Understanding Us: What Makes Difference and What Difference Does Difference Make

Reading "How to Argue with a Racist" and how will it be integrated in class?

Introduction and Preface-Wed
Part I- Fri

Graphical Analysis

Same or Different?

Why do this?

These images should prepare you to think deeply about the way we categorize peoples and whether that categorization is biologically appropriate.

NOTE:

1=we are all quite the SAME
10=we are all quite DIFFERENT

(from How Neanderthals Gave us Secret Powers)

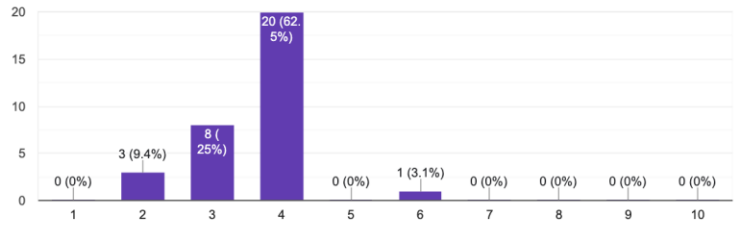
Neanderthal
Skin pigmentation,
Immune system
Allergies

Denisovan
Tolerance to low oxygen

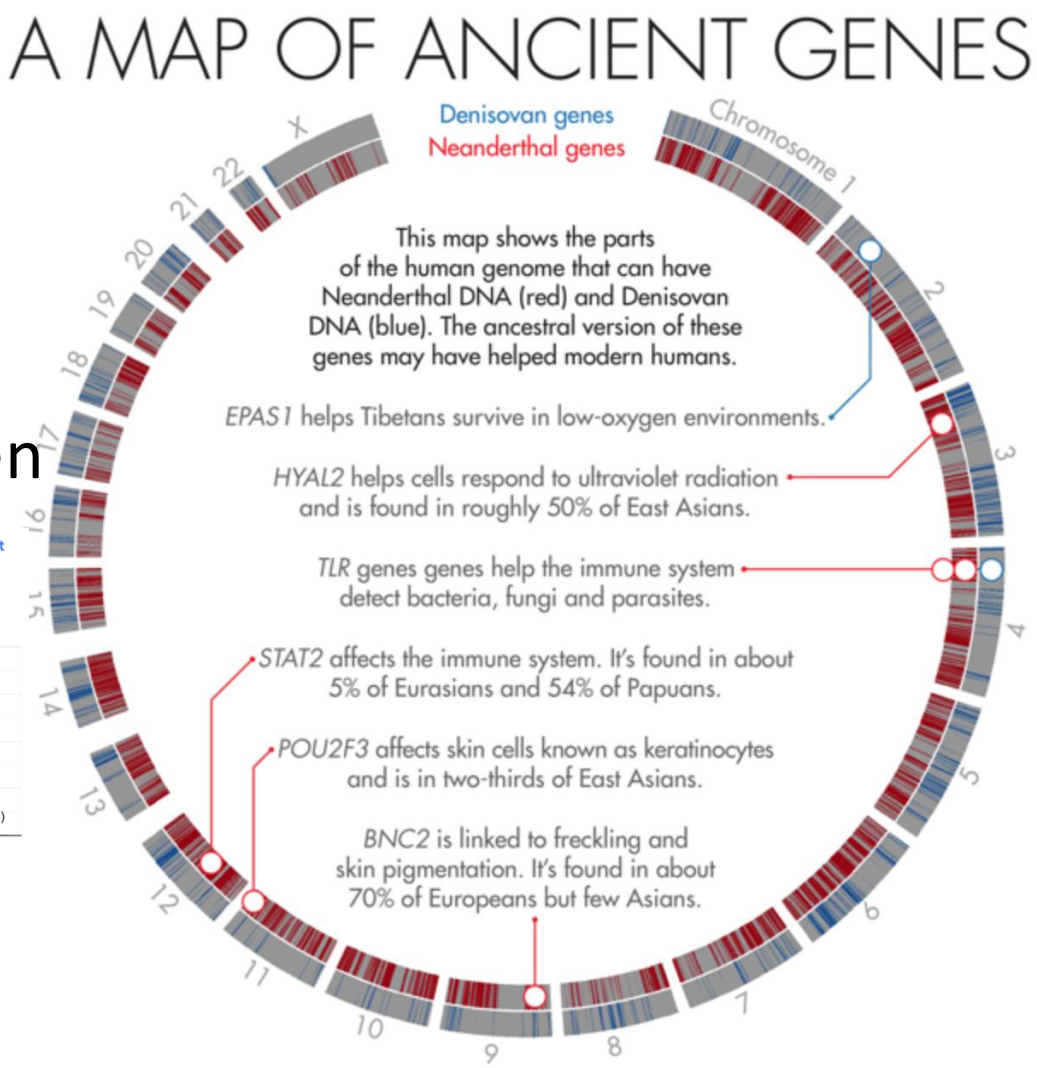
1. Colored regions are the parts of the genomes that we share with Denisovans and Neanderthals.

Copy chart

32 responses



1.



2.

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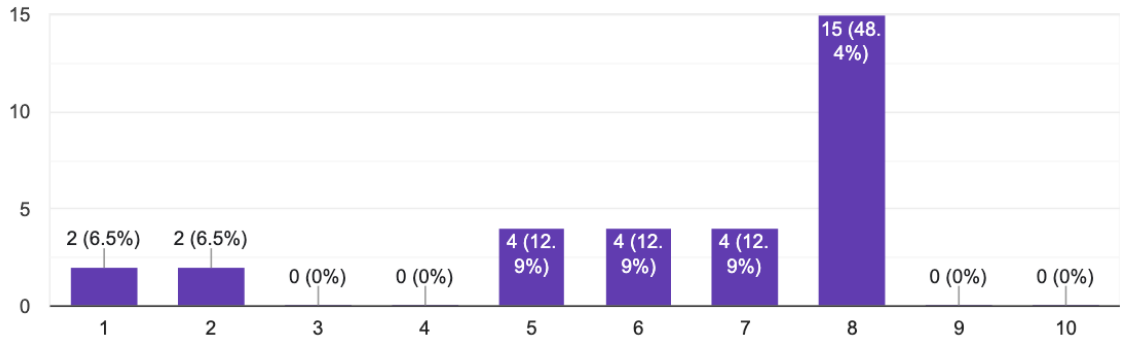
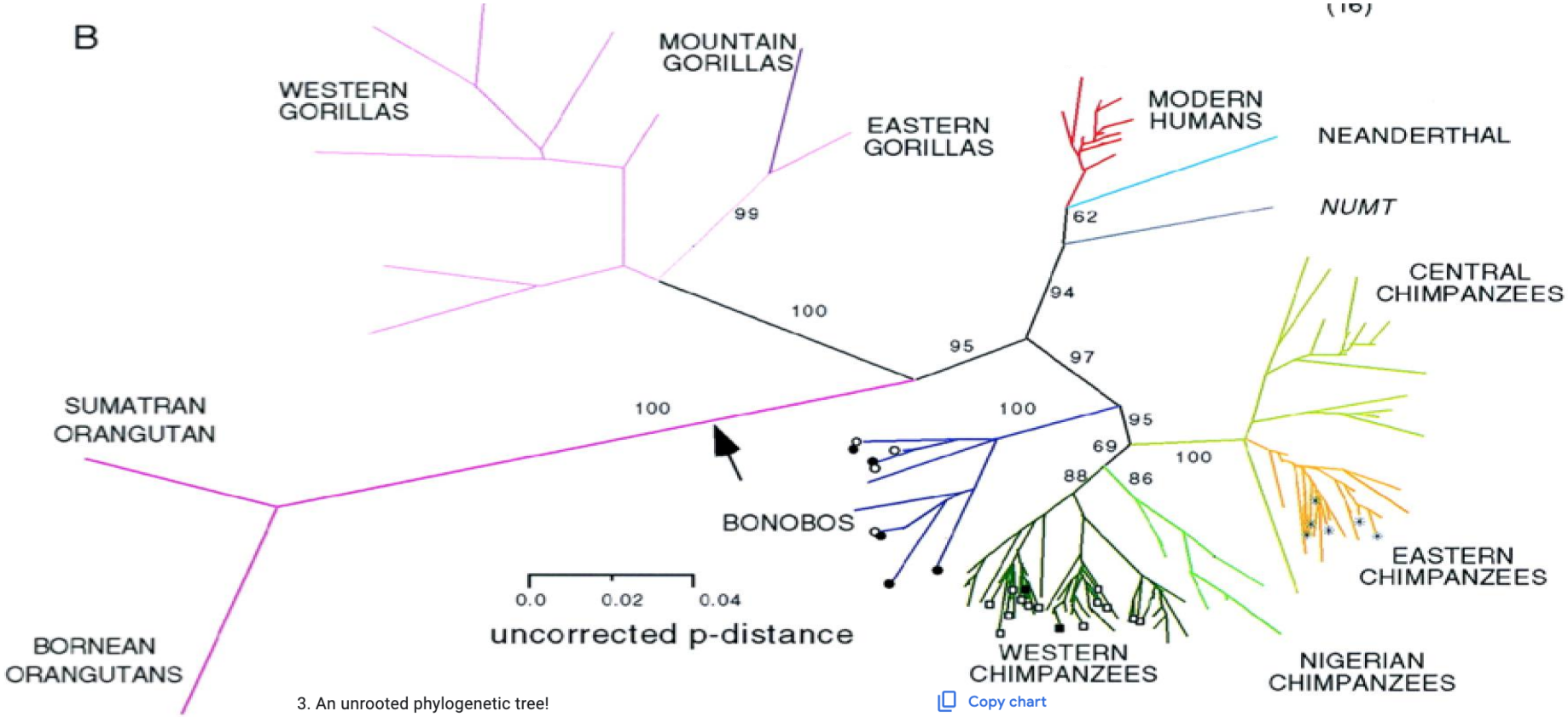


