

Chili pepper and reversal of innate aversions

Diary of Christopher Columbus, Jan 15, 1493

- “toda la gente no come sin ella, que le halla muy sana”
- (they eat nothing without it, and deem it very wholesome)
- Bernardo de las Casas
- “without chile, they do not think they are eating”

Chile history in Mexico

- *Capsicum anuum*: main species
- Consumption as far back as 9000 ya
- Cultivation between 5000-7000 ya
- Introduced to Europe after Columbus and Cortez
- Innately negative
- Most widely consumed spice in world







The Flavor-Principle Cookbook

by Elisabeth Rozin

This unique cookbook defines foreign cuisines in terms of recurrent flavor combinations and cooking techniques. Make *any* food taste an unlimited number of ways by varying and combining flavor principles and cooking methods.



Soy Sauce + Sherry-Gingerroot (Cantonese)



Olive Oil-Tomato + Garlic + Cheese-Herb (Southern Italian)



Cinnamon-Honey-Nut (Middle Eastern)



Lime-Chili (Mexican)



Lime-Chili (Mexican)

Why?

- Replaces more expensive black pepper

Adaptive Value ?

- Anti-microbial
- Cover decay
- Vitamin A and C
- Sweating/cooling
- Accidental acquired taste

Mechanisms of acquisition

- Desensitization - NOT SUFFICIENT
- Instrumental – NOT SUFFICIENT
- Addictive - NO
- **HEDONIC REVERSAL**
 - Mere exposure
 - Evaluative conditioning
 - Social

