Last time

- What are the sources for human variation?
- How do humans vary across geography?
- What is a cline?

Last Time

- What forces have been responsible for shaping modern human variation?
- What have humans adapted to?
- How has culture impacted adaptation and vice versa?
- What are the different ways of adapting to an environmental stressor?

Adaptation

- What is adaptation?
    - What is genetic adaptation?
    - What is acclimatization?
- How do these shape human variation?

Studying Human Variation - a Biocultural approach

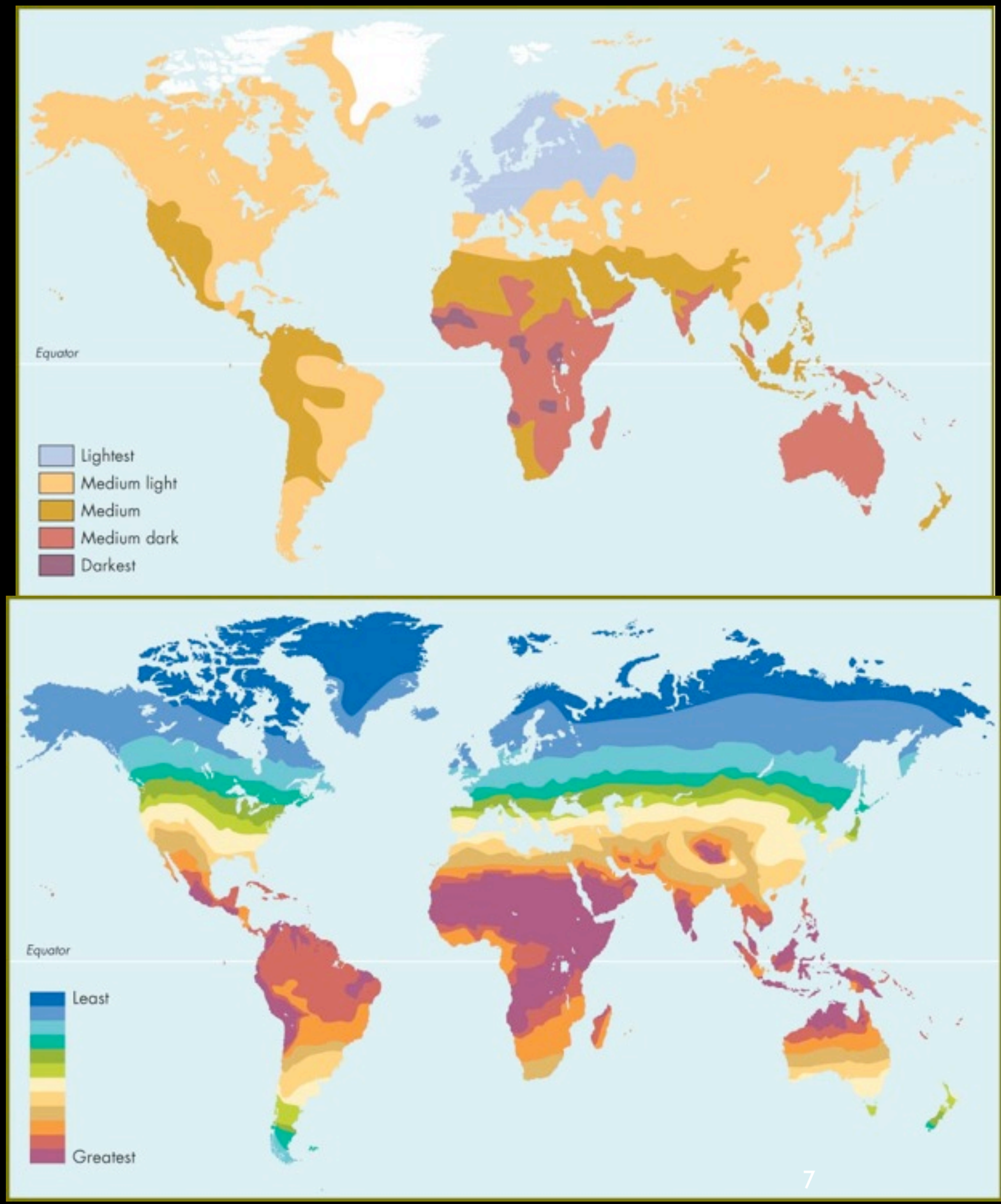
Biology is intertwined with human cultural behavior and both shape human diversity

We have evolved through the 4 forces of evolution intertwined with cultural behavior

Can you give an example of how culture has created a selective force in human evolution?

