# Contaminants of Emerging Concern: Moving Targets and Changing Paradigms

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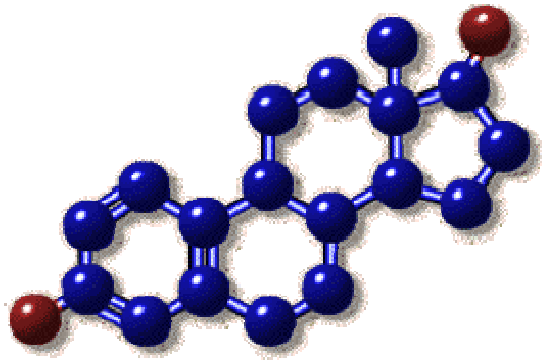


# Contaminants of Emerging Concern in Water*

PFOA

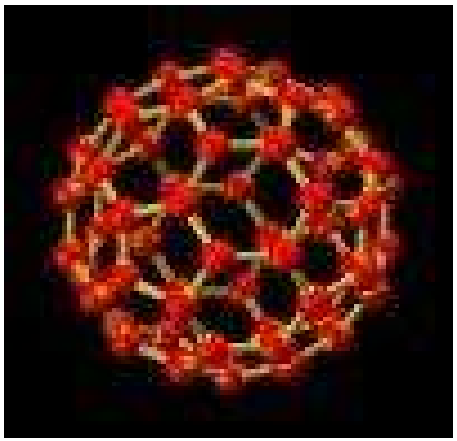
Pharmaceuticals and Personal Care Products

Prions

Nanomaterials

Pesticides

Endocrine Disrupting Compounds



Legacy

PBDEs

*Not an exhaustive list.

# Sources:
# The usual suspects

***"It isn't pollution that's harming the environment. It's the impurities in our air and water that are doing it."***
**-Dan Quayle**

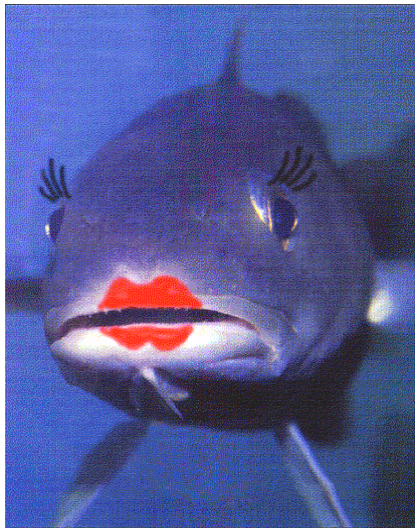
# The “Un-usual” Suspects

We expect to find chemicals in urban areas…..

