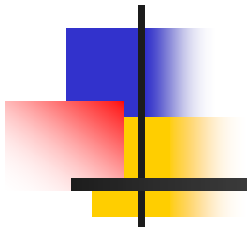
Why Humans Like Junk Food



Steven Witherly, PhD
Technical Products Inc

No Theory on Food Pleasure

No Theory on Food Pleasure

Special Thanks To:

Aaron Graham

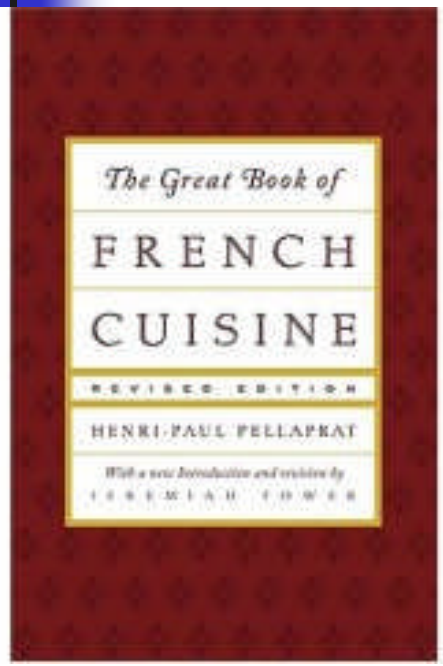
GRIFFITH LABORATORIES
the FOOD architects

Flavor Chemists & Food Pleasure

- FC are in the *Pleasure* Business
- Food & Flavor Choices are Based on *Pleasure & Memory*
- Knowledge of Food Pleasure will help Flavor Chemists Design Better Foods and *Win Customers*

The Society of Flavor Chemists®

Art and Science



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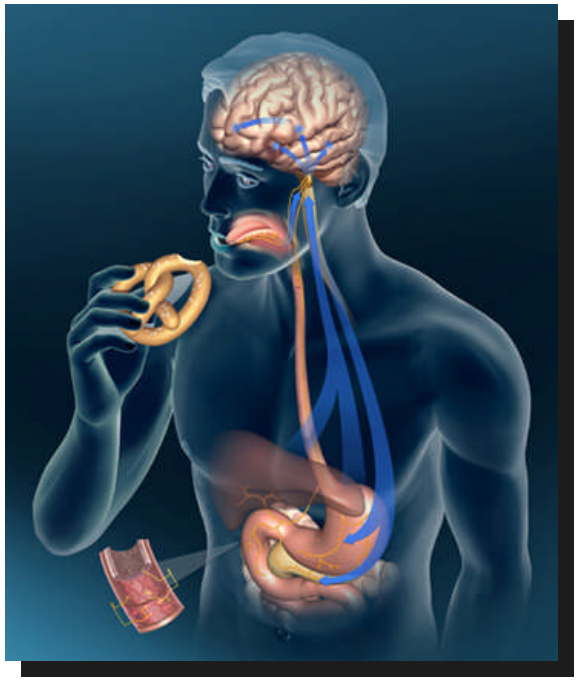
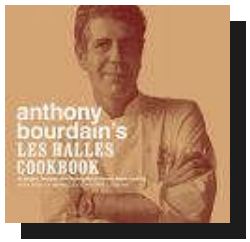
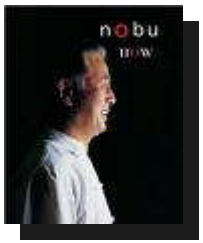
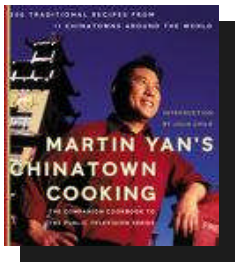








Talk Outline

- Latest Research in Chemical Senses
  - How Many Senses are there?
  - Latest Taste Research
  - Latest Olfaction research
- What is Food Pleasure?
  - Pleasure Center
  - Important Food Theories
    - Food Pleasure Equation
- Flavor & Culinary Applications

Food Perception Theories

- Food Pleasure Equation
  - Sensation plus calories
- Emulsion theory
  - Salivation Response
- Dynamic Contrast
  - Tostada Effect
  - Ping-Pong Pleasure
  - Meatloaf Effect
- Sensory Specific Satiety
- Evoked Qualities (Emeril Bam Effect)
- Flavor-Flavor Learning
- Mere Exposure Effect
- Taste-Aversion Learning
- Rozin's Fundamental Principle
  - Disgust Theory
- Human are "Cookivores"
  - R. Wrangham
- Essential Nutrient Coding
  - Goff & Klee
- Wanting vs. Liking Theory
  - K. Berridge

Favorite Foods

- Why We Like Doritos
- Why We Like Vanilla Ice Cream
- Why we Like Garlic
- Why We Like KFC Chicken
- Why We Like Chocolate

Food Theories?

What Makes Food Taste Good?

We are All Experts?

- Pangborn told me:
  - "Since everyone has a nose and tongue we all think we are experts on good food"

Fundamental Theories

- Central Limit Theory (mathematics)
- Pareto's Principle (80/20 rule)
- Theory of Relativity (Einstein)
- Big Bang Theory
- Theory of Everything (String)
- Evolutionary Theory (Darwin)
- Entropy Theory (Thermodynamics)
- Gravitational Theory (Newton)

Food Pleasure & Guilt

All common pleasure pathway

Food Industry (Big Bucks)

- Food Industry is Almost a Trillion Dollar Industry!
- Fast Food alone is 100 billion!
- Snack Food 100 billion!
- Food Service: 500+billion!

Doritos Effect

New Book…

Wouldn't it be Great if Someone Wrote a Book Summarizing This Sensory Information for Food Professionals

Why Humans Like Junk Food

- The Inside Story on Why You Like Your Favorite Foods, the Cuisine Secrets of Top Chefs, and How to Improve Your Own Cooking Without a Recipe
- By Steven A Witherly, PhD.
- Barnesandnoble.com, iUniverse.com, Amazon.com
- Author directly: signed, postage and taxes included.
  - check: Technical Products Inc. 23510 W, Windrose Place, Valencia, Calif. 91354, $31.95

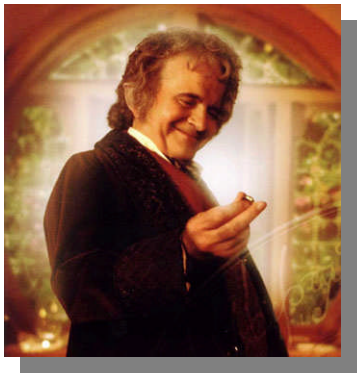


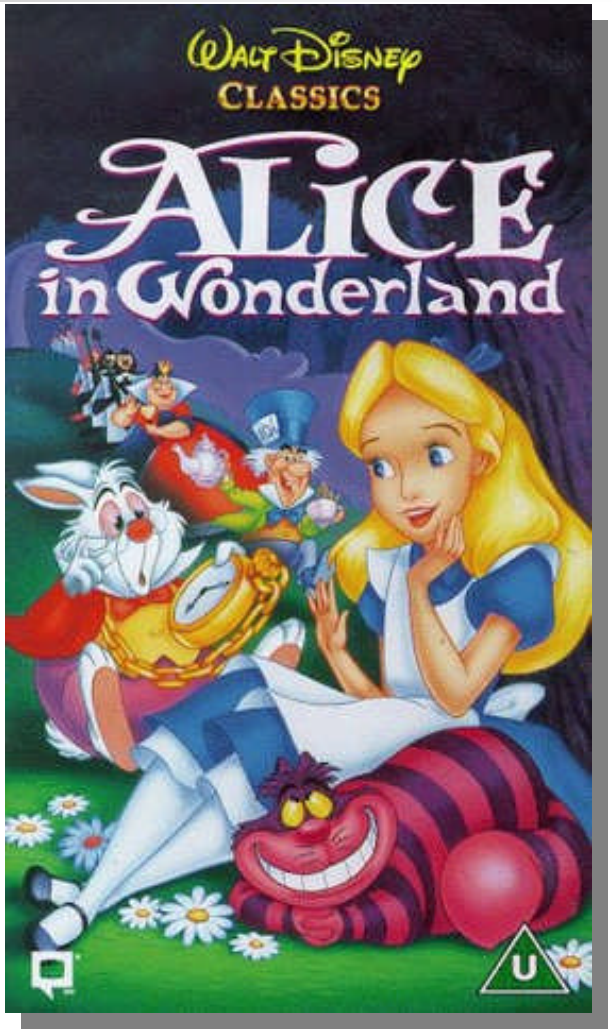
Food Company Powerhouses:

Food Favorites

Where to Begin?

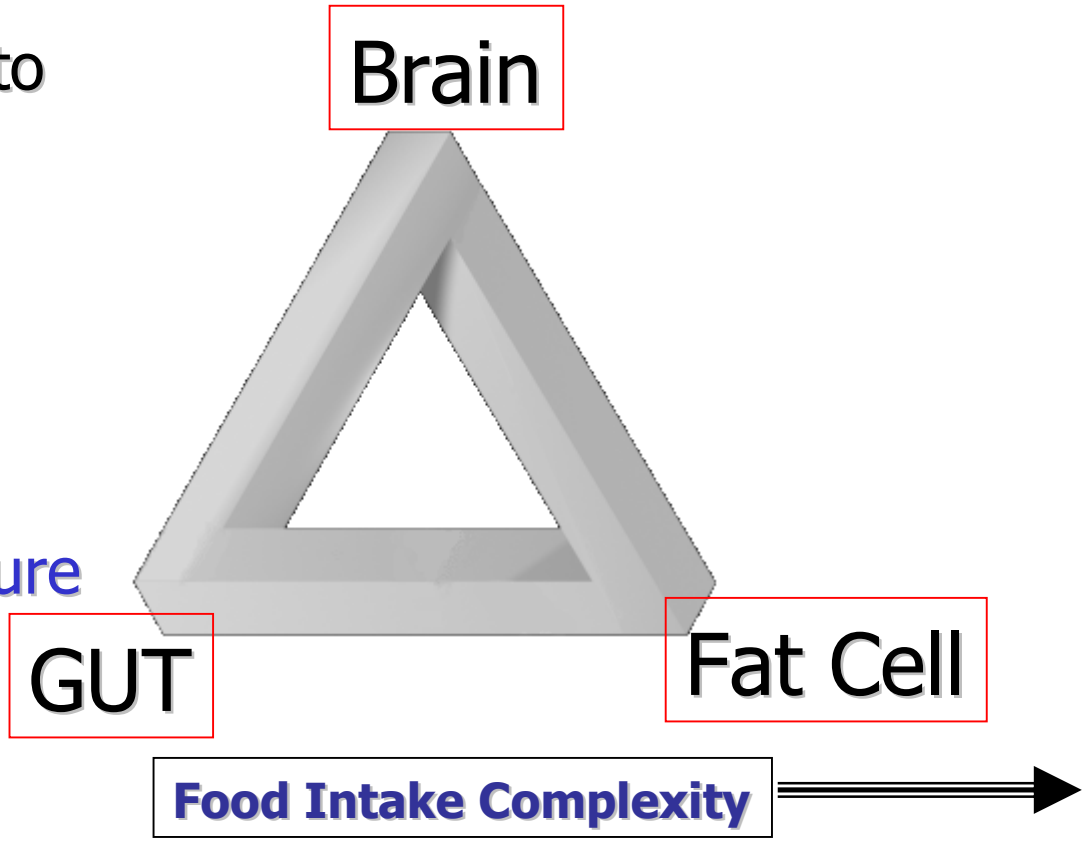
- Let's Start with Some Fundamental Aspects of Food Intake!