2.

https://www.buzzfeed.com/annamendoza/all-the-colours-of-the-world

Segment length is proportional to genetic difference.

Gagneux et al. PNAS 1999;96:9:5077-5082
https://www.pnas.org/content/96/9/5077.full



3. An unrooted phylogenetic tree!

32 responses

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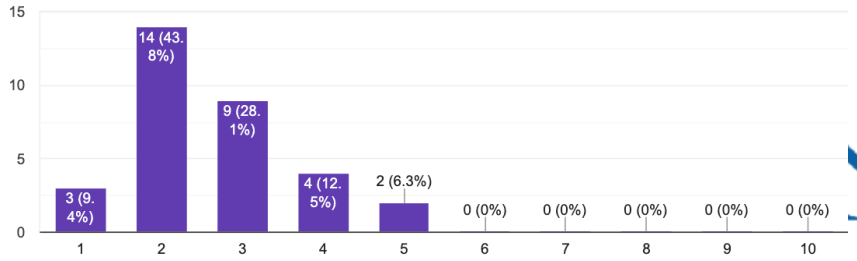

3.

NAS

A FORMATIVE JOURNEY

As humans migrated out of Africa—in two waves, sc
scientists say—they adapted to new environments
ways. Skin color is just one; high-altitude populatio
example, adapted to breathing low-oxygen air.

4. Dispersal of different groups of Homo sapiens out of Africa from Science Magazine.

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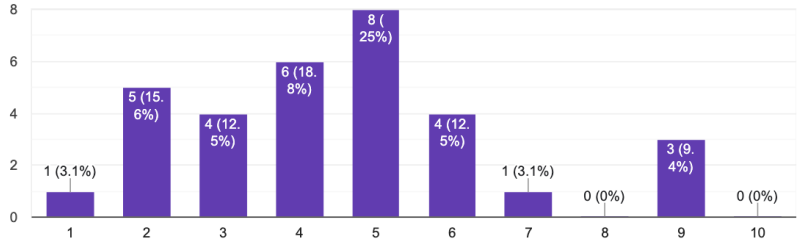
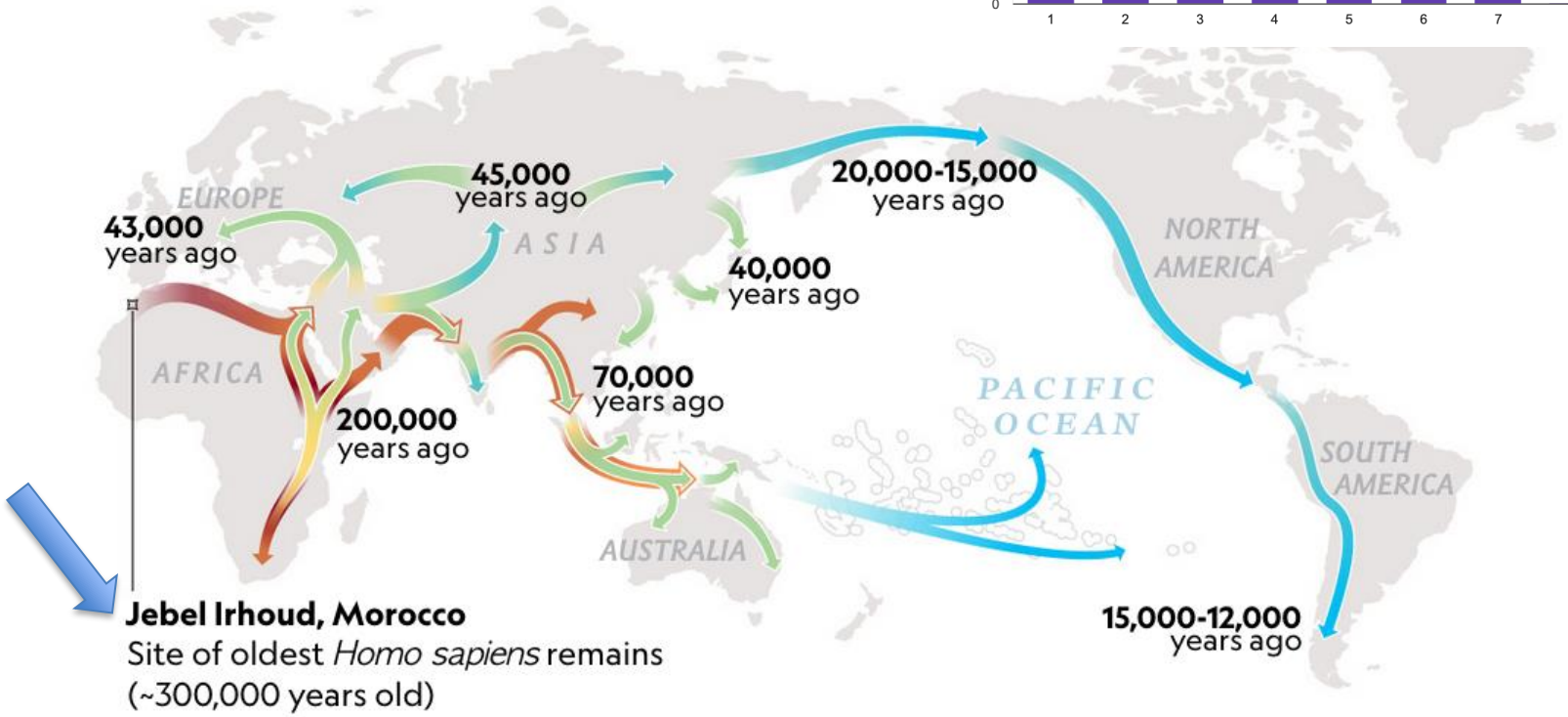
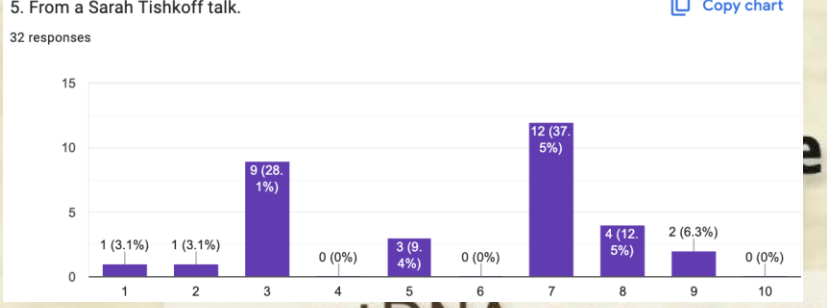




