

# Main Points

## 1) Diversity, Phylogeny, and Systematics:

- Infraclass Eutheria
- Orders Perissodactyla through Soricomorpha

## 2) Evolutionary relatedness within the Homonidae

- convergence and sexual selection for skin color in H. sapiens
- example: if your dog were a lot smarter, did not fear you, and could talk
- the unique mating system of H. sapiens

## 3) Cultural uniqueness of H. sapiens

- why we do drugs and get tattoos
- example: characteristics of religion as exaptations

Terms: patagium, sexual selection, secondary sex characteristic, father-at-home hypothesis, exaptation

Pre-reading: Monday Sep 26—Crooks et al 2017

Wednesday Sep 28—wrap-up and review for test

Disclaimer: this lecture might require some maturity and thick skin, and no prudishness

# Order Perissodactyla: odd-toed ungulates

**Taxonomy: 18 species**

**Distribution: Ethiopian, Neotropical, Palearctic, Oriental**

**Characteristics:**

- cursorial
- weight borne on middle digit
- cecum usually present

**Grevy's zebra**



**black rhino**



**Baird's tapir**



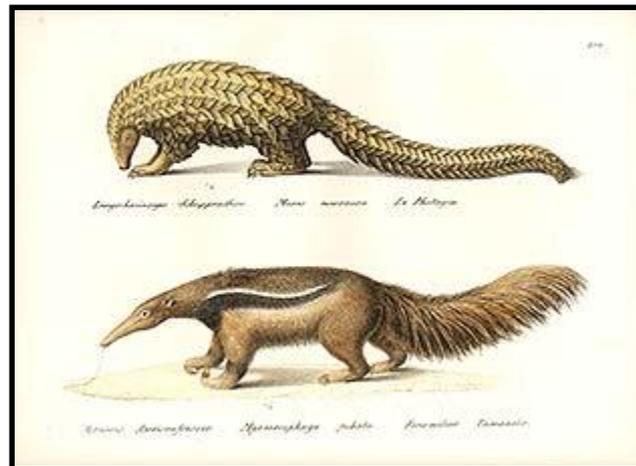
# Order Pholidota: pangolins or scaly anteaters

