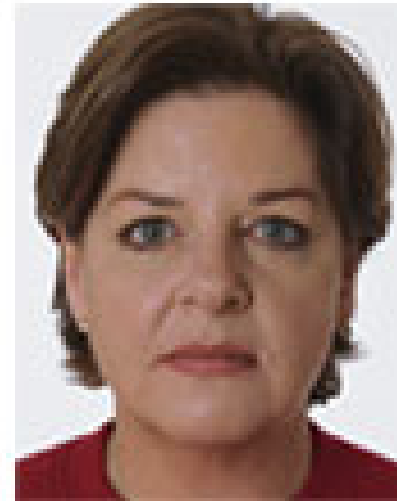
Foods • Drugs • Cosmetics • Pesticides

BOTOX: *Botulinus* toxin

Before



After



How much is too much? How little is OK?

Exposure

- Dose makes the poison.
- All-or-none.

Response

- Safe levels of everything.
- Anything spells harm.

Safety Evaluation

- Aware testing limitations
- Testing irrelevant.

Pesticide Perceptions are our Chemical World

Pesticides Become Focus of Environmentalism

Some Issues That
Moved and Polarized
the Public

Loss of public confidence in chemical technologies, particularly pesticides— Environmentalism!



Rachel Carson, *Silent Spring*, A Novel, 1962

√ **Pure foods: RESIDUES**

- Cl_{many} HC: milk, everywhere
- Chemical carcinogenesis
- Cranberry scare

√ **Water/Air: ENVIRONMENT**

- Weapons testing
- Oil spills
- Minamata Disease: Mercury
- Mississippi River fish kills
- Thin-shelled bird eggs

√ **Testing: SAFETY EVALUATION**

- Thalidomide and DES
- Diethylstilbesterol
- Thresholds, NOAEL, LOAEL
- **SAFETY**
- **UNCERTAINTY FACTOR**
- Reference Dose

