

Natural Selection At Work

Example of the interface of natural selection and environmental/culture change – Milk products and Lactase

all human populations produce in their infants an enzyme, lactase, in the lower intestines that enables them to assimilate the primary constituent of fresh milk, lactose. Hence practice of breast feeding and reliance on mother's milk.

But it is only in cultures that have developed a herding and/or dairying orientation, such as east African cattle herding societies, Arab and most European societies, thus continuing the consumption of milk products such as cheese, and milk itself, through adulthood, have they also retained the production of lactase throughout a person's life span.

e.g., 80% of Americans of European descent are lactose tolerant

There is an adaptive advantage in producing an enzyme that fully digests milk foods

But in those societies that have not developed a reliance on milk products, such as most Asian, Australian Aborigine, American Indian and most African societies, they do not continue to produce the lactase enzyme throughout their adult lives.

e.g., only 10 to 30% of African-American and 0 to 30% of Asian-Americans are lactose tolerant

There is no adaptive advantage in continuing to produce an enzyme that has no purpose – waste energy

= example of natural selection at work

Now the problem arises when the environment changes, i.e., cultural institutions change and milk products begin to be consumed by lactose intolerant populations. The typical consequence is intestinal discomfort, abdominal cramping, diarrhea and in extreme cases, bone degeneration.

Because genetic adaptation and the selection process is not changing with the environmental processes

e.g., practice of shipping powdered milk to developing countries as part of "aid programs" to supplement acute protein-calorie malnutrition, and relief from natural disasters

– results often in more discomfort and even deaths

– many aid workers upset when recipients of powdered milk refuse to consume it but instead used it for white-washing their homes!