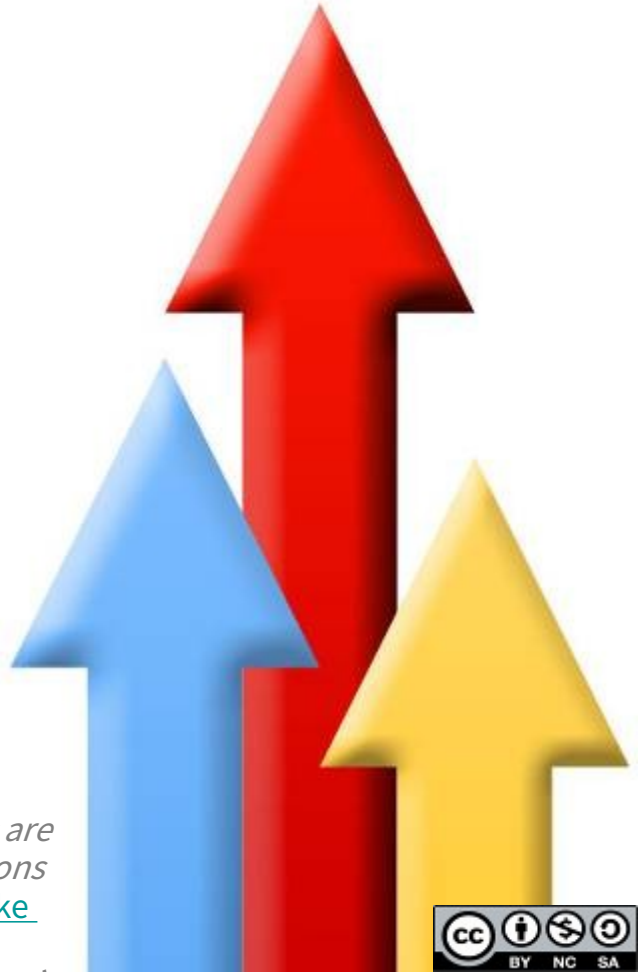
Biology for Future Presidents

Important Concepts That Can Be Easily Understood

Week1

- Course Introduction
- Scientific Research



by ***Professor Larry N. Vanderhoef***
Chancellor Emeritus & Distinguished Professor
University of California, Davis, U.S.A

Life Expectancy of Teetotalers V.S. Heavy Drinkers

Teetotalers

People drink no alcohol at all

Dr. Chas. Holahan led a six-member team of U Texas conducting a 20-year Experiment: Alcoholism: Clinical and Experimental Research . 1824 participants who age from 55 to 65

Why Do Heavy Drinkers Outlive Nondrinkers?

By JOHN CLOUD Monday, Aug. 30, 2010

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Correction Appended: Aug. 31, 2010

One of the most contentious issues in the vast literature about alcohol consumption has been the consistent finding that those who don't drink tend to die sooner than those who do. The standard Alcoholics Anonymous explanation for this finding is that many of those who show up as abstainers in such research are actually former hard-core drunks who had already incurred health problems associated with drinking.

But a new paper in the journal *Alcoholism: Clinical and Experimental Research* suggests that — for reasons that aren't entirely clear — abstaining from alcohol does tend to increase one's risk of dying, even when you exclude former problem drinkers. The most shocking part? Abstainers' mortality rates are higher than those of heavy drinkers.

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Source: Time Magazine Helath,
Why Do Heavy Drinkers Outlive Nondrinkers?
By John Cloud, August 10, 2010

Scientific Research

Evaluating Reports in the Popular Press

Obesity in Oregon

- 16 Percent of American children (10-17 years old) obese in 2007. **10%** rise since 2003.
- Why Oregon is better?

Deseret News

Oregon has lowest rate of childhood obesity

By Carla K. Johnson
Associated Press
Published: Monday, May 3, 2010 2:30 p.m. MDT

CHICAGO — What's the magic in Oregon that keeps kids lean? It's a mystery health officials would like to solve as they admit all states are failing — by a mile — to meet federal goals for childhood obesity.

Oregon has the nation's lowest rate of hefty kids, according to a new government study, which found big gaps between regions and ballooning obesity rates in many states from 2003 to 2007.

More than 16 percent of American children ages 10 to 17 years were not just overweight, but obese, in 2007. That's a 10 percent rise from 2003. Mississippi topped the nation with more than a fifth of its kids obese.