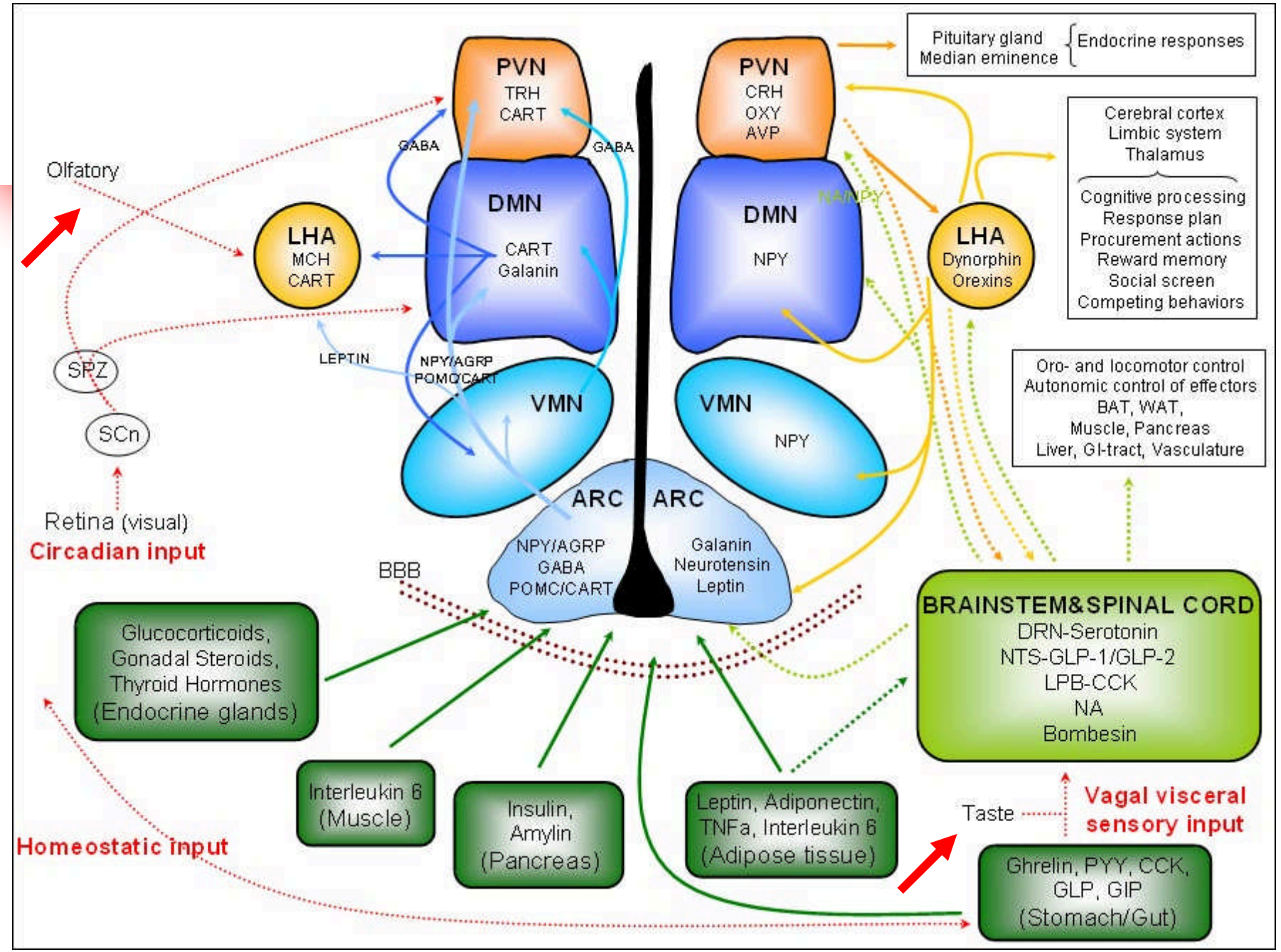




Intake Principles

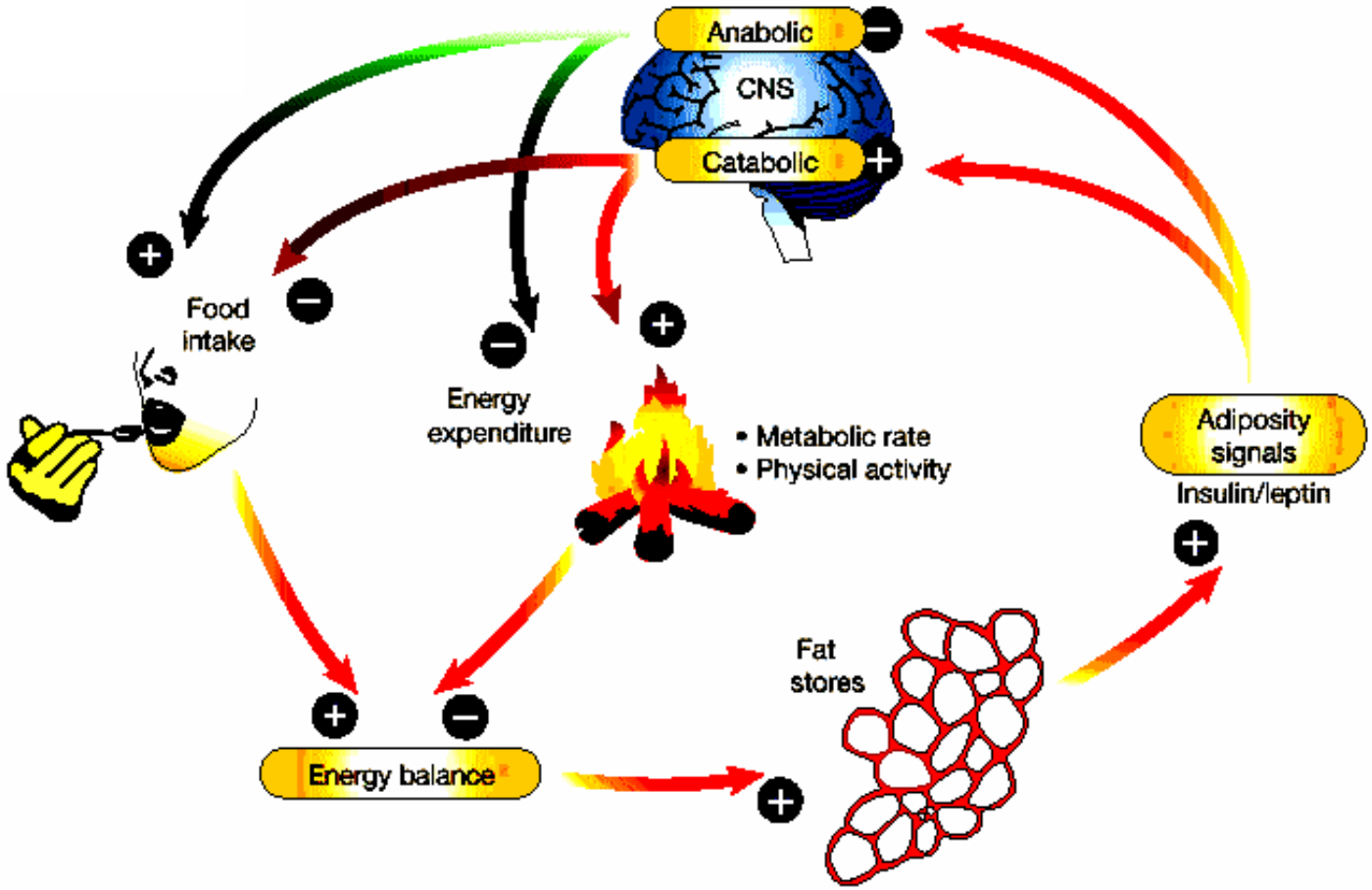
- 1. Brain Designed to Seek Calories (fat)
- 2. Each System Talk to Each Other!
- 3. System is Biased Upward
- 4. System has Long Term Memory
- 5. System uses Pleasure for Control




Pituitary gland
Median eminence
Endocrine responses
PVN
TRH
CART
PVN
CRH
OXY
AVP
Cerebral cortex
Limbic system
Thalamus
Cognitive processing
Response plan
Procurement actions
Reward memory
Social screen
Competing behaviors
GABA
GABA
Olfatory
DMN
CART
Galanin
DMN
NPY
NA/NPY
LHA
MCH
CART
LHA
Dynorphin
Orexins
LEPTIN
NPY/AGRP
POMC/CART
VMN
VMN
NPY
Oro- and locomotor control
Autonomic control of effectors
BAT, WAT,
Muscle, Pancreas
Liver, GI-tract, Vasculature
SPZ
SCn
Retina (visual)
Circadian input
ARC
ARC
NPY/AGRP
GABA
POMC/CART
Galanin
Neurotensin
Leptin
BBB
BRAINSTEM&SPINAL CORD
DRN-Serotonin
NTS-GLP-1/GLP-2
LPB-CCK
NA
Bombesin
Glucocorticoids,
Gonadal Steroids,
Thyroid Hormones
(Endocrine glands)
Interleukin 6
(Muscle)
Insulin,
Amylin
(Pancreas)
Leptin, Adiponectin,
TNFa, Interleukin 6
(Adipose tissue)
Taste
Vagal visceral
sensory input
Homeostatic input
Ghrelin, PYY, CCK,
GLP, GIP
(Stomach/Gut)

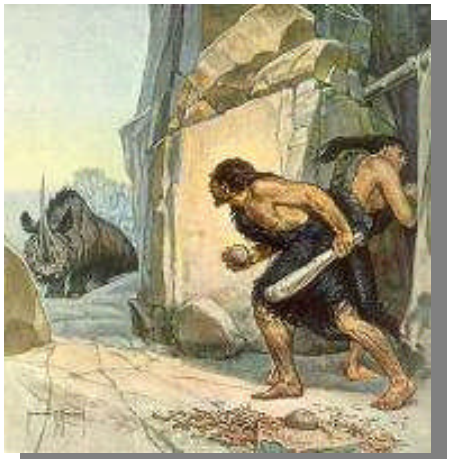
Simplified Food Intake

Chemical Senses



Human Diet Evolution

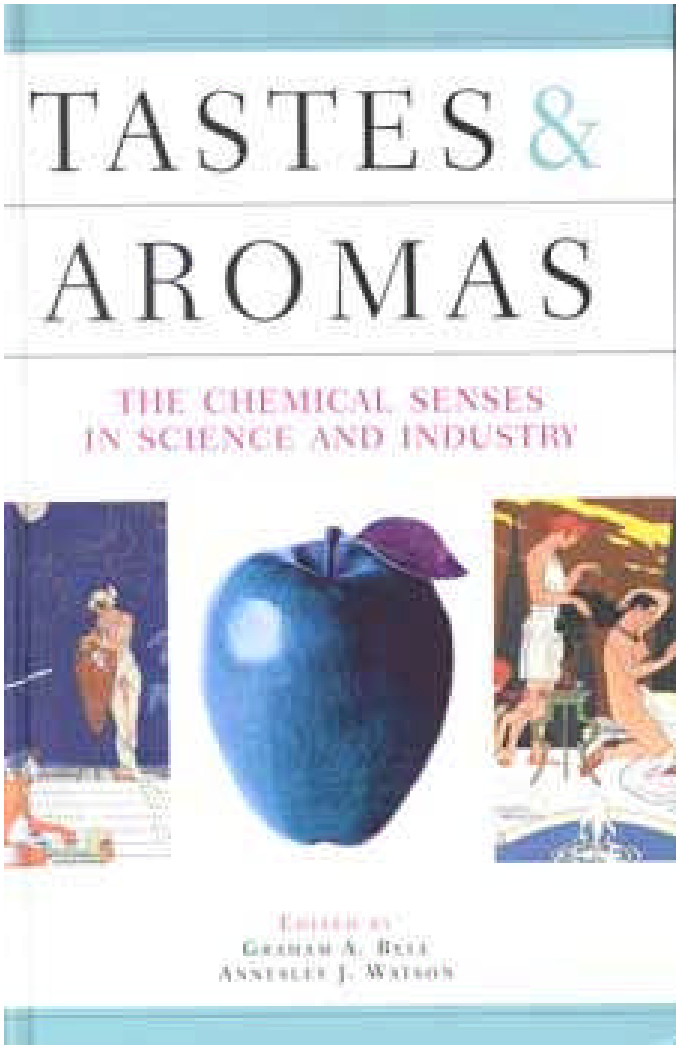
- Salt, fat and sugar rare in our Past!
- We crave what is scarce!



Lean meats, berries, whole grains, vegetables, fruits, honey

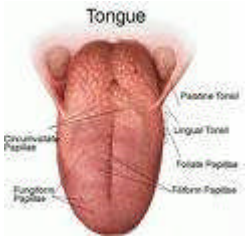
Thrifty Gene Hypothesis

Chemical Senses



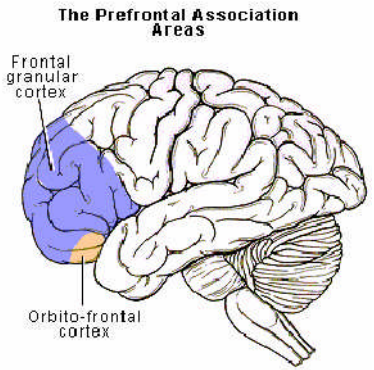
Chemical Senses Overview

- Sense of Taste
  - The basic tastes
  - Additional taste sensations



- Sense of Smell
  - Aroma sense
  - Trigeminal sense

- Brain Flavor Processing (OFC)



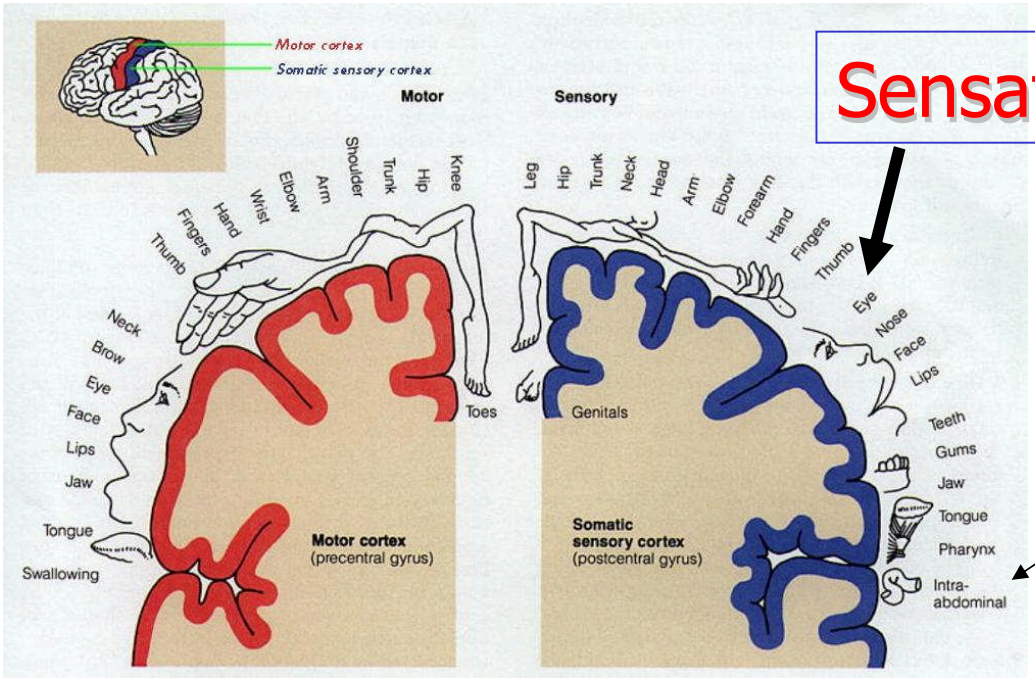
Number of Senses?

- Just the Classic Five?
  - I don't think so!
- More than 20!
  - Osmolality & Stretch receptors
  - Positional Sense
  - MSG
  - Heat & Cold Perception
  - Hot Pepper (Vanilloid),

Bruce Durie, New Scientist Magazine

Sensory Homunculus I

- 40% of all sensation from the mouth and face
- Intestines about 5% of sensation

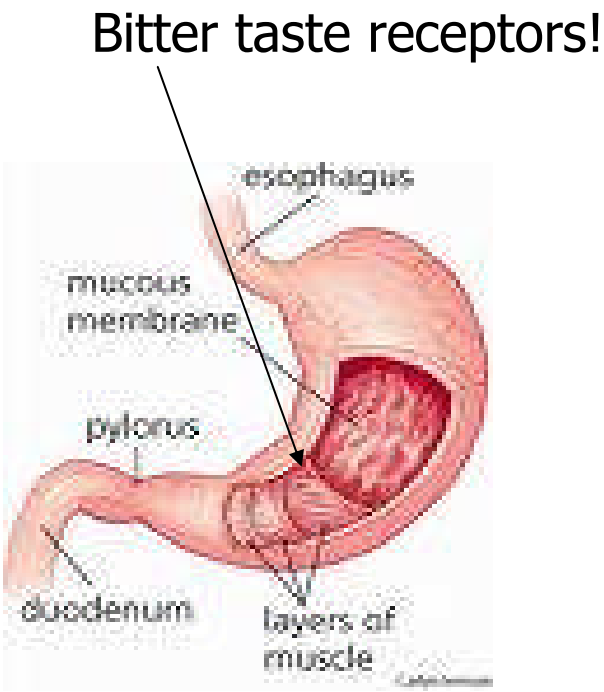


What You Look Like!

