

Pesticides & Plastics

A Benefit or Detriment?

Louis LaPierre, Ph.D.



Pesticides

According to the US Environmental Protection Agency (EPA):

“...a pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.”

Common types:

Herbicides – plants/moss

Insecticides – insects

Fungicides – molds/fungi

How do pesticides work?

Pesticides are *poisons*, so they work in a variety of ways to *interfere* with chemical processes in organisms.

Benefits of Pesticides

Used by plants for millions of years...

Used by humans for over 4500 years to:

- Increase food production

- Control disease vectors (e.g., mosquitos, rats)

- Control other harmful animals (e.g., wasps, fleas)

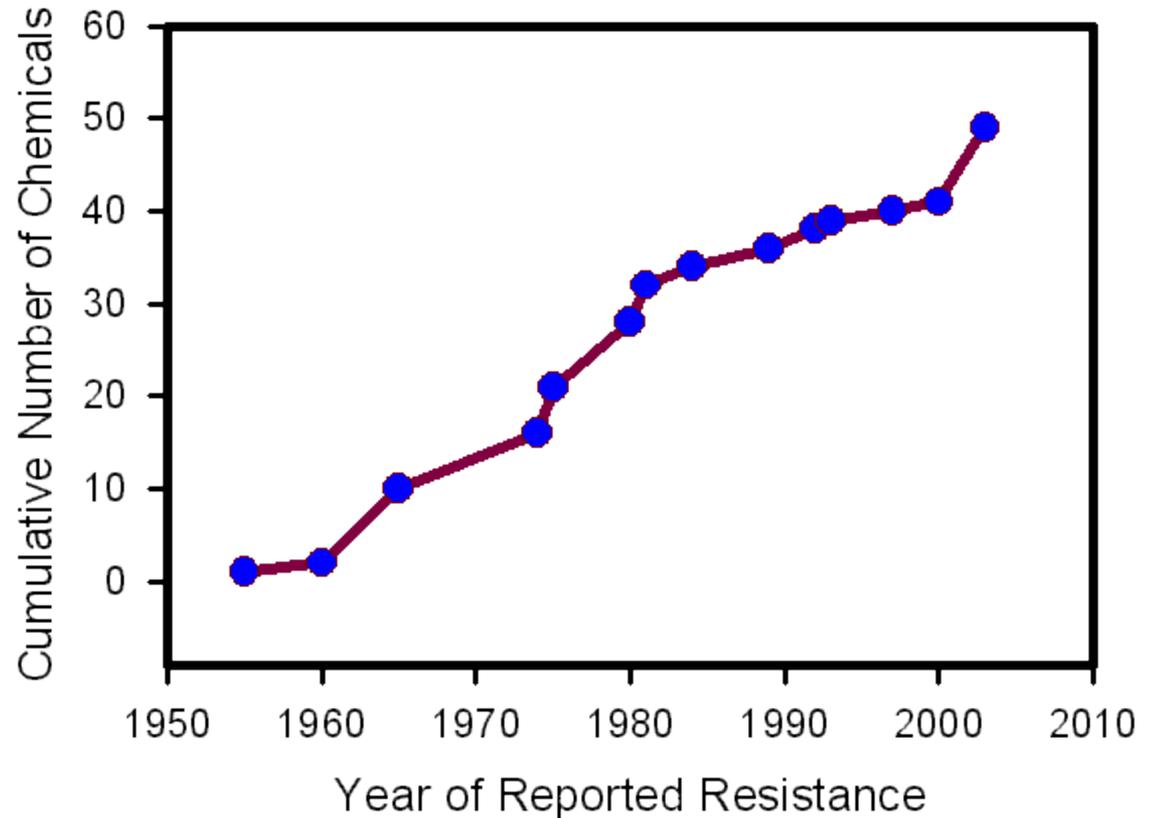
- Control weedy, invasive plants and algae

- Protect food from contamination

Classic [Raid commercial](#) – “Kills bugs dead”

Limitations of pesticides:

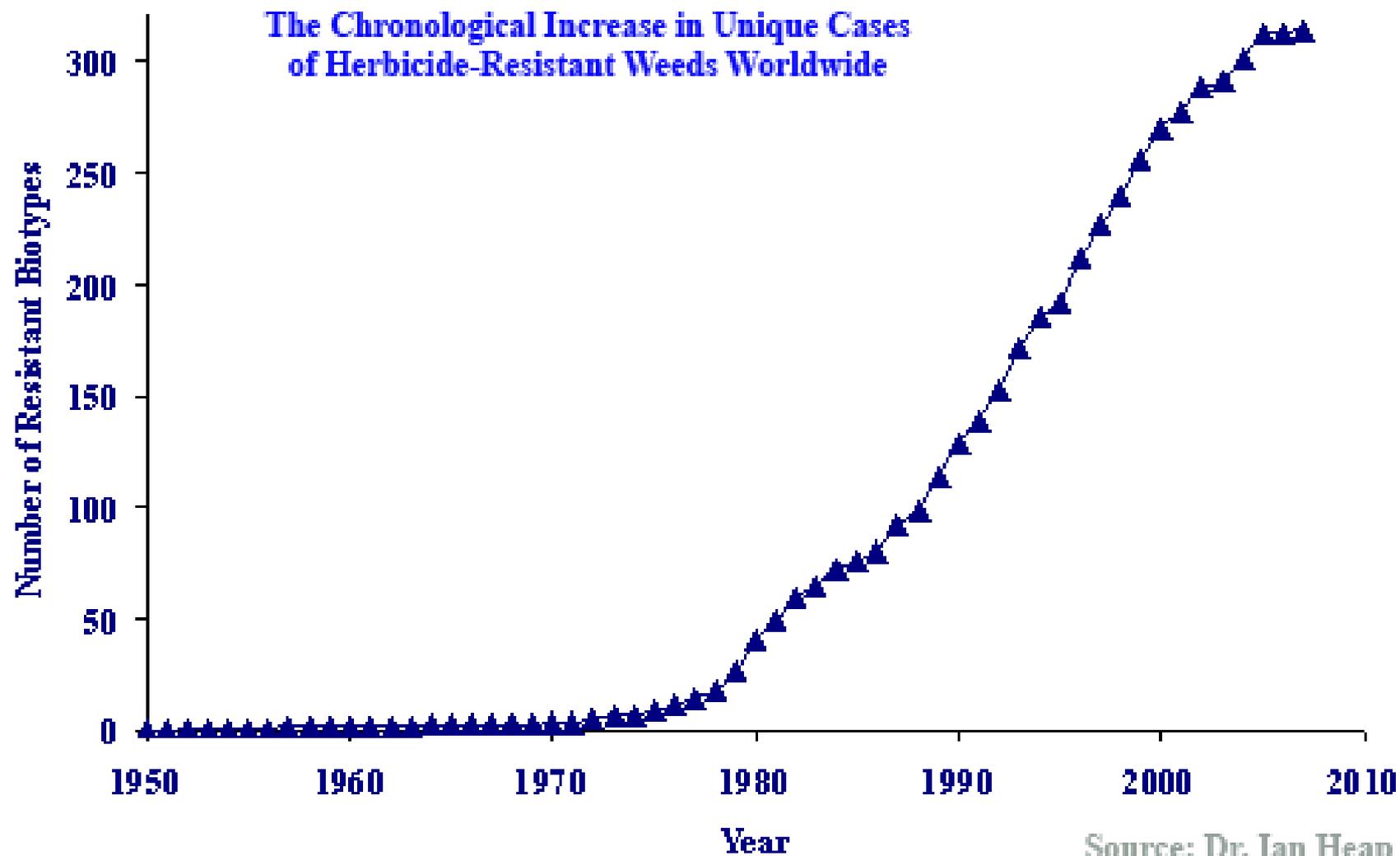
Case study: Colorado potato beetle and evolution of insecticide resistance



- Many more examples for evolution of resistance among pests exposed to pesticides:
 - Aphids and neonicotinoids (e.g., imidacloprid)
 - Mosquitoes and DDT (an organochlorine)
 - Various insects against various insecticides
 - Various weeds against various herbicides



The Chronological Increase in Unique Cases of Herbicide-Resistant Weeds Worldwide



Source: Dr. Ian Heap
<http://WeedScience.com>

Benefits of Plastics

Plastics are

durable

flexible or rigid

corrosion-free

light

inexpensive

Plastics are used in

toys

packaging

building and construction

transportation

electronics

[medical industry](#)

(plasticsindustry.com)



What are the risks?