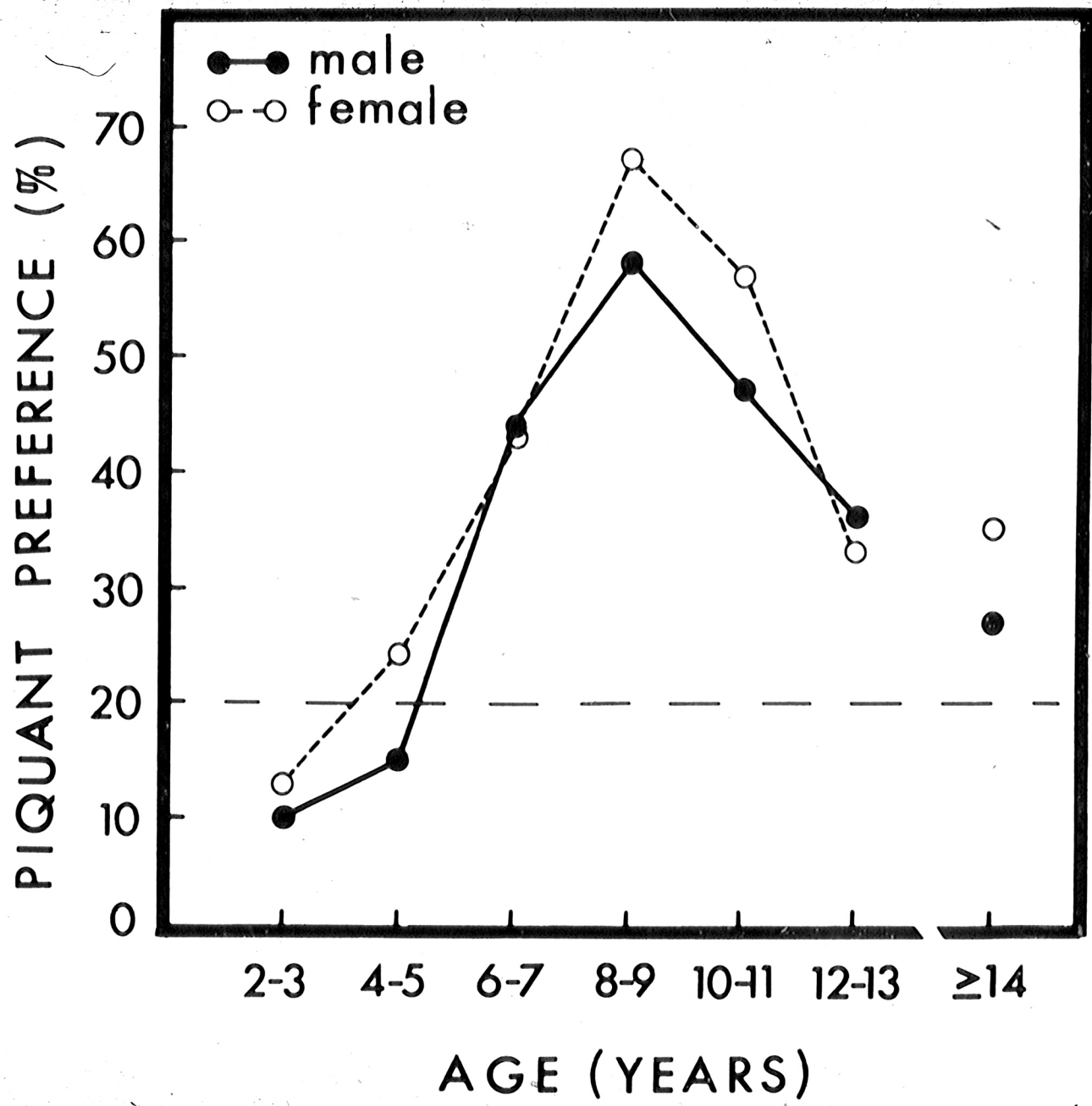












CODEX MENDOZA

Aztec Manuscript



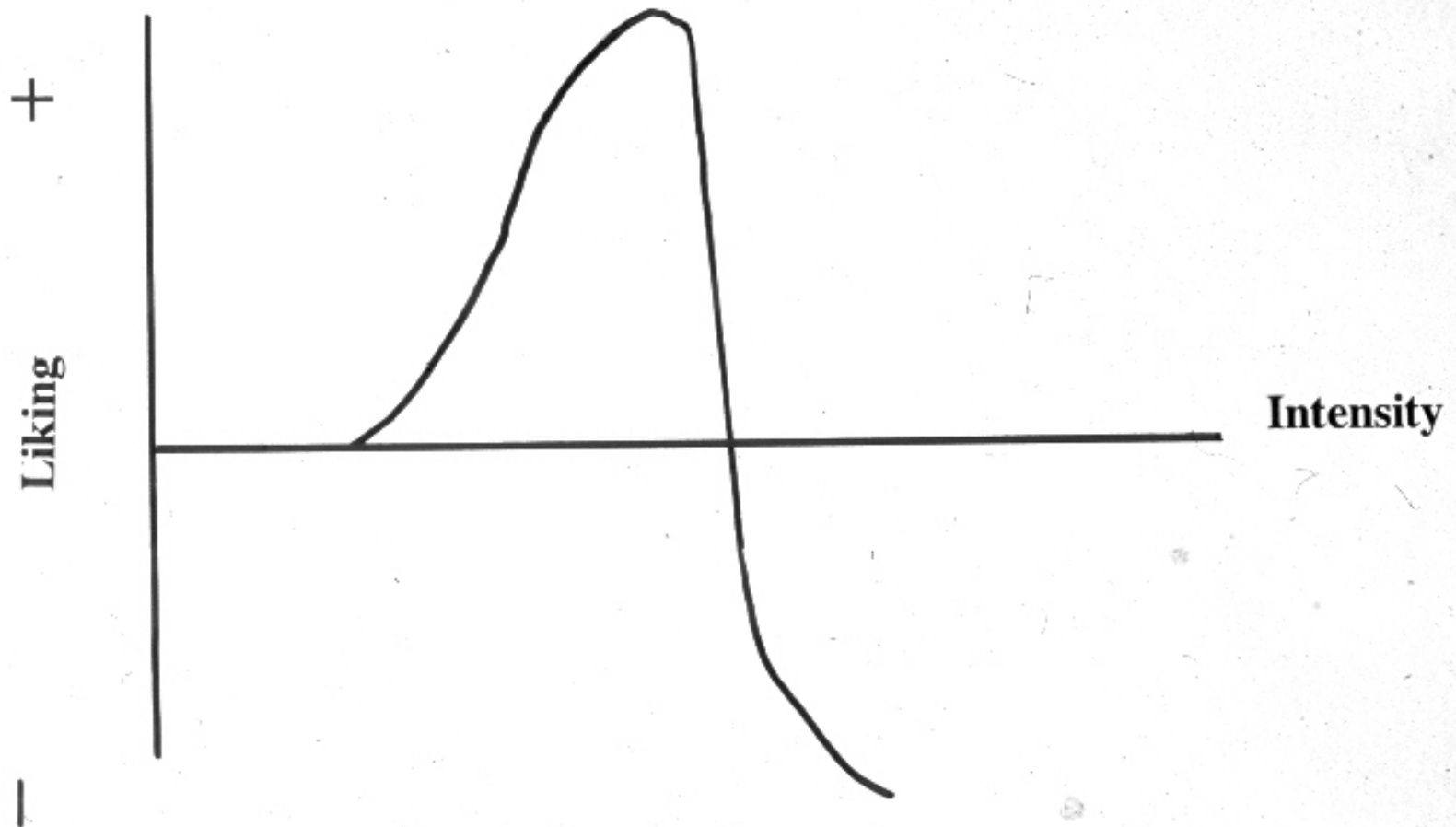
Contexts for chili pepper for American college students

• CONTEXT	PERCENT EATING
• Pizza	54
• Meat/fish	47
• Hoagies (subs)	44
• Vegetables	36
• Snacks/crackers	14
• Beverages	14
• Sweets	4
• Dairy	4
• Fruits	4





Liking for Chili Pepper as a Function of Burn Intensity



Evidence for benign masochism

(For Ss with item rating >40 on 100 point like scale)

(5 point disagree to agree scale)

- My favorite level of mouth burn from chili is about the highest level I can stand before it gets too painful. 43% agree