4.

JASON TREAT AND RYAN T. WILLIAMS, NGM STAFF
SOURCE: CHRISTOPHER BAE AND OTHERS, *SCIENCE*, 2017

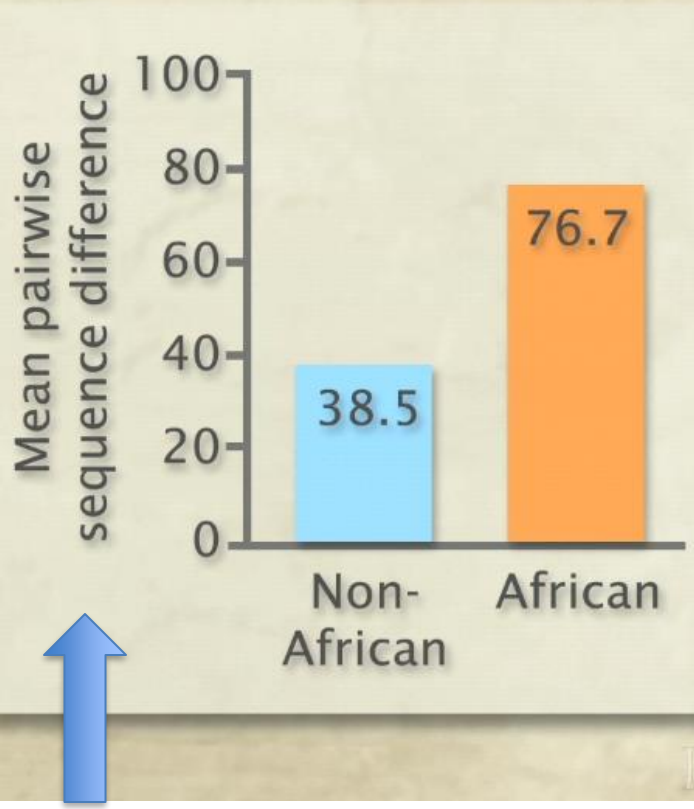


etic Diversity

mtDNA sequence differences

Sequence 1: ...GCGTATATGT...

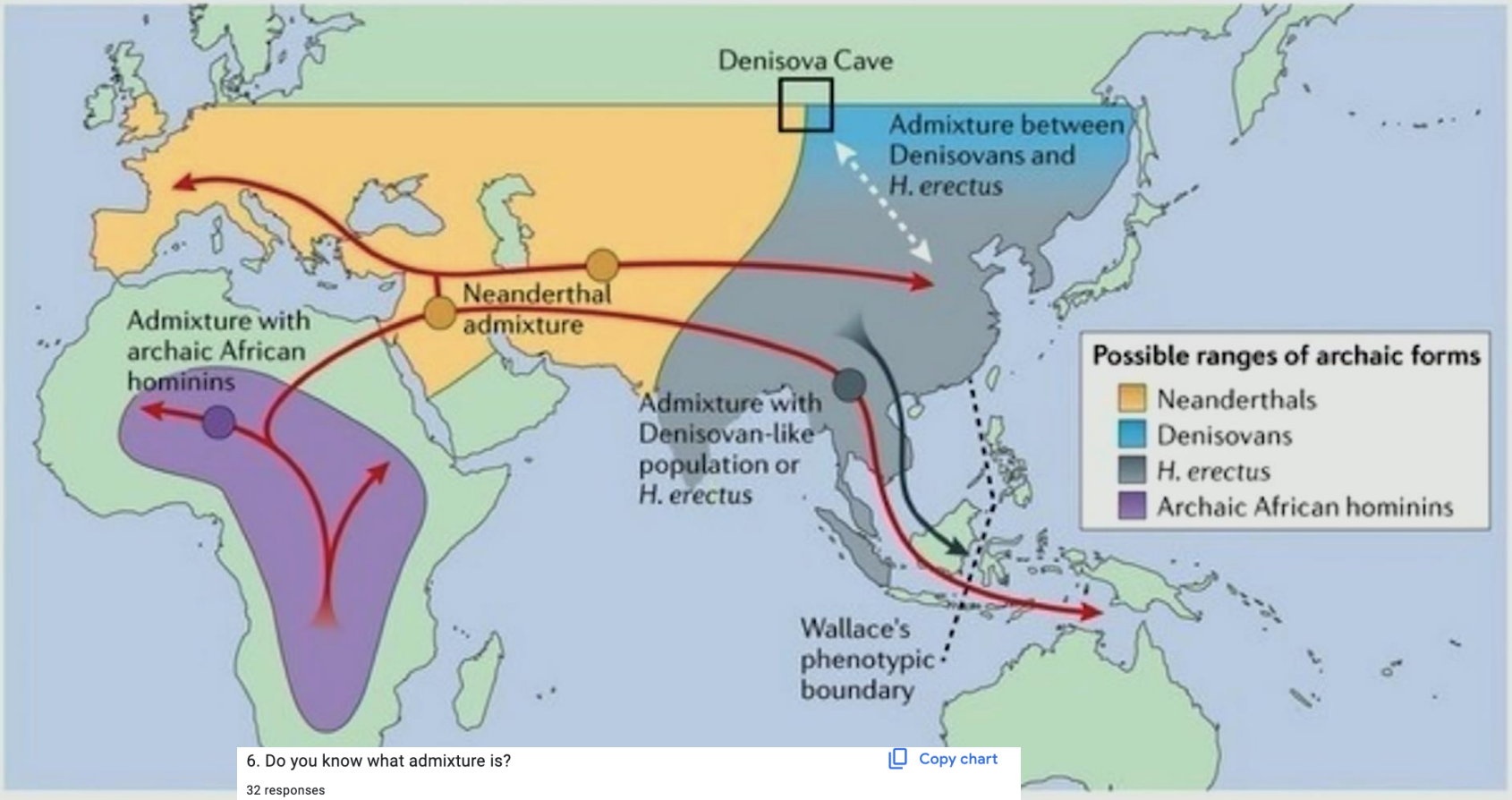
Sequence 2: ...GGGTATCTGT...