For humans and other non-target organisms, chemicals in many plastics and pesticides can act as:

Neurotoxins

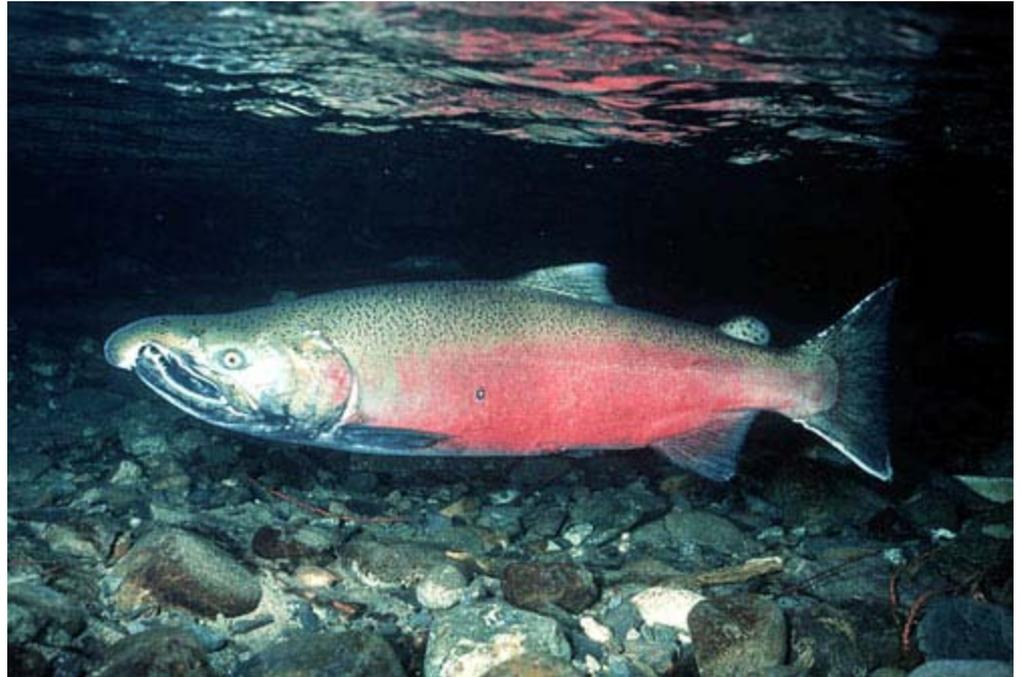
Endocrine disruptors

(e.g., phthalates, bisphenol-A are found in a variety of plastic products)

Non-target organisms

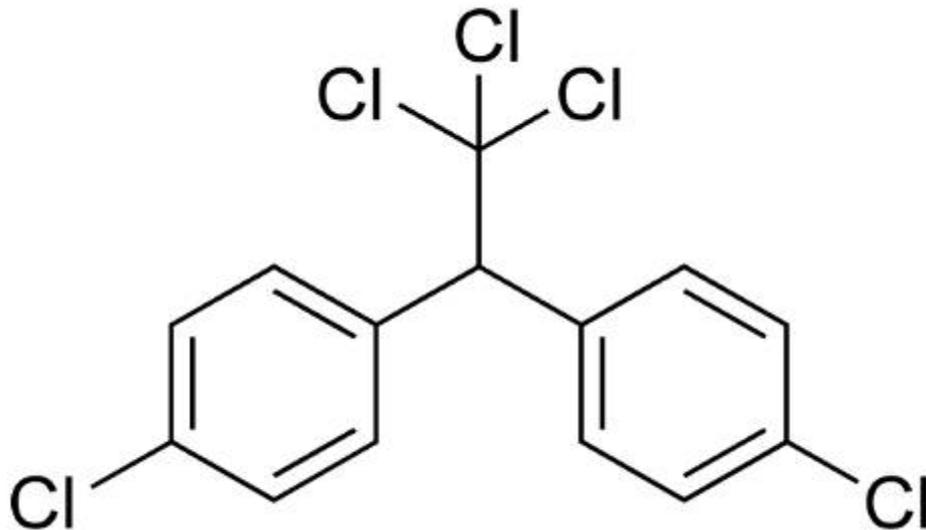


Colony Collapse Disorder?



30 day-
old
Human
embryo

- **Environmental toxicologists** study the effects of chemical poisons released into the environment.
- One of the first of these poisons to be identified as having a wide-spread impact on non-target organisms was the insecticide [DDT](#).