**Taxonomy: 7 species**

**Distribution: Ethiopian and Oriental**

**Characteristics:**

- dorsum and tail covered in hardened scales
- convergent with anteaters



# Order Dermoptera: colugos or flying lemurs

**Taxonomy: 2 species**

**Distribution: Oriental**

**Characteristics:**

- furred patagium
- comb teeth
- enlarged cecum

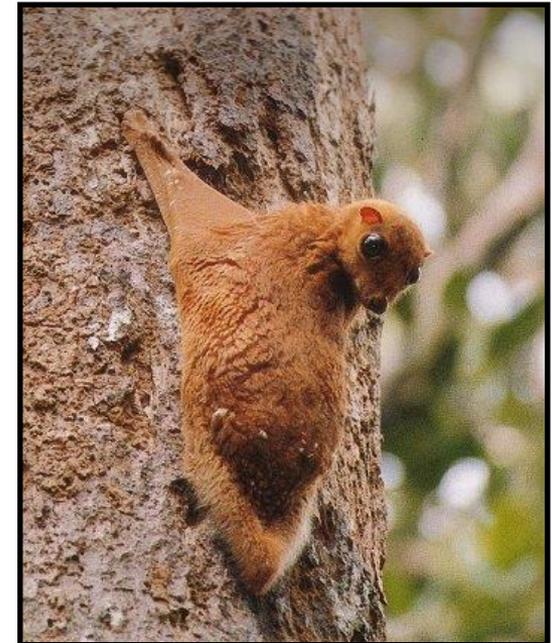
**Malayan colugo**



**Malayan colugo**



**Phillipine colugo**



# Order Soricomorpha: true shrews, moles, solenodons

**Taxonomy: 429 species**

**Distribution: cosmopolitan, except for Australasia and southern Neotropics**

**Characteristics:**

- poorly-developed auditory bullae**
- enlarged incisors and reduced canines**



# Evolutionary Relatedness Within the Homonidae



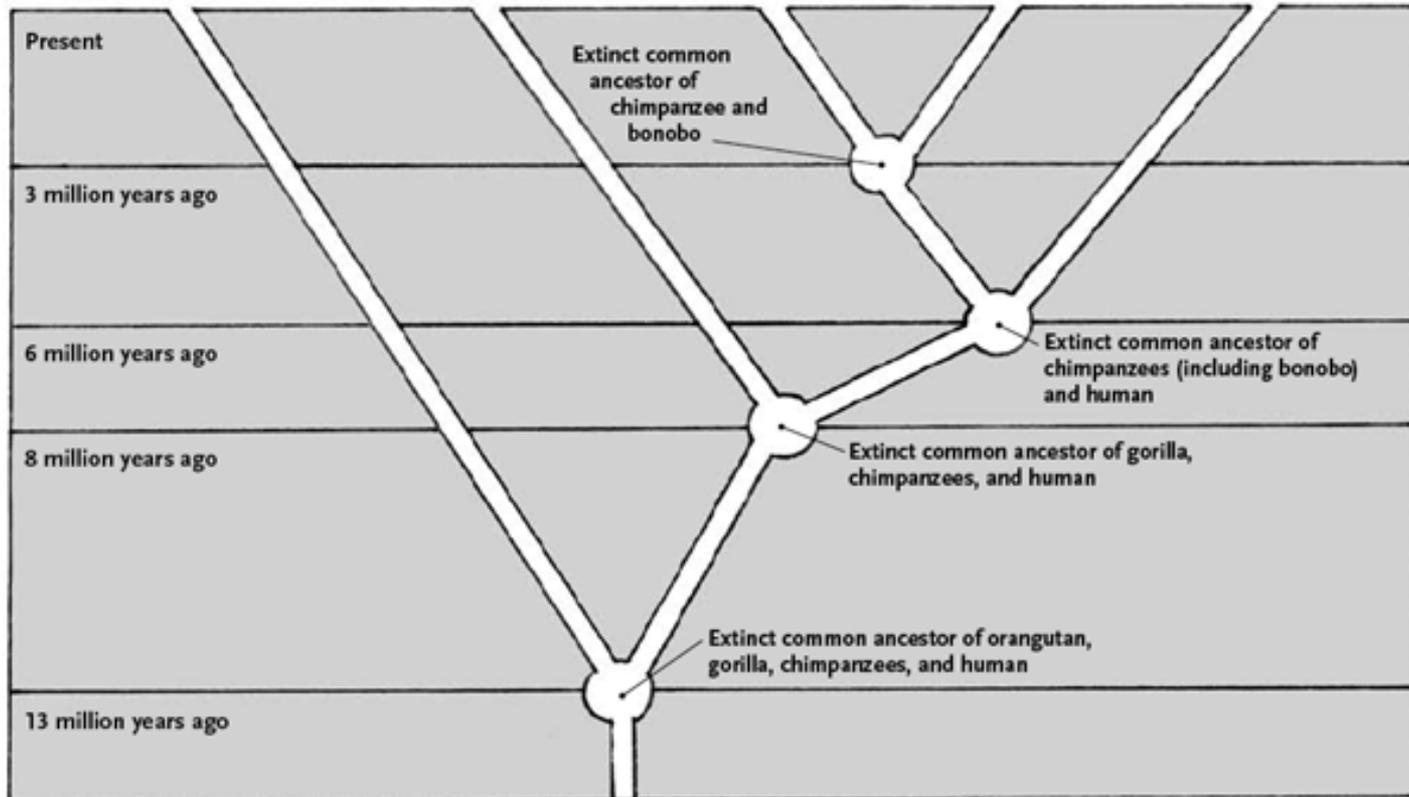
Orangutan  
48 chromosomes  
(24 pairs)

Gorilla  
48 chromosomes  
(24 pairs)

Chimpanzee  
48 chromosomes  
(24 pairs)

Bonobo  
48 chromosomes  
(24 pairs)

Human  
46 chromosomes  
(23 pairs)