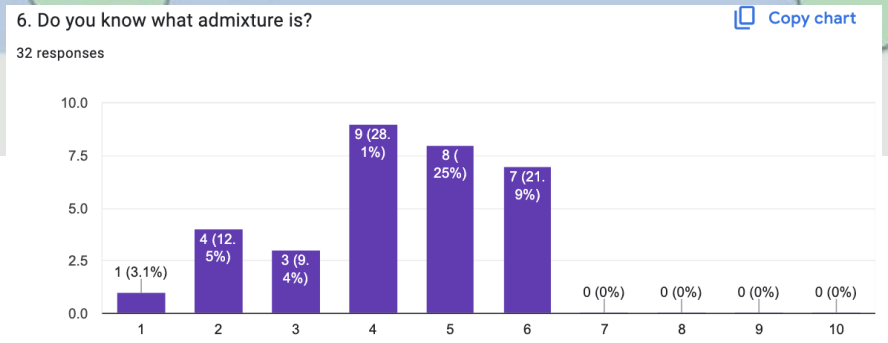
5.

How can there be so many differences between individuals of African descent and so few differences between individuals in the rest of the entire world of “Non-African decent”?

What we need to know: Was there admixture with archaic populations in Africa?



6.



7. (Actually from an article you will read.)

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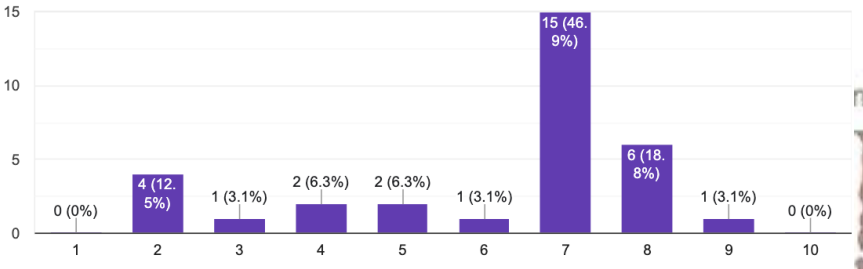
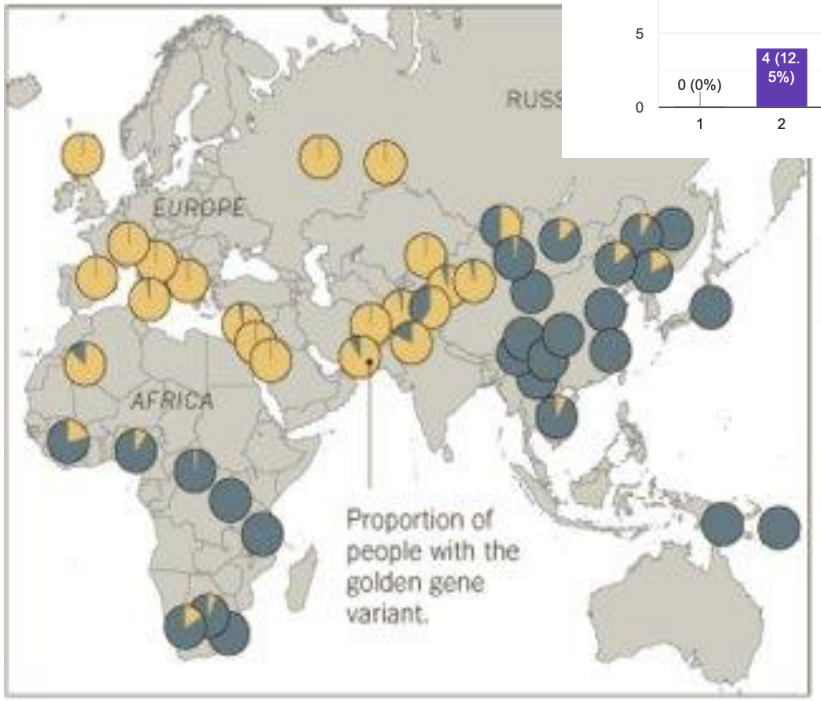
32 responses

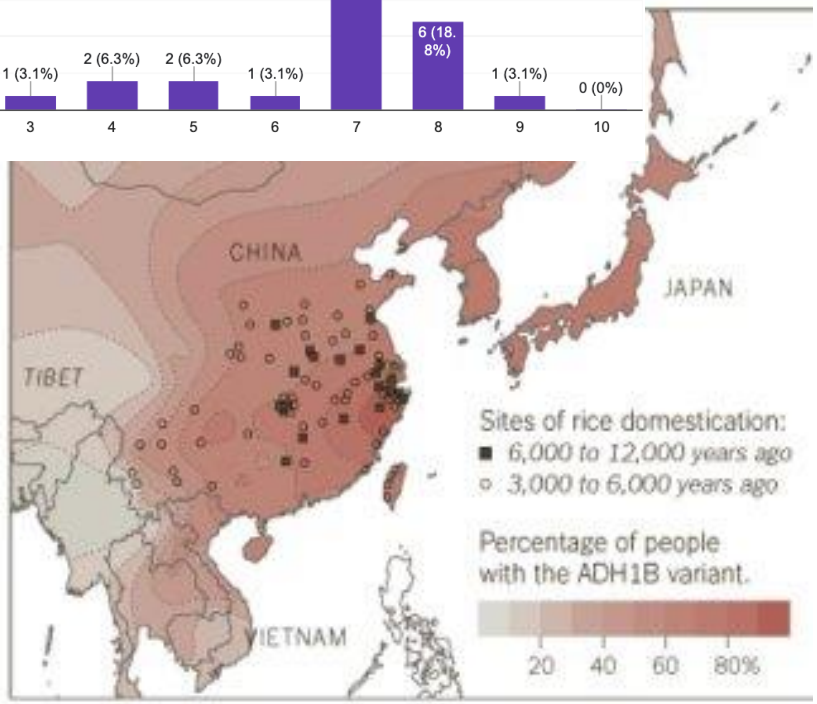


Genetic Changes

Researchers have found increasing evidence

nd climate.





SKIN COLOR Europeans and Asians probably acquired lighter skin to better synthesize vitamin D. A variant known as the golden gene is found in more than 98 percent of Europeans but is rare in East Asia, where lighter skin is thought to derive from a different set of genes.

ALCOHOL A variation in a gene called ADH1B protects against intoxication, making the skin flush when a person drinks. The variant became almost universal among southern Chinese after rice cultivation and fermentation began about 10,000 years ago.

Sources: Molecular Biology and Evolution; BMC Evolutionary Biology

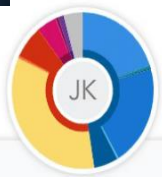
THE NEW YORK TIMES

From the article you read/will read!

7.

Ancestry Composition

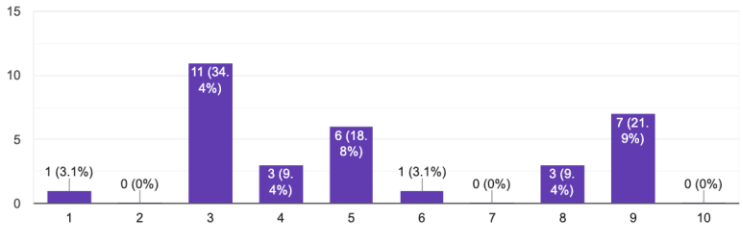
Your DNA tells the story of who you are and how you're connected to populations around the world. Trace your heritage through the centuries and uncover clues about where your ancestors lived and when.