Posters from late 1940s

This Year's Most Powerful Fly Spray
IS LIQUID DDT KILL-COAT
*The 2-WAY SPRAY!



*YES SIR
2-WAY
BECAUSE

* 3 MONTHS
KILLING WHEN
SPRAYED ON
SURFACES!

* INSTANT
KILLING WHEN
SPRAYED ON
INSECTS!

QUICK KILLING! When you spray
DDT Kill-Coat AT insects it kills at once.

**KILLS ALL HOUSEHOLD INSECT
PESTS!** Used either way DDT Kill-Coat
kills Flies, Silverfish, Mosquitoes, Moths,
Fleas, Ants, etc.

3 MONTHS LASTING ACTION

When you spray a coat of DDT Kill-Coat
on walls, window sills, wire screens,
carpet edges, etc., it leaves a "killing-
coat" of 99% DDT. This "killing-
coat" remains effective for 3 months.
No insect can walk on it and live.

Liquid D.D.T.
KILL-COAT



8 OZ. CAN
1/8



8 OZ. CAN COMPLETE WITH
PUMP TO FIT 3/8

THIS YEAR'S MOST POWERFUL FLY SPRAY

"DDT is good for me-e-e!"



The great expectations held for DDT
have been realized. During 1946,
exhaustive scientific tests have shown
that, when properly used, DDT kills a
host of destructive insect pests, and is
a benefactor of all humanity.

Pennsalt produces DDT and its prod-
ucts in all standard forms and is now

one of the country's largest producers
of this amazing insecticide. Today,
everyone can enjoy added comfort,
health and safety through the insect-
killing powers of Pennsalt DDT prod-
ucts . . . and DDT is only one of
Pennsalt's many chemical products
which benefit industry, farm and home.



GOOD FOR FRUITS—Ripe
apples, pears, peaches that are
free from unsightly worms
... all benefits resulting from
DDT dusts and sprays.



GOOD FOR STEERS—Diet grows sweeter
meats . . . for it's a scientific fact that
comparative to untreated cattle... feed steers
gain up to 50 pounds extra when protected
from horn flies and many other pests with
DDT insecticides.



KNOCK OUT FOR THE HOME—helps
make healthier, more comfortable homes . . .
protects your family from
dangerous insect pests. Use
Knock-Out DDT Powders
and Sprays as directed . . .
then watch the bugs "bite
the dust!"



KNOCK OUT FOR DAIRIES—Up to 20% more
milk . . . more butter . . . more
cheese . . . tests prove greater milk pro-
duction when dairy cows are protected
from the annoyance of many
insects with DDT insecti-
cides like Knock-Out Stock
and Barn Spray.

KILLING SALT

CHEMICALS

27 Years' Service to Industry • Farm • Home



GOOD FOR ROW CROPS—25
more barrels of potatoes per acre
... several DDT tests have
shown crop increases like that!
DDT dusts and sprays help
truck farmers pass these gains
along to you.



KNOCK OUT FOR INDUSTRY—Food
processing plants, laun-
dries, dry cleaning plants,
hotels . . . dozens of industries
gain effective bug control,
more pleasant work conditions
with Pennsalt DDT products.

She longed for a Star Trek-type doctor with a
state-of-the-art diagnostic tool. The doctor, with
a few computer bleeps, would locate the exact
cause of her newly discovered and doctor-
baffling skin lesions and assign a painless
treatment with no side effects.

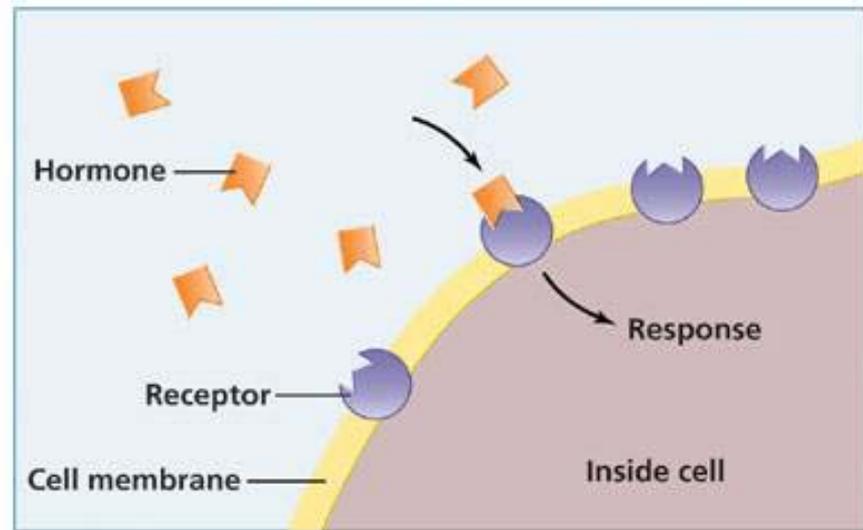
One of the many pieces of evidence in support of **EVOLUTION** is that we share many genes, and physiological and metabolic functions with other organisms – even bacteria!