Sensory Input To Brain

Stomach: 2nd Oral Receptor System

- The stomach contains:
  - Osmoreceptors
  - Sense organs for:
    - Amino acids
    - Fatty acids
    - Glucose
    - Acids and bitter tastants
  - Noiciception (vanilloid)
  - Mechanoreceptors
  - Texturoreceptors
- Bodies 2nd chance to evaluate food!

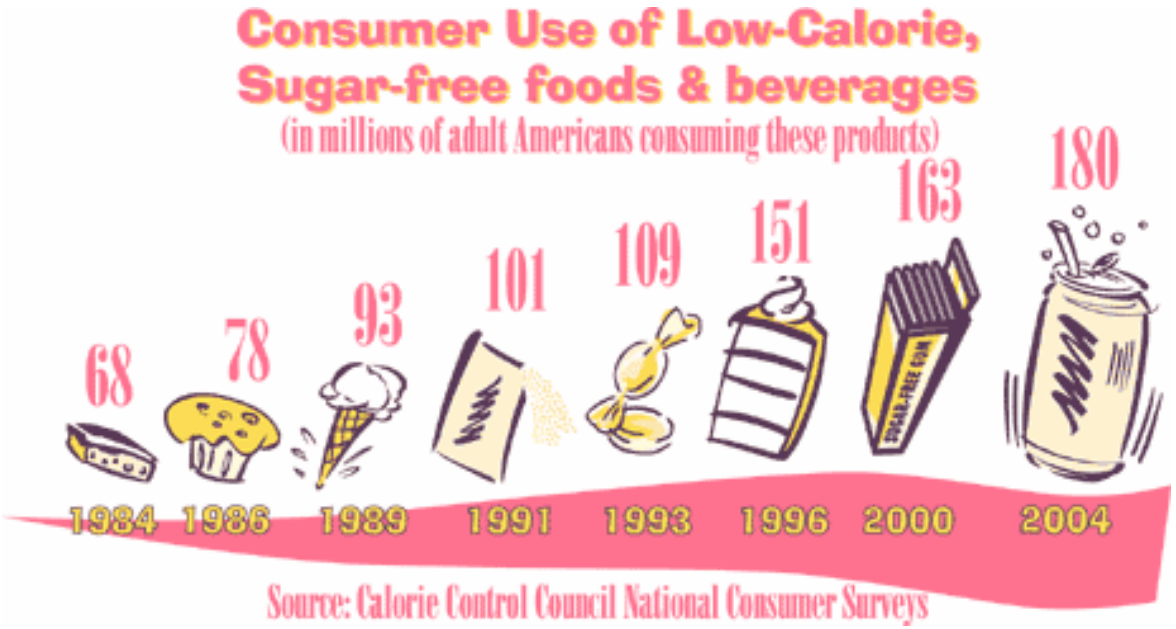


Gut Check: Osmolality

Potassium Chloride

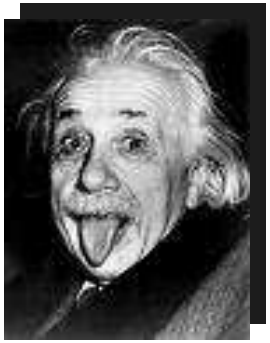
30 Percent Sensing Rule

- In making lower calorie foods of favorites:
- Change the calories by more than 30% is very risky, body will sense the change.



The Sense of Taste

- Two General systems:
  - **Gustation**
    - Sweet, sour, bitter, salty, umami, etc.
  - **Orosensation**
    - (feel): hot, cold, tactile, texture, pain



Sense of Taste

- Motivates and Directs Ingestion
- Differentiates toxins from nutrients

Bitter ⟷ Sweetness

(Bad) toxins (Good)

Scott, Prog. Psychobiol. Physiol. Psy., 15:231 (92)

Brain and Taste

- Only 4% of the cells in the Gustatory Cortex Respond to Taste…
- What Are All the Rest of the Neurons Responding to ???
  - Answer: Orosensation!!!

Orosensation

Is it safe?

- Orosensation (somatosensory)
  - Vast Trigeminal innervation of mouth
    - Texture, Touch
    - Temperature
    - Mouth burn and pain
  - Trigeminal system contributes to both the sensorimotor and motivational control of ingestive behavior (Zeigler)
  - Somatosensation stronger than taste!
- Good Cooking *Activates* Orosensation!

Oral Cavity Complexity

- Salt
  - (TWO! Channels)
- Bitter
  - (T2R's; lots, caffeine)
- Sweet (sucrose best)
  - (T1R2+3)
- Amino acid
  - mGluR4
  - T1R1+3
- Sour
  - (H+ block K+ channels)
- TRPV1-V6
  - (heat, osmoreceptors)
  - TRPV1 (33c heat, capsaicin, acids)
    - Artificial Sweeteners!
  - TRPV3; heat>33c and camphor
  - TRPV2: heat >43c

- TREK-1
  - (pain, heat, osmolality)
- TRPA1 (ANKTM1)
  - Low temp. 17c threshold
  - Pain, stinging/burning
  - Oregano, THC, mustard oil
  - Cinnamaldehyde
- TRPM8
  - Low temps, 15-25c
  - menthol, icilin
- CB-1 & CB-2 receptors
  - (cannabinoid, piperine)
- Fat taste(s)
  - CD36 receptor transporter
  - Viscosity detecter
- Tactile (bay leaf, thyme)

8? Basic Tastes, Many Sensations

- Hedonic Tastes
  - (1) Salty
  - (2) Sweet
  - (3) Umami
  - (4) Water Taste (Rolls)
- Aversive Tastes
  - (5) Bitter
  - (6) Sour
- Energy Tastes
  - (7a,b) Fatty acid taste?
- Heat Taste
  - (8) Vanilloid receptor

- Taste Sensations
  - Astringent
  - Electric taste
  - Alkaline taste
  - Alcohol taste
  - Metallic Taste (9)
- Orosensation (trigeminal)
  - Touch (tactile)
  - Temperature
  - Pain
  - Pressure

How Powerful is Taste?

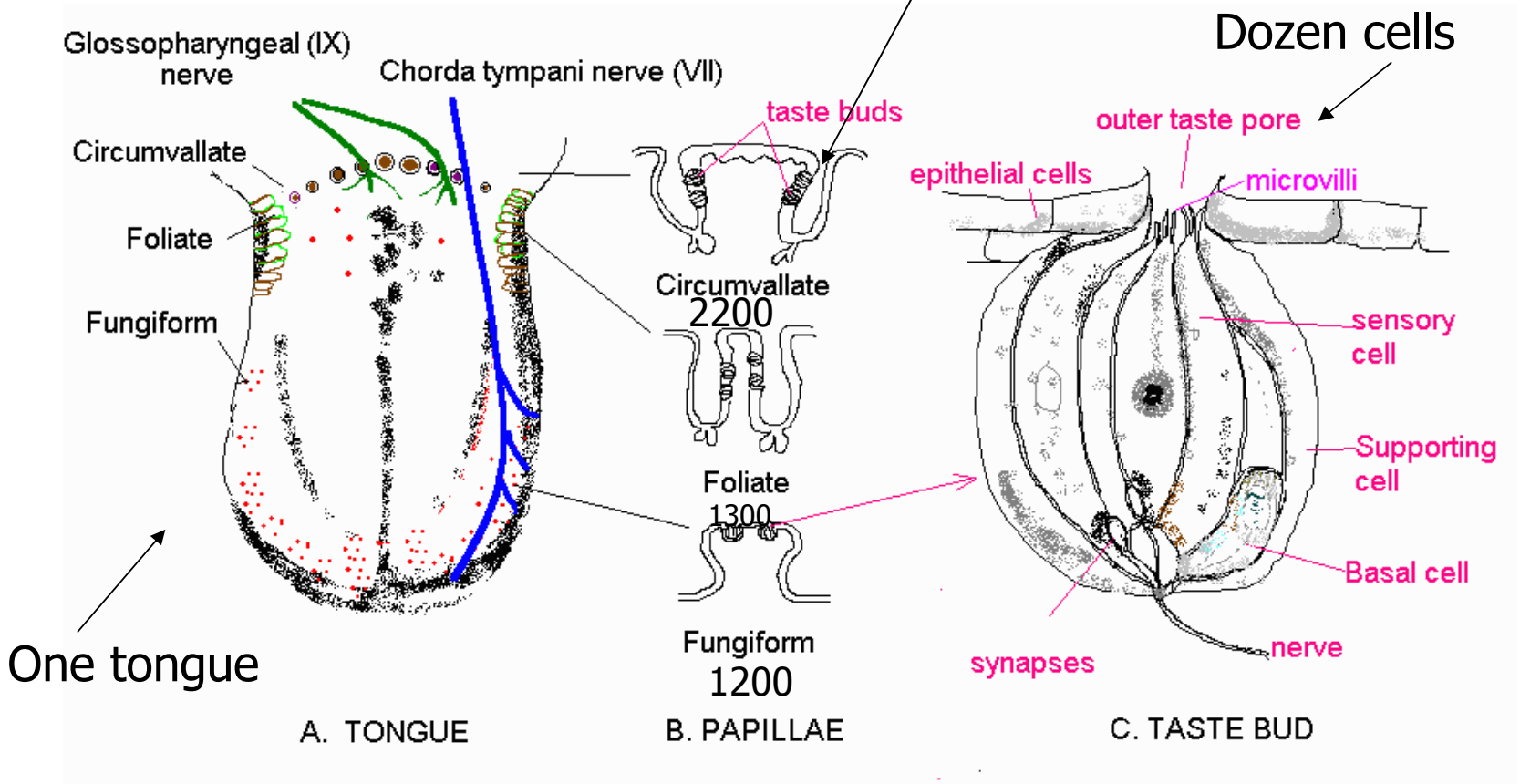
- 3rd Most Potent Pleasure stimulator behind:
- Drugs (crystal meth)
- Sexual stimuli
- Sucrose/Salt
  - Body prefers it *emulsified!*

...Hoebel says: "Highly palatable foods and highly potent sexual stimuli are the only stimuli capable of activating the dopamine system with anywhere near the potency of addictive drugs."...

http://www.reuniting.info/science/articles/fast_food_sexual_stimulation_may_be_addictive

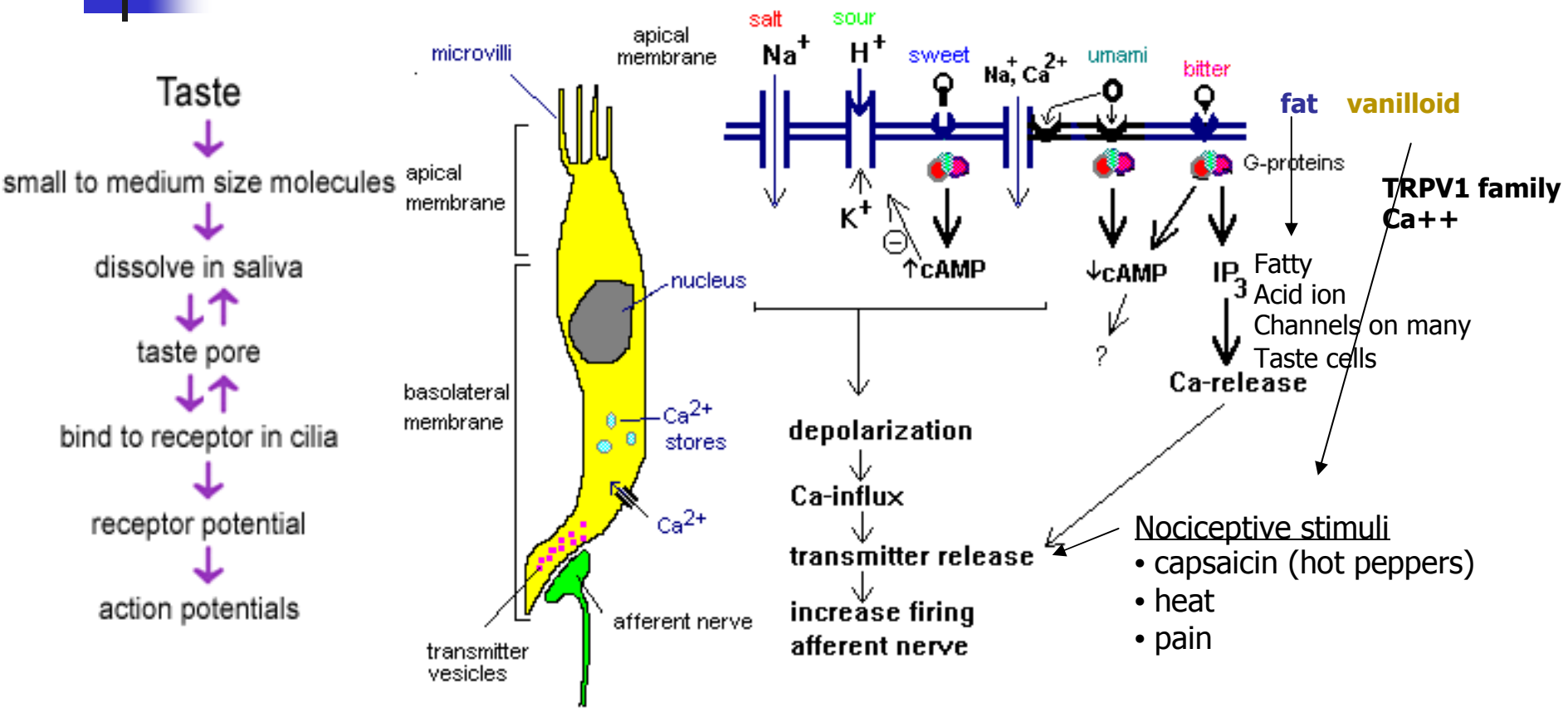
Taste Buds

- 5000 taste buds/tongue
- 30-100 tb's per papillae
- 2500 taste buds elsewhere in mouth
- Access to buds key in sauces



