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Q7(b)

Critically examine the physiological responses and acclimatization to cold climate in Man

UPSC Civil Services Mains 2015 · Anthropology GS 1 · 15 marks · Concepts and methods of Ecological Anthropology: Bio-cultural Adaptations

9.7 Concepts and methods of Ecological Anthropology: Bio-cultural Adaptations-Genetic and Non-genetic factors. Man's physiological responses to environmental stresses: hot desert, cold, high altitude climate.

Core demand of the question

- Critically examine the physiological responses and acclimatization to cold climate in Man
- Write about 200 words for 15 marks

Revision summary

Immediate cold defence is skin constriction and shivering.

Finger hunting reaction rewarms digits at a cost.

Acclimatization can raise heat production and habituation.

Bergmann and Allen rules are population trends.

Technology and diet do most of the work in polar life.

Introduction

Cold stress threatens core temperature. Human answers are immediate physiology, slower acclimatization, and culture. Biology alone is a thin coat.

Body

Immediate responses

- **Vasoconstriction** in the skin saves heat. **Shivering** raises metabolic rate.
- **Cold-induced vasodilation** in fingers, the **Lewis hunting reaction**, periodically rewarms digits at a heat cost.
- Clothing, fire, and shelter cut the load before physiology is tested.

Acclimatization

- Repeated exposure can raise metabolic heat, as in some **Inuit** and high-latitude studies, and improve finger blood flow.
- **Habituation** may blunt shivering and pain, which is useful and also risky.
- **Bergmann** and **Allen** rules describe stockier, shorter-limbed trends in cold climates; they are statistical, not a uniform Indian or European type.

Critique

- **Inuit**, **Sami**, and **Tierra del Fuego** peoples succeed with technology and diet as much as with brown fat.

- Laboratory cold tests on students do not equal polar seasons.
- Hypothermia and frostbite remain when culture fails. There is no Darwinian guarantee.

Flow diagram

Cold -> Vasoconstriction shiver
Cold -> Metabolic vascular acclimatization
Cold -> Clothes fire diet

Conclusion

Cold responses are constriction, shivering, and some metabolic and vascular acclimatization. Culture is the main human adaptation; body-size rules are tendencies, not uniforms.

Facts & figures

Lewis hunting reaction

Alternating constriction and dilation in cooled fingers.

Bergmann's rule

Larger body mass in colder climates, a statistical ecological pattern.

Allen's rule

Shorter appendages in colder climates, reducing heat loss.

Inuit

Classic case of clothing, fat-rich diet, and some physiological cold work.

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