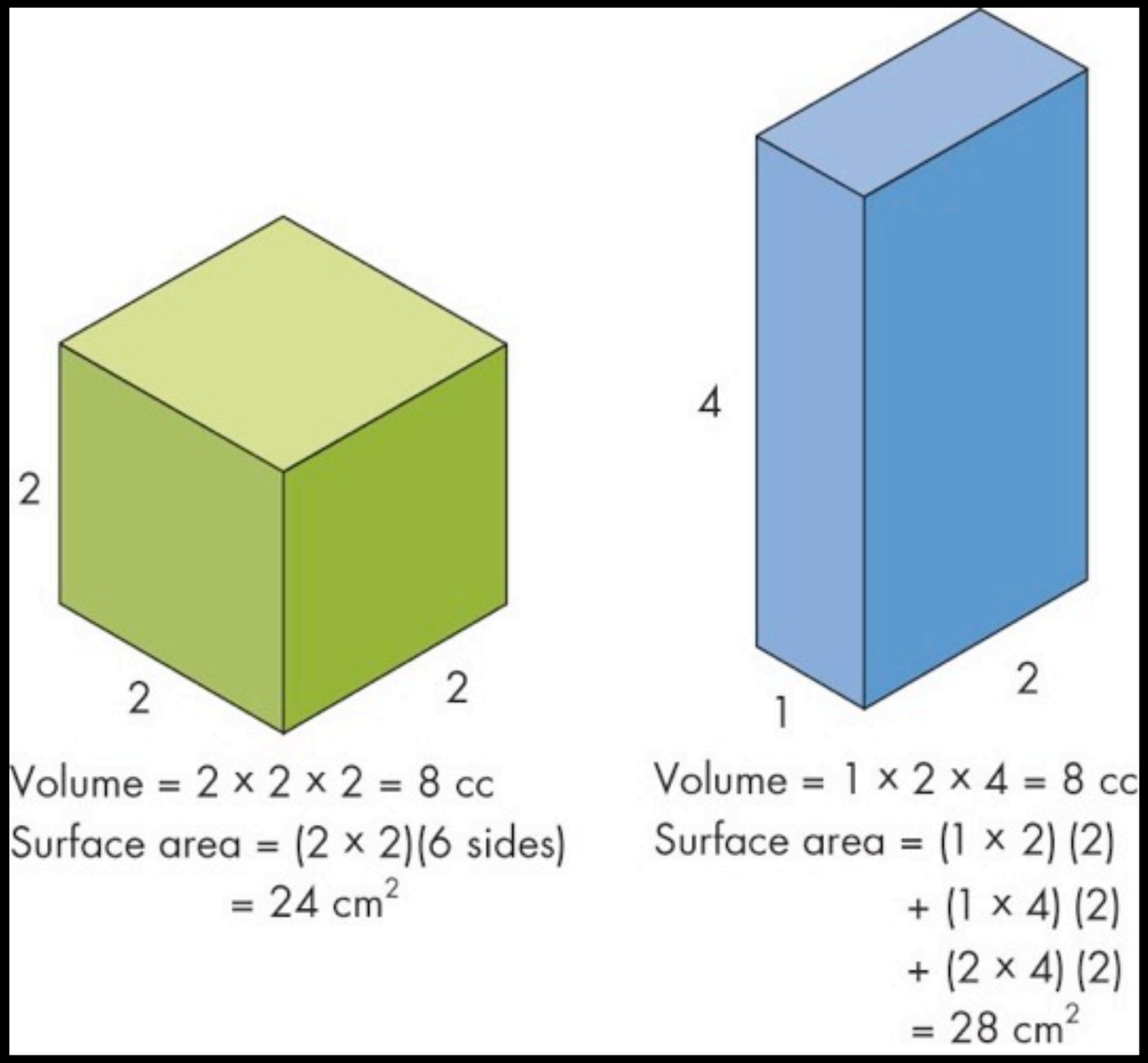
What do humans need to adapt to?

- Solar Radiation
    - too much or too little
- Heat and Cold
    - Bergmann and Allen rules
- Altitude / Humidity
- Disease
    - sickle cell anemia
- Diet
    - Lactose tolerance
- What else?