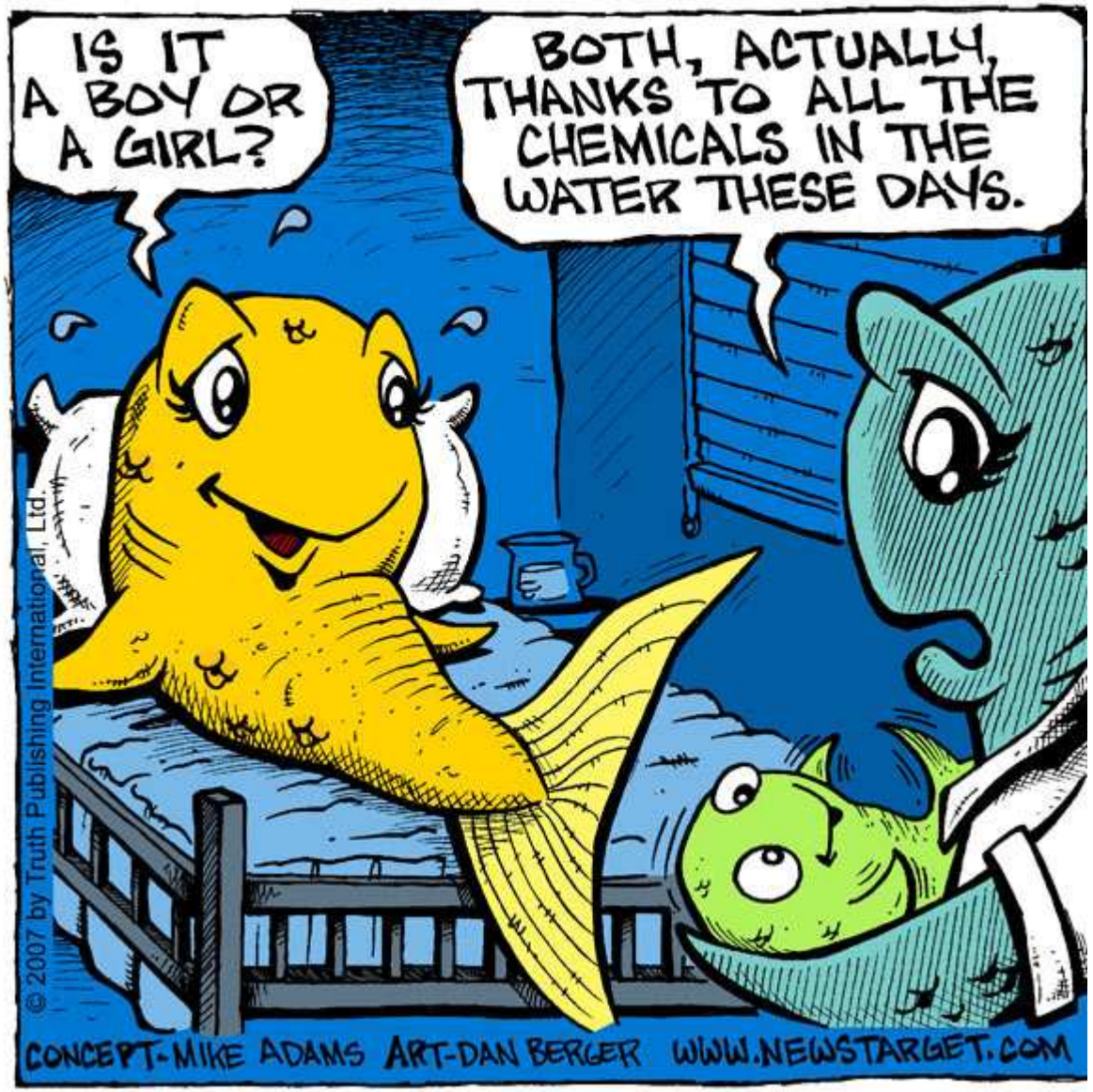
But what about here?????

# Sentinels in the Environment

"Intersex" (contain both male and female reproductive cells) fish are being found even in what was considered "pristine" areas such as Rocky Mountain National Park



# COUNTERTHINK



All substances are poisons; there is none which is not a poison. The dose differentiates a poison from a remedy

-Paracelsus

# With EDCs…it's the *timing* not necessarily the *dose* that makes a poison

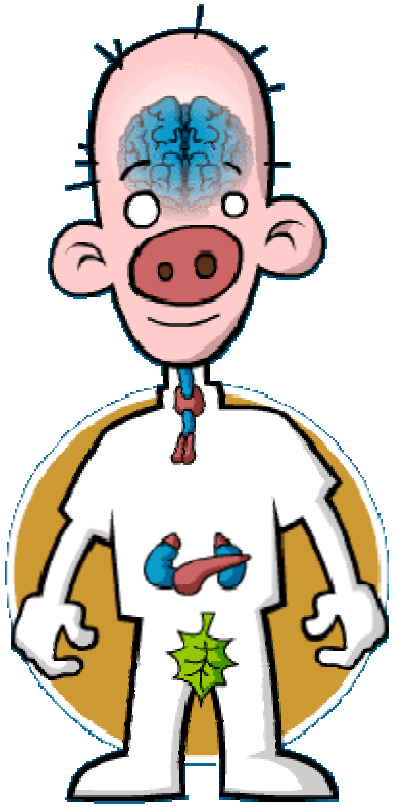
e.g. Study found the PBDEs only administered during critical phase during neonatal brain development in mice causes behavior disturbances

e.g. Intersex condition of fish is observed if exposed to EDCs during specific developmental stage of juvenile fish