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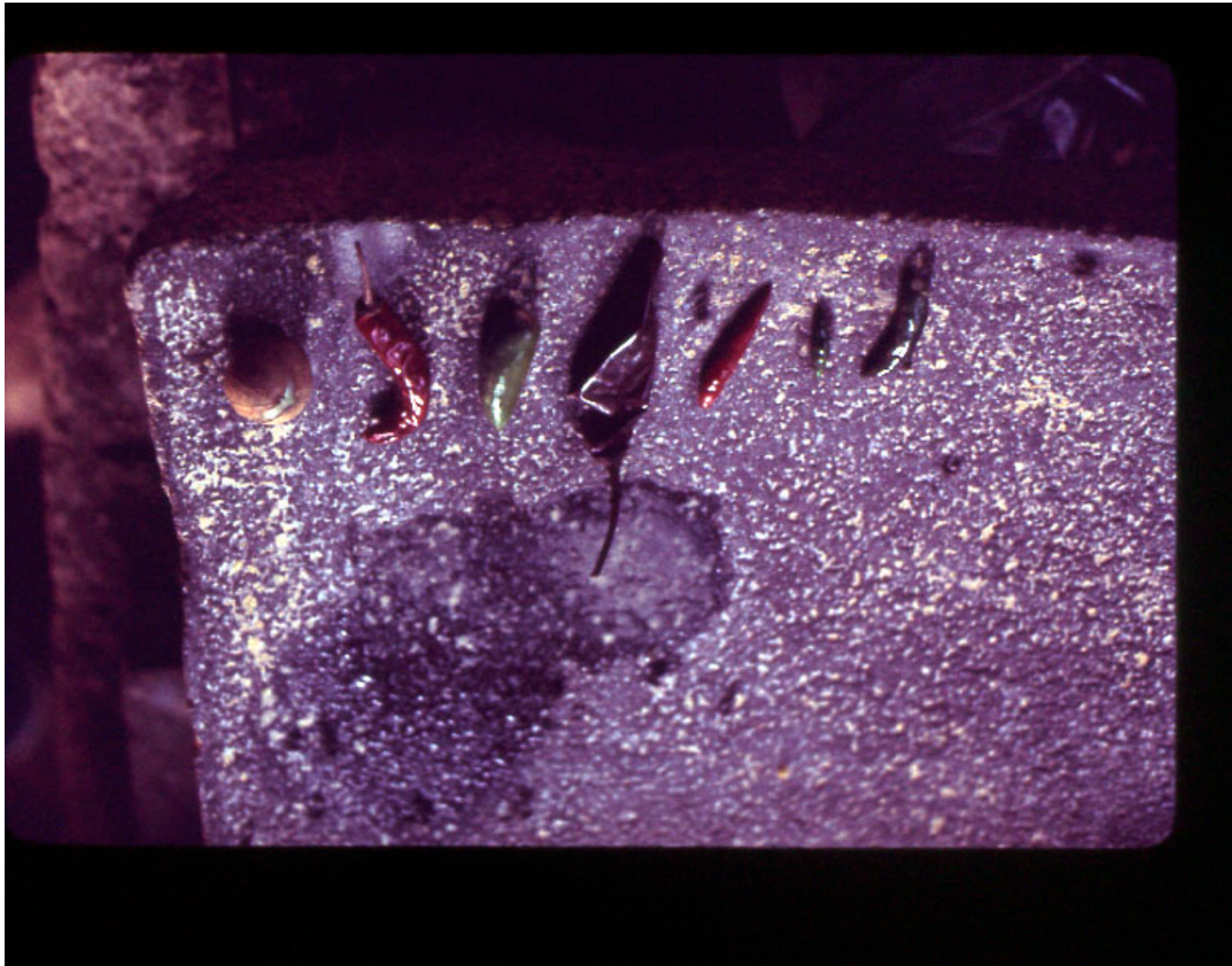
- My favorite roller coaster is the scariest I can stand. 60% agree





Types of benign masochism

- Oro-nasal irritation
- Bitter tastes
- Pain (e.g., in massage, in hot tub)
- Fear
- Disgust
- Exhaustion
- Sadness

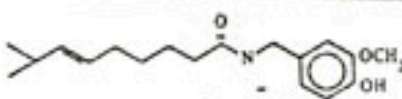
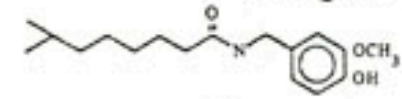
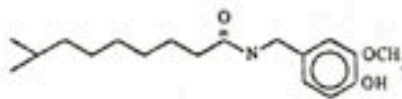
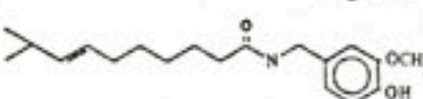
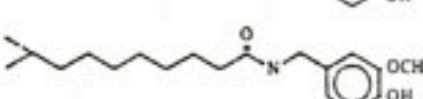




Capsaicin

- Found primarily in placenta
- At least five natural forms
- Poorly absorbed, mostly passed in feces

TABLE 2 Sensory Properties Of Capsaicins

Capsaicinoid	Pungency	Time-Course	Location	Structure	
Capsaicin	High	Rapid	Back		Capsaicin (C)
Nordihydrocapsaicin	Mod.	Rapid	Back		Nordihydrocapsaicin (NDC)
Dihydrocapsaicin	High	Rapid	Back		Dihydrocapsaicin (DC)
Homocapsaicin	Low	Slow, long	Mid		Homocapsaicin (HC)
Homodihydrocapsaicin	Low	Slow, long	Mid		Homodihydrocapsaicin (HDC)

Source: Adapted from Todd, P. H. Jr., Bensinger, M. S., and Biftu, T., *Journal of Food Science*, 42, 660-665.