Skin color and solar radiation

Heat and Cold



Volume = 2 × 2 × 2 = 8 cc

Surface area = (2 × 2)(6 sides)
= 24 cm^2

Volume = 1 × 2 × 4 = 8 cc

Surface area = (1 × 2) (2)
+ (1 × 4) (2)
+ (2 × 4) (2)
= 28 cm^2

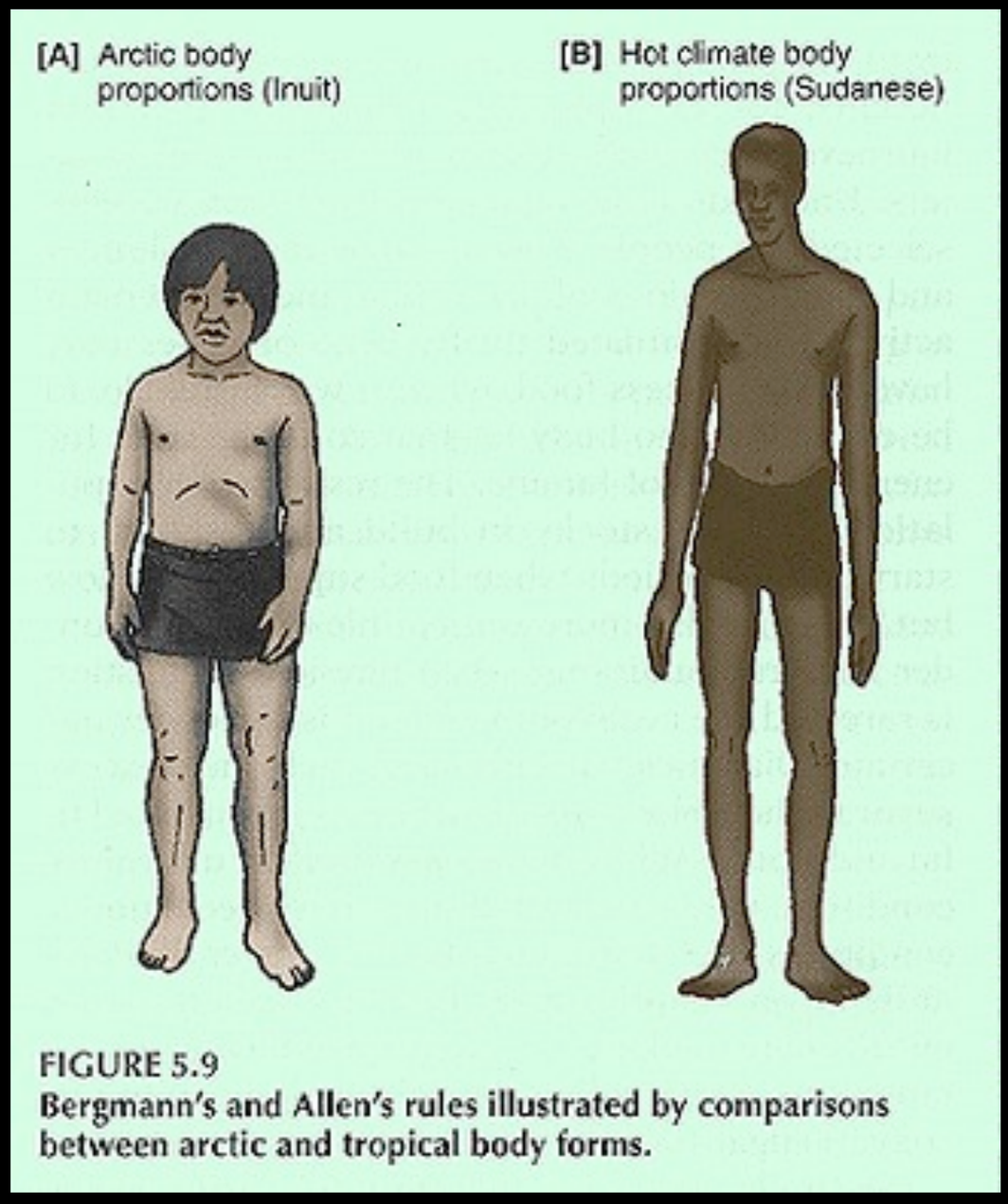


FIGURE 5.9
Bergmann's and Allen's rules illustrated by comparisons between arctic and tropical body forms.