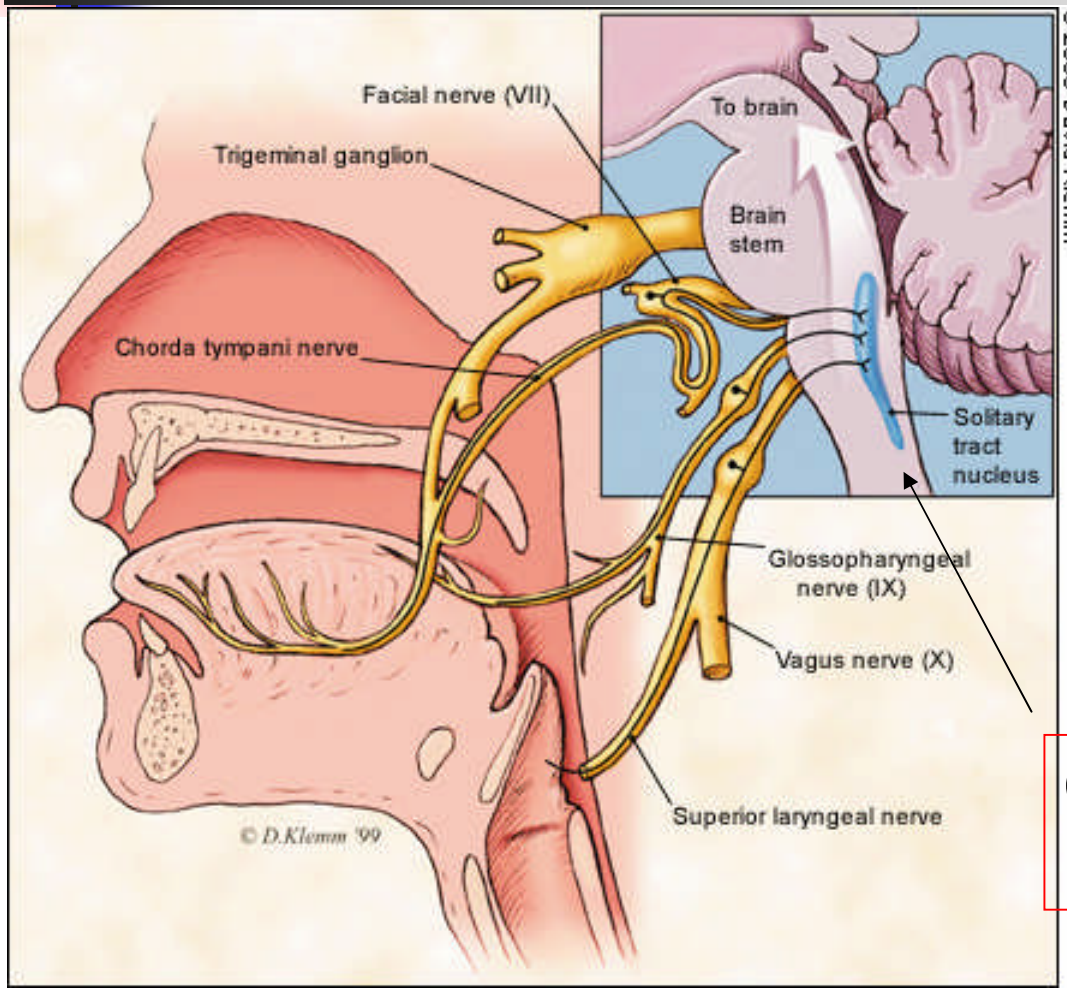
http://www.cf.ac.uk/biosi/staff/jacob/teaching/sensory/taste.html

General Taste Transduction



http://www.cf.ac.uk/biosi/staff/jacob/teaching/sensory/taste.html

Taste Pathways



•The **Gustatory Nucleus** receives projections from the taste buds of the tongue via cranial nerves VII (facial nerve), IX (glossopharyngeal nerve), and X (vagus nerve). The paired gustatory nuclei are located in the medulla, and are often called the ***solitary nuclei*****.** Neurons within these nuclei encode the acceptability of a taste as well as its quality. For example, dangerous sour and bitter substances are encoded as bad tasting and are spit out, while life-sustaining sweet and salty substances are encoded as good tasting and are swallowed.

• The **gustatory nuclei** send profuse projections to a number of brain regions including the pons, lateral hypothalamus, amygdala, ventral posterior thalamic nucleus, and the primary and secondary gustatory cortical regions. Gustatory projections to the hypothalamus (**pleasure center**) may play a role in the reinforcing effects of sweet and salty tastes when we are hungry.

Gastrointestinal input into solitary nuclei!

Fat Taste I

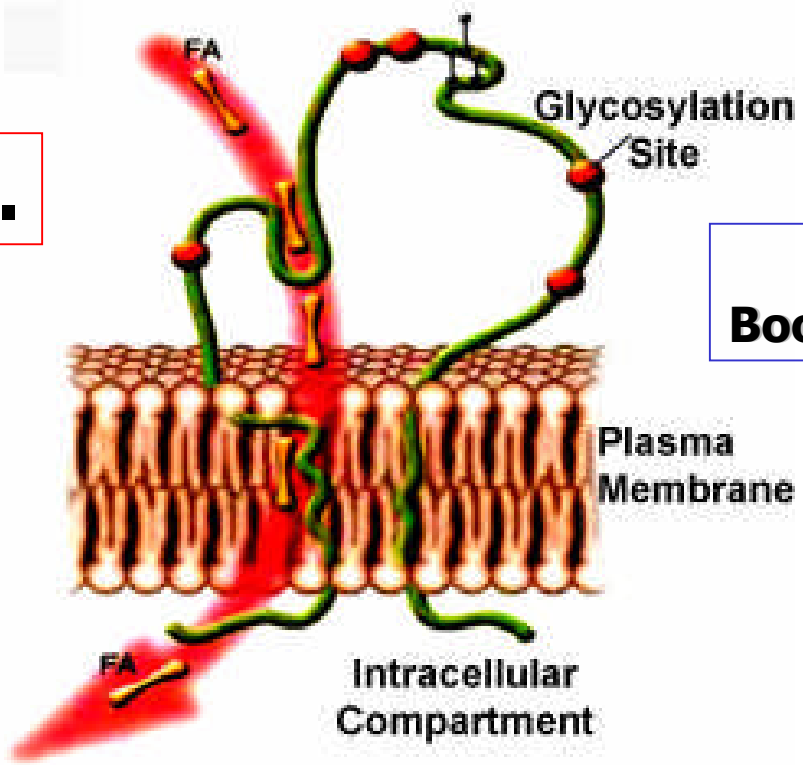
- "Orosensory" Perception [Feel]
- "Fat, Fatty Acids activate taste cells in tongue, throat and upper third of the esophagus…sending pleasurable signals to brain.
- "Thrilling Pleasure" (Rolls)

Schiffman, Current Dir. Psych. Sci., 7:137 (98)

Mattes/Lermer, Prog. Lipid Res. 38:117 (99)

Fatty Acid Taste

1.



Fatty acids Boost Sweet Taste!

2. **inhibition of delayed rectifying potassium (DRK)**

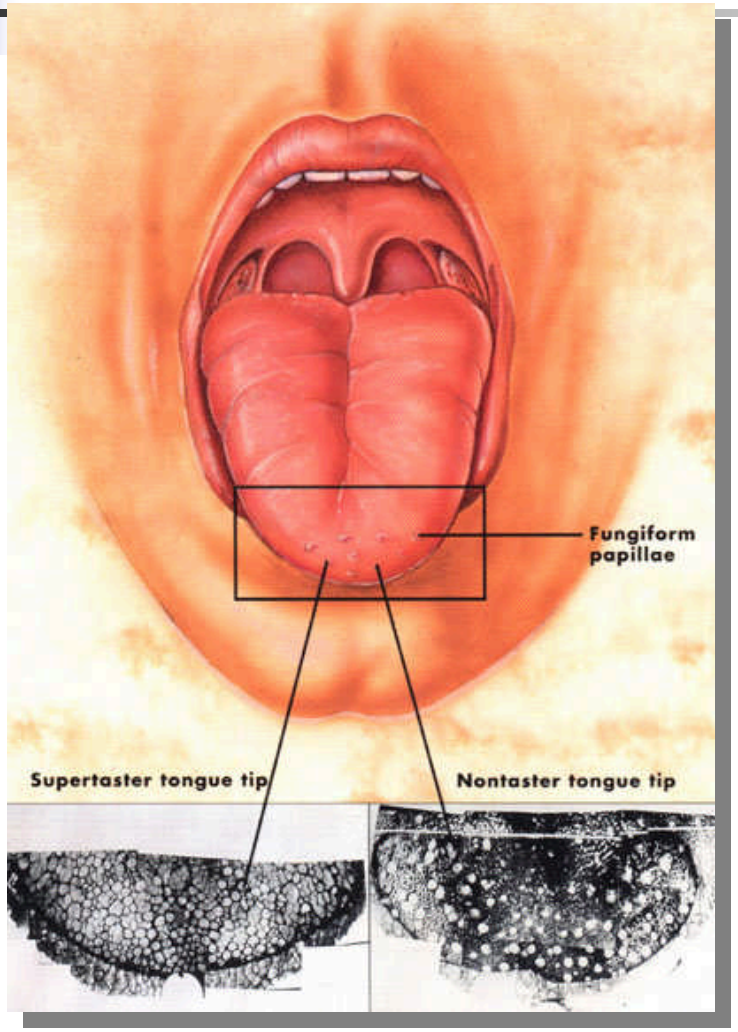
Phy. & Beh., 86:681-,2005.

Sensory Variability

"We live in our own sensory world - individual differences in sensory functioning…even with simple aromas and flavors…will not be similarly perceived as acceptable."

David Mela, Prepared Foods, July, 1996

Supertasters



Supertasters have higher number of Taste buds…foods In general are too intense for these folks. Beware of these People in taste panels

Photos courtesy of Linda Bartoshuk, Ph.D. Yale. Illustration by Lydia Kibiuk.

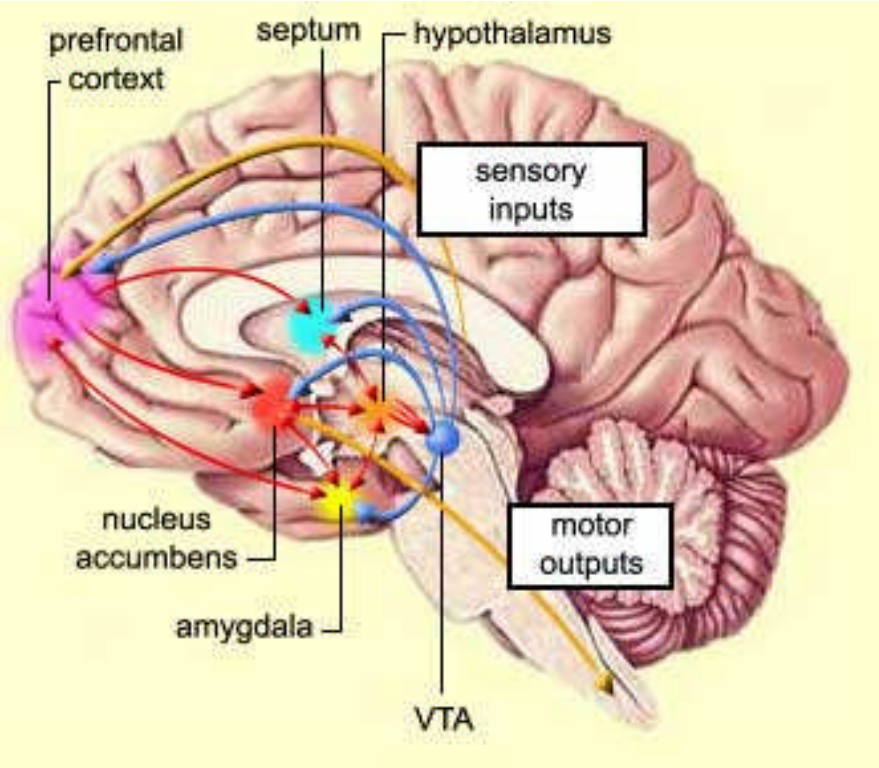
Supertasters and Pleasure

- Individuals sensitive to bitter (coffee)
- Groups: non, medium, supertasters
- ST = greater oral sensation
  - Linked with Food aversions
  - Bitter vegetable rejection
  - High Fat perception

Bartoshuk, Neurosci & Biobeh. Review 20:79 (96)
Drewnowski, Ann. NY.Acad. Aci., 855:797 (98)

Pleasure Center & Food Choice

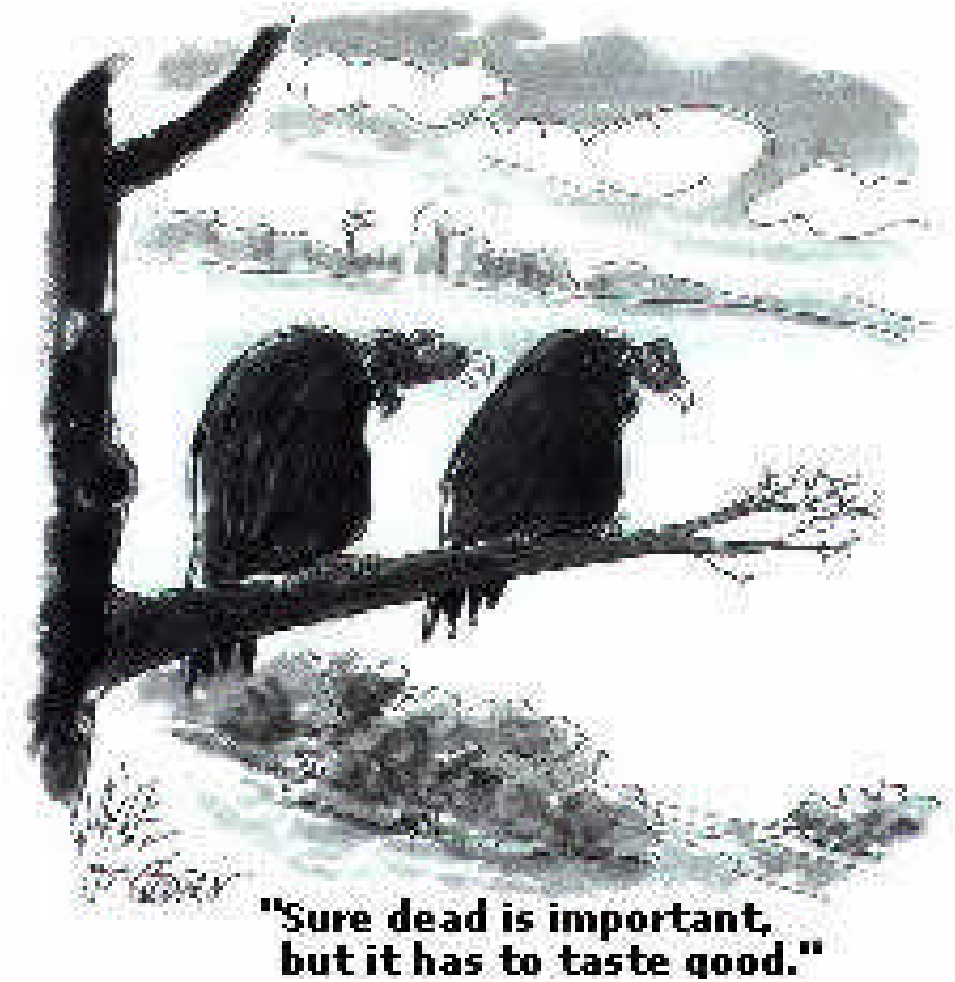
- Nucleus Accumbens:
  - Codes for Taste Pleasure
  - Lights up when We Want Something (purchase intent)



