



Arctic ecosystem as a human habitat

Major adaptive constraints:

- ★ cold stress
- ★ near absence of useful plants
- ★ reliance on seasonal fish and game resources



Adaptations to arctic constraints: cold stress

Cold Stress:

Genetic and developmental adaptations:

- ★ high peripheral blood flow to warm extremities
- ★ rounded body form (Allen's rule) to reduce surface area to volume ratio preventing heat loss
- ★ thermogenesis to increase BMR

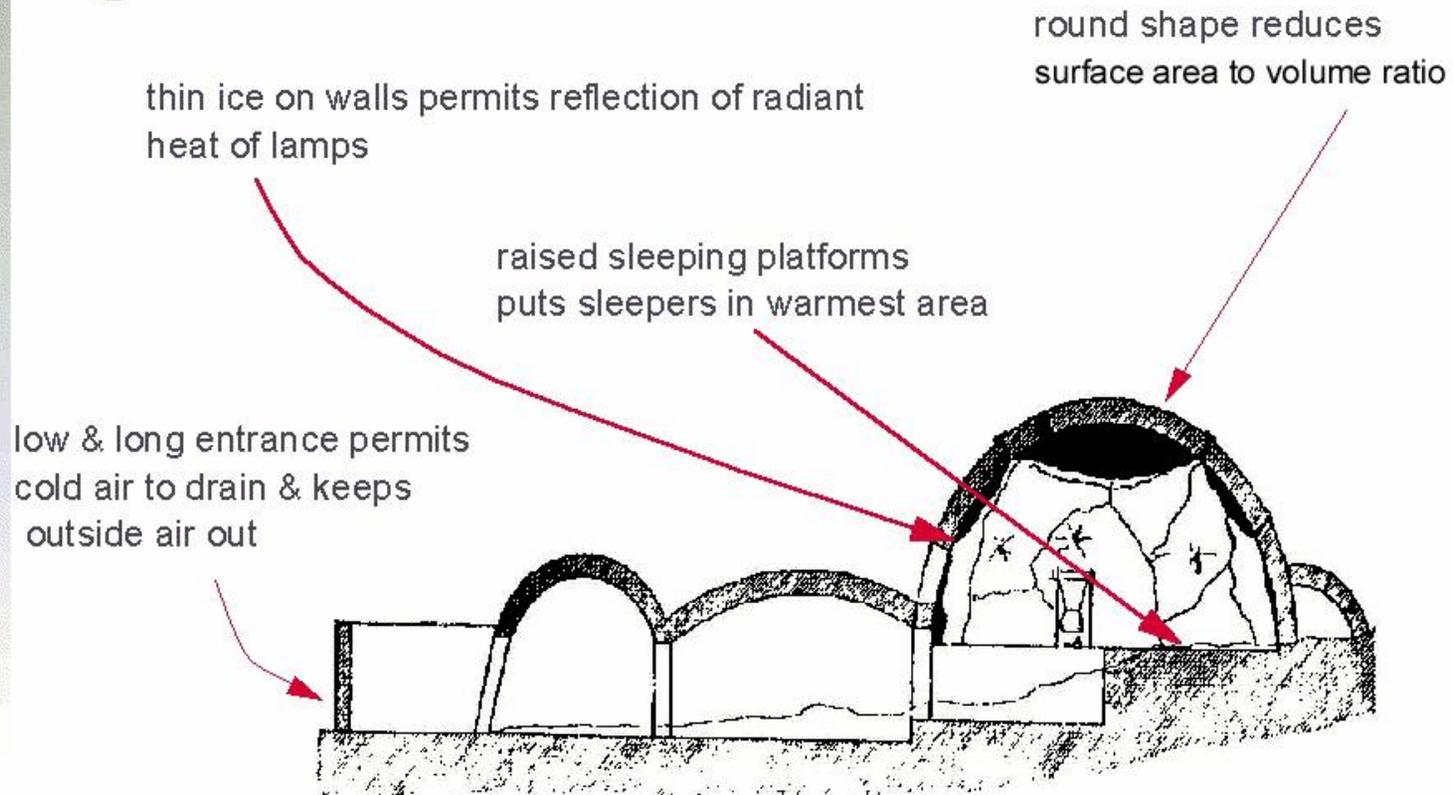
Cultural adaptations:

- ★ snow house (igloo) design
- ★ radiant heating
- ★ clothing (e.g., down-filled parka)