Oregon was the star, with the lowest rate of obesity — defined as body mass index in the 95th percentile or above — at just under 10 percent. And Oregon was the only state whose childhood obesity fell significantly from 2003 to 2007.

Even the best states fell short. The federal Healthy People 2010 initiative set a childhood obesity goal of 5 percent. Only Wyoming girls came close to that, according to the study appearing in May's Archives of Pediatrics and Adolescent Medicine.

"You've got such wide differences at the geographic level, which means there is potential to further reduce obesity," said lead author Gopal Singh, an epidemiologist with the U.S. Health Resources and Services Administration.

What works? It's unclear how much states can overcome the effects of poverty, race and family history — all of which have complex links to obesity.

Black and Hispanic young people in the study were twice as likely as whites to be overweight or obese, even when the researchers took into account other risk factors like inactivity and poverty.

Oregon is 90 percent white. It also has a high rate of breast-feeding, and some research suggests that protects against obesity.

Oregon law sets nutrition standards in schools and requires chain restaurants to provide nutritional information on request. Those steps, taken recently, wouldn't have shown up in the new study's results, but may reflect Oregon's inherent interest in health.

The figures for this analysis came from a representative telephone survey of parents who gave information about their children. Figures for about 47,000 children were analyzed for 2003 and about 44,000 children for 2007. That's not as accurate as a government survey that weighs and measures children. Data from that suggest childhood obesity rates nationwide may be starting to stabilize.

In a separate paper based on the same data, Singh found that a child living in a neighborhood with unsafe surroundings, poor housing and no access to sidewalks, parks and recreation centers had 20 to 60 percent higher odds of being obese or overweight.

Experts blame the rise in childhood obesity on fast food, neighborhoods without sidewalks, television, video games, schools neglecting physical education and a host of other societal changes, said Dr. Joe Thompson, director of the Robert Wood Johnson Foundation Center to Prevent Childhood Obesity.

Now, lawmakers must move the obesity numbers in the right direction to save future medical costs, if for no other reason, Thompson said.

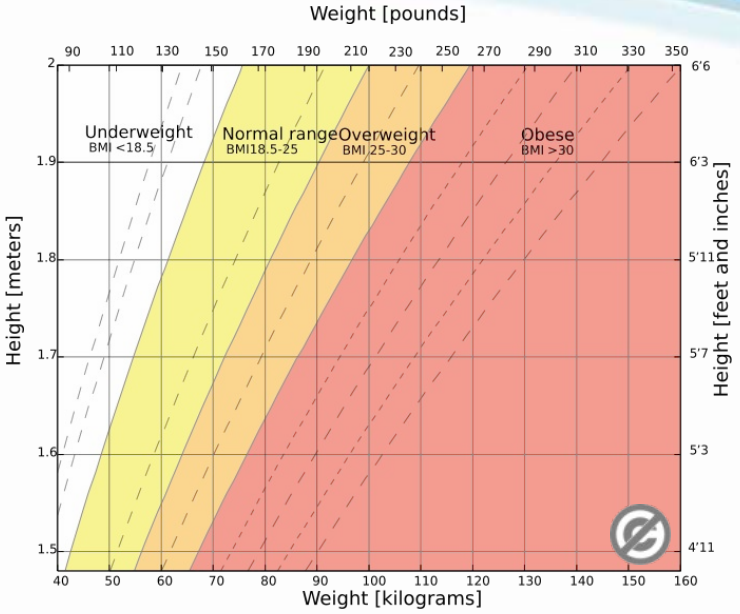
On the Net:

Archives: www.archpediatrics.com

Source: Deseret News, Oregon has lowest rate of childhood obesity
By Clark K. Johnson May 3, 2010

Body Mass Index

The **body mass index** (**BMI**), or **Quetelet index**, is a heuristic measure of body weight based on a person's weight and height. Though it does not actually measure the percentage of body fat, it is used to estimate a healthy body weight based on a person's height, assuming an average body composition. Due to its ease of measurement and calculation, it is the most widely used diagnostic tool to identify weight problems within a population, usually whether individuals are underweight, overweight or obese. It was invented between 1830 and 1850 by the Belgian polymath Adolphe Quetelet during the course of developing "social physics".[1] Body mass index is defined as the individual's body weight divided by the square of his or her height. The formulae universally used in medicine produce a unit of measure of kg/m^2. BMI can also be determined using a BMI chart,[2] which displays BMI as a function of weight (horizontal axis) and height (vertical axis) using contour lines for different values of BMI or colors for different BMI categories.



