Anaheim: Target, 2007

- Our chemical world-It's about Use!
- Food and environmentalism
- Everything goes somewhere! (*see Website*)
- 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

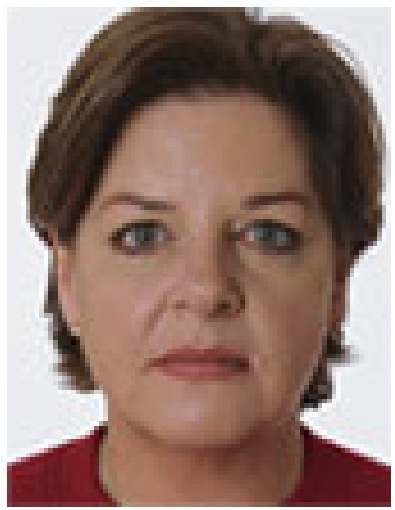
Process••***Commercial Products***••Pollutants

Foods • Drugs • Cosmetics • Pesticides

BOTOX: *Botulinus* toxin

Before

After



BTX: toxin blocks release of ACh and causes muscle paralysis.

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

1.Food

2.Properties

3. Ingredients

What makes strawberries ***strawberries*** and grapes ***grapes***?

- Water
- Glucose, sucrose, pectin
- Hydrocarbons, esters, aldehydes,ketones, alcohols, acids (tartaric, malic, citric)
- Minerals
- Nutrients (vitamins, antioxidants)

key flavor chemicals

- (*Z*)-3-hexenal (green),
- 4-hydroxy-2,5-dimethyl-3(2*H*)-furanone (caramel-like, sweet),
- methyl butanoate (fruity),
- ethyl butanoate (fruity),
- methyl 2-methylpropanoate (fruity),
- 2,3-butanedione (buttery)

- Water
- Glucose, sucrose, pectin
- Hydrocarbons, esters, aldehydes,ketones, alcohols, acids (tartaric, malic, citric)
- Minerals
- Nutrients (vitamins, antioxidants)

other key chemicals

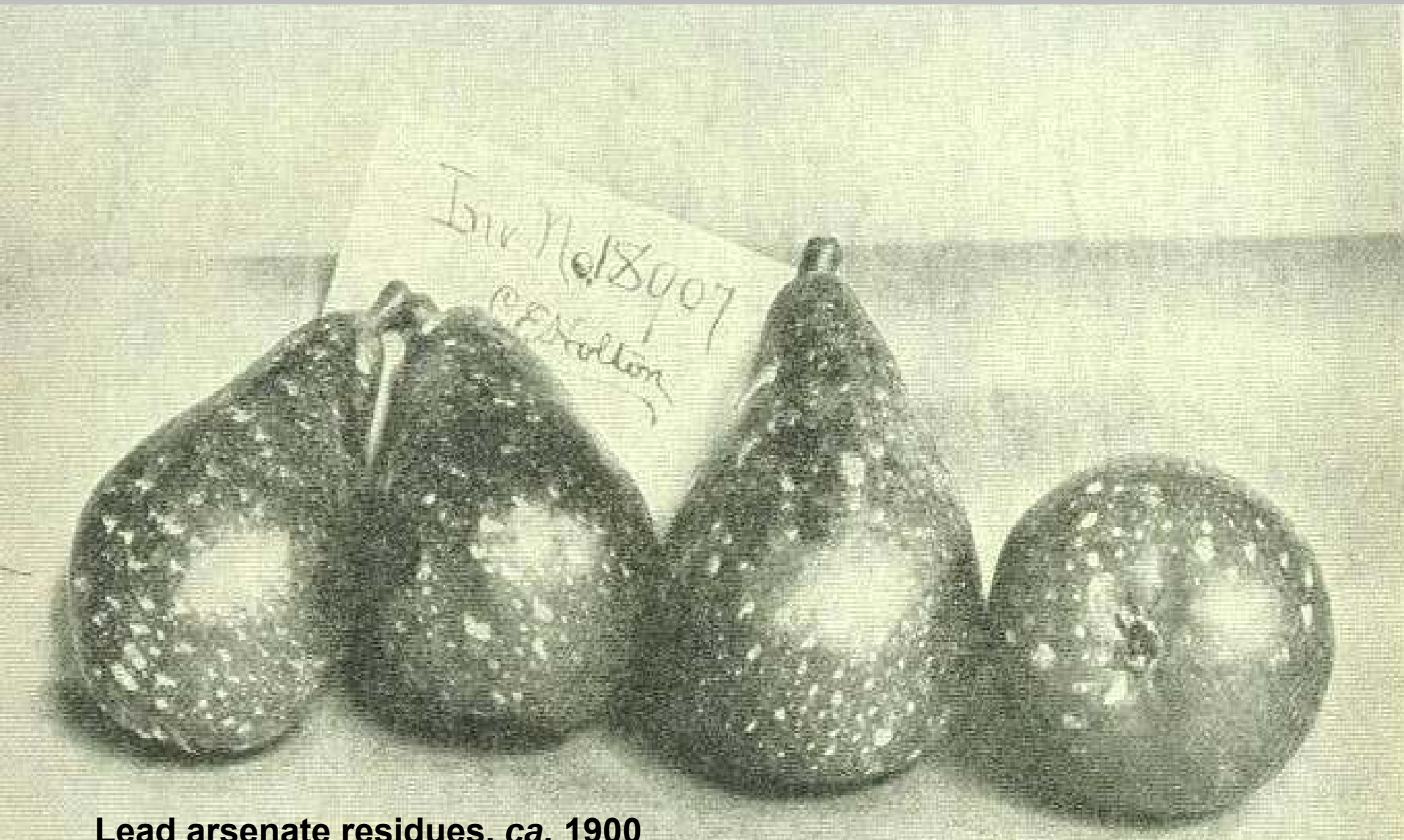
- Methyl anthranilate
- Anthocyanins (phenolics; both)