**African (Nilot), Kenya**



**Mongol (Inupiat), USA**



**Australoid (Aborigine), Australia**



**Australoid (Papuan), New Guinea**



**Mongol (Ainu),  
Japan**



**Caucasian (Aryan), Sweden**



**Caucasian (Pashtun),  
Afganistan**



**Capoid (Khoisan)  
Botswana**

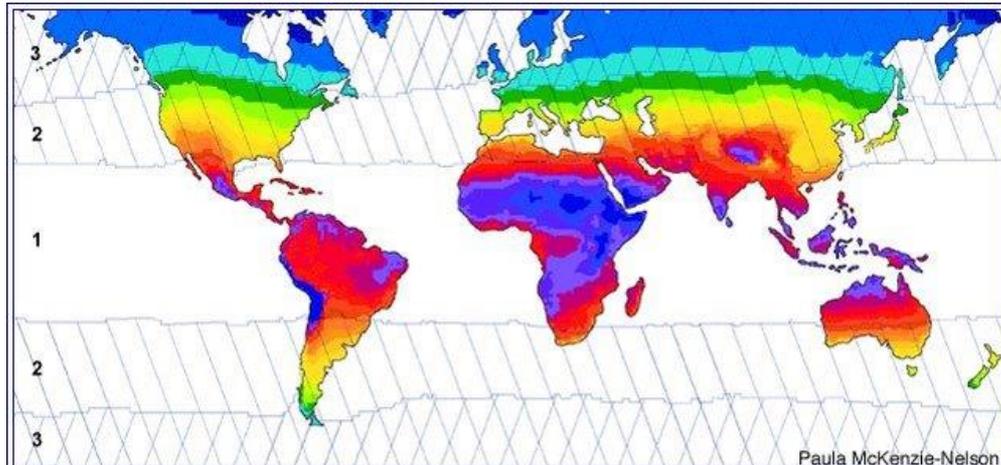


**African (Pygmy), Cameroon**



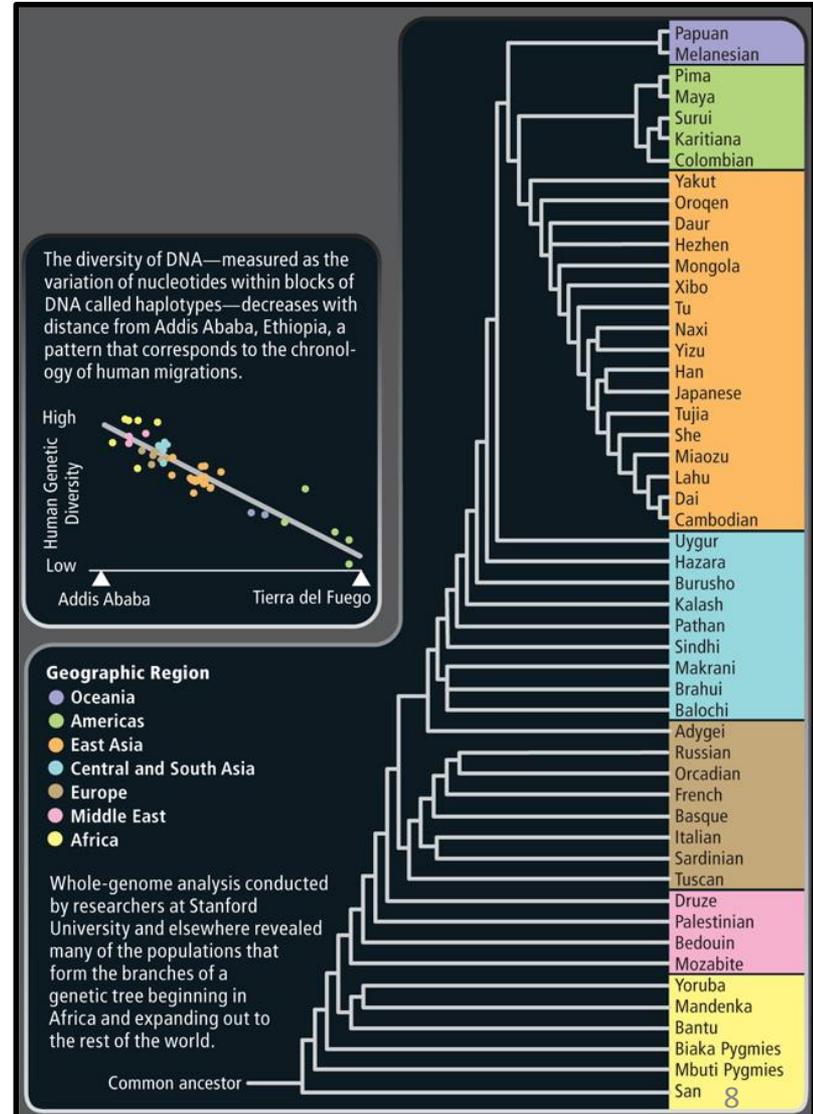
# Convergence and Sexual Selection Within H. sapiens

**H1: skin color is an outcome of natural selection. Melanin provides protection against harmful effects of UV radiation (loss of vitamin B9), but inhibits vitamin D production.**



Academy researchers Nina Jablonski and George Chaplin combined clinical and satellite data to produce this map. The colors reflect the degree of ultraviolet radiation at different latitudes. Background patterns illustrate three zones of human skin tone.

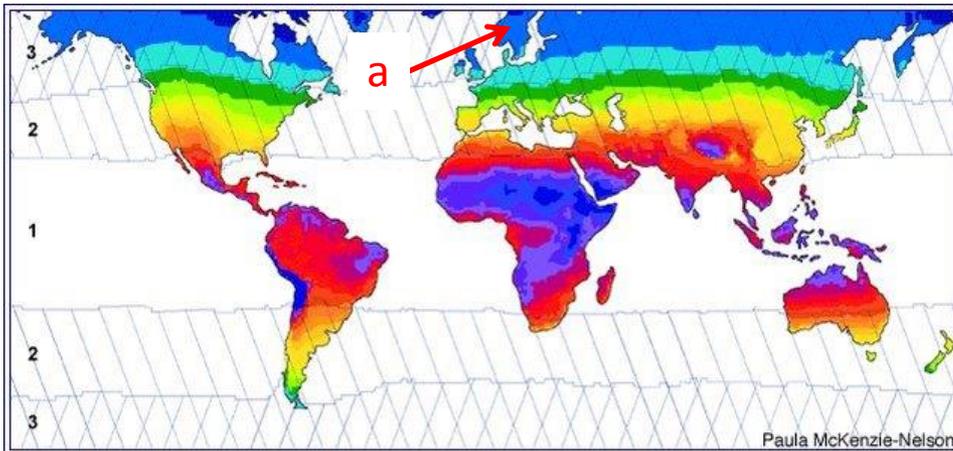
- Zone 1 contains tropical peoples with the darkest skin color.
- The skin of people native to Zone 2 possesses the most potential for growing lighter or darker seasonally.
- Zone 3 natives have paler skin to make up for lower levels of sunlight.



