

# Environmental Adaptations

“The structure of every organic being is related, in the most essential yet often hidden manner, to that of all the other organic being, with which it comes into competition....” (Darwin, 1859)

- Food
- Illness
- Hunting
- Gathering
- Shelter

# Acquisition and Selection of Food

Principal temporal occupation of most animals

**Problem: What do you need and what should you avoid?**

Rats prefer sweet foods and avoid bitter foods

Sweet food tends to be nutritious

Bitter food tends to be toxic

Plant toxins co-evolved as adaptations

Consumption of sweet and salty foods proportional to relative need for calories and salt

- Salt sufficiency problematic, especially for vegetarian diet
- Psychological drives for food coordinated with needs

# Food, continued

**Neophobia:** Rats avoid novel foods

- Consume only in small amounts
- Consumed separately
- If combined with familiar food, illness results in avoidance of **Only** the novel food
- Efficient tuning of evolved adaptation to problem of nutrition & toxicity

# Food, Humans (not the food group)

Kwakiutl (North America) male status contingent on distribution of Food

- Failure results in divorce among Central and Coastal African Tribes

# Illness

What is morning (pregnancy) sickness?

Frequency of nausea 75%

Frequency of food avoidance 100%

H<sub>x</sub>: Adaptation to avoid consuming teratogens

- Avoid foods with highest levels of toxins
  - Benign for children and adults but not fetus
  - No aversion to cereals & (almost) bread
- Onset during period of greatest vulnerability
  - major organ formation (Schizophrenia)
- Offset with end of vulnerability
- Elevated spontaneous abortions with absence
  - 10.4% vs. 3.8% [Compare live births?]
- Universal across cultures (per adaptation; same foods?)

# Watch out when speculating

## Alternative H<sub>x</sub>:

- Olfactory inputs unique in projecting directly to Temporal Lobe
- Temporal Lobe has highest density of Sex Hormone Receptors
- Endocrine status shifts like hell at pregnancy
- An endocrine shift should (accidentally) disrupt what tastes good  
(are there shifts with ovulation, birth control pill?)
- Lack of Morning Sickness might signal an insufficient endocrine shift  
With negative consequences for fetus
- Loss of Morning Sickness might reflect a learning response

Logical ≠ True

What is a Sympathy Hurl?

# I Hunt, Therefore I Am: The emergence of modern humans?

- Tool Making (spears, arrows; tools found among bones x-2million yrs.)
- Big Brains (strategy;  $E = \text{BigMac}^2$ )
- Language (coordinated hunting parties)
- Strong male coalitions (ubiquitous across cultures; for hunting)

All human groups consume more meat than any other primate species  
20-40%, with high > 90% in hunting & cold seasons (e.g.: !Kung)  
Vs. 4% for Chimpanzees

Essential nutrients difficult form vegetarian diet

Aka Pygmies: 56% of time hunting ; 27% gathering; 17% processing  
(vis-à-vis food related activities)

# From Primate to Prime Rib!

- Like other primates, we can't synthesize our own Vitamin C, because we used to swing from fruit trees and didn't need to evolve the capacity
- Other primates have mostly colon (fibrous veggies)
  - Humans have mostly small intestines (proteinaceous meat)
- Human tooth fossils with fibrous erosions
- Vital amino acids A & B12 obtained from meat
- 2 million year old bones with cut marks



# The Provisioning Hypothesis

Male human primates uniquely invest in children

Male investment absent in non-carnivorous species

Meat:

- High density
- Efficiently transported across distances

Reciprocal altruism (across time) and social exchange:

- Successful hunting exceeds need of individual
- Success problematic
- Low cost of sharing – spoils anyway
- High benefit from sharing

# Sexual Division of Labor

- Pregnancy and children impede hunting but not gathering
- Present in modern Hunter-Gatherers
- Products can be exchanged

# What Motivates a High-Risk Hunting Strategy?

## Hawkes's (1991) Showoff strategy:

To woman's advantage to reward men who "show off" with rare but big kills

- Child-rearing help
- Sexual favors

Males:

- Increase ability to father children
- Increase survival of children from whatever female
- Low cost

# What Motivates a High-Risk Hunting Strategy?

Ache (Paraguay): 84% shared outside of family  
(who says, “A round of beer for everybody”?)