Creative-expansive use of irritant spices



El Bulli





OLEANA

The tip of the (sp)iceberg

Chocolate

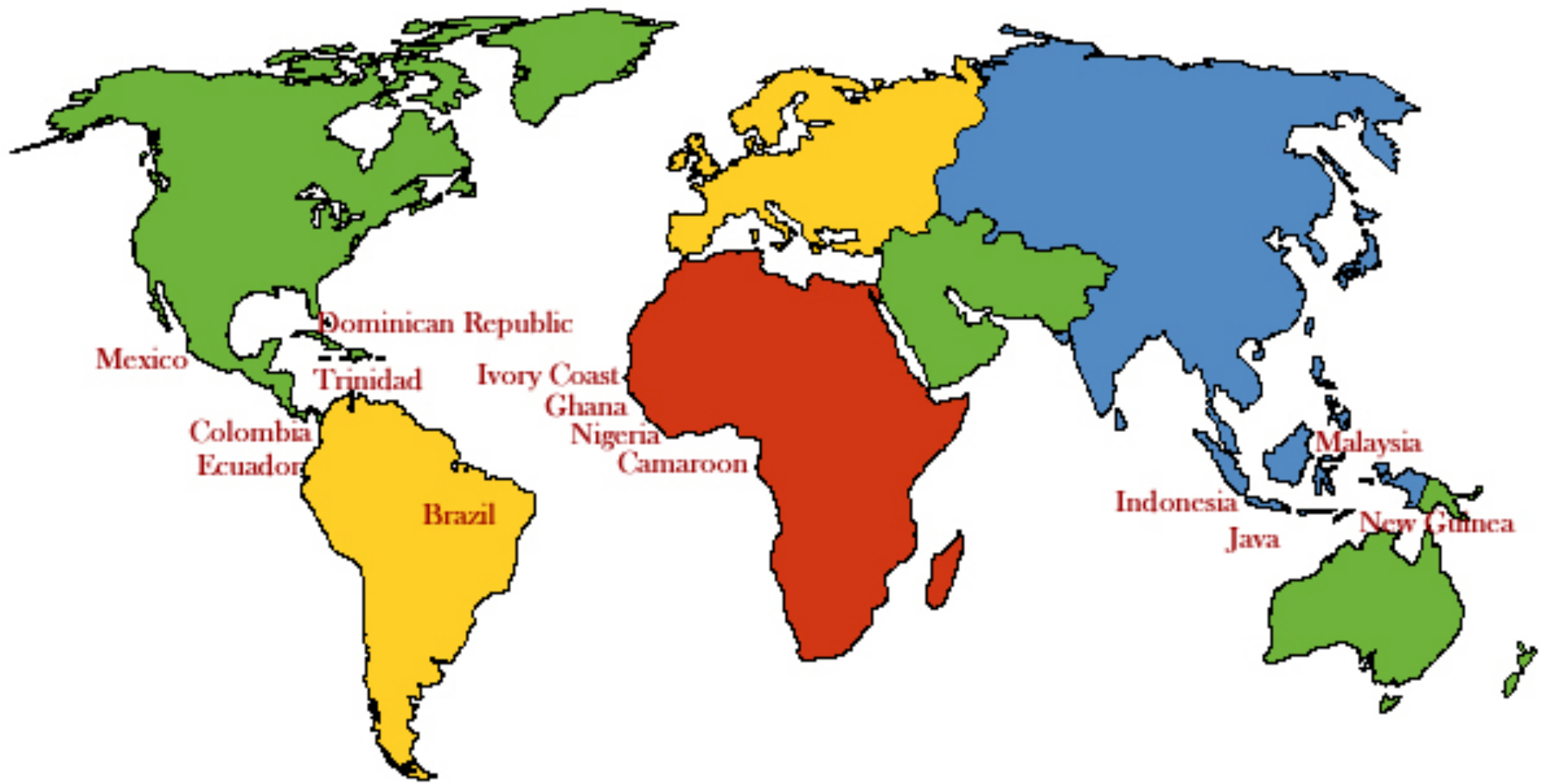




In this detail from the Codex Nuttall, a Mixtec book from Oaxaca, Mexico, the great Mixtec King 8 Deer receives a pot of frothy chocolate from his bride Princess 13 Serpent, in the year AD 1051. Chocolate was always present in Mesoamerican wedding ceremonies.



Detail of an early 18th-century painted tile panel depicting a chocolatada (chocolate party) in Valencia, Spain.



Contents of chocolate

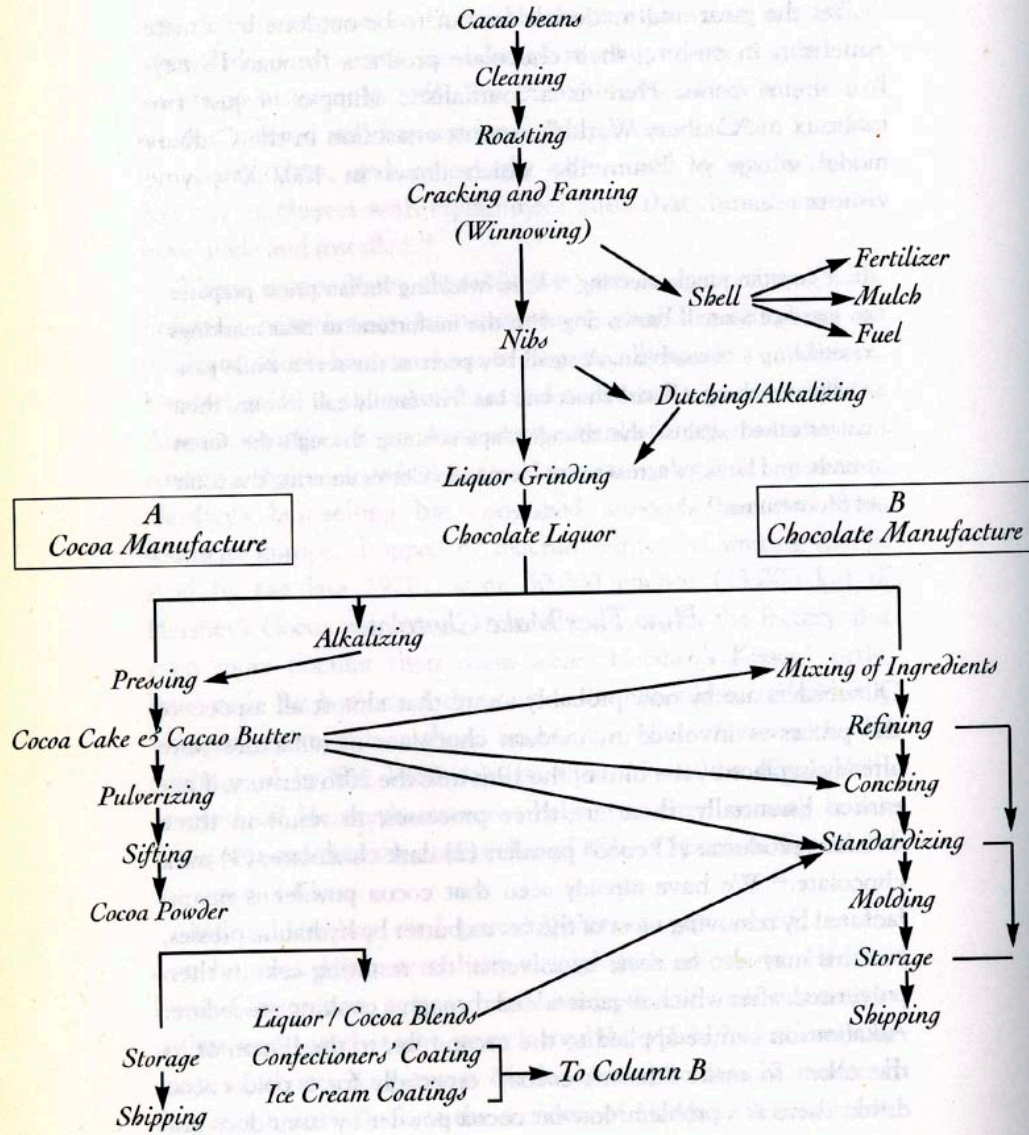
	Fat %	Sugar%	Milk Solids %	Pharmacology
Bitter	50-55			Full
Milk	28-40	40-50	12-22	Most
Cocoa powder	9-22			Full
Cocoa butter	98.5-100			None