8. From an add for ancestry testing.

Copy chart

32 responses



Jamie King

European	**47.4%**
Iberian	19.7%
Spain	
Ashkenazi Jewish	0.5%
Sardinian	0.2%
Broadly Southern European	21.1%
Broadly Northwestern European	0.3%
Broadly European	5.5%
East Asian & Native American	**41.8%**
Native American	34.4%
Peru	
Manchurian & Mongolian	< 0.1%
Southeast Asian	< 0.1%
Broadly East Asian	0.5%
Broadly East Asian & Native American	6.8%
Sub-Saharan African	**5.2%**
West African	4.5%
East African	< 0.1%

23andMeBlog

8. https://www.ispot.tv/ad/wK
V/ancestrydna-kim

nature International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audi

News & Comment > News > 2018 > May > Article

NATURE | NEWS

Evidence mounts for interbreeding bonanza i ancient human species

***Nature* tallies the trysts among Neanderthals, humans and other relatives.**

Ewen Callaway

17 February 2016

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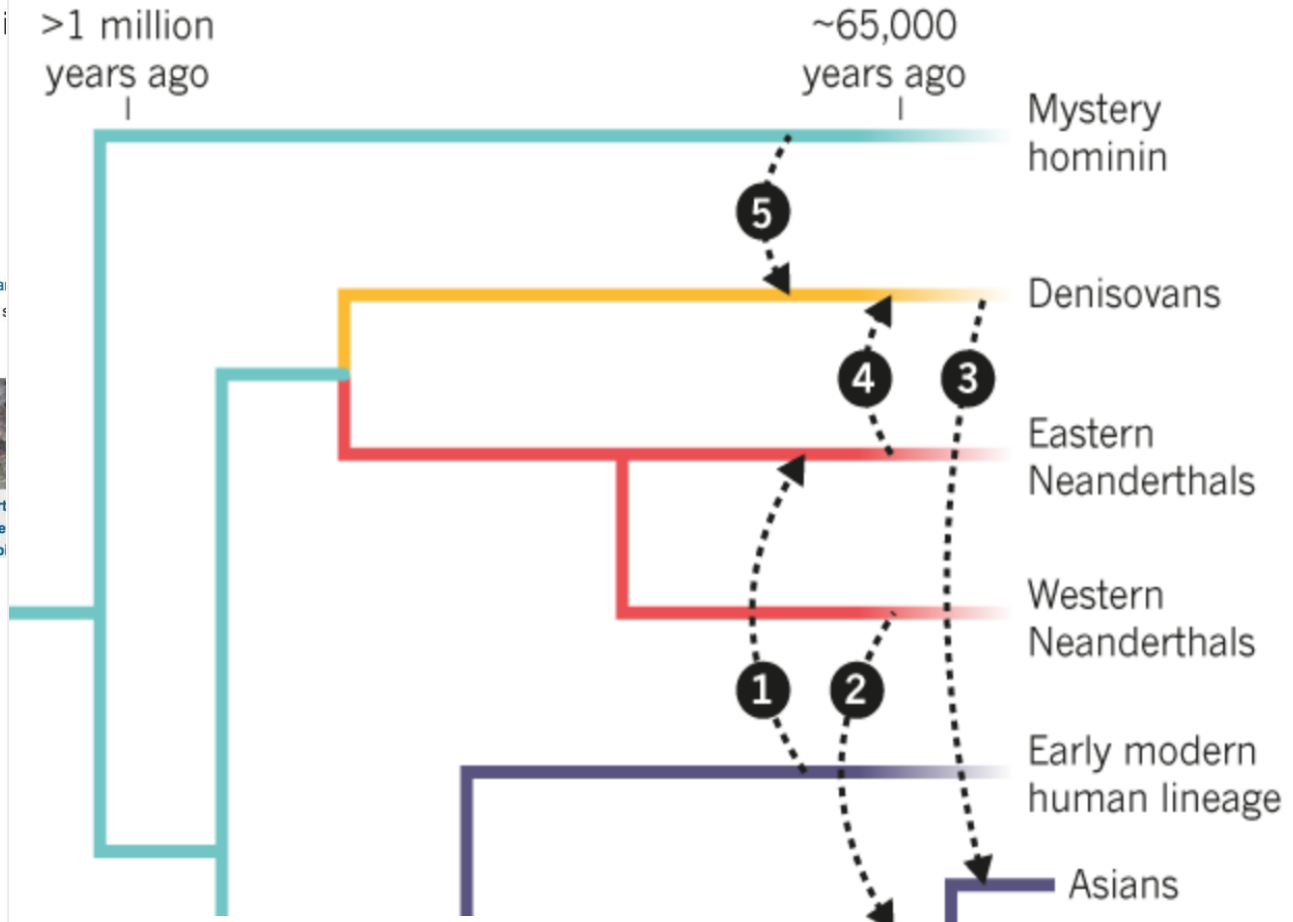
The discovery of yet another period of interbreeding between early humans and Nea adding to the growing sense that sexual encounters among different ancient human s commonplace throughout their history.

"As more early modern humans and archaic humans are found and sequenced, we're going to see many more instances of interbreeding," says Sergi Castellano, a population geneticist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. His team discovered the latest example, which they believe occurred around 100,000 years ago, by analysing traces of *Homo sapiens* DNA in a Neanderthal genome extracted from a toe bone found in a cave in Siberia.

Neandert outsize e human bi

A HISTORY OF INTERBREEDING

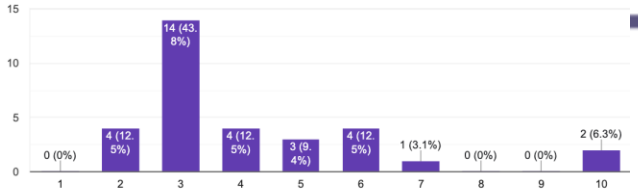
Early modern humans, Denisovans, and Neanderthals all interbred with each other on multiple occasions in the past 100,000 years.



9. From Nature Magazine

Copy chart

32 responses



9. Inferring interbreeding or admixture from genome analysis

https://www.nature.com/news/evidence-mounts-for-interbreeding-bonanza-in-ancient-human-species-1.19394

Fr

NEWS · 22 AUGUST 2018

CORRECTION 23 AUGUST 2018

Then found AN INDIVIDUAL that was a result of interbreeding.

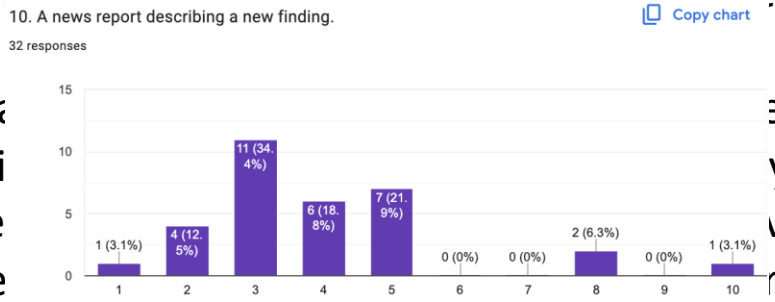
Mum's a Neanderthal, Dad's a Denisovan: First discovery of an ancient-human hybrid

10.

Genetic analysis uncovers a direct descendant of two different groups of early humans.

A female who died around 90,000 years ago was half Neanderthal and half Denisovan, according to genome analysis of a bone discovered in a Siberian cave. This is the first time scientists have identified an ancient individual whose parents belonged to distinct human groups. The findings were published on 22 August in *Nature*[1].