Food Purity

A BASIC HUMAN CONCERN

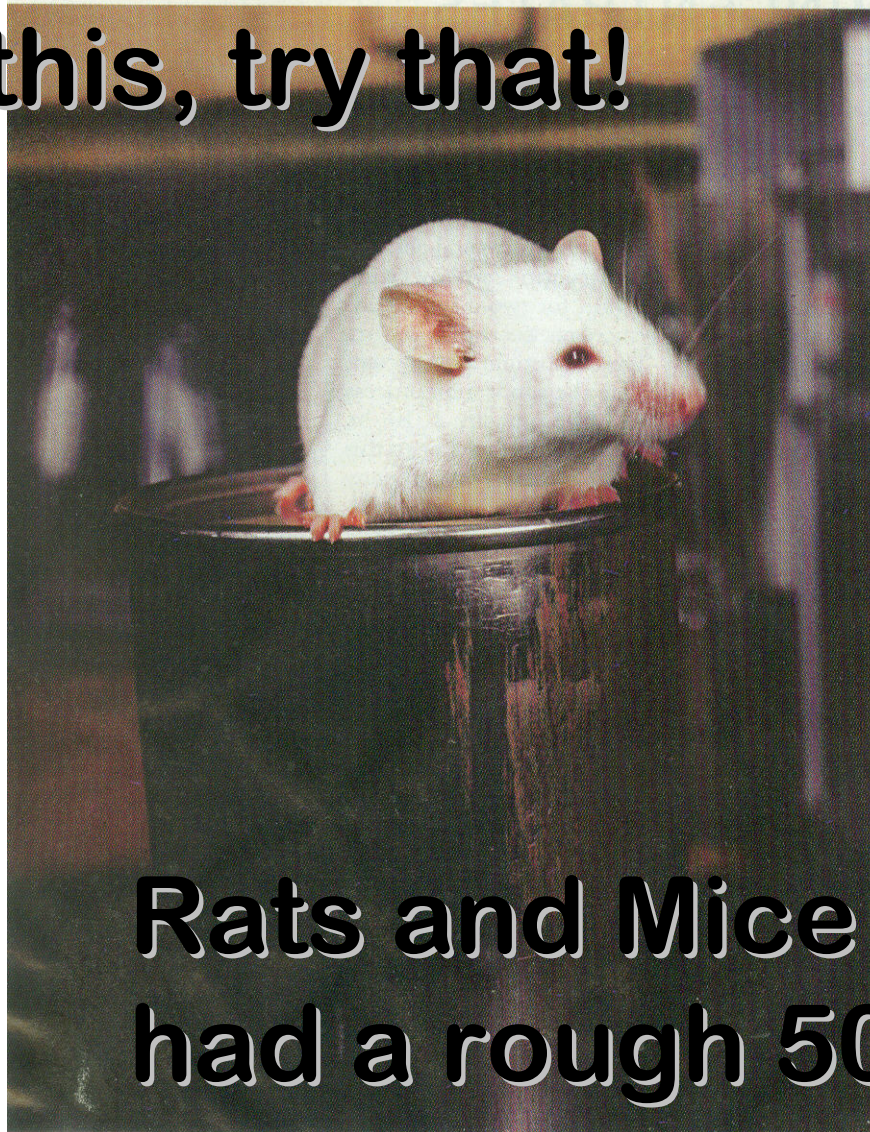
Food as Food

Properties

Ingredients

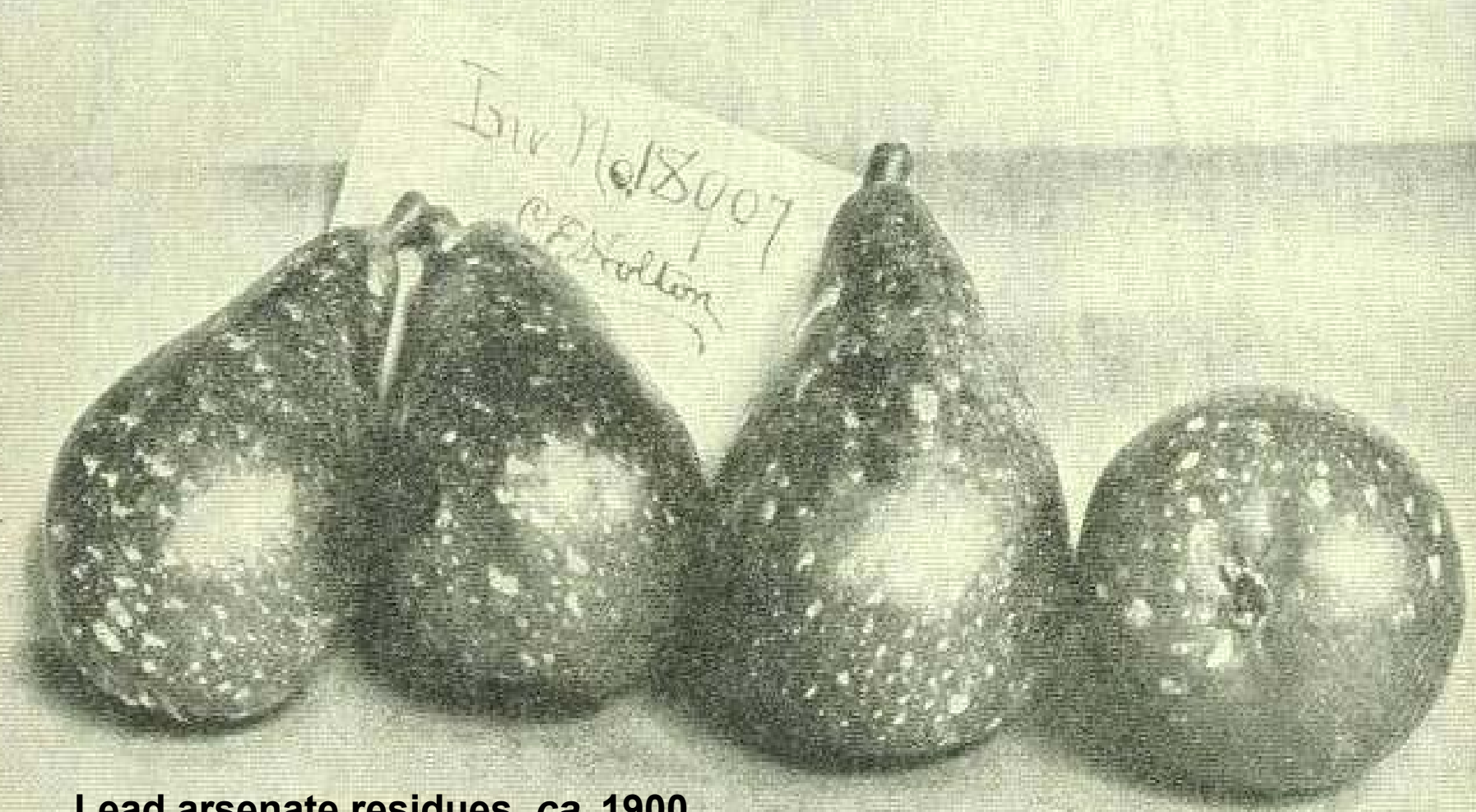
Chemicals

Take this, try that!



**Rats and Mice have
had a rough 50 years!**

“Pesticide residues are a condition of production...



Lead arsenate residues, ca. 1900

A white mouse is shown on a plate of food, which appears to be a large, dark, and textured mass, possibly a piece of meat or a large vegetable. The mouse is looking towards the right. The background is a dense, red, textured surface, possibly a field of red flowers or a large pile of red berries. The overall image has a grainy, low-resolution quality.

***“...to be on the safe side,
she doesn’t buy.”***

1959



USA, 2006!