Annual chocolate consumption per capita (kg) (OCCO)

- World .530
 - World minus India, China, Indonesia .967
- Europe 1.868
- Americas 1.197
- Africa 0.134
- Asia/Oceania 0.106

Chocolate Manufacture

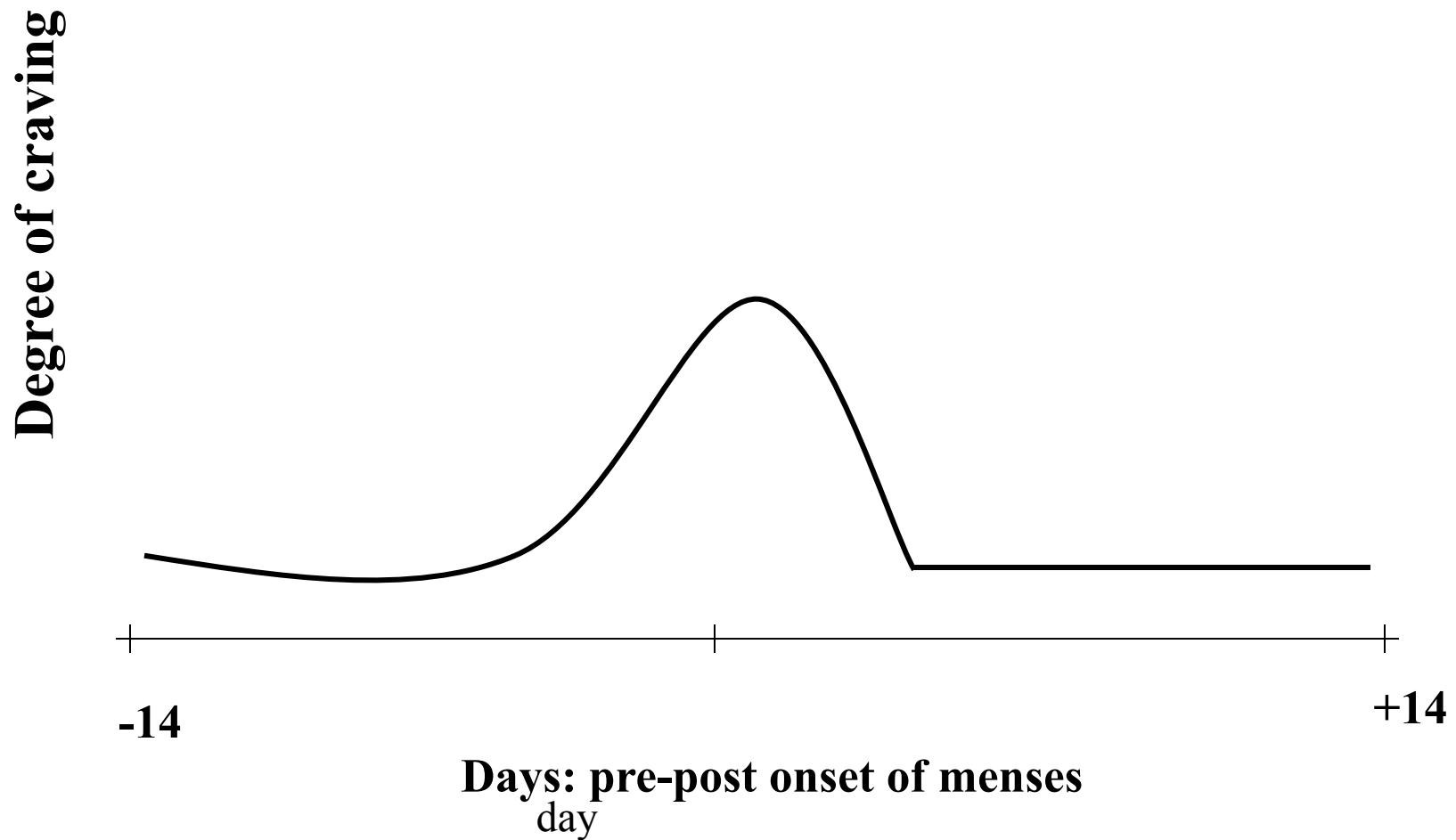
~flow chart after Minifie~



Chocolate craving incidence (%)

	Penn student females	Penn student males	Their mothers	Their fathers
Percent cravers	43%	16%	37%	15%

Perimenstrual chocolate craving



Chocolate craving

- A pharmacological base (caffeine and other arousing substances)?
- Nutritional base (e.g., high in magnesium)?
- Pure pleasure: IT TASTES GREAT!