# What is the Endocrine System

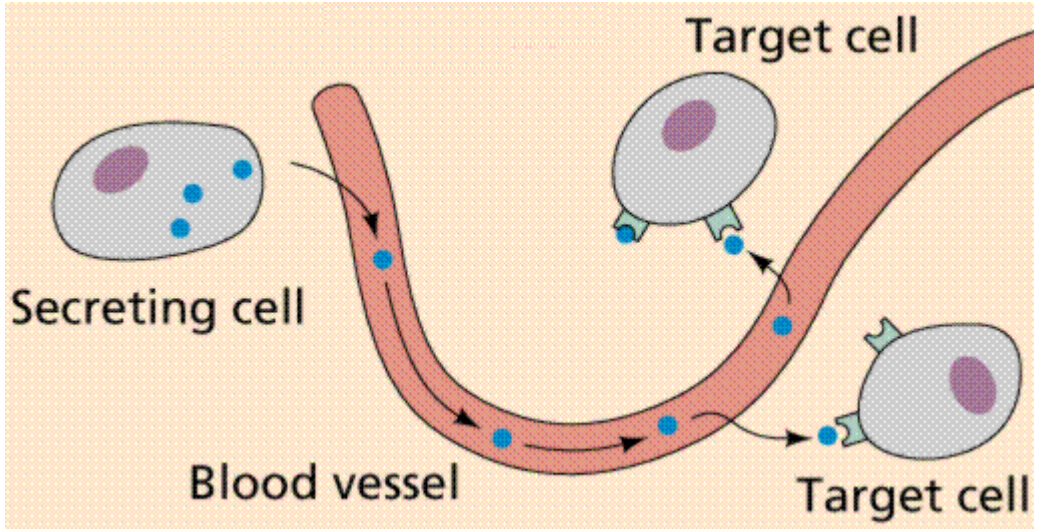
Complex network of glands and hormones that regulate the body's functions

- Growth
- Development and maturation
- Operation of various organs



# Endocrine System

1. Endocrine gland cells synthesize hormone
2. Hormone is secreted into the blood
3. Hormone circulates in the blood
4. Hormone binds to receptors on (or inside) target cells
5. Binding causes target cell reaction
   (e.g., protein production, cell division)
6. Unused hormones are metabolized and excreted



# What is an Endocrine Disruptor

A natural or synthetic chemical that interferes (**+**/-) with the

- synthesis,
- secretion,
- transport,
- binding,
- action
- elimination

of any hormone in the body (there are 50!)

# Health Effects of EDCs

- BPA suppresses insulin-regulating hormone causing “metabolic syndrome” which can lead to heart disease, stroke, and type 2 diabetes
- Perfluorinated chemicals have been linked to liver toxicity
- Impaired Immune System from DDT, Phlalates, PCB exposure (animal studies)
- Cancer, Behavioral/Learning and Reproductive Effects

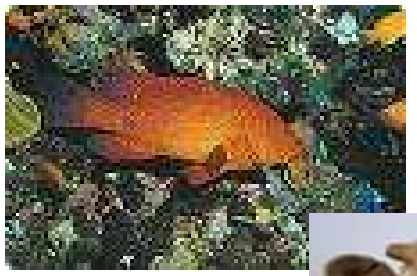
# EPA Office of Water's Strategy

EPA is pursuing a four-pronged strategy:

- Strengthening Science
- Improving Public Understanding
- Identifying Partnerships and Promoting Stewardship Opportunities
- Taking Regulatory Action When Appropriate

# Strengthening Science

- Areas of research
  - Sources
  - Fate and Transport
  - Exposure Pathways
  - Ecological Assessment
  - Human Health Assessment
  - Managing Contaminants



# Identifying Partnerships and Opportunities for Stewardship

- Stakeholder listening sessions
  - Environmental groups/NGOs
  - Drinking water/Wastewater Utilities
  - State Environment and Public Health Associations
  - Agricultural Associations
- Major Stakeholders' Recommendations/Concerns
  - Human Health Effects
  - Risk Communication
  - Take Back Programs
  - Drug Disposal Policy
  - Monitoring programs