Pesticide residues are present in lower amounts than well known “constituents” {unspecified}

- Food as food
- Properties
- Ingredients

- Pesticide residues

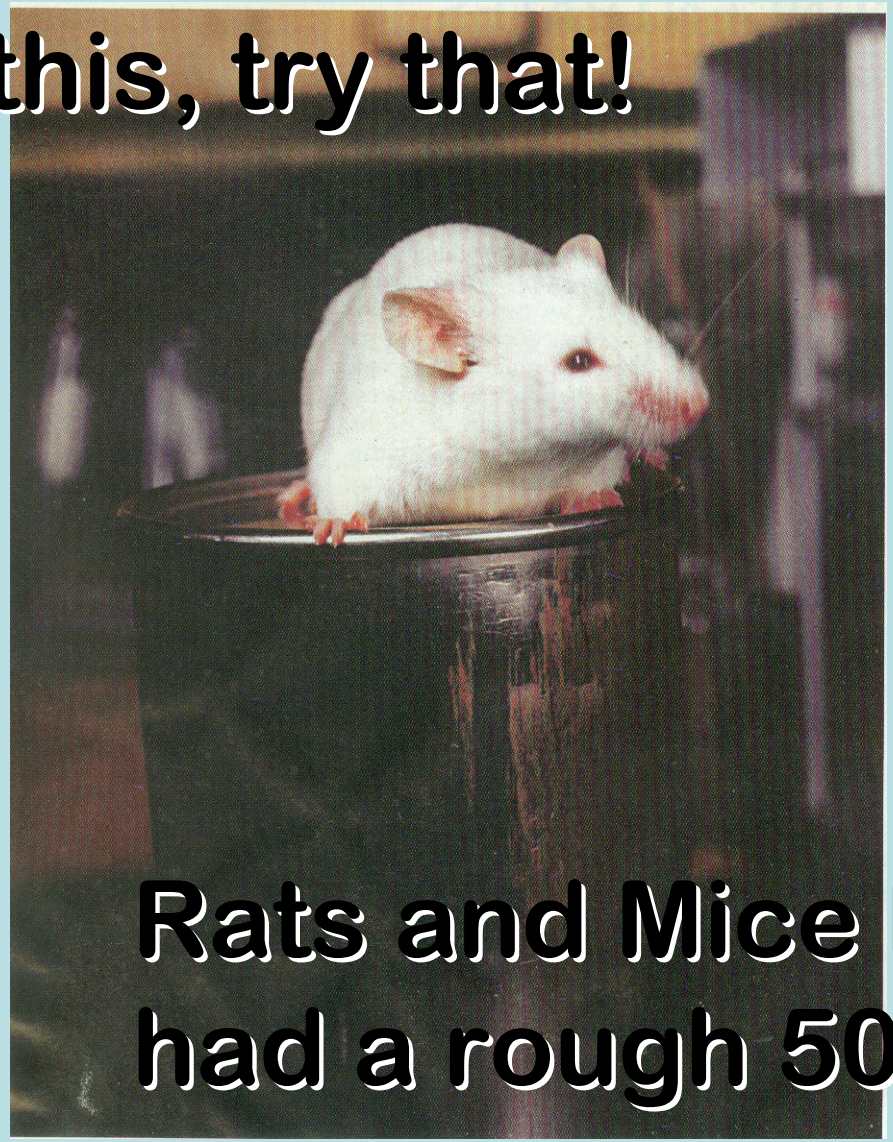
“Pesticide residues are a condition of production…