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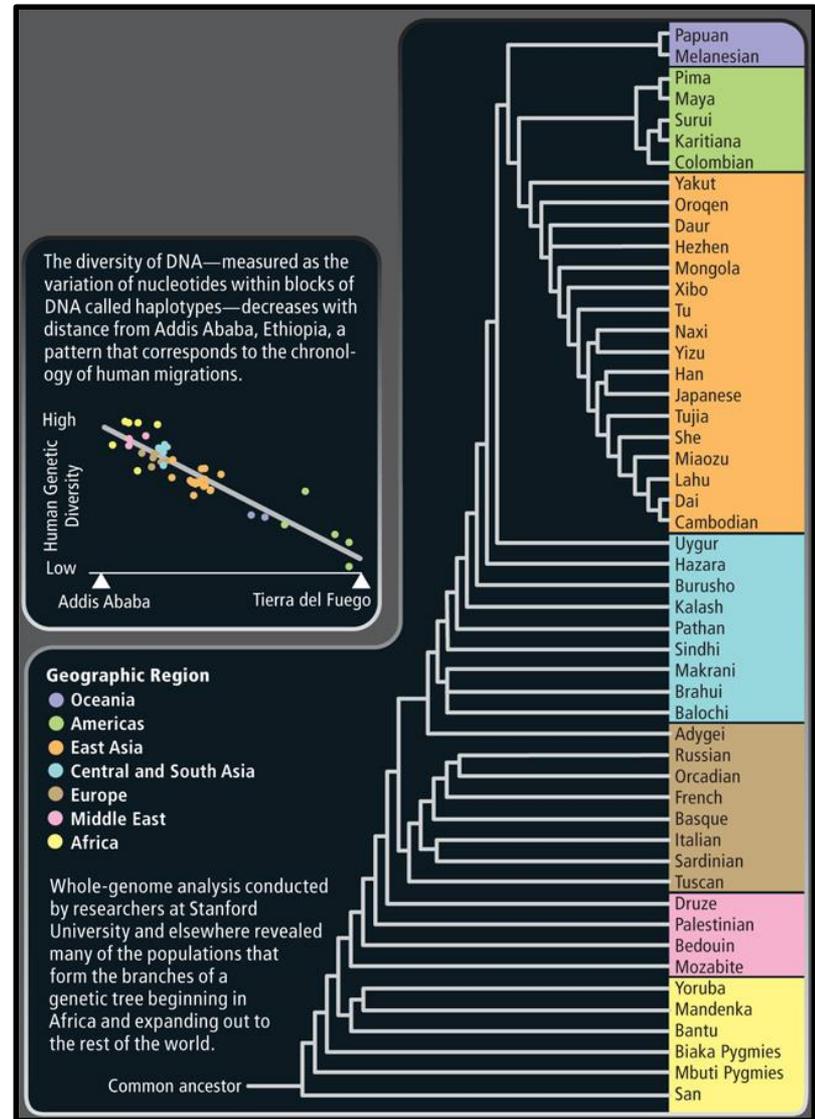