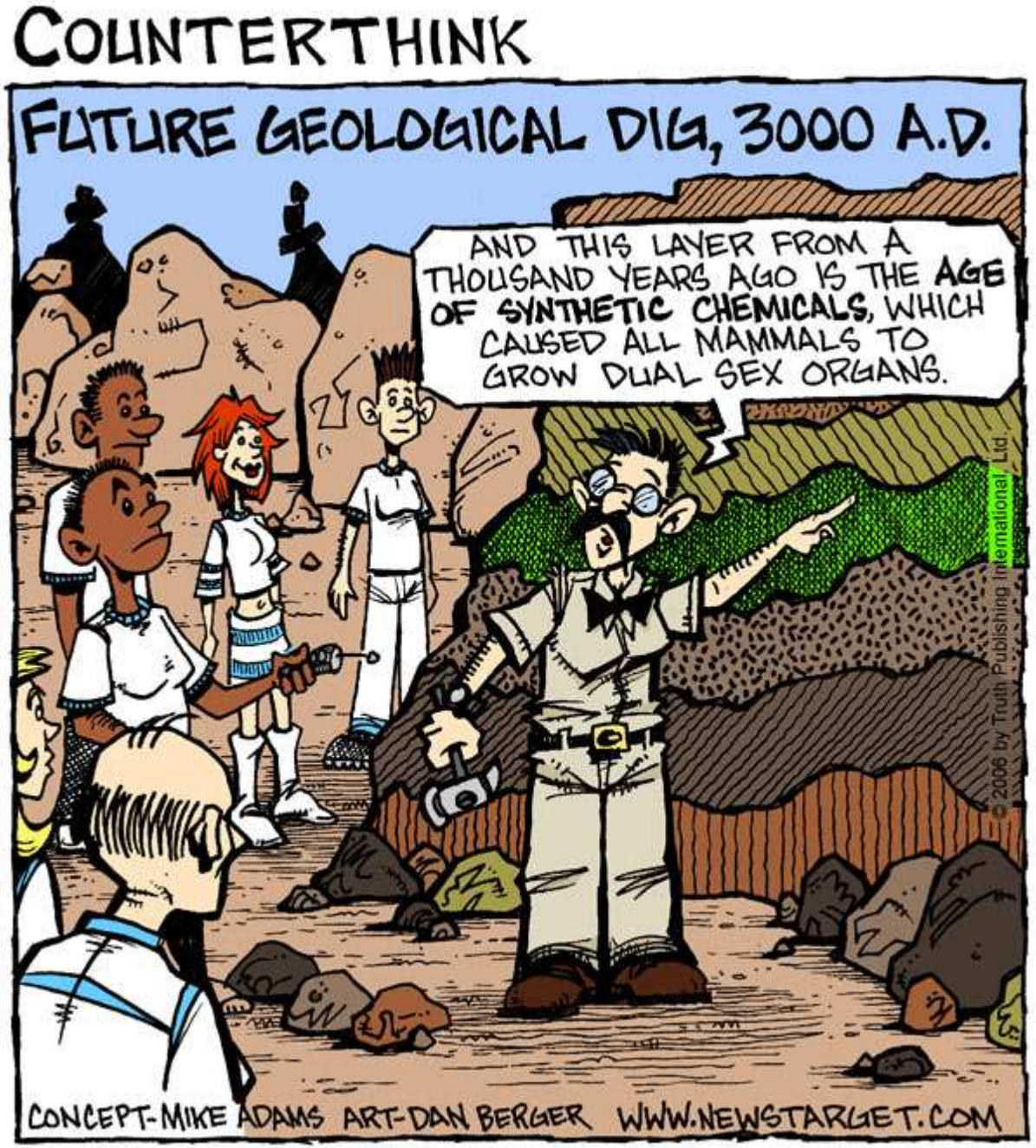
# Improving Public Understanding

- Important to get information to the public as it becomes available
- Launched PPCPs in water website (www.epa.gov/waterscience/ppcp)– links with PPCP research website (www.epa.gov/ppcp)
- Coordinated with ONDCP/FDA to revise drug disposal guidelines (posted 2/2009)

# Taking Regulatory Action when Appropriate

EPA will use existing regulatory tools when appropriate to minimize the amount of chemicals entering the waste stream

Health Care Industry Study—as part of the effluent guidelines planning process, EPA is conducting a study on the pharmaceutical disposal practices of hospitals, long-term care facilities, hospices, and veterinary hospitals to identify best practices to minimize pharmaceutical discharges to water.

Third Contaminant Candidate List (CCL3)—the Agency proposed 104 contaminants it will evaluate to determine if national drinking water regulations are needed to protect public health. The public comment process concluded on May 21, 2008. The Agency is evaluating the comments received to inform its decision on which chemicals to include on the final list.

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