"To find a first-generation person of mixed ancestry from these groups is absolutely extraordinary," says population geneticist Pontus Skoglund at the Francis Crick Institute in London. "It's really great science coupled with a little bit of luck."



The team, led by pa e Pääbo of the Max Planck Institute for Evoluti y, conducted the genome analysis on a single va Cave in the Altai Mountains of Russia. This cave roup of extinct humans first identified on the basis of DNA sequences from the tip of a finger bone discovered[2] there in 2008. The Altai region, and the cave specifically, were also home to Neanderthals.

11. A diversity of local adaptations

32 responses

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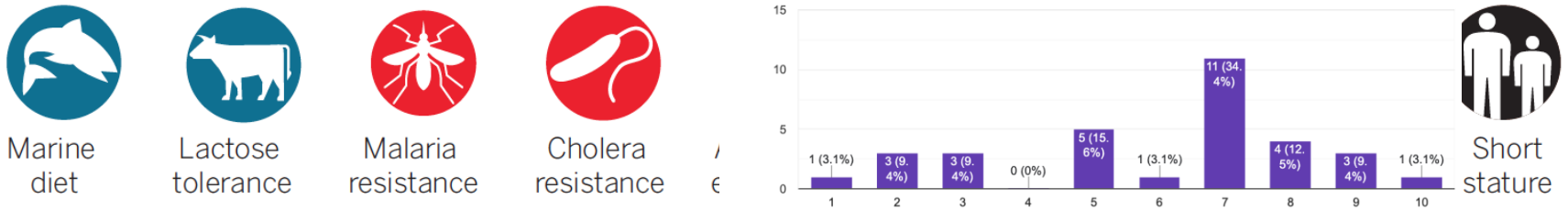
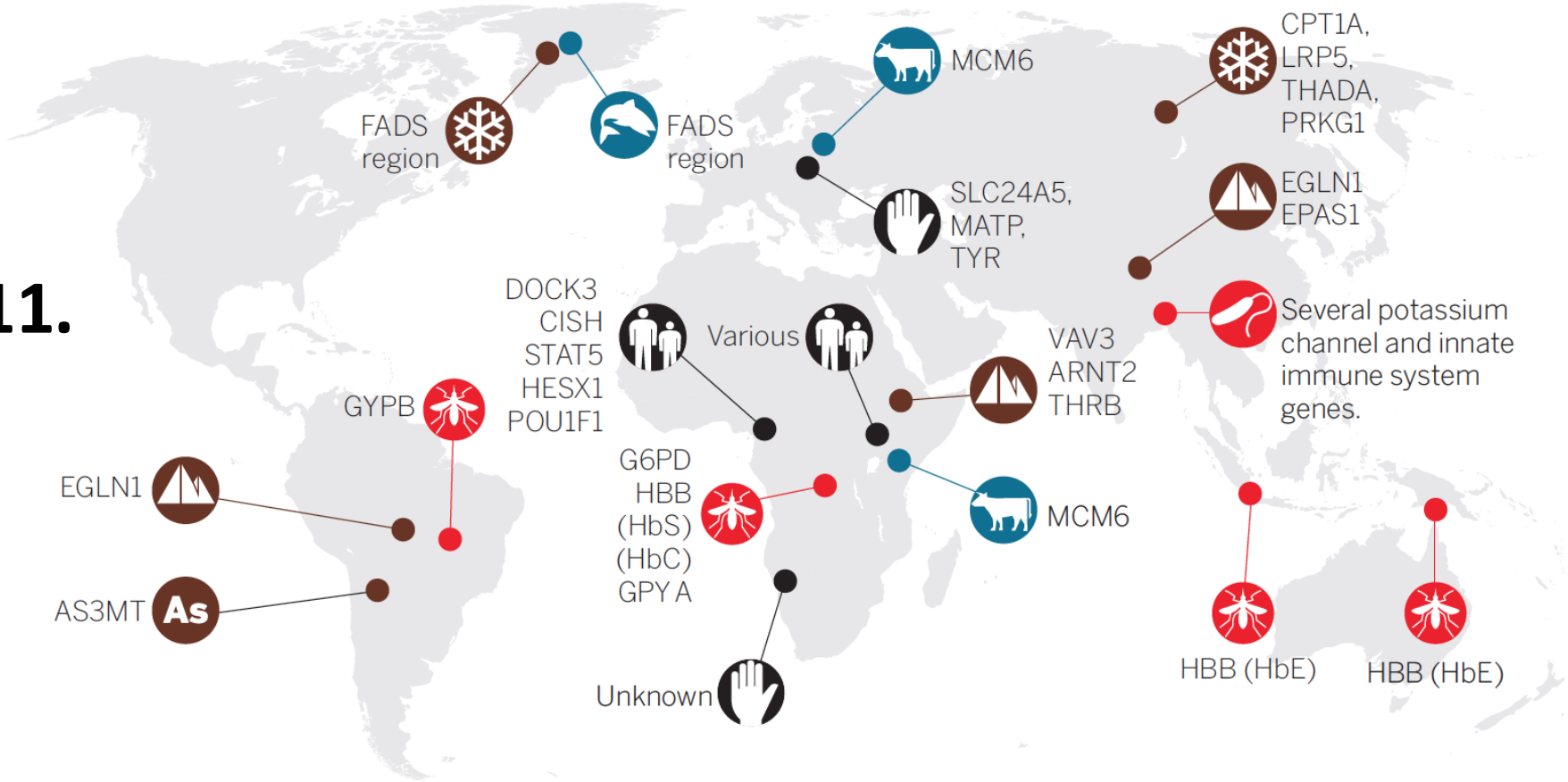


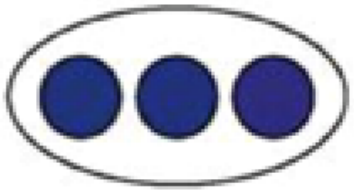
11.



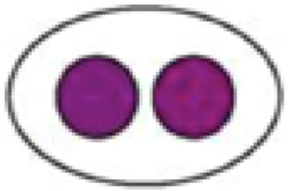
Global distribution of locally adaptive traits. Adaptation to diverse environments during human evolution has resulted in phenotypes that are at the extremes of the global distribution. Fumagalli *et al*. have integrated scans of natural selection and GWAS to identify genetic loci associated with adaptation to an Arctic environment.

More recent article than one you read/will read. This is from 2015.

Researchers CHOSE to collect samples from people living in 3 locations and found the following (color indicates genetic similarity)