Human Gustation Summary

- Sense of Taste more Complex
  - Up to Twenty Basic Tastes or Sensations!
- Umami Receptor
  - Two Forms—unique interactions
  - MSG versus 5’ Nucleotides
  - Signals for Protein in Environment
- Salt Taste Receptor
  - Two Forms!
    - Acid plus Heat

Food Must Taste Good

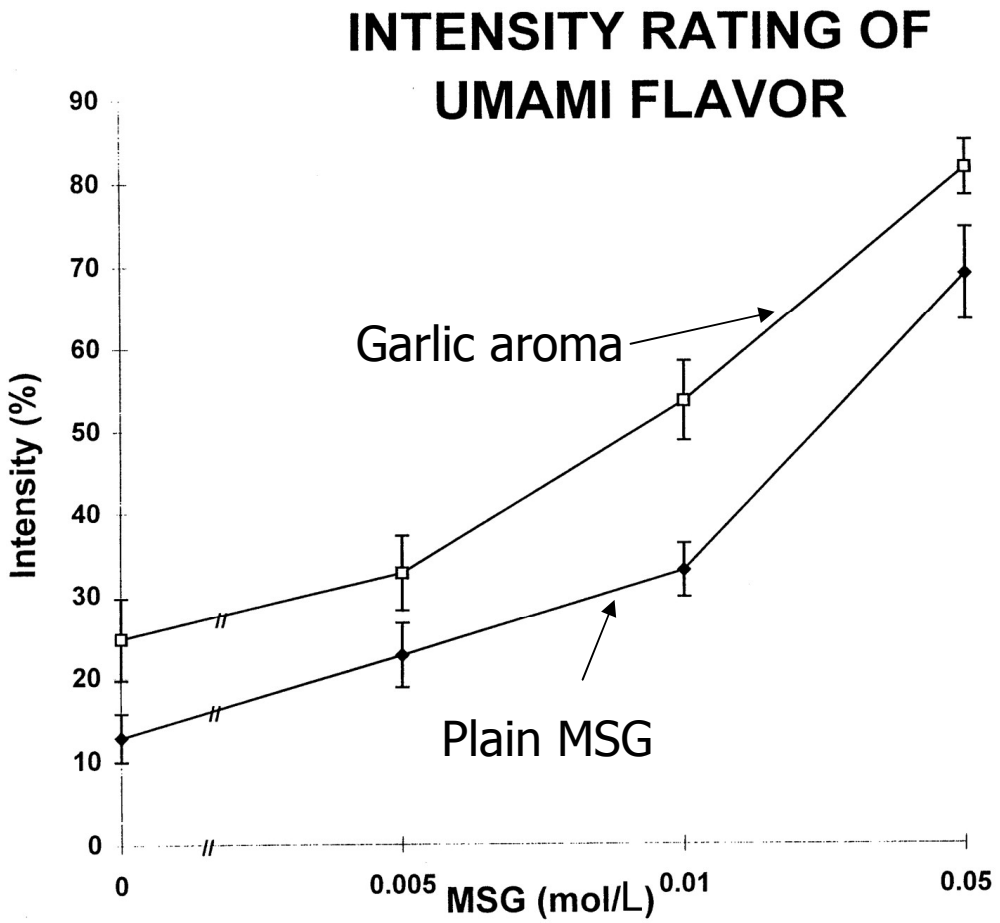


Hedonic solutes

- NaCl (huge)
- Sugars, hi intensity sweeteners
- Umami:
  - MSG, amino acids
  - 5 prime nucleotides
  - **Garlic** derivatives
- Flavorants:
  - Lactones
  - Maltols
  - Chlorogenic acids
  - Many taste-active flavor compounds

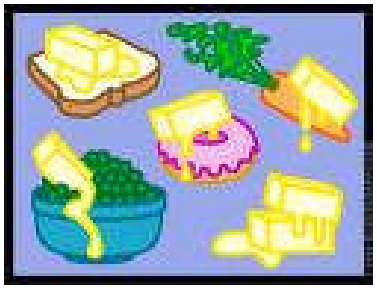
Amino acids
Peptides
Fatty acids
Glycoconjugates
Maillard comps

Garlic boosts Umami



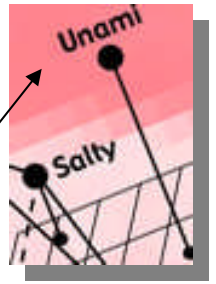
Sugar and Fat Pleasure

- Pleasure magnified when mixed with fat (1): Emulsion Pleasure Theory
  - Brain Loves Emulsions with sugar/salt



MSG Coated Salt (Aji-Shio)

- MSG Coated salt (10% MSG)
- Absolutely wonderful salt
- Perfect proportion of solutes



That should be umami!

Foods High in MSG

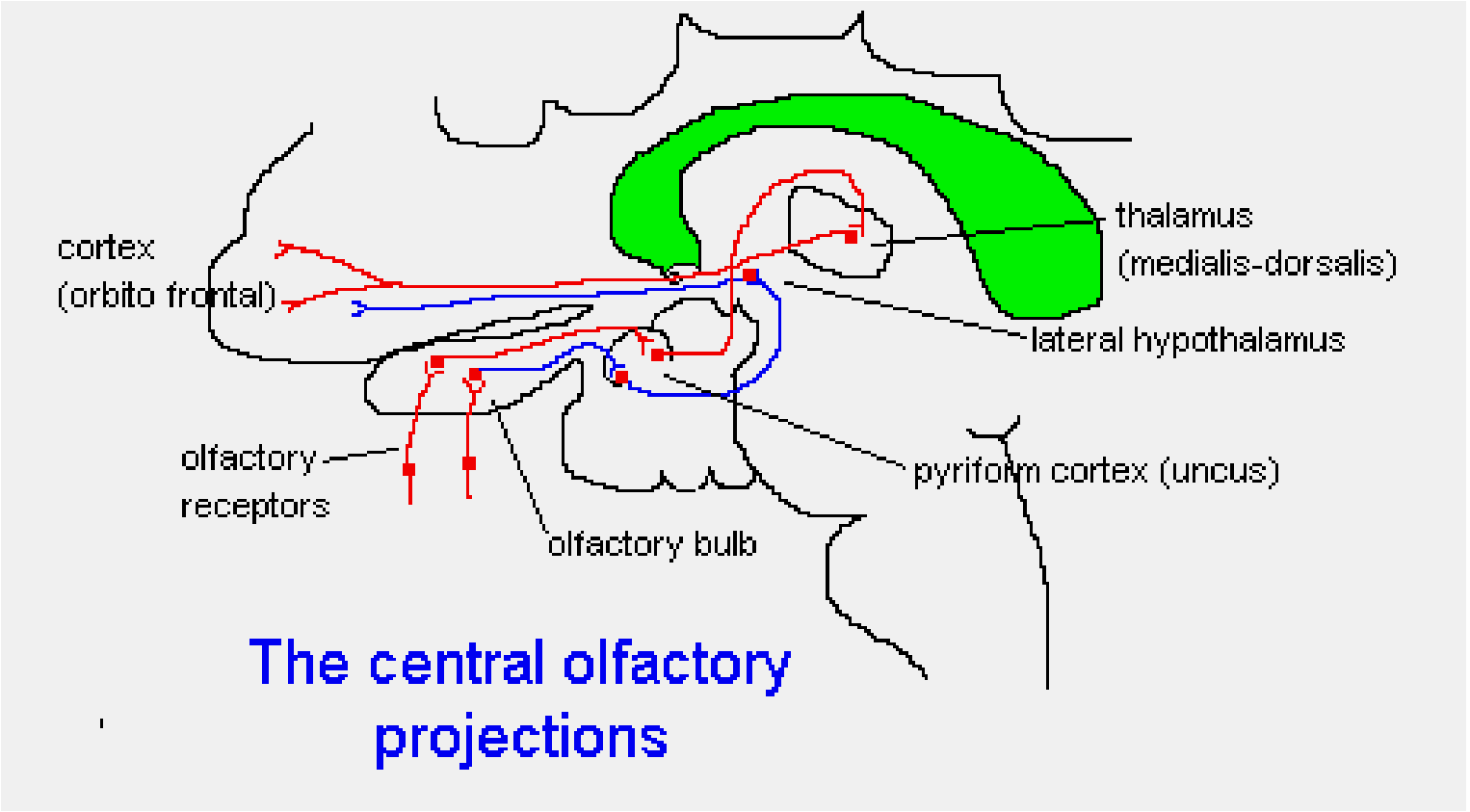
- Many preferred food are naturally high in MSG:
  - Soy Sauce
  - Parmesan cheese
  - Tomato
  - Potato
  - Breast Milk!
  - Sardines
  - Fish Sauces

Marukin

Taste & Doritos

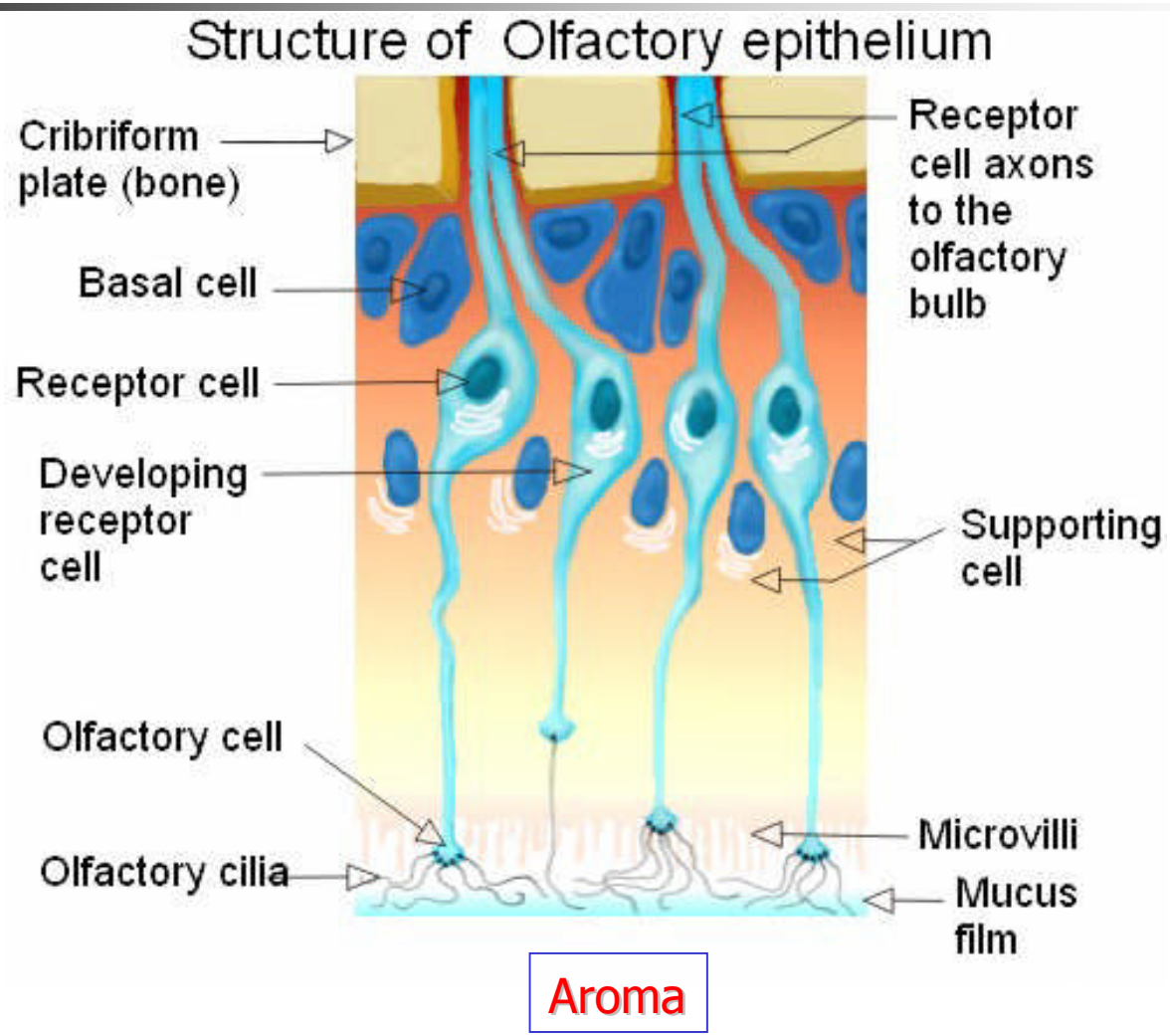
- Loaded with Taste Active Compounds
  - Salt
  - Sugars:
    - Dextrose
    - Sugar
  - Acids
  - 5’Nucleotides
  - Monosodium glutamate