What does this mean? (good -- bad -- ugly)

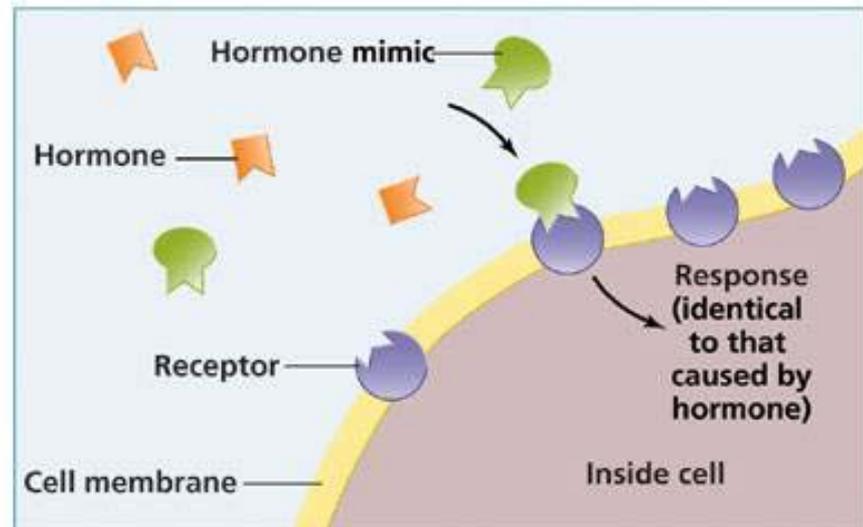
Many chemicals
mimic hormones in
our bodies (so
what?)...

This is a good thing,
right?

Endocrine
disruptors



(a) Normal hormone binding



(b) Hormone mimicry

Endocrine disruptors have been linked to:

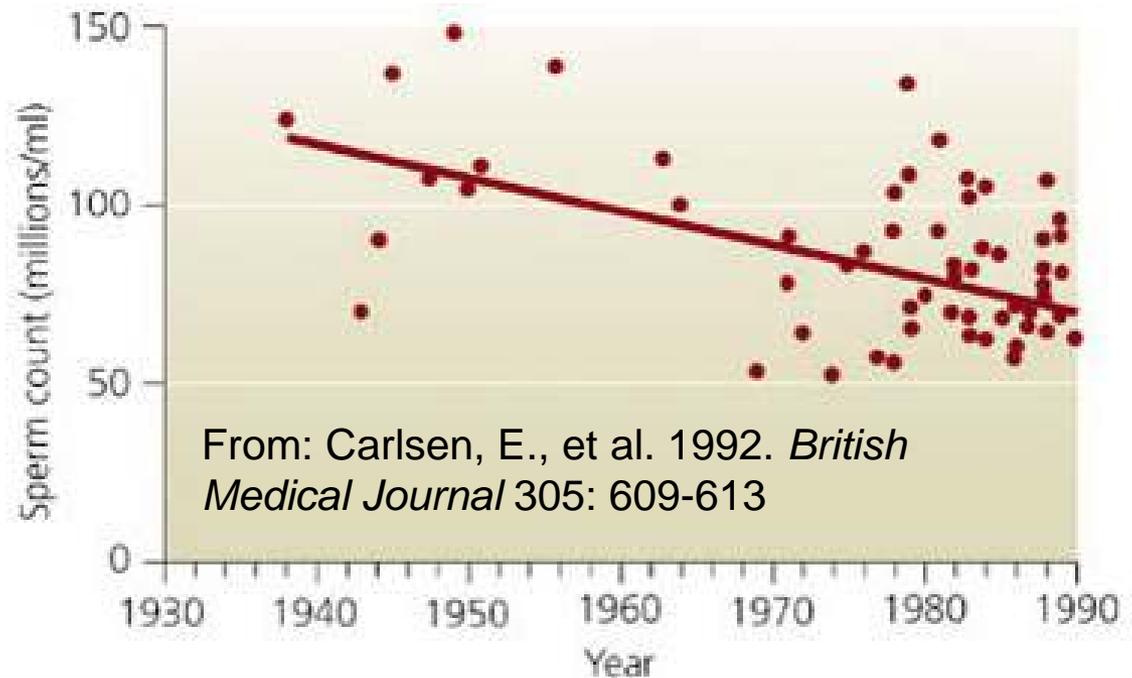
- Increased predisposition to cancer
- Reversal in normal sex differences in brain and behavior
- Decreased testosterone
- Adverse impact on sperm development
- Developmental abnormalities