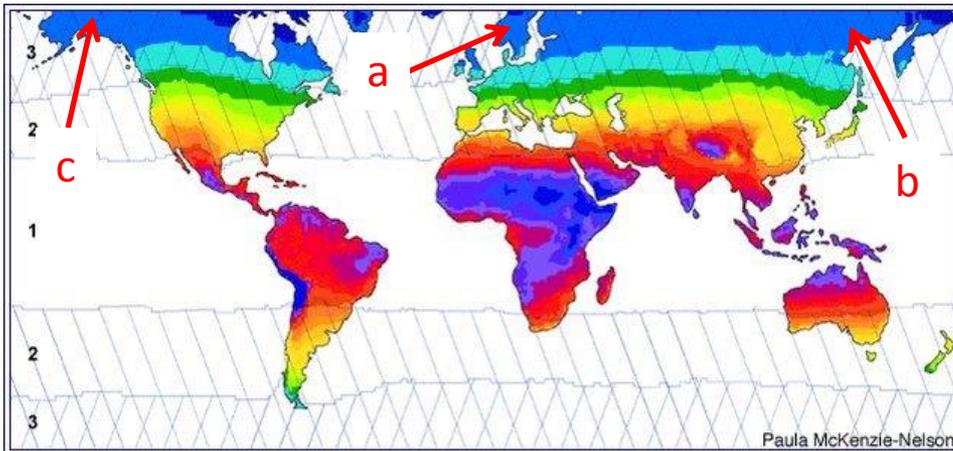
Paula McKenzie-Nelson

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## high latitudes

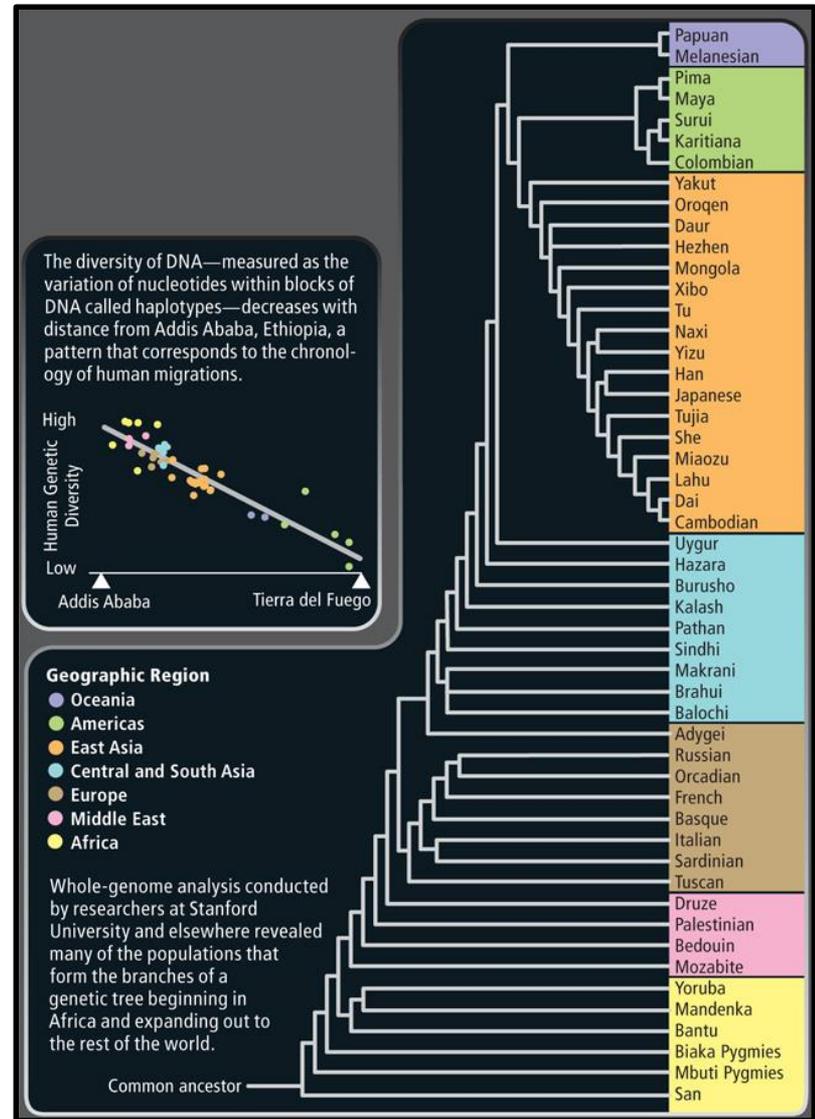


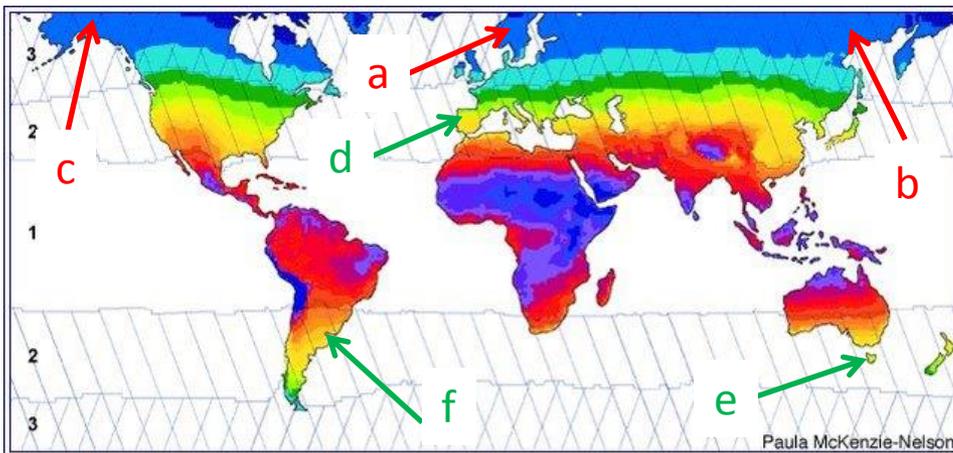


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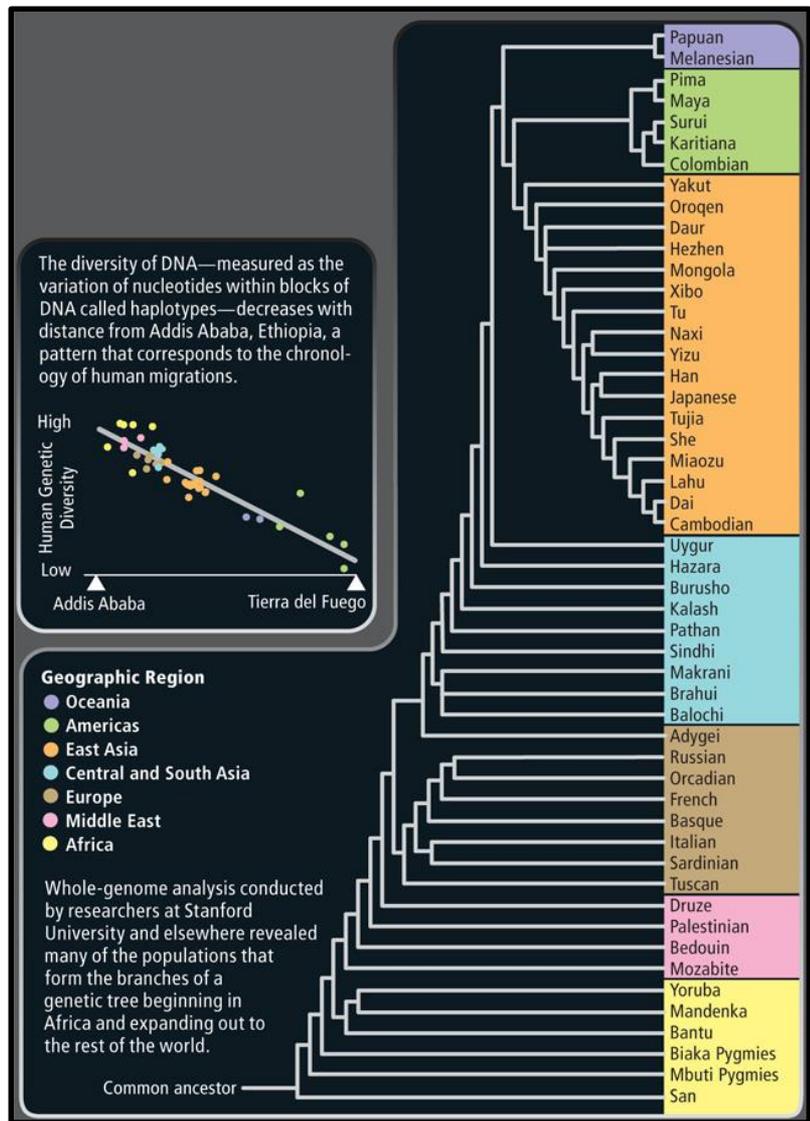
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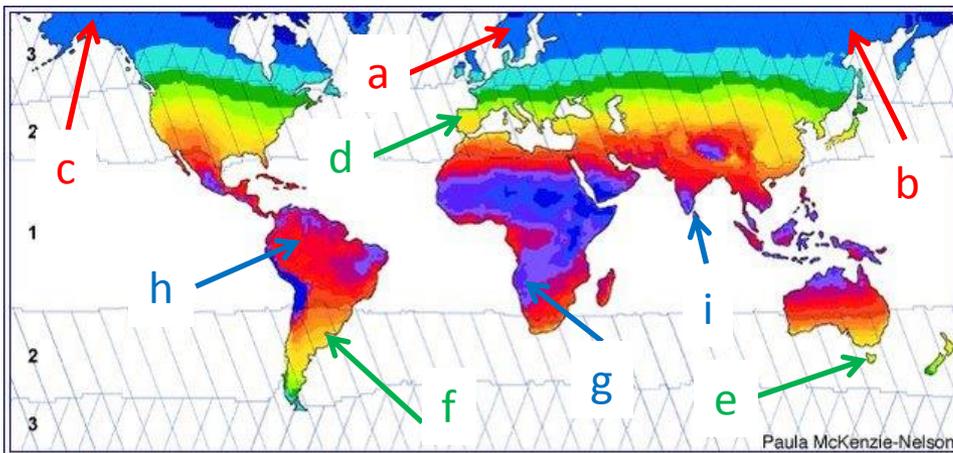
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### high latitudes



