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Physical Anthropology

Human Adaptability

natural selection
physiological, anatomical, behavioral, genetic
genotype/phenotype/biology/culture

human ecology: human biology & human adaptability

environment: physical, biological, cultural

levels of adaptation:
1. psychological (behavioral)
2. physiological acclimatizations (acclimations)
3. developmental (plasticity)
4. genetic

stresses: heat, cold, high altitude

<u>High Altitude</u>

7,500-13,000 feet
Tibet, Andes, Ethiopia
-low barometric pressure
-hypoxia: oxygen starvation
-low humidity
-cold, high winds, solar radiation, etc.

primary acclimatizations (acclimation)
-increased heart & pulse rates
-increased respiratory rate
-mountain sickness

secondary responses:
-kidney excreting more alkaline urine
-increased r.b.c. & Hb count
-increased capillary network in lungs
-use of stimulants (Coca leaves, alcohol)

tertiary responses:
-retarded growth & development
-rt. ventricle of heart larger
-risk of miscarriage/infant mortality increases
-aerobic capacity

<u>Cold</u>

normal body temperature: 37°C (98.6°F)

-40° to -90°F in Arctic
Eskimo, Laplanders, Ainu, Tibetan, Andean

Problems:
-avoid lowering body temperature & frostbite
-maintaining body temperature at comfortable levels
-maintaining skin temperature

Responses:
-vaso-constriction
-shivering (goose bumps)
-subcutaneous fat
-postural changes: body shape
-increased metabolic rates

Different mechanisms:
1. redistribution of heat to extremities (e.g., Quechua, Lapps)
2. overall metabolic increase (e.g., Eskimo, Tierra de Fuego)
3. lowering of skin temp. to insulate central core (e.g., Australian Abo., Kalahari Bushmen)

Experimental work:
Korea 1951-52
Eskimo cold stress studies

whole body cooling
cooling of extremities
"hunting response"

<u>Heat</u>
dry or humid

-vasodilation of blood vessels (heat loss through convection & radiation)
-sweating (heat loss through evaporation)
-rise in skin temperature
-plasma & blood volume increase

Adaptation to:
1. Hot humid climates
-induce perspiration at early stage
-darkly pigmented skin
-excessive salt loss
-concentrated urine & dry feces

2. Desert
-lean bodies
-moderate skin color
-concentration of water loss
Bergmann's and Allen's rules: body shape (extremities) and volume