- Increase ability to father children
- Increase survival of children from whatever female

Only 58% of female-gathered food shared

- Fecundity limited
- T&B?

# Usufructs of Hunting (Not an Italian-American Insult)

1. Male parental investment
2. Male coalitions
3. Reciprocity & Social Exchange
4. Sexual division of labor
5. Tool making & usage

Why are meat calories as low as 20-40%?

- Suggests that gathering was primary
- Implies that hunting was trivial to human evolution [?]

# Gather Ye Rosebuds While Ye May, Old Time is Still a-Flying

“To the Virgins, to Make Much of Time” (Robert Herrick, 1648)

## The Gathering Hypothesis (Tanner, Zihlman, and Herrick):

- Transition from forest to savanna
  - A HUGE influence on human evolution
- Tool-making for digging and collecting
  - Lead to tool for hunting & butchering
  - Only AFTER humans emerged
- Primates & Prehominids primarily vegetarian
- 50-80% of modern hunter-gatherer diet vegetarian

# “To His Coy Mistress” Andrew Marvell, 1681

....

My **vegetable** love should grow  
Vaster than empires and **more slow**;  
An **hundred years** should go to praise  
Thine eyes, and on thy forehead gaze;  
But **thirty thousand** to the rest;  
An **age at least to every part**,  
And the **last age** should show your heart.

# “To His Coy Mistress”

Had we but **world enough**, and **time**,  
This **coyness**, lady, were **no crime**.  
We would sit down and think **which way**  
**To walk**, and **pass our long love’s day**.  
Thou by the Indian Ganges’ side  
Shoudst **rubies** find;

....

My **vegetable** love should grow  
Vaster than empires and **more slow**;  
An **hundred years** should go to praise  
Thine eyes, and on thy forehead gaze;  
But **thirty thousand** to the rest;  
An **age at least** to every part,  
And the **last age** should **show your heart**.

....

And yonder all before us lie



# Gather Ye Rosebuds While Ye May, Old Time is Still a-Flying

“To the Virgins, to Make Much of Time” (Robert Herrick, 1648)

Herrick is telling the Virgins to get busy. We will be looking at Evolutionary theories as to why men prefer younger women.

Your assignment for this weekend:

- Derive a theory as to why Evolution would favor such an adaptation
- How would you demonstrate that this is an evolutionary adaptation
- Memorize Herrick
- (Have a good time)

# Gathering: A Weaker Theory For a Weaker Sex?

- Men worldwide hunt -- Suggests efficient  
Universality suggest an Evolutionary Adaptation  
Must have advantages
- Gathering does not account for:
  - Division of Labor
  - Emergence from primates, which gather
  - Male coalitions
  - Male parental investment
  - Eskimos
  - Reciprocal alliances
  - Females sharing food with males

Beef: Its what's for humans

# Man: The Bottom Feeder?

## The Scavenging Hypothesis:

- Few species purely predator or scavenger
- Half the time cut marks are above gnaw marks

## Problems:

- Large predator kills rare, little left
  - Necessitates ranging across vast distances
- Competition with other scavengers, themselves predators
- Predators return to kill
- Quickly rots
  - Primates rarely eat found carcasses
  - Modern tribes do not scavenge despite ability to cook

# Yes Georgia, There Is a Savanna

The Savanna Hypothesis: Where humans originated

- Habitat to chimpanzees
- High density of game
- Lower survival risks
  - Trees for refuge and sun protection
- Preferred landscape of modern humans (across continents)
  - Savanna trees preferred (per canopy)
- Humans prefer natural to constructed environments
  - Prefer constructed environments with vegetation
  - Across continents, cultures, education, & age (30 studies)
  - Natural scenes reduce physiological stress (challenge)

# All The World's A Stage

## H<sub>x</sub>: Three Stages of Habitat Selection:

1. Selection: To see, but not be seen
2. Information gathering:  
    People prefer paths which require exploration  
    View occluded by turns and hills
3. Exploitation: Decision whether to stay

# Why is the Penthouse More Expensive?

## Prediction from Savanna Hypothesis:

Preference for green grass, budding trees, and flowers

- Signals emergence of harvest (but edible themselves)
- Flowers in hospital:
  - Swifter recovery
  - Elevated psychological state