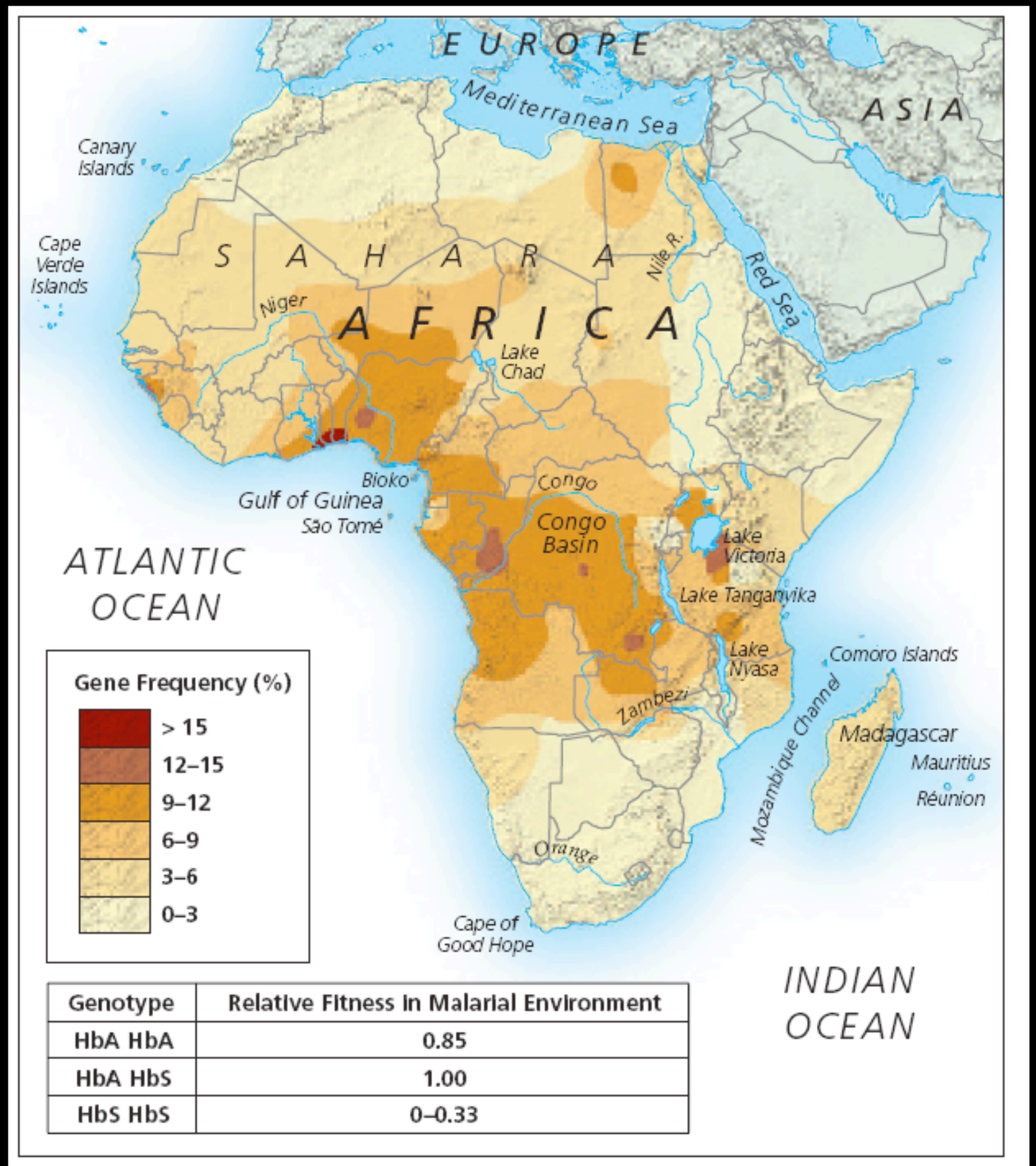
Altitude

Andes

Himalayas

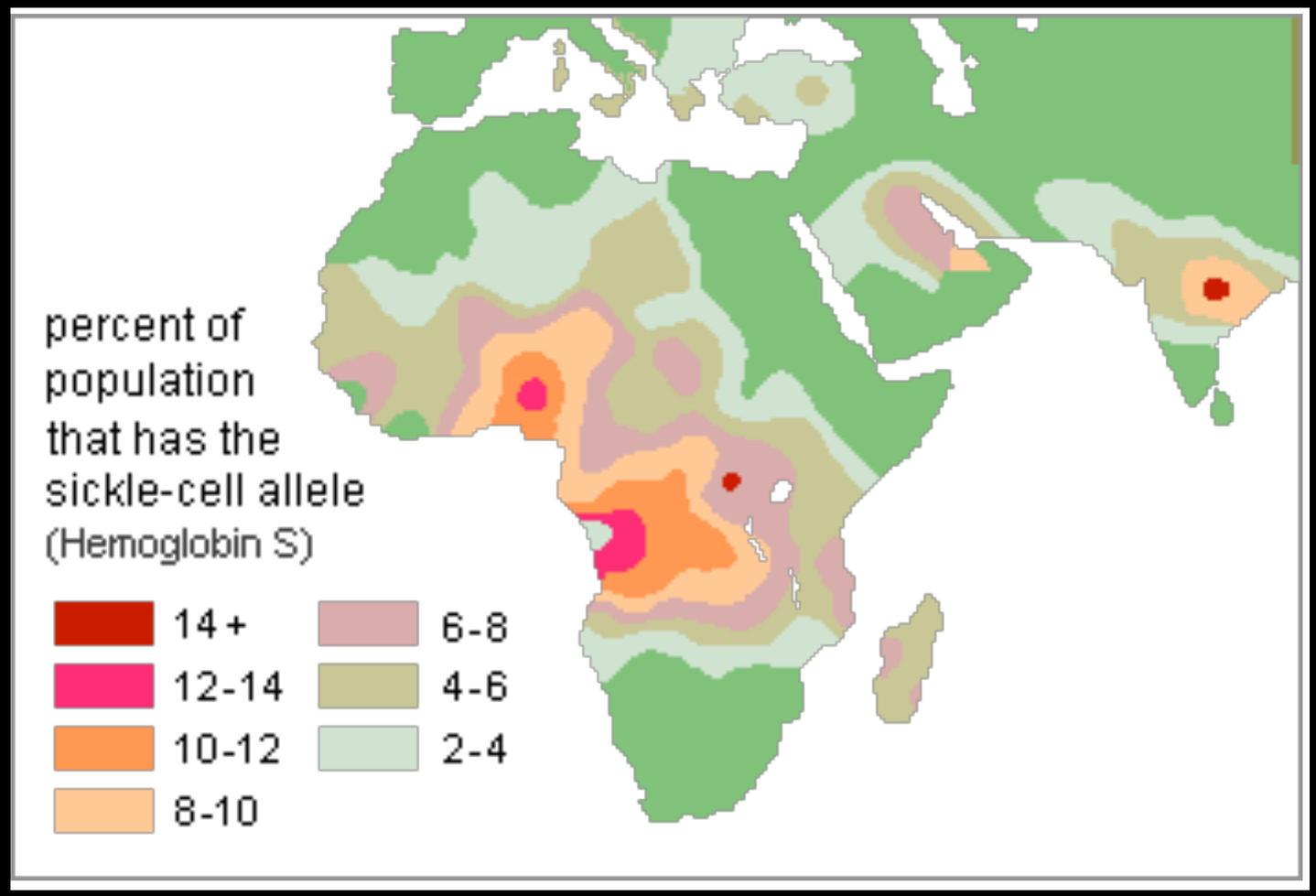
Disease:
Malaria +Sickle cell

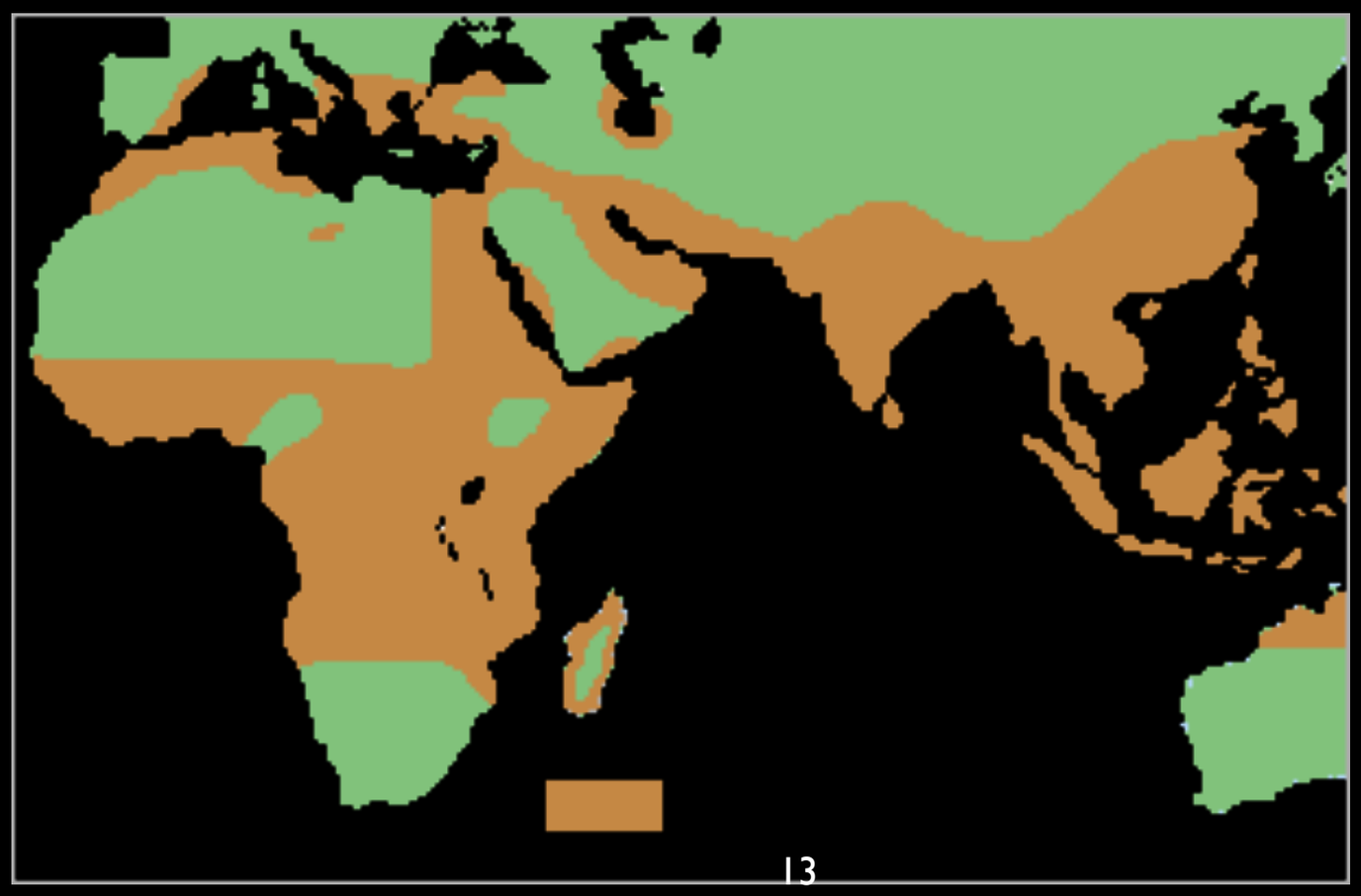
Clinal map of Sickle Cell



Genotype	Relative Fitness in Malarial Environment
HbA HbA	0.85
HbA HbS	1.00
HbS HbS	0–0.33

Sickle Cell and Malaria





	Relative fitness
HbAHbA	0.85
HbAHbS	1.00
HbSHbS	0-0.33

What have humans adapted to?

