


The Evolutionary Ecology of Human-Pathogen interactions

Related topics

- Population growth: why has our population exploded in the past 200 years?
- Red Queen Hypothesis
- Predator-prey relationships
- Exotic species
- For people more interested in this topic, I suggest a course in medical microbiology
- And for people frightened by this, perhaps a course in immunology would be useful 

Have you ever thought...?

Why do you get a fever when sick?

Why do only some people get sick when exposed to pathogens?

Why do you sneeze or cough?

Perhaps the same reason you get diarrhea?

Humans as host

To be ecologically/evolutionarily successful, humans must...

- eat
- drink
- breath
- rid waste
- have sex

All of these activities can be exploited by parasites to infect new hosts

Traits that make a good host

- constant temperature
- moist environment
- constant nutrient supply
- cellular machinery for DNA replication

Humans can reduce susceptibility to parasites

- Acidic stomach
- Hairs and cilia in air passages
- Skin
- Taboos about contaminating human waste with consumables
- Monogamy/Safe sexual practices
- Immune responses: why vaccines work
- Fever
- Sneezing
- Coughing
- Diarrhea

Parasitic Disease Transmissi

eed an “agent” or “germ”

bacteria, virus, protozoa, fungus, animal

eed exposure to the agent

oodborne, waterborne, aerosol, sexually

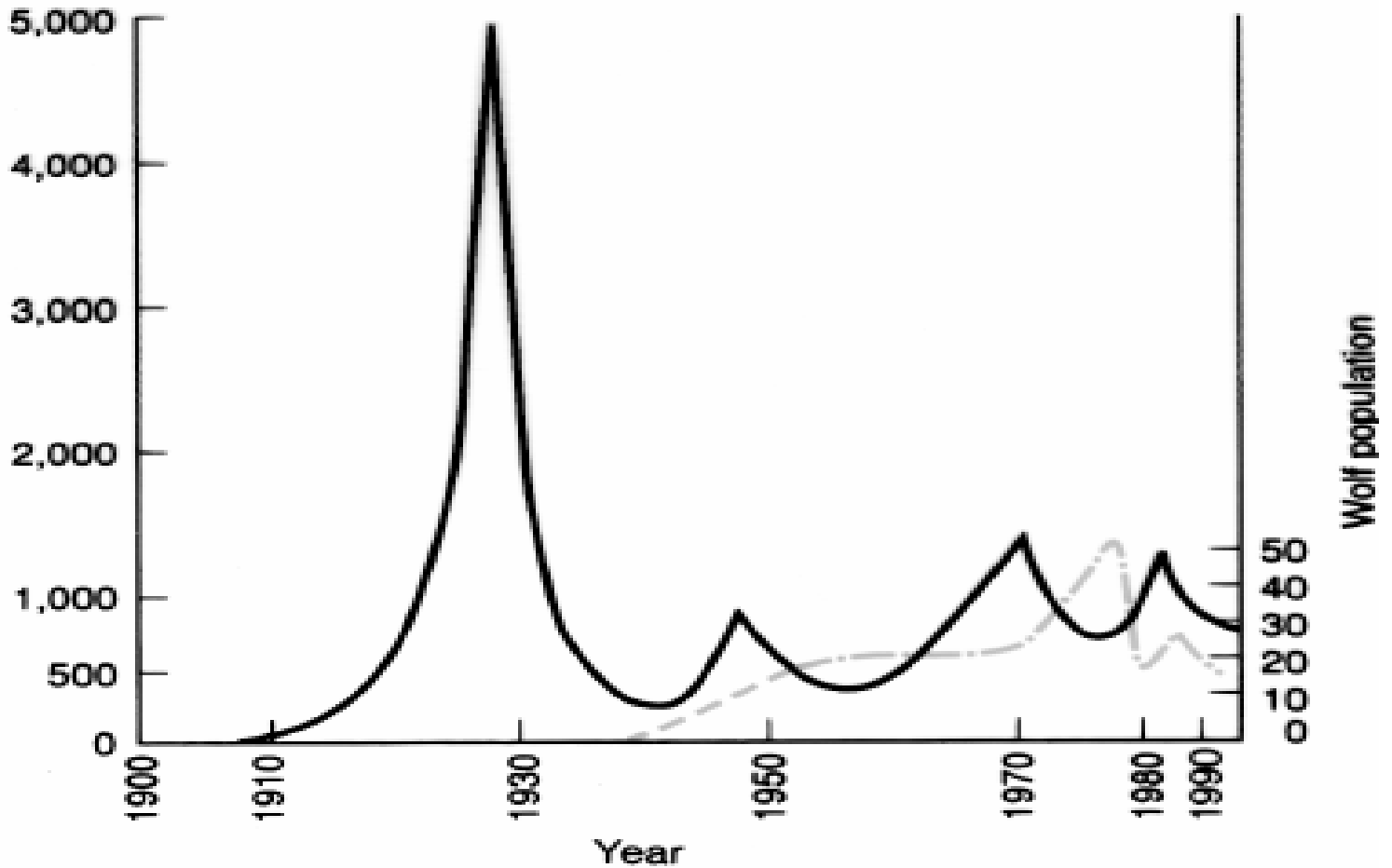
ransmitted, insect transmitted

eed a portal of entry

eed a susceptible host

eed a high enough dose to infect

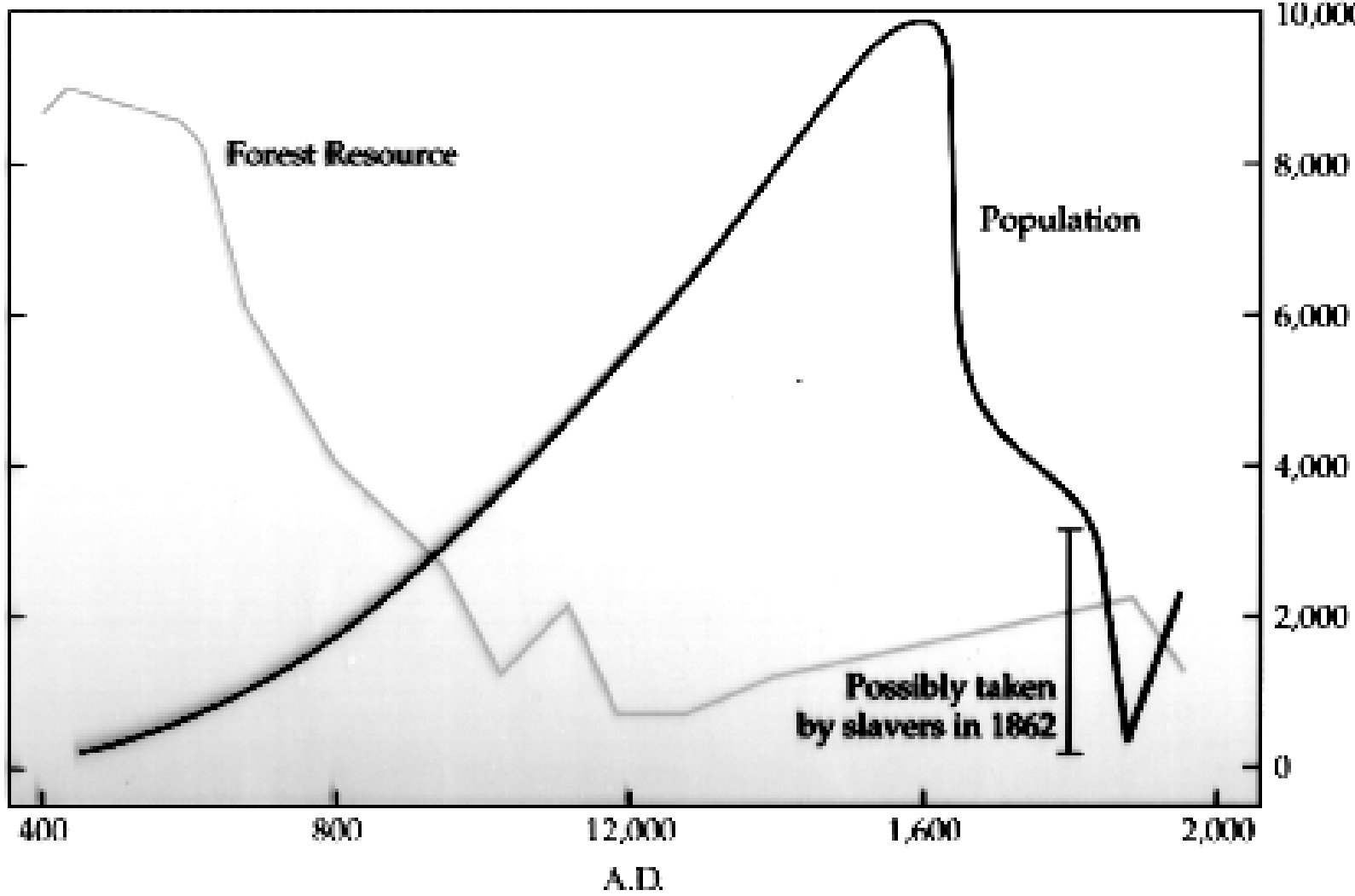
Isle Royal Moose



— Moose curve
- - - Wolf curve
Population size uncertain