### mid latitudes





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### high latitudes



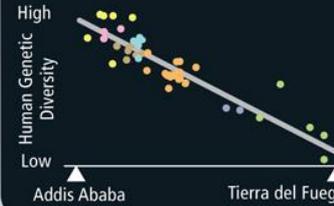
### mid latitudes



### low latitudes



The diversity of DNA—measured as the variation of nucleotides within blocks of DNA called haplotypes—decreases with distance from Addis Ababa, Ethiopia, a pattern that corresponds to the chronology of human migrations.

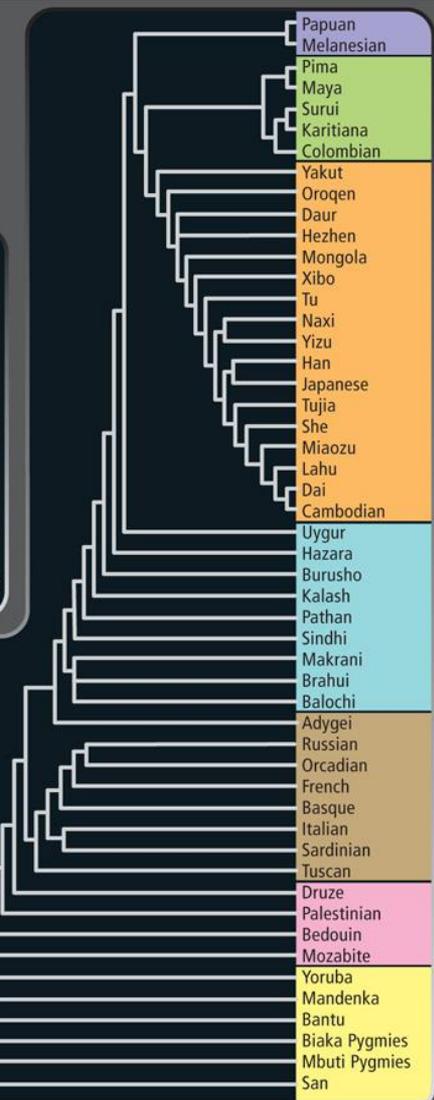


#### Geographic Region

- Oceania
- Americas
- East Asia
- Central and South Asia
- Europe
- Middle East
- Africa

Whole-genome analysis conducted by researchers at Stanford University and elsewhere revealed many of the populations that form the branches of a genetic tree beginning in Africa and expanding out to the rest of the world.

Common ancestor



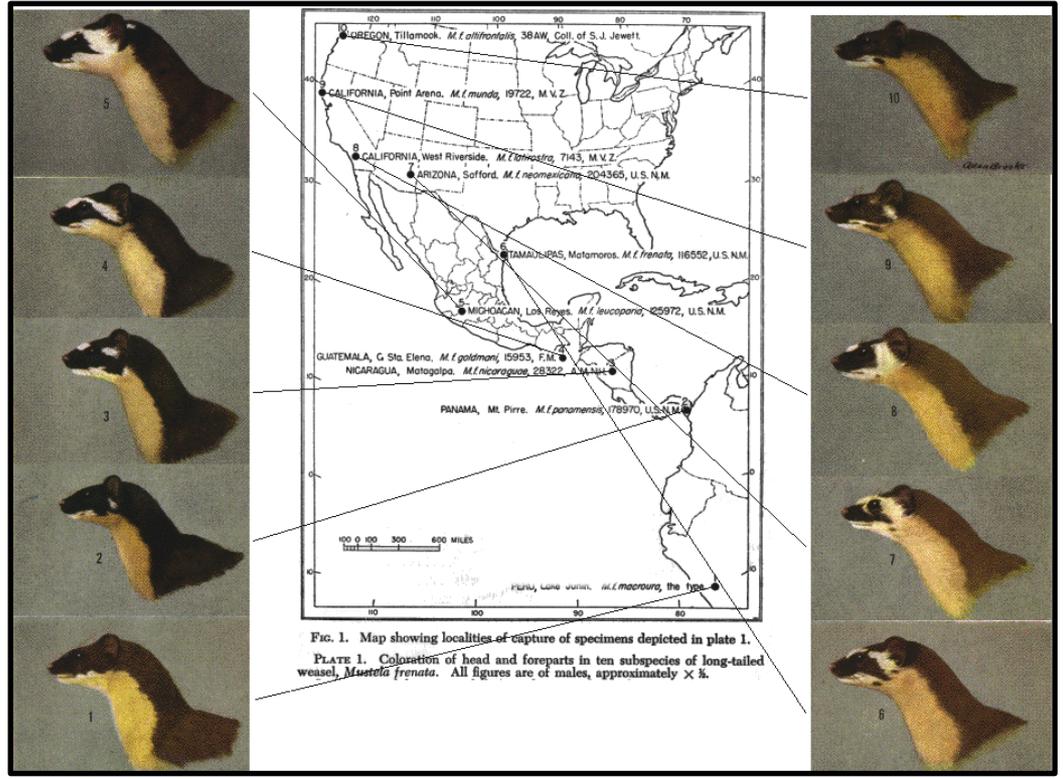
# Convergence and Sexual Selection Within H. sapiens