Olfaction



The central olfactory projections

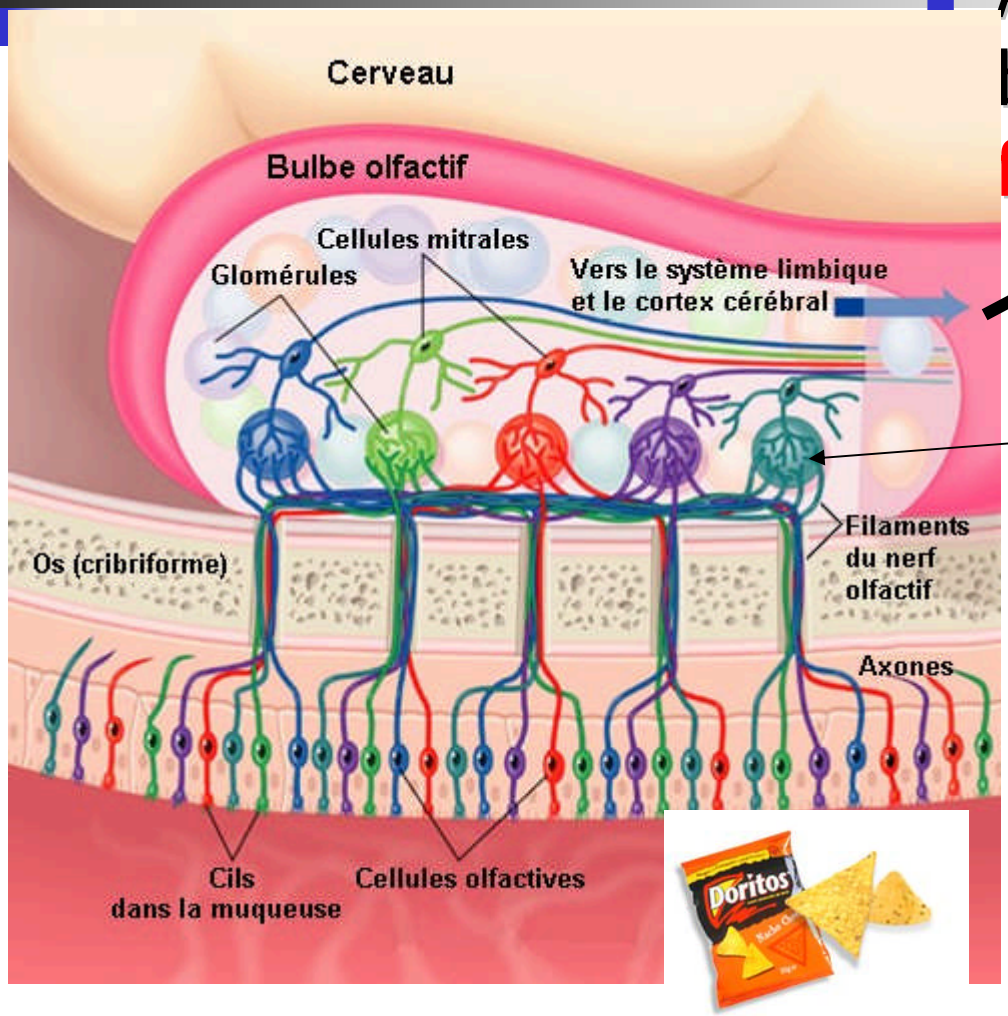
Sense of Smell- basics



Aroma

Olfaction Brain Pathways

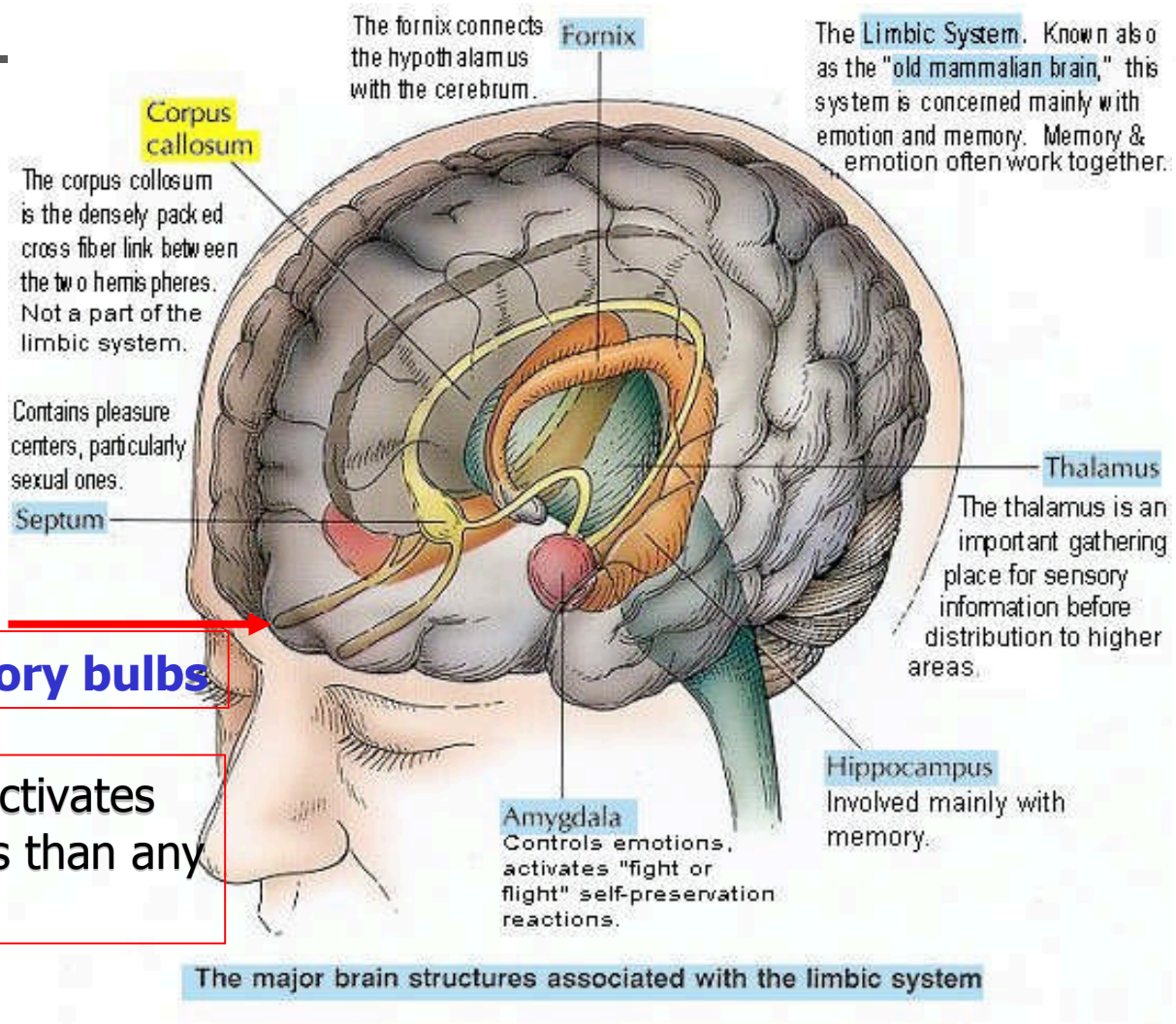
- Aromas processed by the limbic system first!



10,000 Glomeruli

40 million receptors

Limbic System



The major brain structures associated with the limbic system

Olfactory bulbs

Lesson: smell activates
More brain sites than any
Other sense.

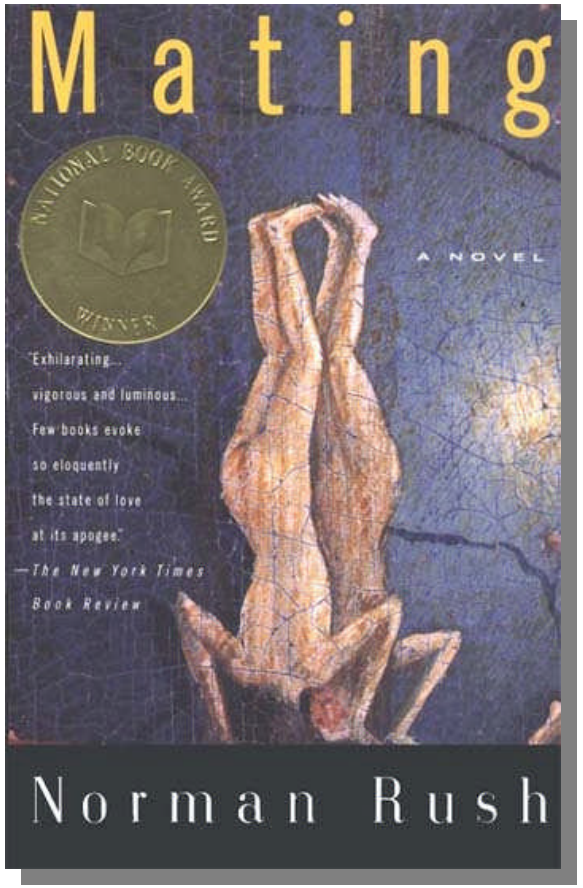
Olfaction

- Aroma:
  - Importance Depends on Significance!

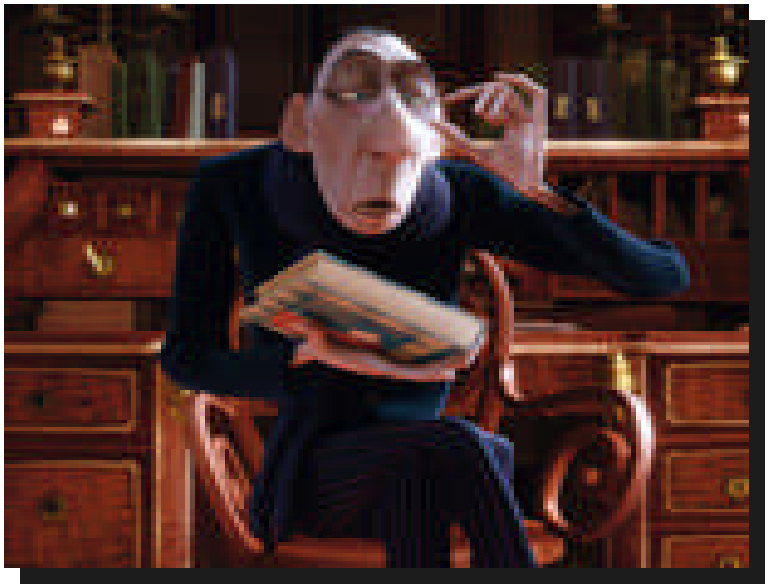
Major function

Olfaction: Most Important

- Food Selection
- Mate Selection!
- Best Mate Smells:
  - Different Genes



Aroma Memory



Anton Ego Liked the Dish of His Youth: Ratatouille recipe developed in the movie by uberchef Thomas Keller!

Olfaction Puny in Humans!

- Human:
  - 40 million receptor cells
- Rabbit:
  - 100 million receptor cells
- Dog:
  - 1 Billion!

Are Some Aroma Preferences Innate?

Essential Nutrient Aromas

- Theory of Goff and Klee:
- Humans *innately* like aromas that have nutritional significance.
  - Fruity = C and sugar and energy
  - Tomato = lycopene, fatty acids
  - Spices: health components
  - Carrot = beta carotene
  - Meat = Vitamin B1, etc.
- Science, 311, 812-, 2006.

Are some aromas innately preferred?

Sense of Smell Principles

- Odorants bind to mucous, must be both fat and water soluble
- 1000 (450) olfactory receptors
- Aromas acquire significance thru food ingestion—forms food memory
  - Fat and sugar best form memories!
- Most aroma preference learned
  - However, certain aroma classes are preferred
- Once formed aromas resistant to extinction
- *Bad aromas remembered better than good
  - Light up motor cortex!
- FLAVOR: Taste + Smell in Orbitofrontal Cortex

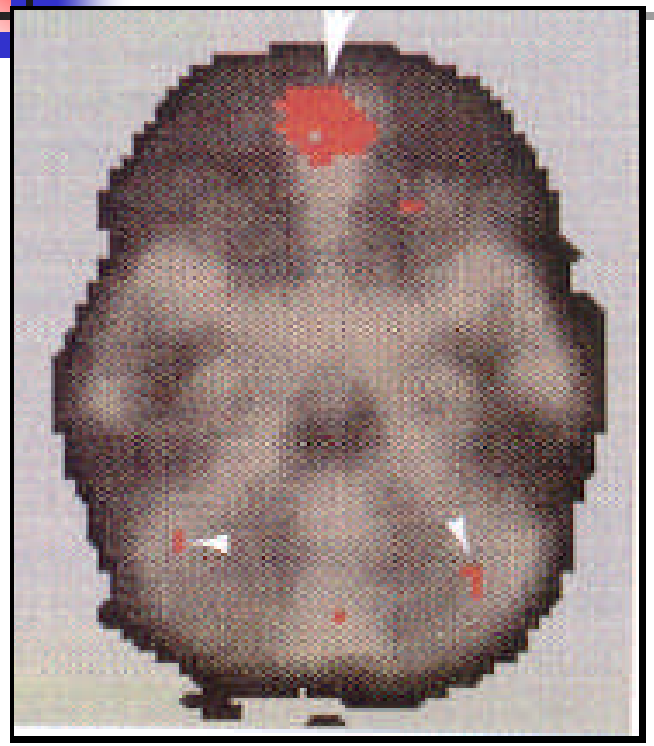
Why Do People like Spicy Food?

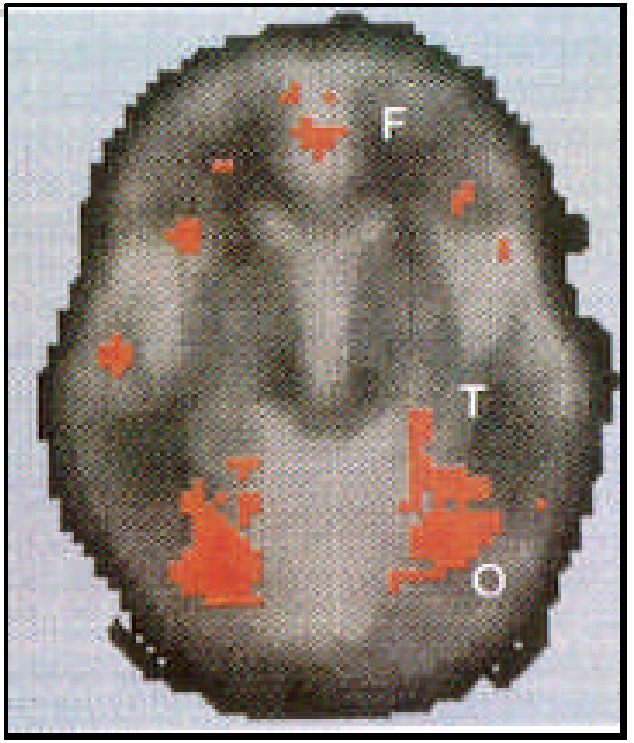
capsaicin & heat & acid

- Hot peppers were domesticated faster than any other plant (besides……???)
- Capsaicin excites vanilloid receptors for heat or hot taste (lots or receptors in mouth)
- PAIN induces (1) endorphin surge
- Releases (2) cannabinoids!
  - Black peppers
  - Hot peppers

Aroma Only

Trigeminal+Aroma





Methylsalicylate

Rosemary

Aromas & Brain Stimulation

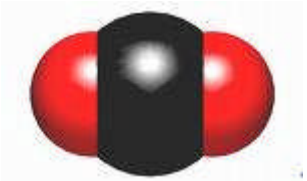
- Aromas: Orbitofrontal Cortex (Right)
  - Repeat Testing = ↓ activity
- Trigeminal Aromas: Widespread brain activation.
  - Repeat Testing = ↑ activity

∴ **Aroma + Trigeminal Aromas = 6X Activation**

Yousem, Radiology, 204: 833 (97)

Pure Trigeminal Odorant

CO_2



Humans are "Cookivores"

- Wrangham hypothesis:
  - Humans evolved with fire 2 million years ago: vision enlarged, noses shrank
  - Aroma receptors down but connections increased dramatically (3 Olfactory Brain Centers)
- Aromas associated now with:
  - Cuisine
  - Fire
  - Fermentation

KFC and Chicken Liking

Chickens have the highest levels Of essential fatty acids in meat protein.