“Every man in this room is half the man his grandfather was.”

- Reproductive biologist, Louis Guillette, at a 1995 congressional committee hearing on reduced sperm counts in men



Are reduced sperm counts in humans the result of exposure to chemicals in pesticides and plastics?



More recent evidence - 1

“Results: We observed... Several combinations of organophosphates were lethal at concentrations that were sublethal in single-chemical trials.”

From:

Laetz, CA, et al. 2009. The Synergistic Toxicity of Pesticide Mixtures: Implications for Risk Assessment and the Conservation of Endangered Pacific Salmon. *Environmental Health Perspectives* 117:348–353.

- http://www.eenews.net/public/25/9960/features/documents/2009/03/03/document_gw_01.pdf

More recent evidence - 2

“The associations between male genital development and phthalate exposure seen here are consistent with the phthalate-related syndrome of incomplete virilization that has been reported in prenatally exposed rodents. The median concentrations of phthalate metabolites that are associated with short [anogenital distance] and incomplete testicular descent are below those found in one-quarter of the female population of the United States, based on a nationwide sample. These data support the hypothesis that prenatal phthalate exposure at environmental levels can adversely affect male reproductive development in humans.”

Swan, HS, et al. 2005. Decrease in Anogenital Distance among Male Infants with Prenatal Phthalate Exposure. *Environmental Health Perspectives* 113:1056–1061.