What satisfies chocolate craving?

Michener & Rozin, 1994

Condition	Mean decrease in craving (100 pts)
Empty (nothing)	12
Placebo capsules (starch)	19

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White chocolate + cocoa cap	43
Milk chocolate (4 oz)	62



Fanciful depiction of a Turk, Chinese, and Aztec indulging in their respective drinks, from Dufour's 1685 treatise on coffee, tea and chocolate. The chocolatière and molinillo are post-Conquest.

The xanthine beverages

- XANTHINE MAIN SOURCE
- Caffeine Coffee
- Theophylline Tea
- Theobromine Chocolate

Chocolate and coffee contexts

- *Chocolate*
 - Candy/cake/desserts
 - Ice cream
 - Hot beverage
 - NO
 - Savory flavoring
 - Soda/yogurt etc.
- *Coffee*
 - Hot beverage
 - Ice cream, iced
 - NO
 - Savory flavoring
 - Soda/yogurt/cake etc.



Turkey with Poblano Mole Sauce

PUEBLA

MOLE POBLANO DE GUAJOLOTE

Turkey with Poblano Mole Sauce

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MOLE POBLANO DE GUAJOLOTE

Turkey with Poblano Mole Sauce

This legendary dish is said to have been created in seventeenth-century Puebla by Sister Andrea de la Asunción, a Dominican nun from the Santa Rosa convent, with the original recipe including more than one hundred ingredients. Today, mole remains the classic dish for festive occasions such as weddings and baptisms. It is better to prepare the sauce in advance, adding the turkey when it is reheated—not only because of the work involved in preparing the mole but because it tastes better when the various flavors have time to mingle and mellow.

1 young turkey, about 8 lb (4 kg), cut into serving pieces
16 cups (128 fl oz/4 l) water
4 cloves garlic
½ onion
1 tablespoon salt

SAUCE

½ cup (4 fl oz/125 ml) plus 2 tablespoons oil
7 oz (220 g) *chiles anchos*, seeds and membranes removed
3 oz (90 g) *chiles pasillas*, seeds and membranes removed
10 oz (315 g) *chiles mulatos*, seeds and membranes removed
4 *chiles chipotles*
1½ lb (750 g) tomatoes
1 onion, coarsely chopped
10 cloves garlic
5 oz (155 g) blanched almonds
3½ oz (105 g) shelled peanuts
8 whole cloves
4 black peppercorns
1 1½-in (4-cm) stick cinnamon
½ teaspoon aniseed
3 oz (90 g) raisins
3 oz (90 g) unsweetened (cooking) chocolate

MEAT and VEGETARIANISM

Meat

- Most favored food
- Most tabooed food
- Ambivalence (chocolate and meat)
- Moral tone with meat
- Vegetarianism (No meatatarianism)

Meat and disgust

- Almost all disgusting foods are of animal origin



Handful
each

Smoked
Pig Feet
\$10.00

Smoked
Pig Tails
\$5.00

Smoked
Pork
\$10.00

FRESH
RABBIT

Old Fashion
Sausage

PORK
KIDNEYS

Pork
Kidney

PORK
TONGUES

Breaded
Veal
Patties

Lamb
Patties

PORK
LIVER

Smoked
Pig, Sausage
\$10.00



Meat and disgust

- Disguised in supermarket presentation in USA
- Name transfers in some case: beef, pork
- Most animal foods rejected in all cultures

Vegetarianism in ancient Greece

- The Golden Age of early man
- Bad for the body – health
- Transmigration of souls
- Depriving animals of life is immoral

Genesis I: 29

(sixth day of creation)

- “God said, ‘Behold I have given you every herb bearing seed which is upon the face of all the earth and every tree in which is the fruit of a tree yielding seed; to you it shall be meat.’”

God to Noah

'Be fruitful and multiply and replenish the earth. And the fear of you and the dread of you shall be upon every beast of the earth...
..Everything that liveth shall be meat for you..."

Problems of eating animals

- Kashrut and other traditions, Hindu ahimsa
- Transfer of animal instincts into humans:
 - You are what you eat

Vegetarianism

- The health dimension
 - Short term and long term
- The moral dimension
 - Killing and suffering
 - Ecology
- Hitler as disturbing to moral vegetarians

Vegetarianism - 2

- The slippery slope
 - Accretion of reasons
 - Backslides

Vegetarianism - 2

- The slippery slope
 - Accretion of reasons
 - Backslides
- Moral vs health vegetarians
 - Moral recruits disgust
- The most common path:
 - Baby animals to mammals to vertebrates to all animals to all animal products (milk, eggs)

Meat free associations

Category	Eaters (128)	Avoiders (62)
Beef and beef products	47	16
Other meats	21	13
Animals/ cows	13	5
Red	7	6
Good, yum, delicious	10	1
Bad, yuch, gross, disgust	0	7
Fat	5	2
Protein	6	0
Dead/blood	3	1