Igloo Design



Adaptive design features of the igloo





Dealing with cold stress while making a living

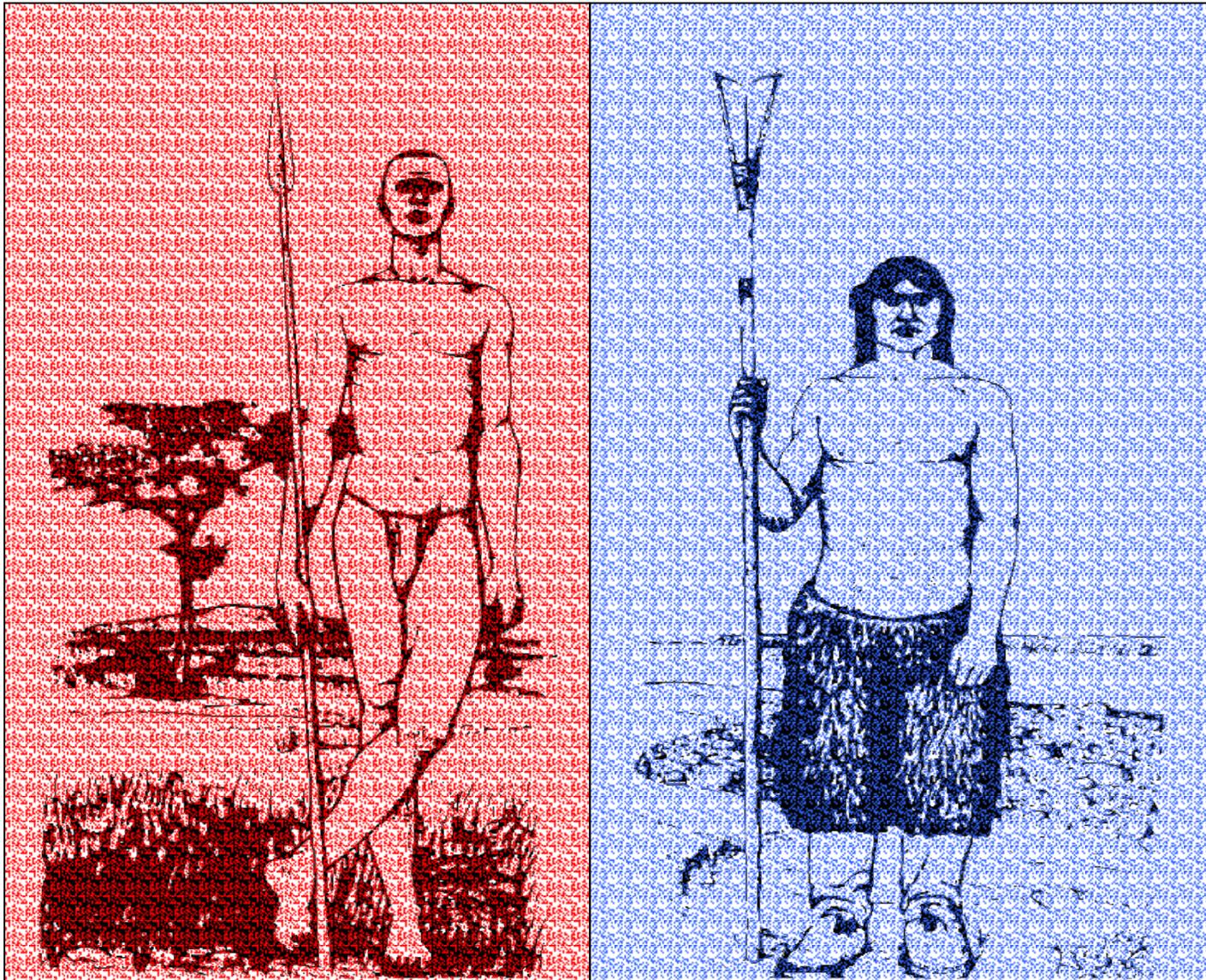




Dealing with cold stress while making a living



How the body adapts to cold and heat stress



▼ Adaptations to Arctic Constraints

Absence of useful plants

- ★ animal sinew replaces vegetable bindings
- ★ fat replaces wood as fuel source
- ★ bone of large animals replaces wood as a construction material (e.g., sled runners)