- sexual selection = evolutionary selection for traits stemming from competition of individuals of one sex for access to the other sex.

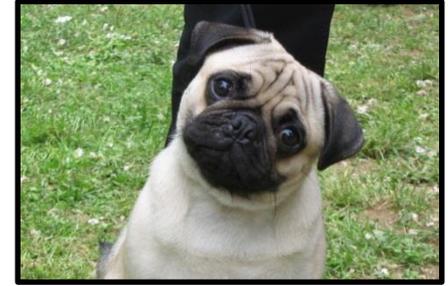


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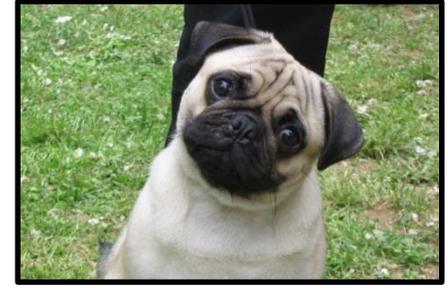
H2: skin color (and eye color, hair color, breast size, and even fashion) is an outcome of sexual selection, in which humans “mold” traits based on arbitrary beauty standards.



# If Your Dog Was A Lot Smarter, Did Not Fear You, and Could Talk



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**“Those disgusting humans have sex any day of the month. Jane wants sex when she knows that she isn’t fertile – like just after her period. John wants sex all the time, but doesn’t care whether his efforts could result in a baby or not. But if you want to hear something really disgusting – Jane and John kept on having sex while she was pregnant! That’s as bad as all the times when John’s parents come for a visit, and I can hear them having sex too, even though John’s mother went through this thing they call menopause years ago. Now she can’t have babies anymore, but she still wants sex, and John’s dad gives it to her. What a waste of effort. Here’s the weirdest thing of all: Jane and John, and John’s parents, close the bedroom door and have sex in private, instead of doing it in front of their friends like any self-respecting dog.”**

**From J. Diamond’s “The Third Chimpanzee”**

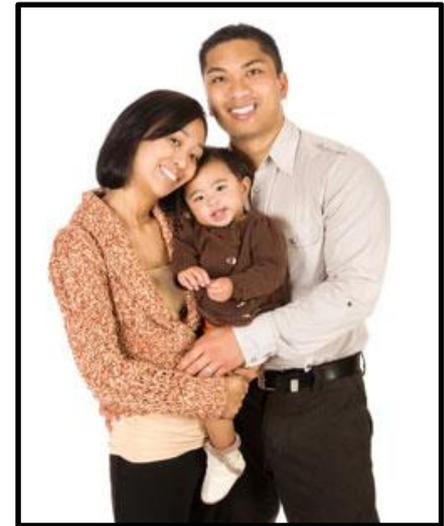
# Two observations about H. sapiens reproduction, compared to other apes

-- human social systems are characterized by concealed estrous/sexual receptivity.



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-- human social systems require (or required) a male to maintain his relationship with a female to successfully rear a child.



**Discussion question: can you think of a reason why H. sapiens' unusual mating behavior and its highly altricial offspring are related?**



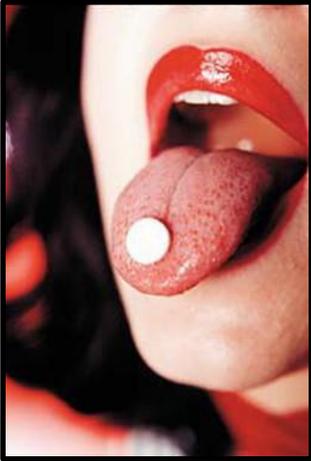
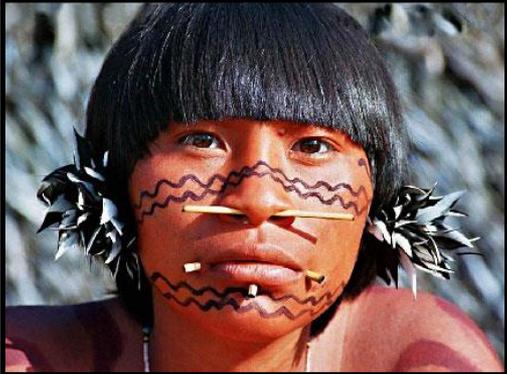
# Father-at-Home Theory

-- female H. sapiens conceal estrous to ensure male H. sapiens remain present to rear altricial young



# Self-Mutilation and Drug Use Within H. sapiens

-- why do we mutilate ourselves and do harmful drugs?