- Can you name at least one environmental stressor, how it can impact fitness, and how humans adapt, culturally, behaviorally, physiologically, and genetically to that challenge?

What does all this variation add up to?

What is Race?

- Biological?

- Cultural?

Linnaeus

Homo sapiens afer
Homo sapiens americanus
Homo sapiens asiaticus
Homo sapiens europaeus
Homo sapiens ferus

Blumenbach

Even while saying all this was arbitrary...

"There is but one species of man....

....All these differences, run so insensibly, by so many shades and transitions one into the other, that it is impossible to separate them by any but very arbitary limits"

Ten Facts about Human Variation

Jonathan Marks

http://personal.uncc.edu/jmarks/pubs/tenfacts.pdf

FAHV 6:

There is much more variation within groups as between groups (polytypy)

FAHV 9:

Humans have little genetic variation

Biological?

- Measure biological difference between populations? How different are human populations?

- Fst = statistical measure of the fraction of variation found between human samples

- Fst 0 means no difference, Fst 1 and the two populations are completely different at the locus or loci

Fst

- Biological subspecies require Fst of at least 0.25
- Looking at multiple human loci, Fst ranges from 0.03 - 0.17

Between 83-97% of our genetic variation is found within populations, and only between 3-17% between populations

Yanomamo v. Lapplander

FAHV 1:

Human Groups Distinguish Themselves Principally Culturally

Cultural?

Races are social categories whose members *are believed* to share a common “biology”

Members are believed to share features or character traits due to a unique common ancestry

Y – U.S. Citizen **R** – Refugee/Asylum **F** – F Visa (student) **J** – J Visa **N** – None of the above

I – Immigrant I-551 ("green card") Date Issued: M M D D Y Y Y Y *Month Day Year* ***(You must provide the date issued and be prepared to submit verification.)***

O – Other Visa (specify) _____ Date issued: M M D D Y Y Y Y *Month Day Year*

7b. If you were born outside the U.S., what year did you move to the U.S.? Y Y Y Y *Year*

8. **Enter your ethnic identity** code in box *(optional).* _____

1 – American Indian or Alaskan Native; tribe _____

2 – Black, non-Hispanic, including African American
3 – Mexican American, Mexican, Chicano
A – Central American
B – South American
Q – Cuban
P – Puerto Rican
4 – Other Latino, Spanish-origin, Hispanic

C – Chinese
J – Japanese
K – Korean
R – Asian Indian
5 – Other Asian
M – Cambodian
L – Laotian

V – Vietnamese
T – Thai
S – Other Southeast Asian
G – Guamanian
H – Hawaiian
N – Samoan
6 – Other Pacific Islander

7 – White
F – Filipino
8 – Other
9 – No Response
D – Decline to State

The application form provides you with an opportunity to report your primary racial or ethnic identity. However, you may use the Web to provide the CSU with more complete information regarding your racial/ethnic identity, if you wish. Neither you nor others can view any data collected on the website. Any information you submit on the website will override and update any existing information. The address for the website is **www.csuethnicsurvey.xap.com**

9. If you have ever been on active duty in the U.S. military services, enter a **Y** in box. ☐ Attach or send a copy of DD214 or DD295 for evaluation of academic credit to the admission office of each campus to which you are applying for admission.

10. **High school attended *** _____

City and State _____ *City* _____ *State*

Graduation Date M M Y Y Y Y *Month Year* GED Date M M Y Y Y Y *Month Year*

* If you have also attended a high school outside of the U.S., please attach the name and location of that high school.

☐ Check here if you will neither graduate from high school nor receive a GED.