Causes of Foodborne Illness

Amnesic Shellfish Poisoning and Domoic Acid

Campylobacter jejuni

Ciguatera Poisoning

Clostridium botulinum

Clostridium perfringens

Cyclospora cayetanensis

Hemolytic Uremic Syndrome (E. coli 0157:H7)

Listeria monocytogenes

Paralytic Shellfish Poisoning

Red Tide, PSP and Safe Shellfish Harvesting

Salmonella

Scombroid Poisoning

Shigella

Toxoplasma gondii

Public health experts estimate that there are 11 to 13 million cases of foodborne illness in Canada every year. Many more in the USA...

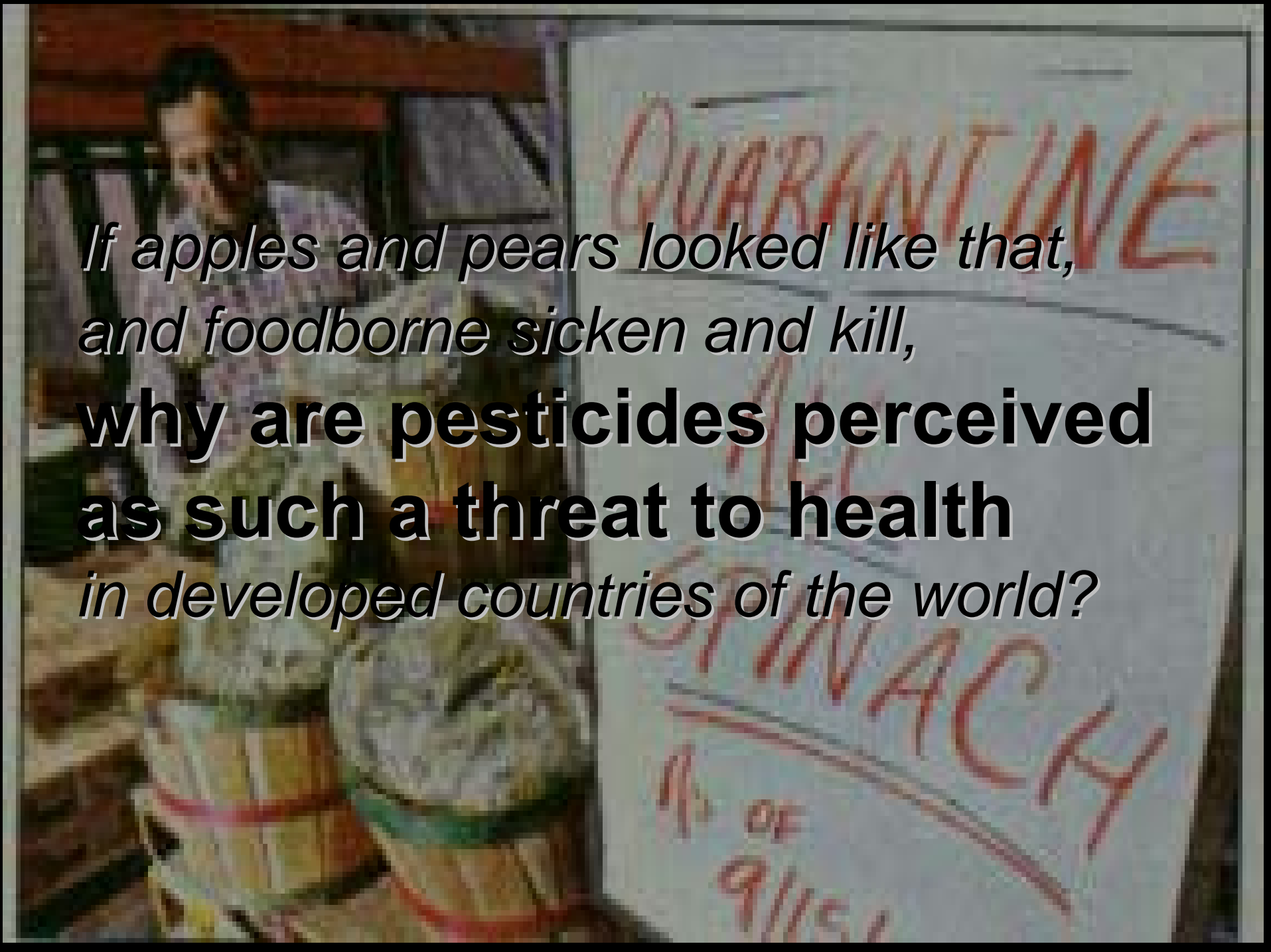
“How many are caused by pesticide residues?” **Silence**



Pesticides are EU citizens' top food- related health concern

63%

September, 2005



*If apples and pears looked like that,
and foodborne sicken and kill,
**why are pesticides perceived
as such a threat to health**
in developed countries of the world?*

New perspective on food residues...

The public revulsion for **pesticides**
is magnified by **the thought they**
will become part of us.

B. Krieger, 2007

To be continued, I promise

Bob Krieger, UC Riverside