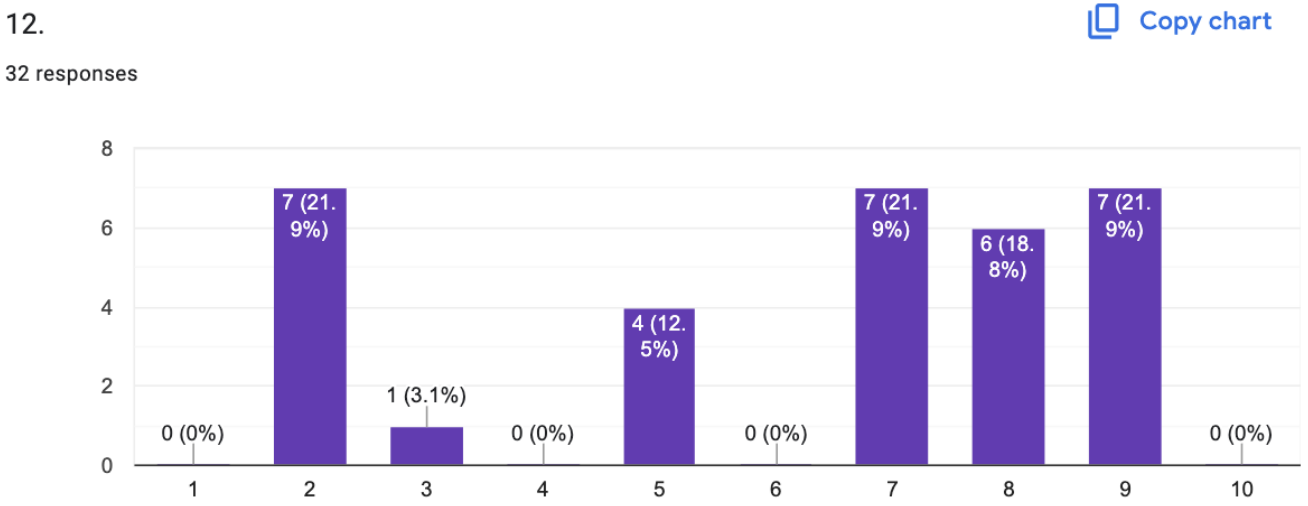
Location 1 with three subpopulations

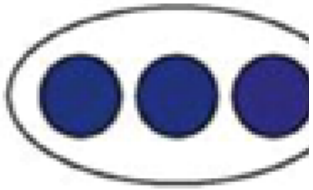


Location 2 with two subpopulations

Location 3 with two subpopulations

12.





13.

32 responses

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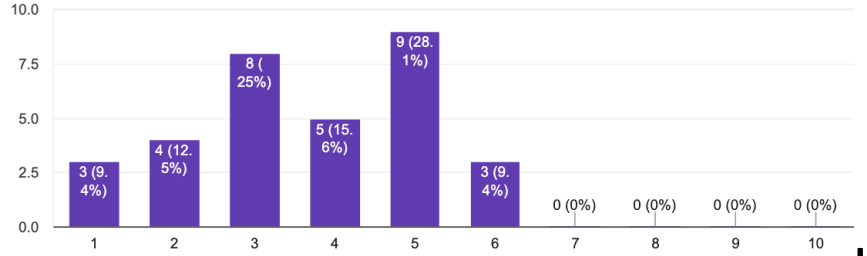


Location 1 with three subpopulations

Location 2 with two subpopulations

Location 3 with two subpopulations

13.

Now lets add more info to the previous slide.

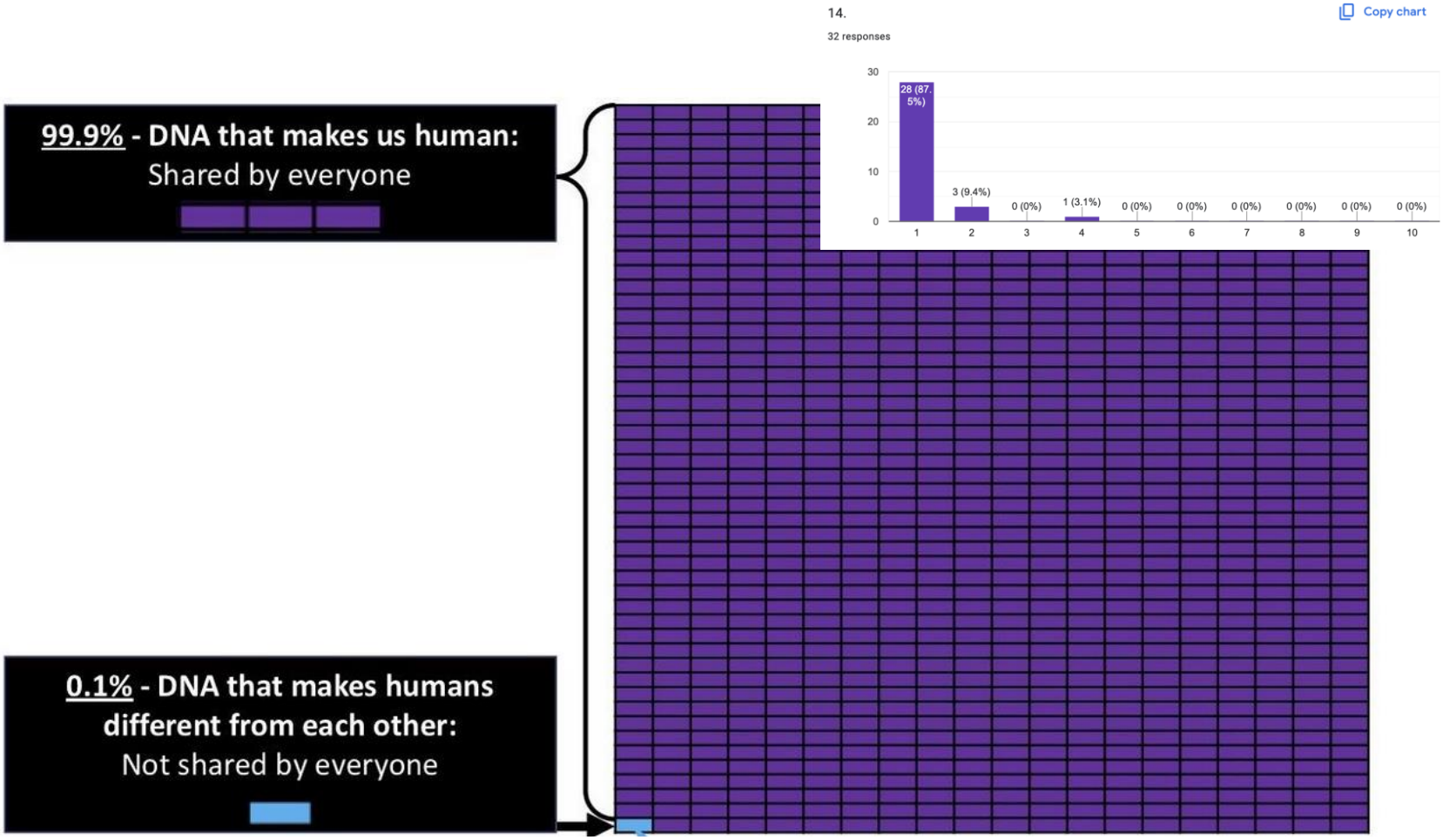
When researchers sampled **every population** between these three populations they found this distribution….

(Maglo et al 2016)

TRENDS in Genetics

How does this additional info affect your perspective?

14.



From Donovan 2015 and Donovan et al 2019

Science Education

ISSUES AND TRENDS

Reclaiming Race as a Topic of the U.S. Biology Textbook Curriculum

Science Education, Vol. 99, No. 6, pp. 1092–1117 (2015)

Science Education. 2019;1–32.