Essential Fatty Acids Create Powerful Aromas

MSG

KFC and Chicken Liking

- Chicken is moist!
- Chicken has high solute load
  - Salt, MSG, Pepper
- High Dynamic Contrast
  - Many just eat the crust!
- May have opioid flavor system
  - White Pepper, Thyme or Bay Leaf, etc.

Food Palatability Theories

- Taste Hedonics
  - Major pleasure driver
- Sensory Specific Satiety
  - Rolls
- Taste Aversion Learning
  - Garcia
- Dynamic Contrast
  - Hyde & Witherly
- Food Pleasure Equation
  - Witherly & Capaldi
- SuperNormal Stimulus
  - Bigger is better
- Flavor-Flavor Learning
  - Familiar breeds liking
- Emulsion Theory
  - Salt & Sugar / Fat
- Evoked Qualities
  - Pleasure memories
- Mere Exposure Effect
  - More is better

Sensory Specific Satiety*

Huge Importance to the Food Industry!

*Variety Effect

Sensory Specific Satiety (SSS)

- Change in hedonics, not intensity, through exposure to sensory stimuli
- Repeated tastings reduce food pleasantness
- Sensory Specific (Taste, Aroma, Visual, Texture)

E.T. & Barb Rolls

Orbitofrontal Cortex

- Some aromas **resistant** to extinction!
- Non-Trigeminal aromas:
  - Vanilla
  - Baked or fried potato
  - Popcorn

Vanilla outsells Chocolate Ice cream two to one!

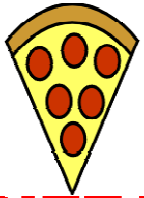
Dynamic Contrast Theory

- "Foods with sensory properties that change rapidly or have major sensory contrasts are ones that are preferred—Hyde & Witherly"
- Most rewarding and reinforcing stimuli are those that change *rapidly*
  - *Robinson & Berridge 2003*

High Dynamic Contrast Foods

- Ice Cream Number One

- Potato Chips
- Pizza



- Popcorn

- Carbonated Soft Drinks

- Chocolate

Dynamic Contrast Theory

- Chocolate:

  - Goes from solid to liquid at body temperature. Allows hedonic solutes to be released. Few fats can do this!

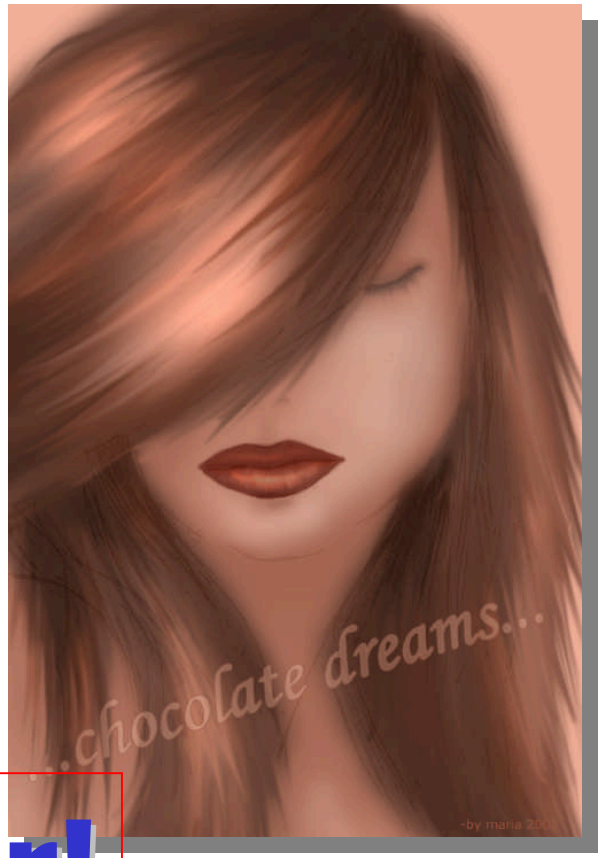
- Popcorn:

  - Melts down extremely fast in the mouth releasing flavor and hedonic solutes without causing much satiety.

Hyde's Ping Pong Pleasure

- Humans like *maximum* sensory stimulation
- Humans like to sensory cycle back and forth
- Examples:
  - Burgers, Fries and Diet Coke
    - Salt-sugar cycling over and over!
  - Beer and pretzels
    - Low salt, high water and High salt, low water cycling
  - Wine and Food:
    - Wine is high water, low pH, low sodium, high vanilla and mouthfeel—exact opposite of food!
    - Wine is sensorially scary!

Chocolate Pleasure



It Melts!

Salt-Fat-Sugar!

Chocoholic Quiz

- **What is your favorite way to consume chocolate?**
- a. By nibbling a bit now and then throughout the day.
- b. By swallowing whole chunks at a time.
- c. By intravenous injection.
- d. I dive into a 100 gallon vat and slurp.

Vanilla Ice Cream is # 1 Favorite

- Ice Cream Melts. Changing Temperature in the oral Cavity is very rewarding
- Why? Brain does not habituate to vanilla aroma!

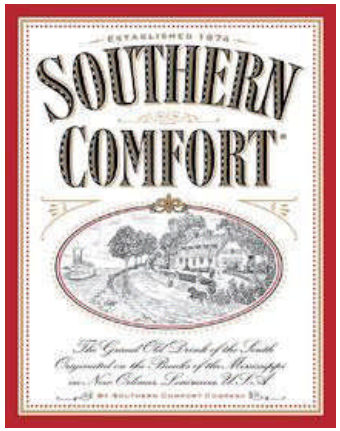
The CHANGE of oral temperature is arousing!

High energy density!

Taste Aversions!

Taste Aversion Learning

- A single pairing with a food with GI malaise or upset stomach can form a permanent food aversion to that food
  - Sensory Specific (Texture)
  - Difficult to extinguish
  - Protects the body from toxic food
- Southern Comfort Phenomenon
  - Sweet drinks often cause GI upset and then taste aversions!



Rozin's Fundamental Principle

- "It is much easier to dislike a food than like it!
- Human's can throw-up!
- Rats can't!

Rozin's Flavor Principles

- All cuisine is dictated by a certain combination of:
  - Cooking Technique
  - Flavoring
- Example:

Food Pleasure Equation 1

- The Food Pleasure Equation:

$$F.P. = f(\text{Sensation}) + (\text{Calories})$$

See book: "Why We Eat, What we Eat", ED Capaldi

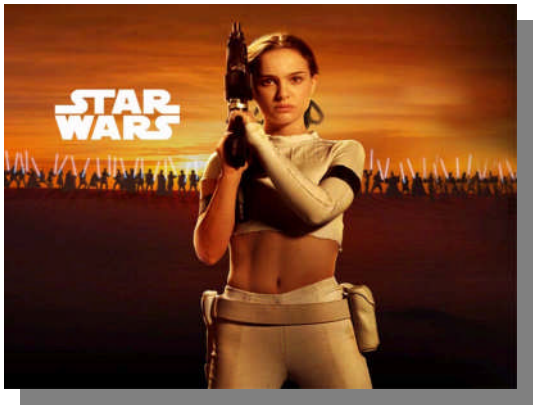
Food Pleasure Equation 1

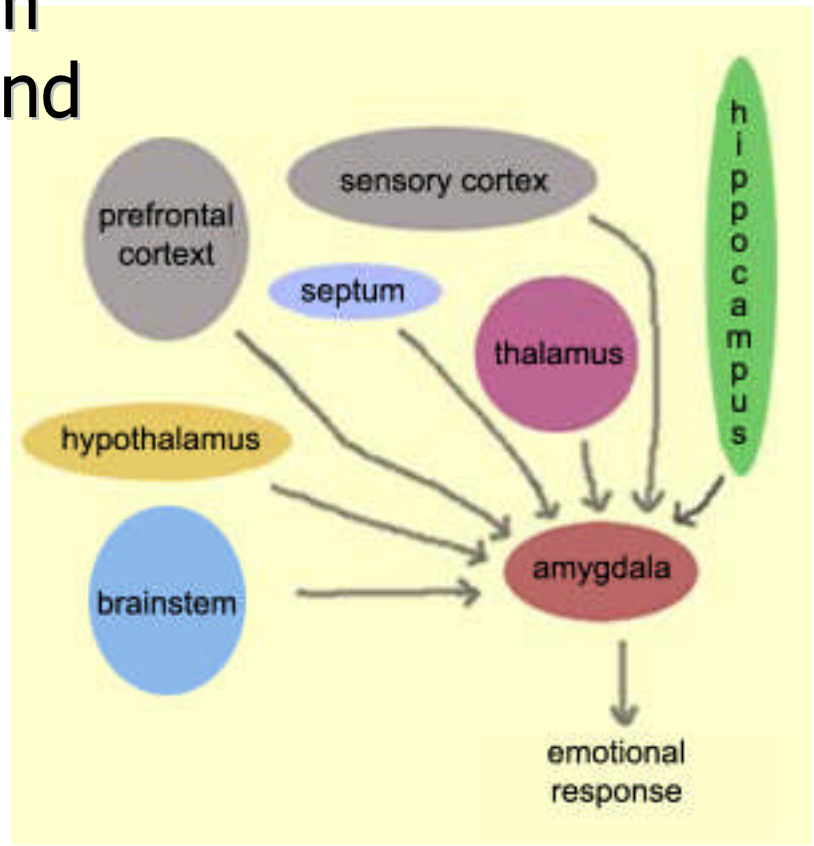
FP= Sensory + Caloric Content

- Gustation
  - Salt, MSG, 5'Nuc.
  - Sweet, Water
  - Fat Taste
- Olfaction
  - Aroma
  - Trigeminal
- Dynamic Contrast
  - Temperature change
  - Snap, crackle & pop
- Protein
  - Casomorphins
  - Gluteomorphins
- Carbohydrates
  - Neurons like glucose
  - Fat cells like fructose
- Fat
  - Essential fatty acids
    - Linoleic
    - linolenic

Amygdala & Memory

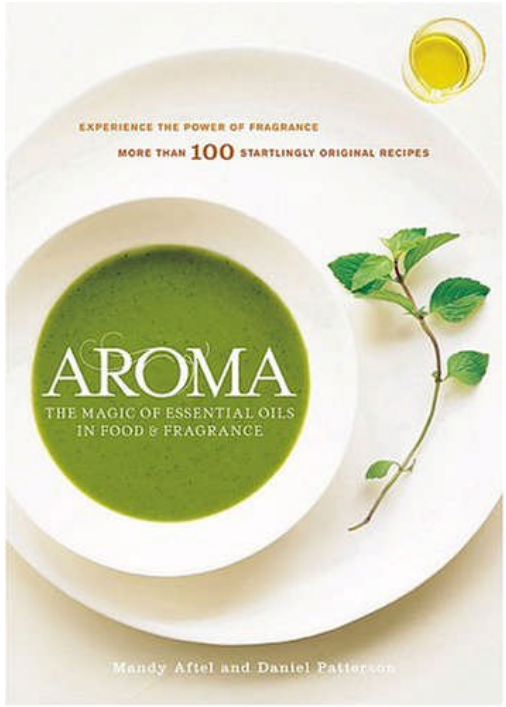
- Receives sensory input from taste, smell, sight, sound and texture
- Creates a "Food Memory"
- Searches for significance





Moncrief's Observation

- All things being equal, the brain prefers aromas with *more* complexity, not less.
- Food Layering Theory
- Long Hang-time Odorants
- Essentials Oil & Fragrances
  - Terpenes special