$$\begin{aligned}
\mathrm{BMI} &= \frac{\mathrm{mass(kg)}}{(\mathrm{height(m)})^2} \\
&= \frac{\mathrm{mass(lb)}}{(\mathrm{height(in)})^2} \times 703^{\dagger} \\
&= \frac{\mathrm{mass(lb)}}{(\mathrm{height(ft)})^2} \times 4.88^{\dagger} \\
&= \frac{\mathrm{mass(st)}}{(\mathrm{height(in)})^2} \times 9840
\end{aligned}$$

Wikipedia Body Mass Index

Body Mass Index Table

	Normal						Overweight					Obese										Extreme Obesity																			
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	Body Weight (pounds)																																							
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
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73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
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76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.*

Chart Courtesy of National Institute of Health, U.S.A.

Obesity in the U.S.A.

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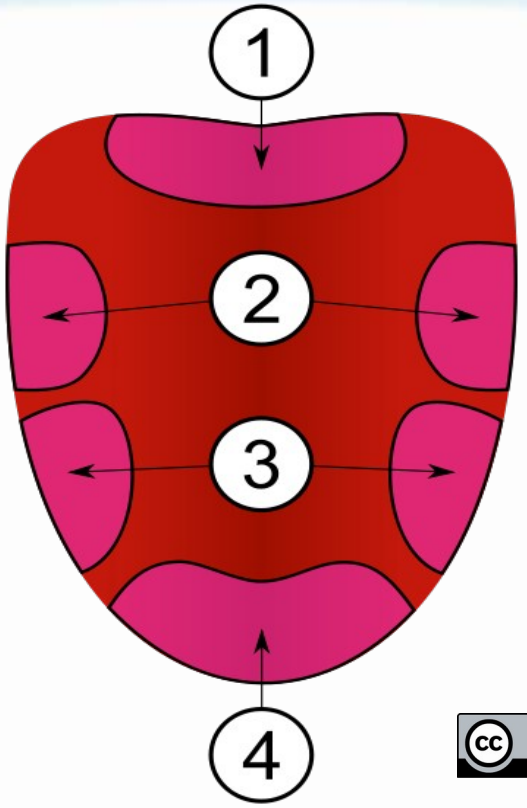

Popular myth about dis tinct regions for tast ing different tastes

1. *Bitter*
2. *Sour*
3. *Salt*
4. *Sweet*

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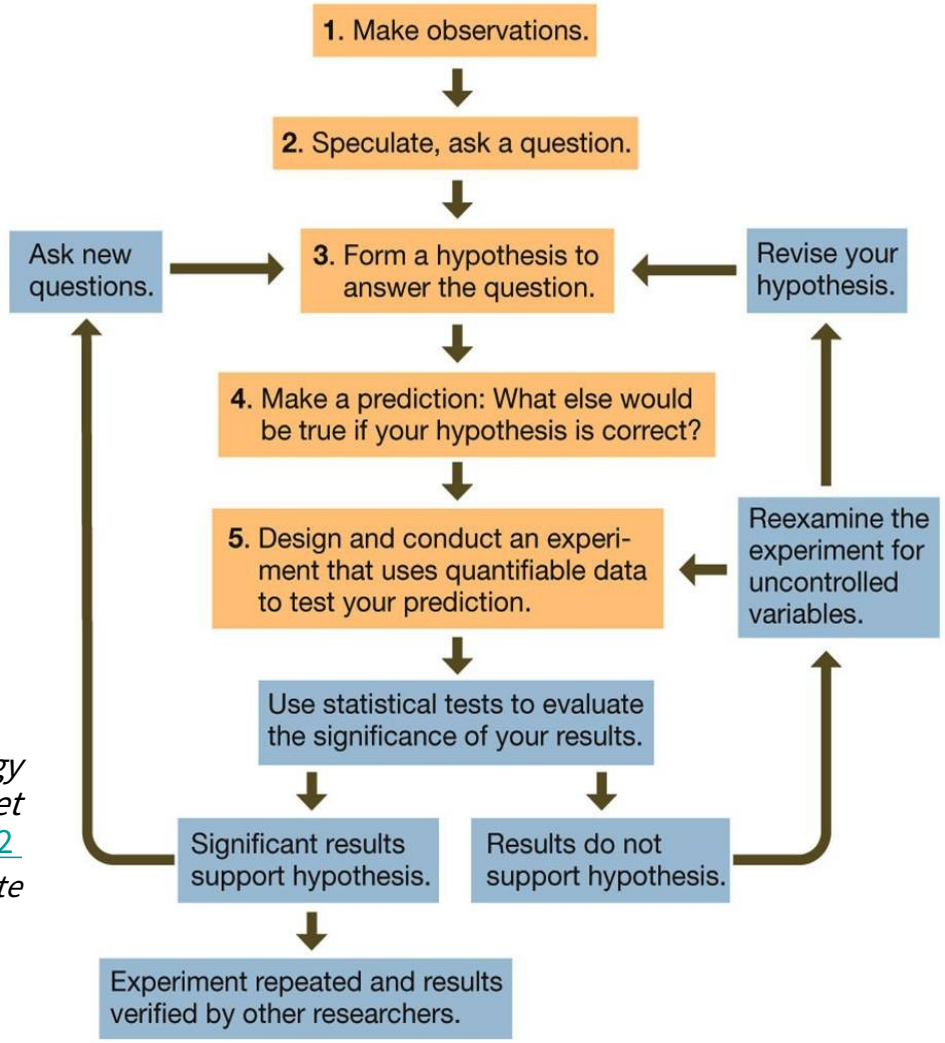
Why do we "like" foods that are high in calories (sugars & fats)? High salt?