- <http://www.ehponline.org/docs/2005/8100/abstract.html>

More recent evidence - 3

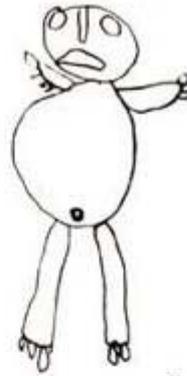
Pesticide exposure and children

From: Guillette, EA, et al. 1998. *Environ. Health Perspect.* 106: 347-353

Drawings by children in the foothills



4-year-olds



5-year-olds

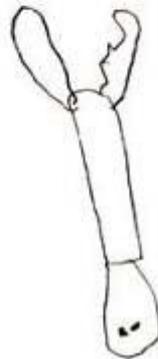


Drawings by nonexposed children

Drawings by children in the valley



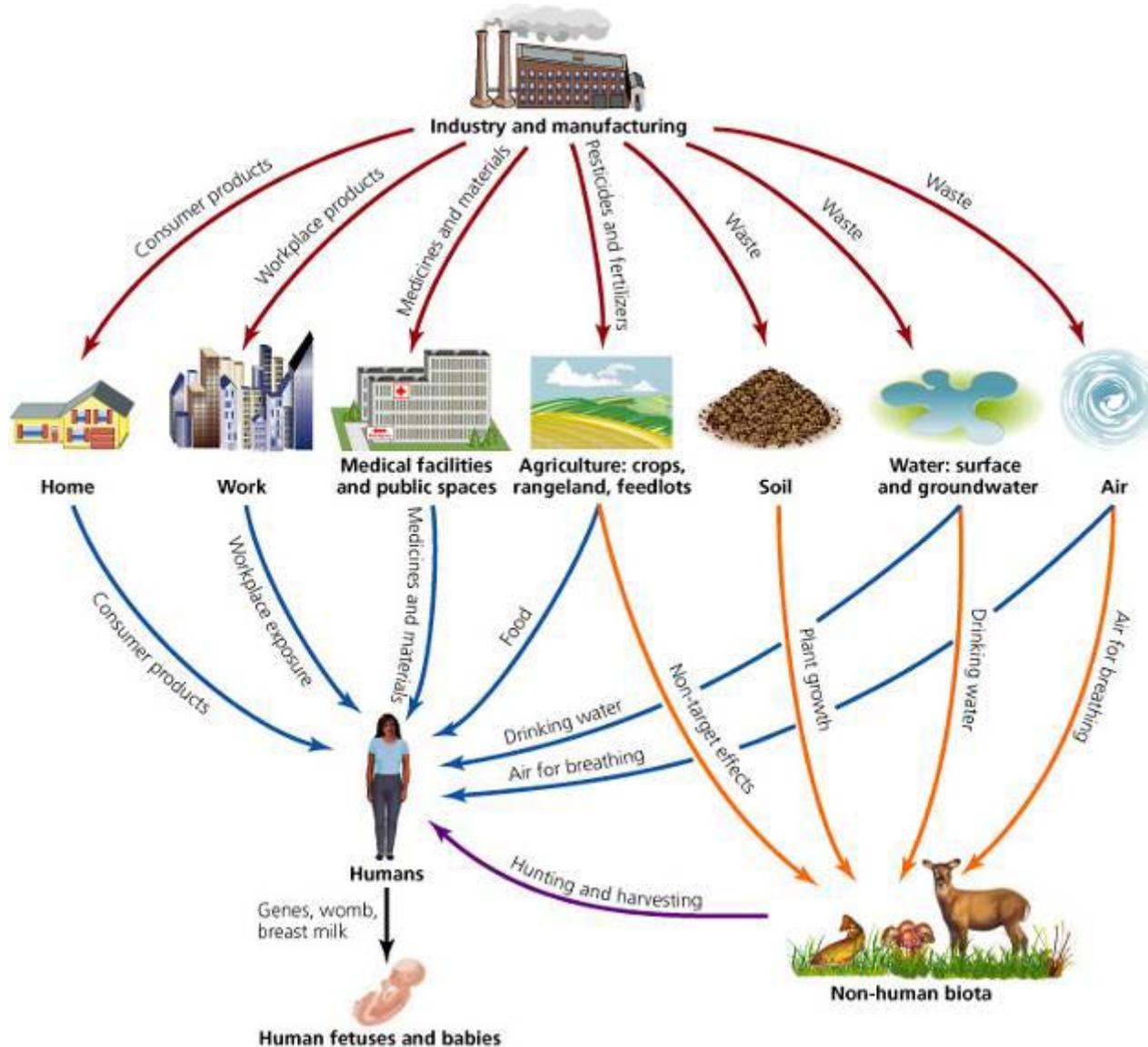
4-year-olds



5-year-olds

Drawings by exposed children

How do they get into the environment and our bodies?



Chemicals our bodies

- Chemical Body Burden
<http://www.chemicalbodyburden.org/>
- “Pollution In People: A Study of Toxic Chemicals in Washingtonians”
<http://www.pollutioninpeople.org/>

Toxic Pollution Found In Washingtonians

Toxic Chemicals	Pam Tazioli	Bill Finkbeiner	Karen Bowman	Ann Holmes Redding	Lisa Brown	Laurie Valeriano	Patricia Dawson	Denis Hayes	Allyson Schrier	Deb Abrahamson
PFCs ("Teflon chemicals")	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PBDEs (toxic flame retardants)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phthalates (plasticizers and fragrance carriers)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pesticides		✓		✓	✓		✓		✓	✓
DDT (banned pesticide)	✓		✓	✓	✓		✓	✓	✓	✓
PCBs (banned industrial coolant)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mercury	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lead			✓							
Arsenic	✓		✓		✓		✓	✓		

Source: <http://www.pollutioninpeople.org/>

In addition to developmental abnormalities, many of these chemicals can compromise immune system function.

This makes organisms more susceptible to other infections that might normally not be of concern.



Alternatives to Pesticides

Back to basics...

Keep your area clean to discourage ants and other pests and use vinegar and soap as a spray to kill them if that's the goal.

In the garden:

Promote beneficial insects and use "elbow grease."

Use safe alternatives: sulfur, insecticidal soaps, water.

Choose plants that are naturally resistant to pests.

Accept a few blemishes.

The bottom line: The “good life” has risks

Use alternatives to pesticides and plastics whenever possible and use CAUTION and follow directions when applying pesticides. Do not heat foods in plastics.

You have more control over LIMITING your exposure to these chemicals than you might think:

- educate yourself

- support programs and legislation

- vote with your pen and your penny!