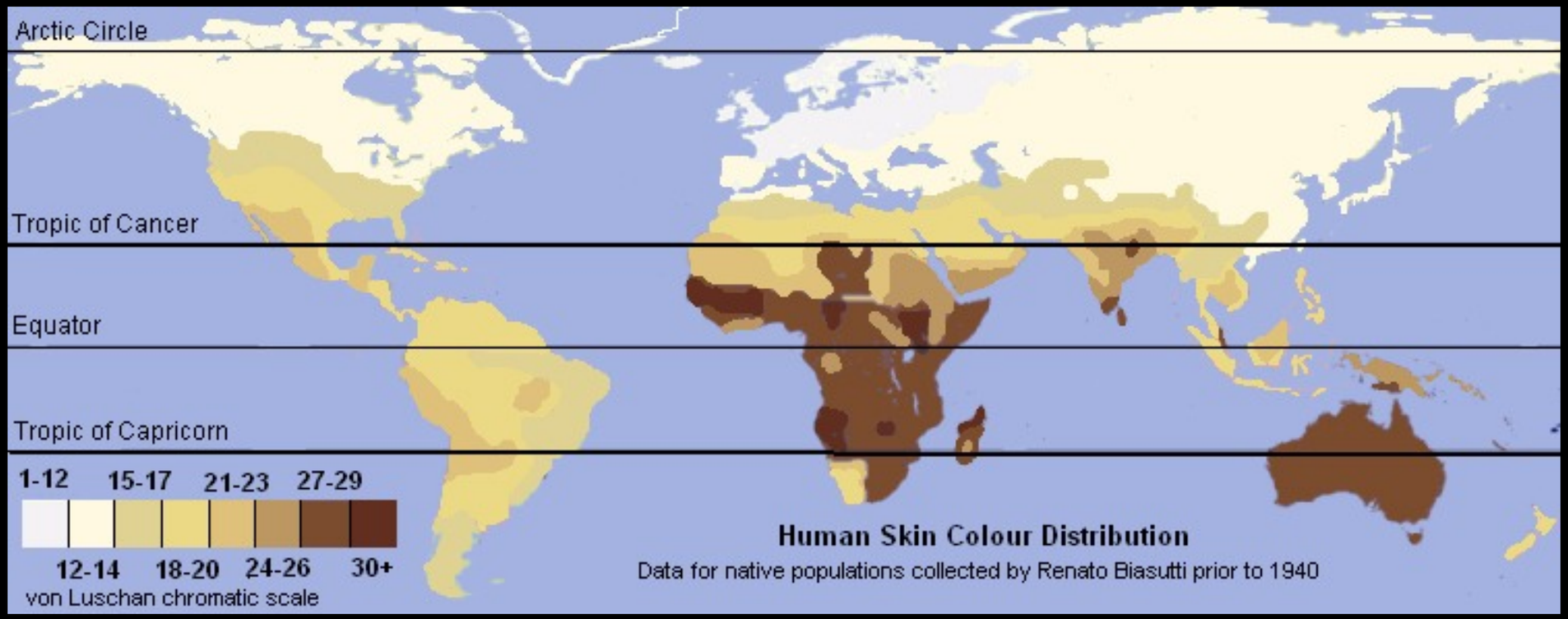
Continued on next page

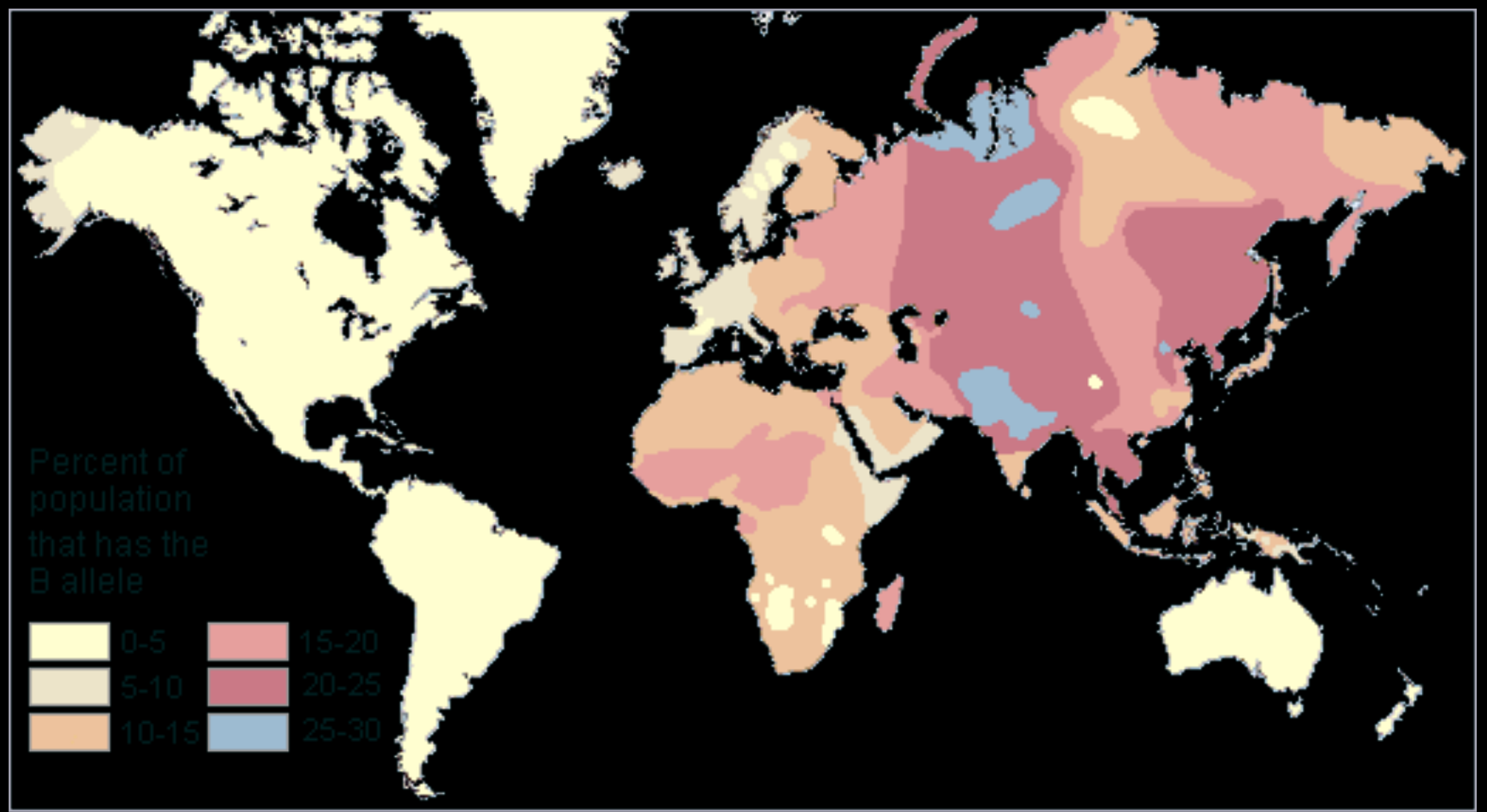
FAHV 2:

Human Biological Variation is continuous, not discrete.

FAHV 7:

People are similar to those nearby and different from those far away


Arctic Circle
Tropic of Cancer
Equator
Tropic of Capricorn
1-12
12-14
15-17
18-20
21-23
24-26
27-29
30+
von Luschan chromatic scale
Human Skin Colour Distribution
Data for native populations collected by Renato Biasutti prior to 1940


Percent of population that has the B allele
0-5
5-10
10-15
15-20
20-25
25-30

FAHV 4:

Populations are biologically real, not races

FAHV 5:

Populations also have a constructed component


MOROCCO
ALGERIA
LIBYA
EGYPT
MAURITANIA
MALI
NIGER
CHAD
SUDAN
ERITREA
ETHIOPIA
NIGERIA
CAMEROON
CENTRAL AFRICAN REPUBLIC
GHANA
CÔTE D'IVOIRE
ZAIRE
CONGO
ANGOLA
ZAMBIA
ZIMBABWE
BOTSWANA
NAMIBIA
SOUTH AFRICA
TANZANIA
KENYA
SOMALIA
DJIBOUTI
MADAGASCAR
COMOROS
SEYCHELLES
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
GULF OF GUINEA
RED SEA
Western Sahara
SAO TOME AND PRINCIPE
EQUATORIAL GUINEA
GABON
LESOTHO
SWAZILAND
1 SEMITIC-HAMITIC
2 BANTU
3 GUINEAN
4 HAUSA
5 WESTERN BANTOID
6 NILOTIC
7 CENTRAL BANTOID
8 MANDE
9 CENTRAL AND EASTERN SUDANESE
10 EASTERN BANTOID
11 MALAY-POLYNESIAN
12 KANURI
13 SONGHAI
14 KHOISAN
15 INDO-EUROPEAN

FAHV 3:

Clustering populations is arbitrary

FAHV 8:

Racial classification is historical and political, and does not reflect natural biological patterns

FAHV 10:

Racial issues are social-political-economic, not biological

Print numbers in boxes.

Month Day Year of birth

➔ **NOTE: Please answer BOTH Questions 7 and 8.**

7. Is Person 1 Spanish/Hispanic/Latino? *Mark ☒ the* ***"No"*** *box if* ***not*** *Spanish/Hispanic/Latino.*

- ☐ **No,** not Spanish/Hispanic/Latino
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, other Spanish/Hispanic/Latino — *Print group.*
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban

8. What is Person 1's race? ***Mark ☒ one or more races*** *to indicate what this person considers himself/herself to be.*

- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian — *Print race.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander — *Print race.*
- ☐ Some other race — *Print race.*

➔ **If more people live here, continue with Person 2.**

2000

➔ **NOTE: Please answer BOTH Question 8 about Hispanic origin and Question 9 about race. For this census, Hispanic origins are not races.**

8. Is Person 1 of Hispanic, Latino, or Spanish origin?

- ☐ **No,** not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin — *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

9. What is Person 1's race? *Mark ☒ one or more boxes.*

- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian — *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander — *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race — *Print race.*

2010

British Census Form

- White
  - British, Irish, other
- Mixed
  - White and Black Caribbean
  - White and Black African
  - White and Asian
  - Other Mixed
- Asian or Asian British
  - Indian, Pakistani, Bangladeshi
  - Other
- Black or Black British
  - Caribbean, African, other
- Chinese or other