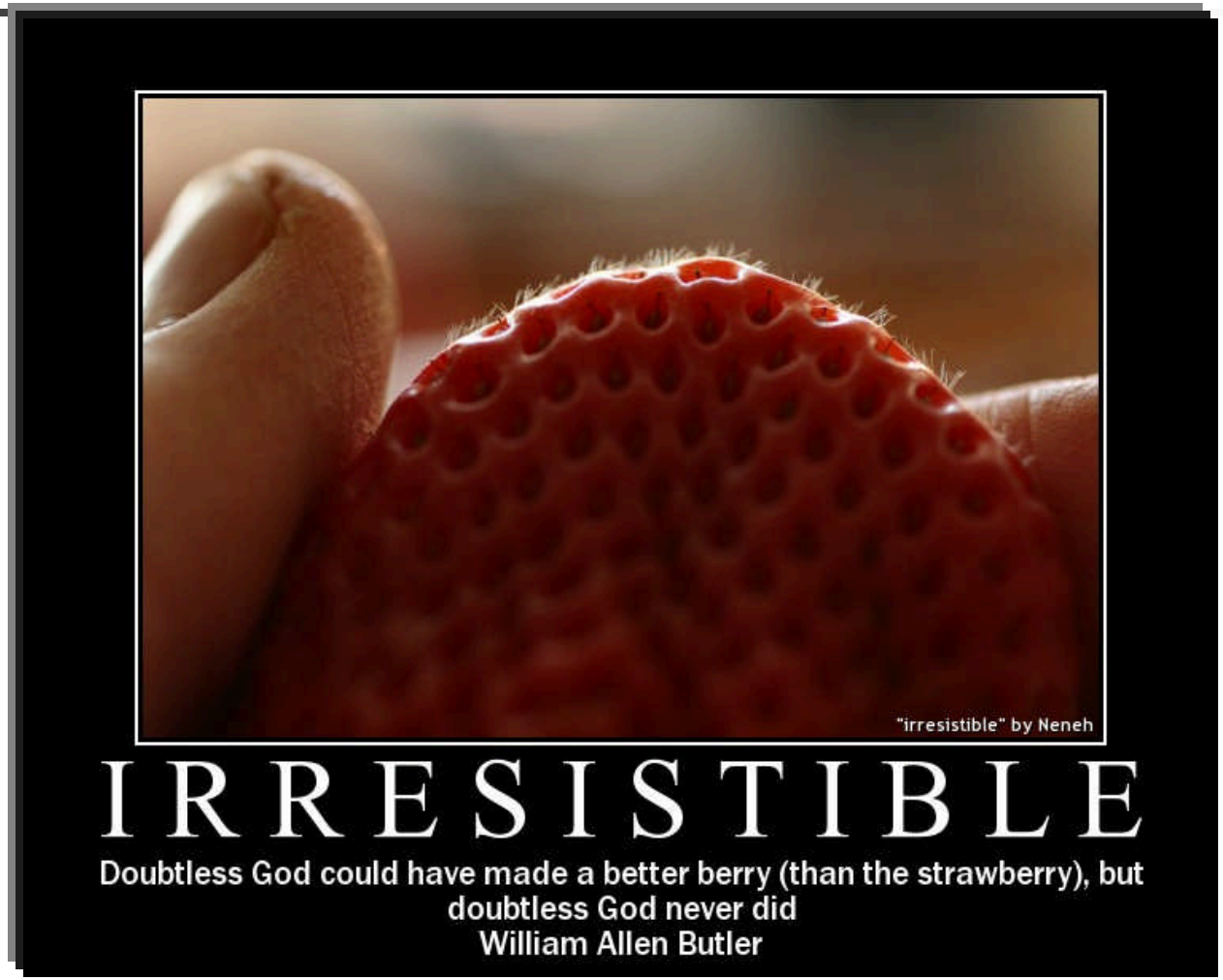


Holy Grail of Cooking

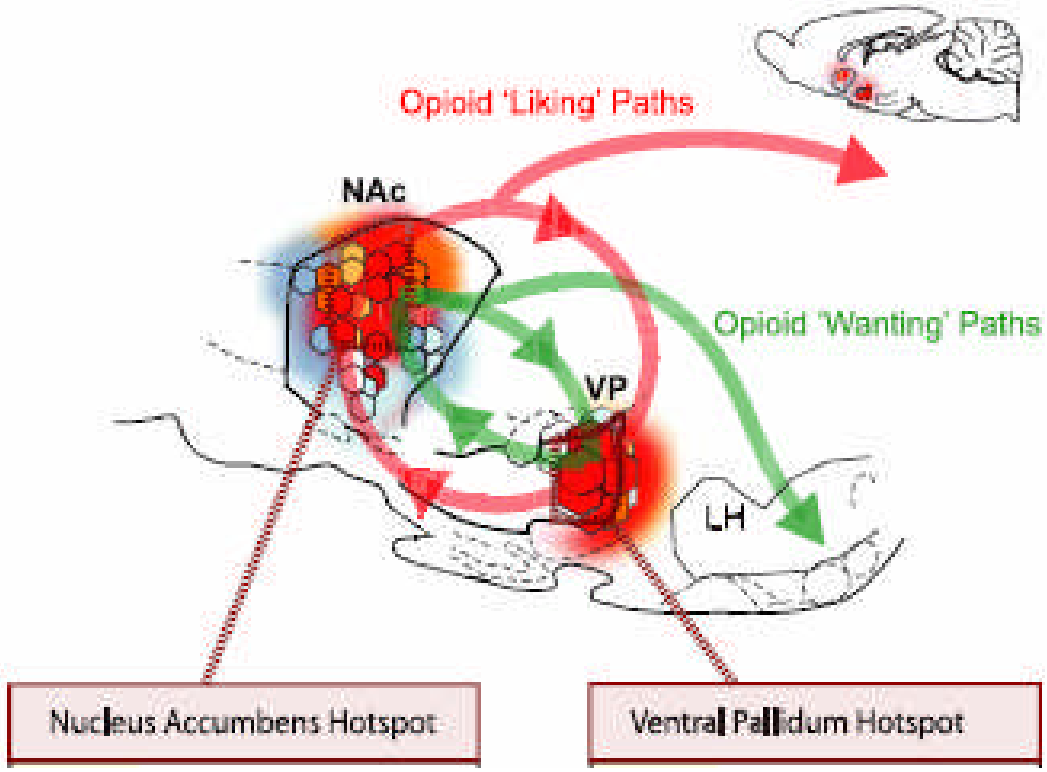
Culinary Pleasure Equation

Food Pleasure = Liking + Wanting

Making Food Irresistible



"Wanting" versus "Liking"



Two separate brain mechanisms: influence food choice

Food Pleasure Equation 2

Food Pleasure = Food Liking + Food Wanting

- Food "Liking":
  - Food Pleasure Equation (Witherly)
    - Sensation plus Stimulation
    - Hedonic Based
- Food "Wanting":
  - Food choice *without* hedonics!
  - What is Food Wanting???

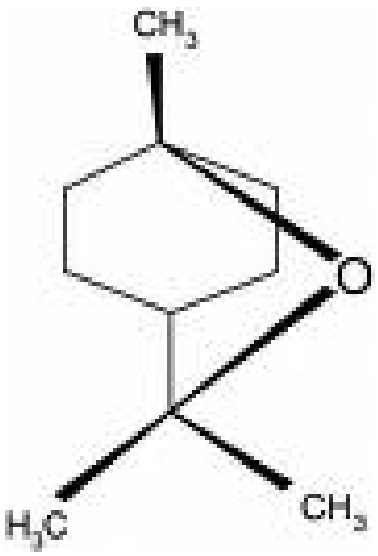
Significance of Wanting/Liking

- Most Pleasurable or Irresistible Foods combine both!
- Liking: Opioids and Cannabinoids
  - [Pleasure from food]
  - Hedonic solutes, CD, DC, Spices
- Wanting: Opioid and ?
  - [Eat More Food]
  - Variety
  - Surprise Theory

J. Neurosci., 27: 1594, 2007.

1,8-cineole-eucalyptol

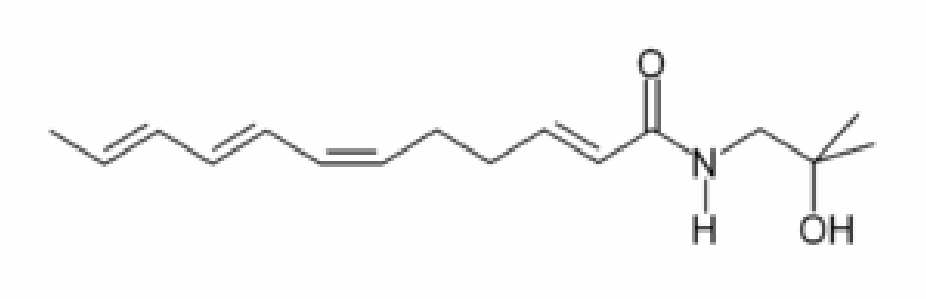
- Bay leaf and Thyme (classic French)
- Promotes blood flow
- Used for pain relief
- 30% population can't smell it
- Binds opioid receptors!



Need alcohol for best extraction!

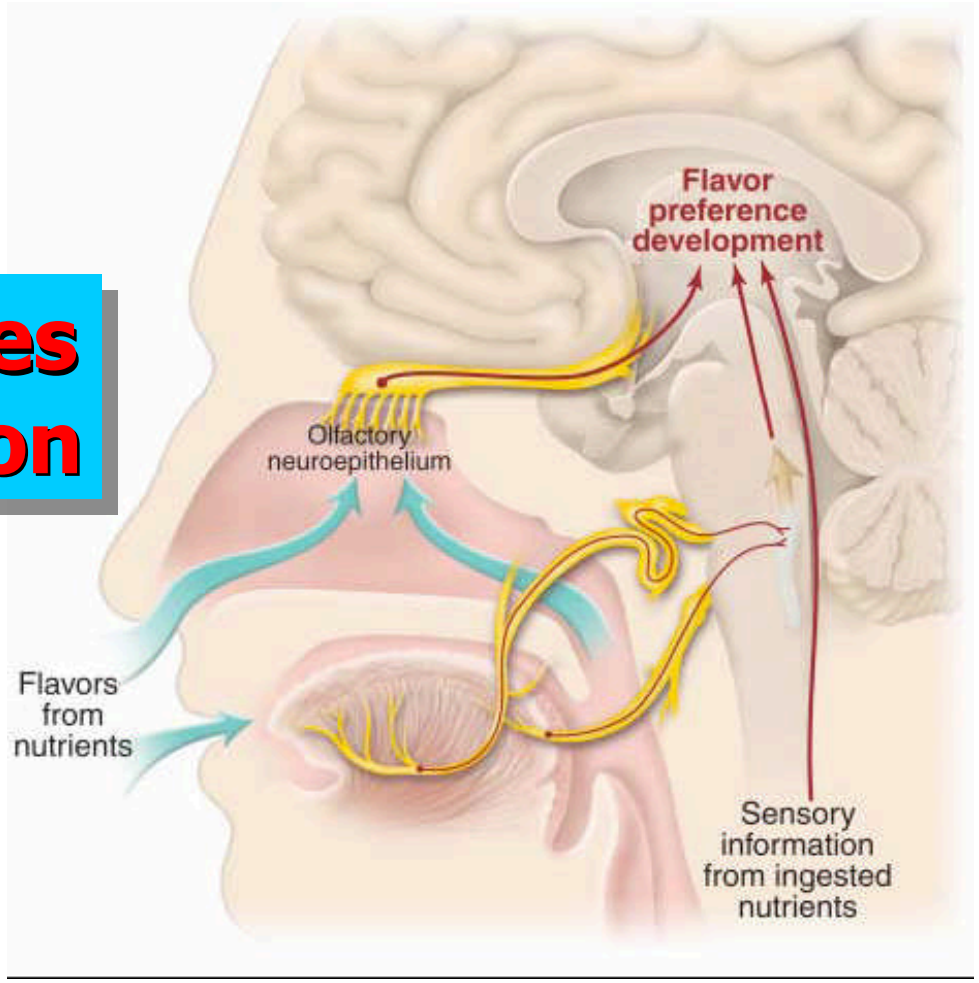
Sichuan Flower Pepper

- Added to Chinese Hot Pot, Major Flavoring
- 3% OH-alpha Sanshool
- Mala: Chinese: "numb and hot"
- Excites "Tactile" Oral Receptors (lips)



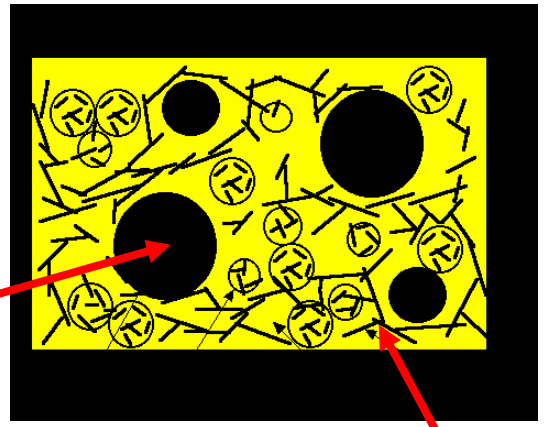
[Flavor+Taste+Nutrients]

All Food Memories Are a Combination



Emulsion Theory

- Humans *Love* Emulsions:
  - Butter (solid)
  - Ice cream (foam)
  - Vinaigrette (liquid)
  - Milk (liquid)
- Tastants get concentrated in water phase
  - Butter is 2.5% salt, but all in water phase that is only 18% of the weight



Evoked Qualities (Hyde)

- Sensory Properties of Food Evoke Memories of Past Consumption.
  - subconscious
- Memories Tap into Pleasure.
  - Garlic aromas and food
- Chefs Call this *Layering*
- Critical to Food Choice
- Example: Emeril's Bam Spice

Secret Weapon Pleasure Foods

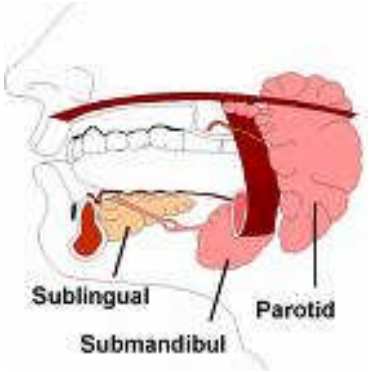


- Garlic: MSG booster, stimulates hot/cold receptors
- Parmesan Cheese: 1.5% MSG, acids and casein
- Bacon: Salt, pork, and cookivore flavors (hickory)
- Shallots: Unique aroma and taste profile
- Butter: Emulsion, short chain FA's, pure aroma
- Soy Sauce: Salt (up to 15%), MSG (1.5%), 5'Nuc.
- Tomato paste: Citric acid, nutritional aromas
- Mushrooms: 5'-Nucleotides (boost MSG 8 times)

Salivation & Food Pleasure

- Dry Food is Sensory Death

- Salivation lubricates & provides hedonic feedback



- Best sialagogues:
  - Acid
  - Umami
  - Dynamic Contrast

Mere Exposure Effect

- Just Being Exposed to a Food Increases Liking!
- Mechanism Involves Reduction of Neophobia
- Take 7-10 Exposures to Work

Final Comments

- Chemical Senses *Drive* Ingestion!
- Gut & Fat Cell *Cannot* be Ignored!
- Food Theories *Must* be Understood!
- Food can be manipulated:
  - More pleasurable
  - More addicting
  - Increased craving

Superior Cuisine (SC)

- **SC** = Tasty Food = Better Nutrient Absorption
- **SC** =Dynamic Contrast, Emulsion and Surprise theories
- **SC** = Spices That ↑Food Pleasure & Excite Orosensation
- **SC** = Hedonic Solutes (salt, sugar, umami)
- **SC** = Saucing & Salivation Response
- **SC** = Cookivore and Essential Nutrient Aromas with Added Complexity

Thank for Listening!

- Company seminars on Food Pleasure are available!

Steven Witherly, PhD

Steven Witherly, PhD

Techproducts@ca.rr.com
661-296-2214
www.Technicalproductsinc.net