Raw beef free associations

Category	Eaters (128)	Avoiders (62)
Bad, gross, disgust, yuch	18	16
Blood, death, dirty	20	11
Unhealthy, organisms	20	7
Beef and beef products	20	2
Red	11	9
Animals	0	2
Good, yum, delicious	2	0
Word: blood/y	17	10
gross	10	10

Most common free associations to “meat”

(CIDIL survey, ~170 random in each country)

Fischler et al.,

	France	Germ	Italy	UK	US
1	boeuf	madcow	Rosso	Beef	Chicken
2	Steak	Rind	Mucca	Lamb	Beef
3	Rouge	Schwein	Pollo	Chicken	Steak
5	Protide	Frisch	Bistecca	Red	pork
5	Poulet	Wurst	Bianca	Pork	Protein
6	madcow	hahn	vitello	protein	Red









Water

Water: the unappreciated nutrient

- Highest need in intake of any nutrient
- Solvent for biochemical reactions
- Reactant in breakdown of fats, CHO, PRO
- Lubricant
- Medium of transport

Human body water content

- Whole body: 50-60%
- Brain: 75%

Percent water in food

Club soda	100%
Lettuce	96%
Whole milk	88%
Apple	84%
Rice	68%
French fries	57%
Beef	50%
Cheese pizza	48%
White bread	37%
Chocolate	1%

Water uses

- Drunk directly (<1% of tap in USA)
- Added in cooking or other edible preparations
- Agriculture/gardening
- Ritual (the Ganges)
- Cleaning
 - Food related
 - Body
 - Possessions

Cultural contrasts

- Water as a pure beverage or not?
- In short supply vs. excess
- Contaminated or not

Ambivalence to water

- Necessary, and for some, tasty
- Source of contamination

History of water use

- In west, not drunk much as a pure beverage
- Europe
 - No significant use in toilets until 19C
 - Little water bathing or washing until 19C
 - Public delivery of water and disposal of water wastes and purification: begins in 19C

Water in the modern world

- Water in the United States
 - Water processing and recycling

Water shortage in the American West

- Limits to the Colorado river source
- Too expensive to desalinate
- The option of recycling
 - Safe
 - Inexpensive

Toilet to tap

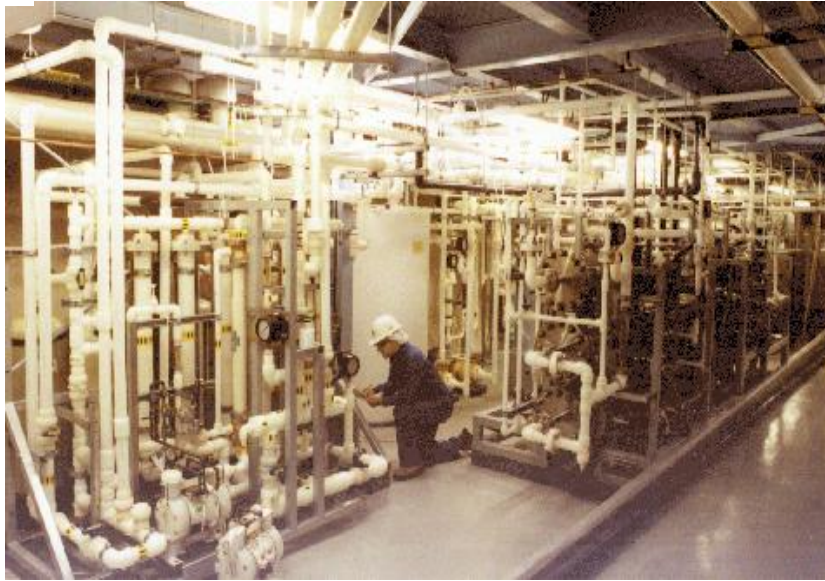




Urine

0.05% Ammonia
0.18% Sulphate
0.12% Phosphate
0.6% Chloride
0.01% Magnesium
0.015% Calcium
0.6% Potassium
0.1% Sodium
0.1% Creatinine
0.03% Uric acid
2% Urea

95% Water



Problems in introducing recycled water

- All psychological
 - Unsavory and disgusting
 - Believed unsafe
 - Not really instrumental
 - Like natural: ideational