What is Scientific Research ?

There is a specific sequence of steps in doing research



Source: *Georgia State University Biology Department's Technical Support Intranet Page,* Bio2107 (spring 2011) Lecture 2 *from Houghton's Lab Website*

***LIFE 9e*, Figure 1.12**

What is Scientific Research?

An Experiment

Question: Is low soil fertility causing poor soybean growth on my one hectare plot of land?

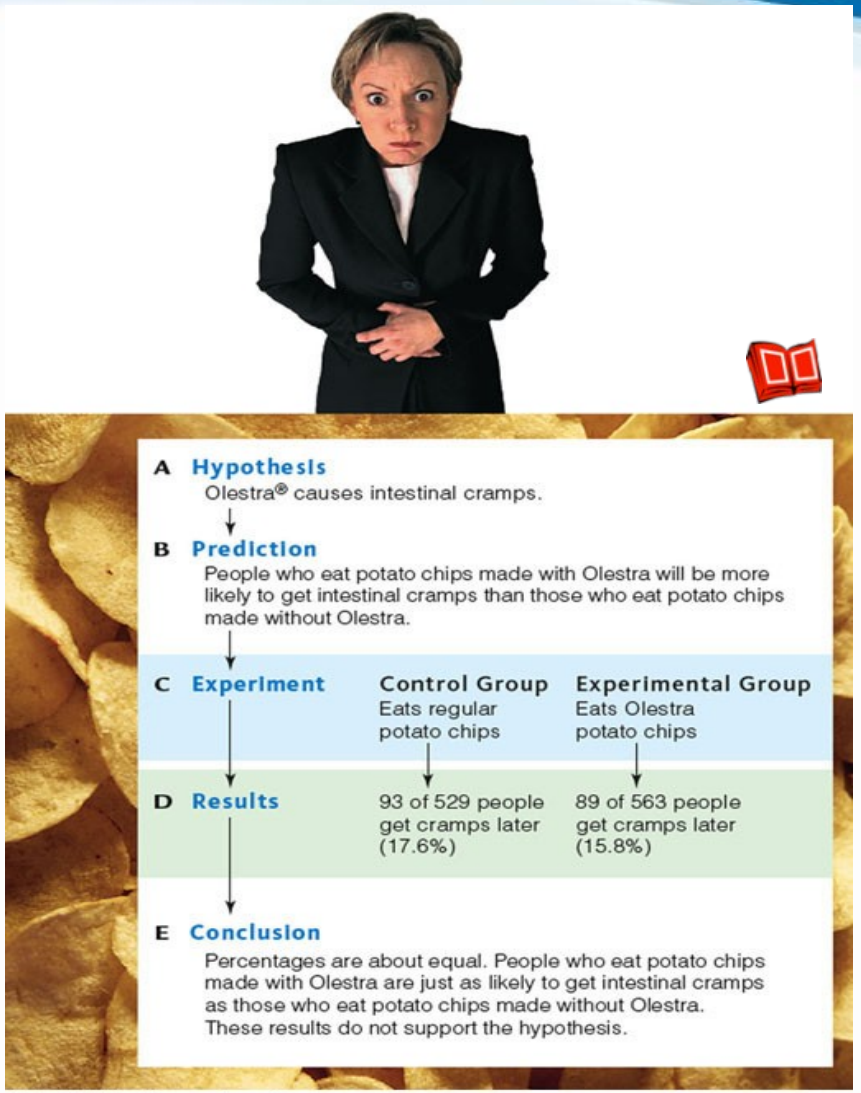
Experiment:

- Add simple chemical fertilizer (N, P, K) to one-fourth of the field, natural fertilizer (compost or manure) to one-fourth of the field, complex chemical fertilizer (N, P, K, Ca, S, Mg) to one-fourth of the field, nothing to one-fourth of the field.
- Plant soybeans
- Measure growth

How could this experiment be improved?

What is Scientific Research?

An experiment to decide if **Olestra** *(artificial, non-digestible fat substitute)* causes cramps



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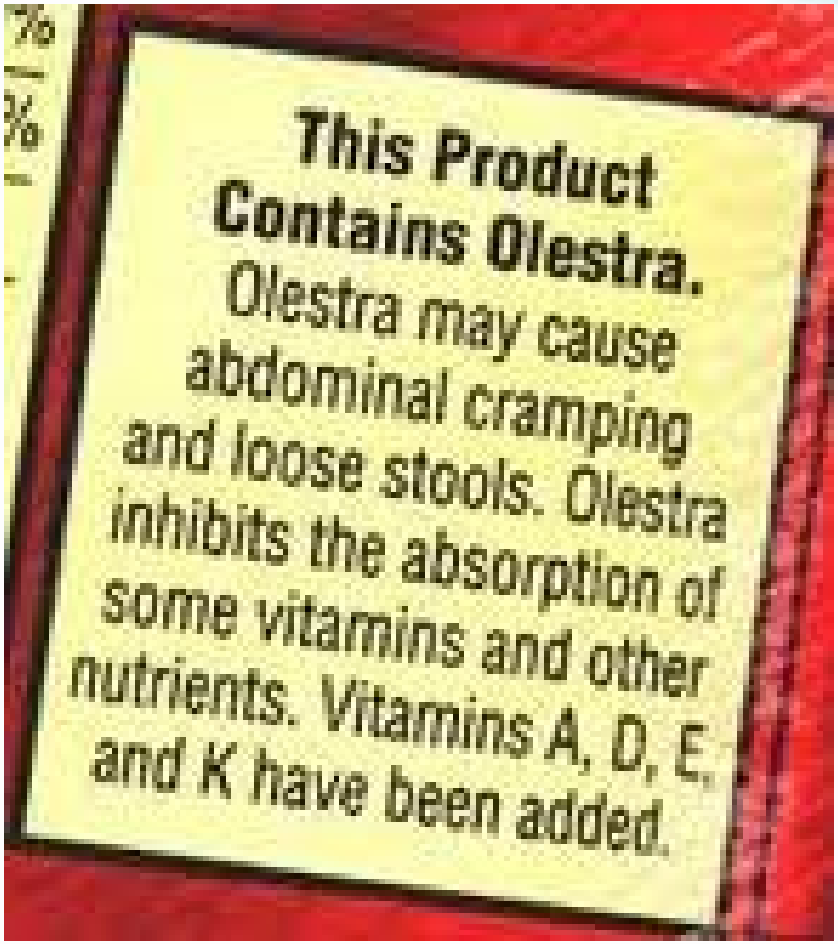
Souce: "Biology, Today and Tomorrow," by C. Starr, C. Evers and Lisa Starr, Third Edition. Brooks/Cole Cengage Learning. ISBN No. 0-495-56157-6.

What is Scientific Research?

If research proves a food product is harmful, that information should go on the label



Source: Resources webpage of Verdant.Net

What is Scientific Research?

Olestra is not digestible. It has no fat.

Source: http://www.womanhonorthyself.com/?p=5047

What is Scientific Research?