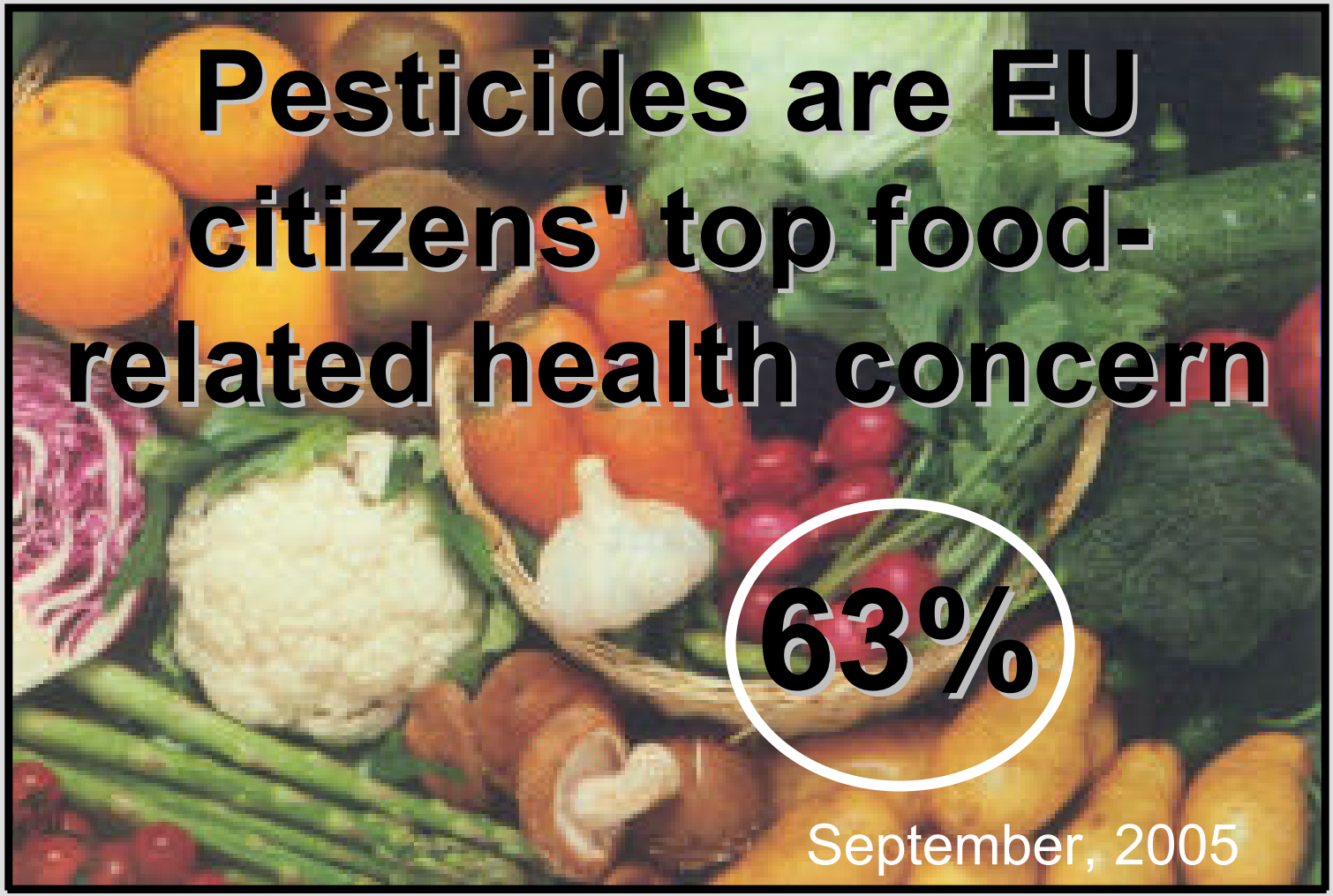
Lead arsenate residues, *ca.* 1900

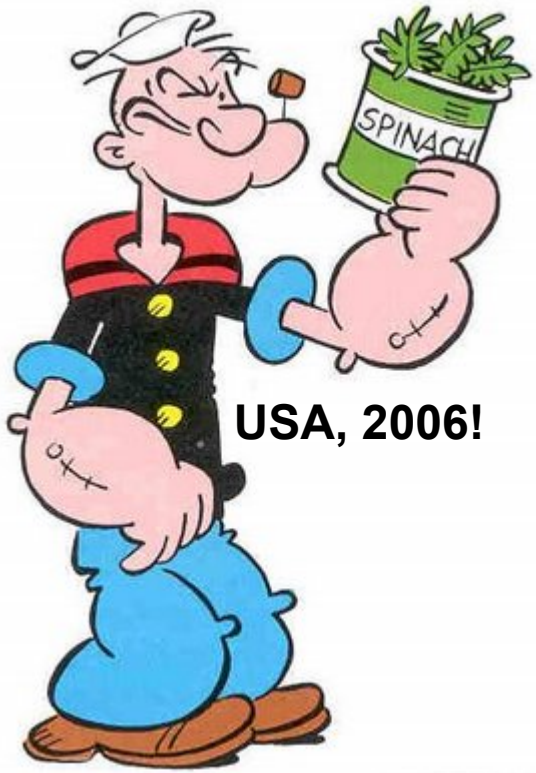

“…to be on the safe side, she doesn’t buy.”
1959

Take this, try that!



Rats and Mice have had a rough 50 years!


Pesticides are EU citizens' top food-related health concern
63%
September, 2005



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. 9,000,000 deaths in the USA....

"How many are caused by *pesticide residues*?" ***Silence***

New perspective on food residues…

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

B. Krieger, 2007