# Self-Mutilation and Drug Use Within H. sapiens

-- indicators of fitness often are honest, and constitute handicaps, expenses, or sources of risk.

-- secondary sex characteristics = features not used directly in reproduction, but used to advertise fitness and increase attractiveness to mates



# Evolution of Religion

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- 2) defuse anxiety
- 3) provide comfort, particularly with respect to disease
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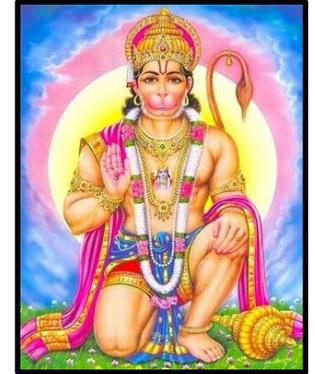
**-- religion has the following characteristics:**

- 1) belief in supernatural agents, which has consequences for how people should behave by rewarding the virtuous and punishing the rule-breakers**
- 2) social movements of people who identify themselves by sharing deeply-held beliefs**
- 3) costly and/or painful sacrifices (self-mutilation, fasting, celibacy or delayed reproduction, etc)**
- 4) supernatural agents can be induced by prayers, donations, and sacrifices**

# Examples of Supernatural Beliefs Confined to Particular Religions

**Hindu:** there is a monkey god who travels thousands of kilometers in a single somersault.

**Crow Indian:** you can obtain benefits from the spirits by spending four days in the wilderness without food and water and cutting off a finger joint from your left hand.



**Catholic:** a woman who had not been fertilized by a man became pregnant and gave birth to a baby boy, whose body went to a place called heaven, often represented as being located in the sky.

**Mormon:** In western New York state on September 21 1823, the angel Moroni appeared to a man named Joseph Smith and revealed to him buried golden plates awaiting the translation as a lost book of the Bible.

**Islam:** men who sacrifice their lives in battle for their religion will be carried to a heaven populated with beautiful virgins.

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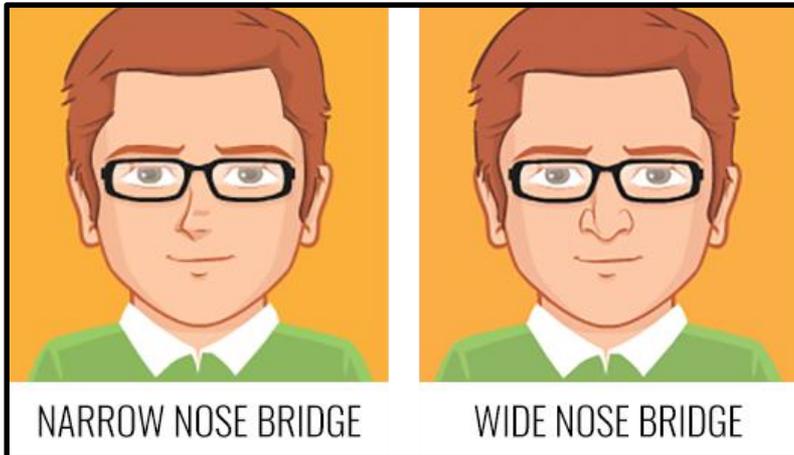
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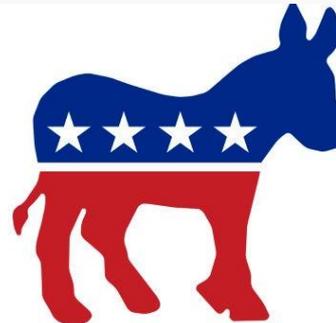
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**Exaptation** = the shift in the function of a trait during evolution. AKA “preadaptation”, AKA “evolutionary by-product”.



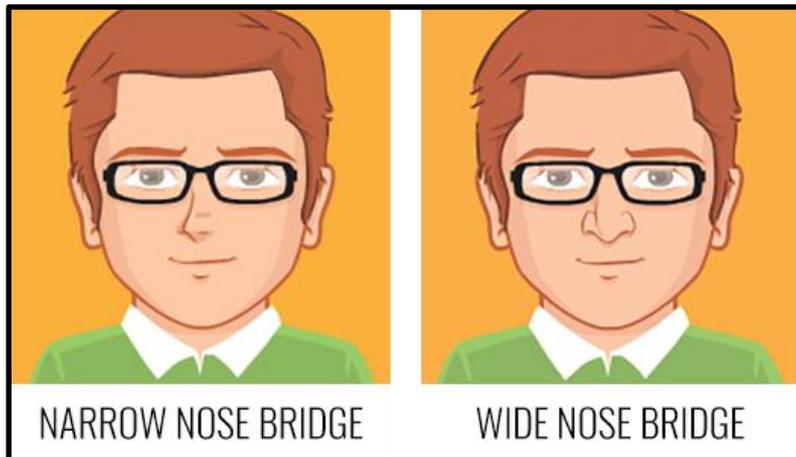
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-- some scholars believe religion “evolved” for group cohesion, and then became an exaptation to explain the unknown, diffuse anxiety, and provide comfort



# Some Reading Recommendations