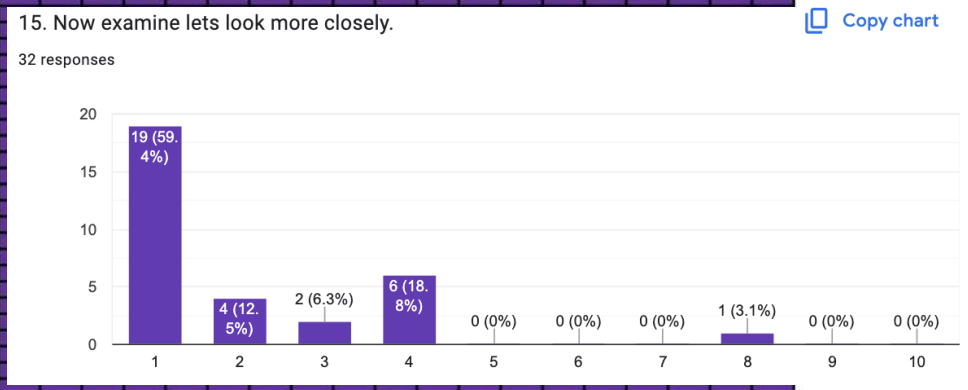
99.9% - DNA that makes us human:
Shared by everyone

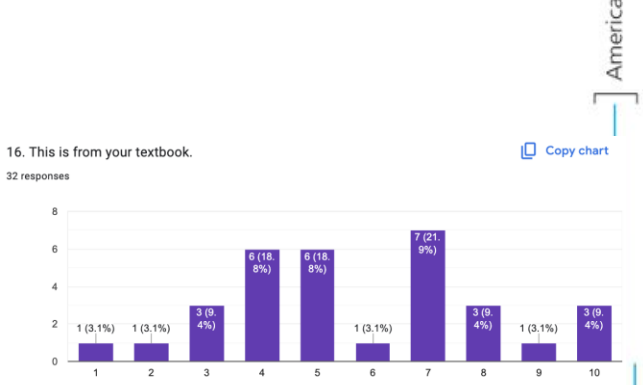
0.1% - DNA that makes humans different from each other:
Not shared by everyone

95.5% - DNA that differs between *same race* individuals

4.5% - *Extra* DNA that differs between individuals of different races

15.

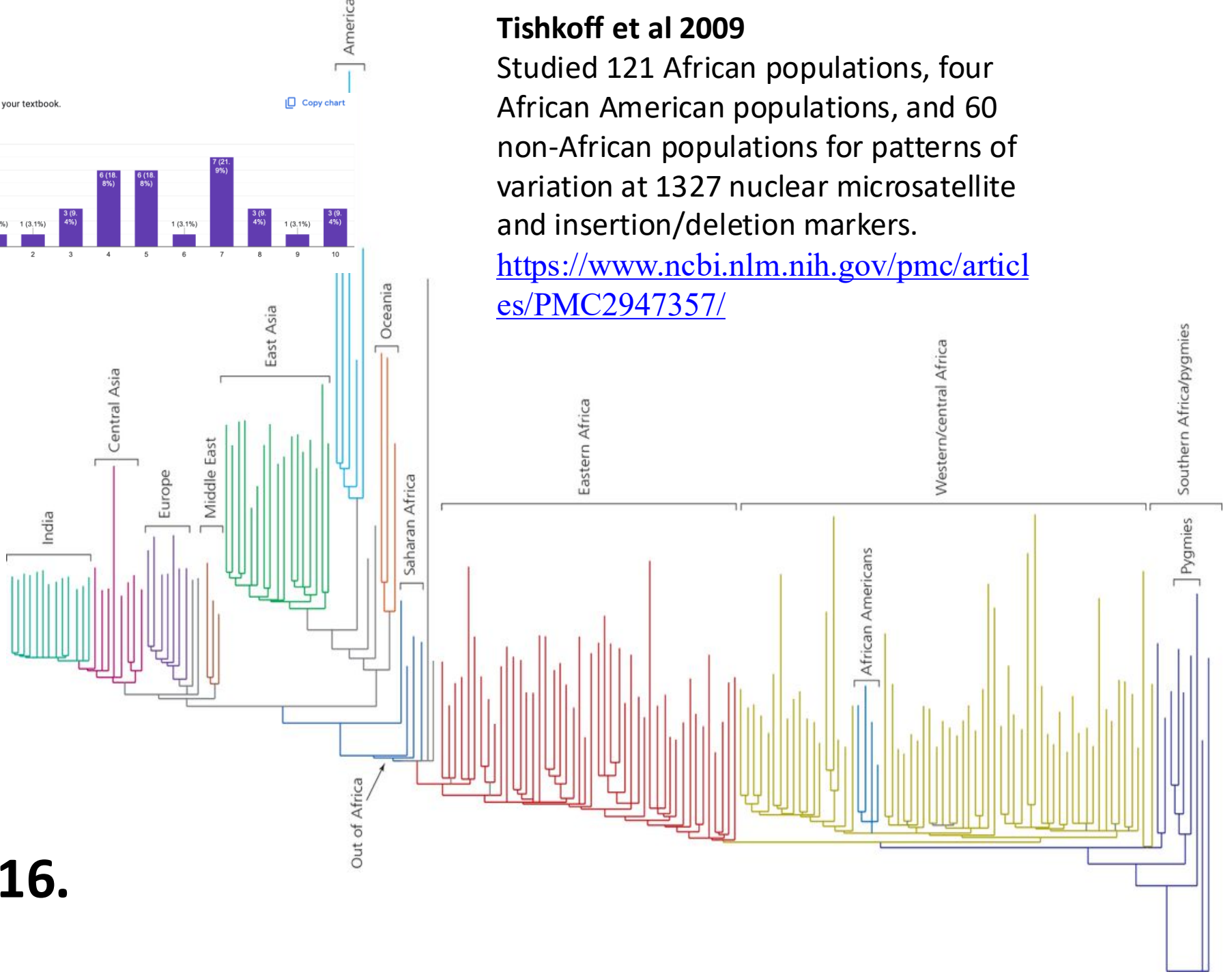




Tishkoff et al 2009

Studied 121 African populations, four African American populations, and 60 non-African populations for patterns of variation at 1327 nuclear microsatellite and insertion/deletion markers.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2947357/



16.

Visualizing Human Genetic Diversity

James Kitchens and Graham Coop

May 16, 2023

Genetics D3 Python R

https://james-kitchens.com/blog/visualizing-human-genetic-diversity

Overlap of only **"COMMON Variants"** (so doesn't include random people that might have a single nucleotide mutation)

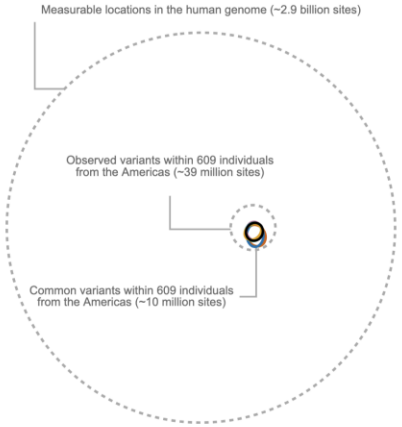
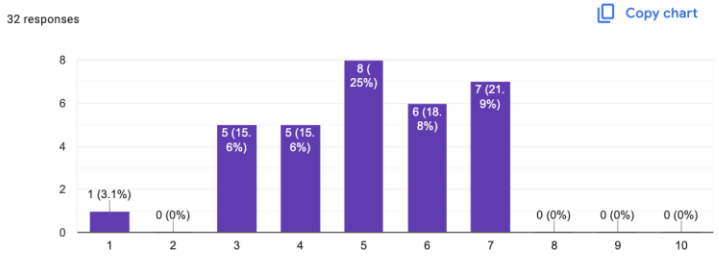


Figure 5 - Common variants in perspective. *An Euler diagram of the common variants in samples located in the Americas relative to the scale of the human genome. As a small note, the positions and orientations of ellipses within the Euler diagram differ slightly from Figure 3. This is because the eulerr package gives varied results with each run due to random starting conditions within the algorithm.*



17.

Figure 7 - Sharing of common variation within geographic regions. *Five interactive Euler diagrams of the 26 global samples using the broad geographic groupings from Biddanda et al. 2020.*