The history of the settlement of Easter Island

Easter Island



Easter Island

3200km west of SA, an isolated, small island, 65 square miles

Colonized by Polynesians around 400AD., island was lush tropical paradise with mature forests

Population reached perhaps 10,000 around 1500

Ate porpoises, birds, and garden vegetables

By 1722, 2000 people inhabited the denuded island, there were no plants and no animals other than people, chickens, rats, and a few insects

By the time of Captain Cook's voyage to the island in the 1770s there were barely 630 people left, eking out a marginal existence; a hundred years later, only 155 islanders remained – done in by slave traders and missionaries.

Big statues show people with sunken cheeks and visible ribs

Not unique to humans...the same has happened with moose on Isle Royale and horses on barrier islands

Might the same thing occur at global scale?, or something unique on islands?



Ecological Footprint

average U.S. citizen has a footprint of 24 acres

line was 23 acres

average Indian citizen has a footprint of 2 acre

world average is 4.5 acres

available world average is 4.5 acres



Ecological Footprint

**If everyone lived like the average American
we would need at least four more planets.**



Ecological Footprint

• current material and population growth trends continue and population stabilizes at 10 billion people in 2040, we will need between six and twelve additional planets

Denver as an ecosystem

In what ways can Denver be viewed as a ecosystem?

What is your contribution to the ecosystem?

- How do you impact it?
- Could you lessen/improve your impact? How