“ **Research**” was reported in TV advertisements starting 50 years ago

 Flickr aldenjewell

What is Scientific Research?

1960
“Research is Holy …”

Source: http://www.mjtoysinc.com/sites/default/files/imagecache/product_full/612.jpg

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What is Scientific Research?

Bonneville Salt Flats of Utah

Controlling the variables in research.

The side-by-side “roads” should be as much alike as possible.

Wikimedia Commons Ray the Rat

What is Scientific Research?

Dr. Hayes figured out how to do experiments in nature where one would not have to add harmful chemicals.

Dr.Tyrone Hayes
UC Berkeley biologist

Source: *By Muy Ngaou, courtesy of National Geographic and from "* National magazines laud young UC Berkeley innovators *", the press release dated Oct. 05 2004 by University of California, Berkely*

What is Scientific Research?

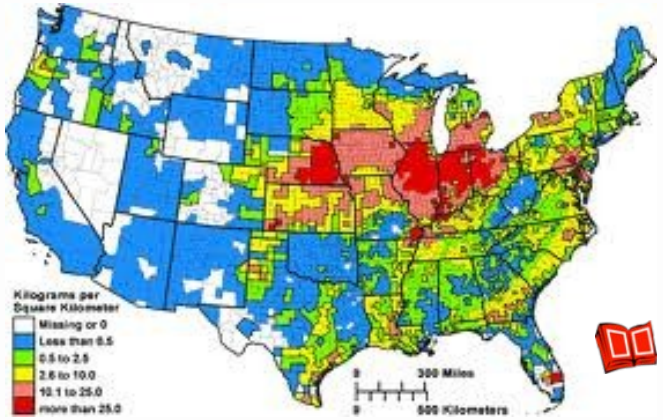
Atrazine

An herbicide. Used more than any other in the world.

Dr. Hayes thinks it is harmful to amphibians.

But this is debatable. EPA believes it is not harmful to amphibians.

Source: MFGpages.com-Global Manufacturer Pages



Atrazine used throughout the USA –

Source: Earth Actually in Science

What is Scientific Research?

- **Correlation** vs. **Cause-Effect**
- Are ***NEW*** pesticides, pharmaceuticals, food additives, smoke stack and auto emissions, tire wear, etc. …
- ***RELATED TO NEW*** diseases, like Alzheimer's disease, Autism, Fibromyalgia, Osteoporesis, Lupus, etc. …

???

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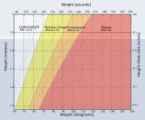		Wikimedia Commons: Author Unknown http://commons.wikimedia.org/wiki/File:Body_mass_index_chart.svg 2011/11/10 visited
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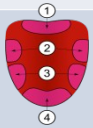		Wikimedia Commons MesserWoland http://commons.wikimedia.org/wiki/File:Taste_buds.svg 2011/11/10 visited
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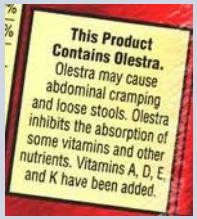		This work is from Verdant.Net Resouce Page http://www.verdant.net/resource.htm and the website claims "***No known copyrighted material is used on this site.***" *It is* used subject to the fair use doctrine in accordance with: •Taiwan Copyright Act Articles 52 & 65 •The "Code of Best Practices in Fair Use for OpenCourseWare 2009 (http://www.centerforsocialmedia.org/sites/default/files/10-305-OCW-Oct29.pdf)" by A Committee of Practitioners of OpenCourseWare in the U.S. The
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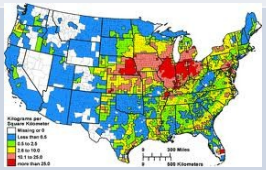		This work is from Earth Actually in Science webpage http://www.actualearth.org/blog/2009/09/10/usgs-finds-u-s-wide-contamination-by-hormone-disrupting-pesticide-atrazine/ and used subject to the fair use doctrine according to: •Taiwan Copyright Act Articles 52 & 64 •The "Code of Best Practices in Fair Use for OpenCourseWare 2009 (http://www.centerforsocialmedia.org/sites/default/files/10-305-OCW-Oct29.pdf)" by A Committee of Practitioners of OpenCourseWare in the U.S. The contents are based on Section 107 of the 1976 U.S. Copyright Act

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