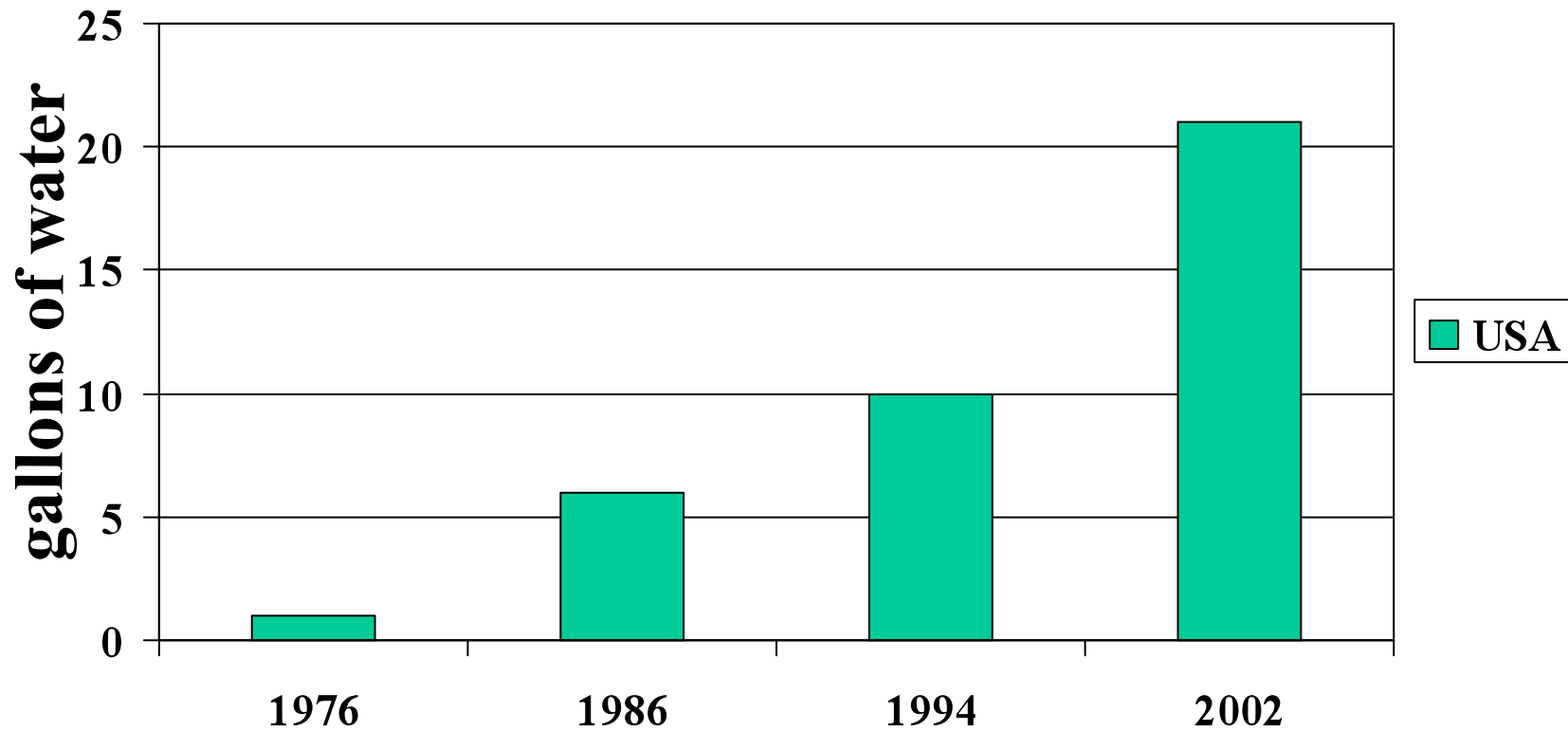
Solutions

- Government imposition (Singapore)
- Don't tell
- Study and try to understand lay concept of water and safety
- Switch to bottled drinking water (<1% of all consumed)
- Reframe concept of water
 - All water is recycled
 - Making pure water

Water in the modern world

- Water in the United States
 - Water processing and recycling
 - Bottled water

Per capita annual consumption, bottled water, USA



Why are people paying for
bottled water?

Potential growth and elaborations in bottled water market





1921
Crystal
SPRINGS
MOUNTAIN
G WATER

PURIFIED WATER
WITH MINERALS ADDED FOR TASTE
Crystal
SPRINGS

CALCIUM
one of the Daily 5 per bottle

6/500 mL
16.9 fl oz
(1.05 pL)
Bottles

52.6¢
3/5.00
CRYSTAL SPRINGS WTR W CALOR
104 7757 0000 01 1 0 930 010 10 0
UP 01



GREAT FOR KIDS ON THE GO!

DANNON
Fluoride
to go
FLUORIDATED
SPRING WATER



8.5 OZ.
8 PACK
8 - 255 mL BOTTLES (2 L)

8 - 8.5 FL OZ BOTTLES (68 FL OZ)

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8.5 OZ.
8 PACK
8 - 255 mL BOTTLES (2 L)

8 - 8.5 FL OZ BOTTLES (68 FL OZ)



Unit Price	90.5¢	Net Wt	3.1
	PER QT		152.0
CRYSTAL SPRINGS FLUORIDATED			
163 1488 50214 22 1 5 7/10			
8/18/10 1001/1/10			



POCONO MOUNTAIN SPRING WATER
100% NATURAL
Pocono Springs

ACME
Purified Drinking Water

ACME
Purified Drinking Water

ACME
Distilled Water

223 .89

223

ACME
Natural Spring Water



PURE MOUNTAIN SPRING WATER
POCONO
100% NATURAL
Pocono Springs
ACME

ACME
Purified Drinking Water
ACME

ACME
Purified Drinking Water
ACME

ACME
Distilled Water
ACME

223 .89
NEW 2.0L PET BOTTLE
ACME

223 .89
NEW 2.0L PET BOTTLE
ACME

ACME
Natural Spring Water
ACME

ACME
Natural Spring Water
ACME



Pure Rain
Water

LITE
Water

223 .89

223

NATURAL DRINKING WATER

THE WATER STORE

HOT TUBS • POOLS • WATER FILTRATION SYSTEMS



Maison de l'eau





1997 FIRST WINTER RUNOFF



NOT FROM CONCENTRATE



NADA SPRING WATER

No cholesterol No fat No calories No preservatives
No caffeine No MSG No sodium No sweeteners



*Bottled natural
water available
50 km*

Dog Water[®]



**fluoride enriched
purified drinking
water!**



Shower Stall



SepticSprings
Natural water

What next?

- From Max's global and sublime to Paul's particular and ridiculous
- Max: Sparkling black energy beverage
- Kathleen: A hyperparabolic orbital drink
- David: Stem cell soda
- Paul: Bottled air

END