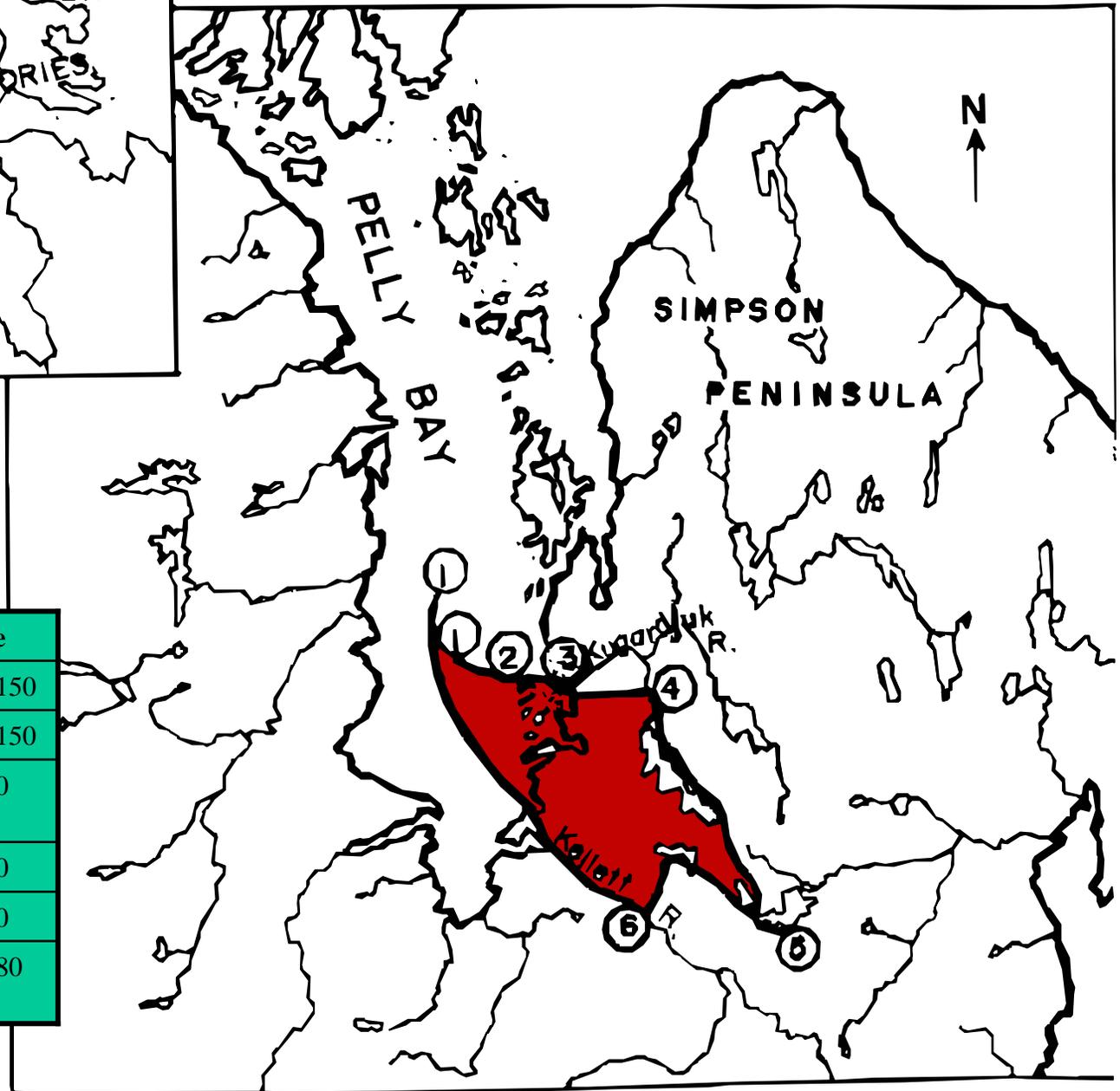


Adaptations to arctic constraints

Reliance on seasonal fish and game resources

- ★ Long distance seasonal movements to resource locations
- ★ Dispersion and aggregation of band members
- ★ Storage and preservation of food resources to survive seasonal scarcities

Netsilik nomadism



Camp	Season-Purpose	Size
1	Mid winter sealing	60-150
2	Mid winter sealing	60-150
3	Seal hunting large breathing holes	5-20
4	Fishing at stone weirs	5-20
5	Caribou hunting	5-20
6	Fishing thru thin river ice	60-80



Wild food resources in Amazonia

Foraging in the tropics is impossible or difficult because:

- biomass is mainly trunks and roots with only 2% (leaves and fruits) potentially edible biomass
- distribution of useful resources is patchy
- resources are high in trees and costly to acquire
- processing costs may be high because of woody coverings and high levels of toxins
- most animals are lean, therefore provide poor caloric resources which may stress the body (Speth and Spielman) with high levels of nitrogen and costly digestion (specific dynamic action)
- seasonality is sufficient to cause problems in availability of plant resources
- high species diversity leads to lack of a staple



Soil problems in Amazonia

Despite its apparent richness of plants the soils are extremely impoverished and fragile.

Geologically, most of the area is an ancient Pre-Cambrian formation

- ★ no upwelling of useful nutrients (most contained and circulated in living biomass)
- ★ soils contain heavy concentrations of aluminum, iron, and silicates
- ★ soils are shallow and have poor mechanical properties



Aquatic resources in Amazonia

Types of Rivers:

- ★ Black (e.g., Rio Negro): highly acidic, from humic acids in poorly drained areas of forest (silent forests with little game); cannot hold high levels of oxygen (starvation rivers); low level of suspended solids so little plant growth (the black color comes from the color of the humic acids), and blackness inhibits the penetration of light for plant growth.
- ★ White water (e.g., Rio Branco): the most productive in terms of fish life. Originate from the Andes, rich in plant nutrient suspended matter, but whiteness inhibits penetration of light.
- ★ Clear water: highly transparent, originates from impoverished crystalline soils, little suspended matter and therefore little plant growth

Tropical forest: three different uses

