Results of Overpopulation

Increased Starvation

Global Hunger – widespread, persistent, unacceptable
If decisive action is not taken, the number of chronically undernourished persons will be substantially the same in 15 years time. The greatest suffering will be in sub-Saharan Africa, where food output has not kept pace with population growth. Reversing these trends will require rapid and sustainable production gains as well as measures to make food accessible to those who need it.

Grain Area Harvested
Projections to 2050

Per Capita  ——  Total Area
Desertification

SPREADING DESERTS THREATEN AFRICA

On the southern edge of the Sahara, an area the size of Texas has become desert over the past 50 years. This same fate now threatens more than one-third of the African continent. The main cause of desertification is not drought but mismanagement of land, including overgrazing and felling of trees and shrubwood for fuel.


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Increased Urbanization

What’s wrong with that?

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Increase Risk from Emerging Diseases

Adults and children estimated to be living with HIV/AIDS as of end 1999

According to the most recent estimates by UNAIDS, 31.6 million adults and children were living with HIV/AIDS in 1999. The year saw 1.6 million new HIV infections, and 2.5 million deaths due to HIV/AIDS. Since the start of the pandemic, the cumulative number of deaths due to HIV/AIDS is 16.3 million.

Categories of Disease Causing Pathogens

- Viruses
- Bacteria
- Fungi
- Parasites (symbionts?)

Parasitic Lifestyles: Symbiosis

Symbiotic Relationships

Interspecific interaction in which one species, the symbiont, lives in or on another species, the host

- Mutualism
- Parasitism
Mutualism
Symbiosis that benefits both partners

Parasitism
Symbiotic relationship in which one organism benefits while the other is harmed

Parasitology Vocabulary
- **Host**: The animal the parasite lives on/in
  - There can be more than one host during a life cycle
  - Often life cycle include larval stages and adult stages in different hosts
- **Vector**: an animal that carries a parasite to the host
- **Reservoir**: Non-human “host” where the parasite can live
  - This term is only applied when the parasite can infect humans
Major Groups of Parasites

- **Protozoans**
  - Single-celled eukaryotes
  - Malaria, Giardia, Trichomonas vaginalis

- **Helminths (The Worms)**
  - Multicellular animals
  - Flukes, Tapeworms, Roundworms

- **Ectoparasites**
  - Multicellular animals
  - Live outside the host
  - Ticks, Lice, Fleas

Protozoan Parasites

- Single-celled eukaryotes
- Can invade:
  - Tissues- Trypanosomes, Toxoplasma, Plasmodium
  - Intestinal lumen- Entamoeba histolytica, cryptosporidium

MALARIA

- Kills 1-2 million/year
- Loss of productivity
- Vaccines slow
- Mosquito abatement
- Swamps
**Plasmodium Life Cycle**

*Co-Incidence*

**Trypanosoma cruzi**

- **Epidemiology:**
  - Mexico to S. America
  - 16-18 million people are infected (45,000 die per year)

- **Vector:** Reduviid bug (aka. kissing bug)
**Trypanosoma cruzi**  
(Chagas Disease)

- **Reservoir:** rodents, armadillos, dogs, cats
- **Pathologies:**
  - Inflammation at bite
  - Swelling of the eyes
  - Fever, malaise
  - Enlarged Heart
  - Heart Failure

**Entamoeba histolytica**

- **Epidemiology:** Worldwide distribution - Mexico, India, West and South Africa, South America
- **10%** of the world’s population is infected
- **Most** are asymptomatic (carriers)
- **50-100,000** deaths per year
- **“Vector”**: Flies carry cysts from human feces to human food or water or humans self-infect after touching fecally contaminated items, can be sexually transmitted

**Entamoeba histolytica**

- **Reservoir:** Humans are the only hosts
- **Pathologies:**
  - Mild to severe intestinal discomfort
  - Dysentary (bloody diarrhea)
  - Can invade and destroy the liver
  - Treated with Metronidazole (Flagyl)
Helminths (The Worms)

- Three main groups:
  - Flukes: Liver flukes, Lung flukes, Intestinal flukes, Schistosoma species (blood flukes)
  - Roundworms:
    - Intestinal (Pinworm, Whipworm, Ascarids, hookworms)
    - Tissue (Trichinella, Ancylostoma, Baylisascaris)
  - Tapeworms:
    - Intestinal (Taenia solium-beef tapeworm)
    - Tissue (Echinococcus granulosus)

Enterobius vermicularis
(Pin Worm)

- Epidemiology: Worldwide
- Most common helminth in North America
- No vector
- No reservoir
  - Treatment: Mebendazole
**Fasciolopsis buski**
(Intestinal Fluke)

- Epidemiology: Southeast Asia
- Females (2-7cm) produce about 25,000 eggs/day
- Has no vector, but has three hosts
  - Reservoir: Pigs
  - Treatment: Praziquantel

**Ascaris lumbricoides**
(Giant Roundworm of Humans)

- Epidemiology:
  - Temperate/tropical regions with poor hygiene
  - 2 billion infected worldwide
  - Fecal-oral transmission
  - No vector
  - No reservoir
  - Nightsoil
Ascaris lumbricoides
(Giant Roundworm of Humans)

- Pathologies:
  - Adults (12-20cm) in intestine can cause mechanical obstruction
  - Abdominal pain
  - Bowel perforation
  - Cough & wheezing from juveniles in lungs
  - Treated with Mebendazole
**Echinococcus granulosus**  
*(Hydatid Cyst Disease)*

- **Epidemiology:** S. America, Australia, Kenya, Europe, Russia (where dogs are used for herding sheep)
- **Canine tapeworm** (dogs, wolves, coyotes)
- **No vector**

- **Reservoirs:**
  - Sheep, elk, caribou

**Pathologies:**
- Cysts can infect liver, lungs or spleen
- Pathologies depend on where the cyst is located—Jaundice, coughing etc
- If ruptured, the cyst fluid will typically kill the host
Treatment: surgical removal of cyst

Ectoparasites
(Yah, the insects)

- Epidemiology: Worldwide
- Usually no vector
- Usually temporary
- Reservoirs: variable
- Pathologies: Itching, scabs at the site of the bite, rashes, redness etc.
- Often carriers of bacterial infections

*Tunga penetrans* is known as the chigger, jigger, chigoe, bicho do pé or sand flea
Pubic Lice

Guess where…