

Agenda

Wed. Oct 24 Review session in Kenny building

Causes of Pathology

- No clear divide between physical pathology and psychopathology

What do we think some possible functions of the sun?

All pathology has a genetic basis

- Combination of genes operating within an environment
- Pathology tends to decrease fitness (less able to reproduce or survive long enough to reproduce)
 - Why hasn't natural selection removed these?

Medicine and social sciences focus on *proximate* explanations of disease

- But there's also ultimate explanations of psychopathology
- Evolutionary biology is not taught in medical school
 - Takes too much time away from other subjects

Teleology: weakness in explaining the past from the future. (We shouldn't talk about the function of the sun in terms of our lives or the Earth, because we didn't exist when the sun was formed)

Evolution: Explaining the future from the past (not an error).

- Medicine tends to focus on neither of this

Causes of Pathology

- Infections
- Defenses
- Diseases of civilization
- Genetic quirks
- Design compromises
- Evolutionary legacies

Bacteria and viruses (pathogen-host coevolution)

- Major cause of death was bacterial and viral infection
 - Viruses is just a string of genetic codes (can manipulate our genetic code)
 - Bacteria is another living organism (live outside ourselves)

In 1925, a miracle occurred with the discovery of antibiotics (Specifically penicillin that comes from a mushroom)

- Exists in moulds because it's the mould/mushroom's defense against bacteria)

Warfare: many soldiers are just injured, but not killed, in combat. They would die anyway because of infections (Especially staph infections)

- Many WWI soldiers died from infection (because there were no antibiotics)
- Most WWII soldiers who were just injured survived because of antibiotics

Rates of infectious disease quickly began to decrease

But now, the bacteria's starting to develop defenses against antibiotics

This is evolution in natural selection

This is a big problem today because of overuse in hospitals and factory farming -> has led to an increase in infection rates (faster evolution)

- Factory farming: bringing a whole bunch of animals together to exploit them for meat or eggs, or dairy
- Thousands of animals within the same region - if one of them gets an infection, they're all at risk for infection
 - They preemptively give them antibiotics just in case one of them gets an infection
 - 40% of the use of the antibiotics in factory farming is actually to promote growth, not fight disease

Ways we remove pathogens from our bodies:

Expulsion: mucus, coughing, nausea and vomiting, sneezing, diarrhea, and possibly menstruation

- Fevers increases temperature to kill the bacteria but not us (hopefully)

Survival rate for syphilis increases when infected with malaria to induce fever

- Iron supplements increase infection rates
- Fever reducing medication prolongs illness

Psychological Defense: Anxiety

- Very unpleasant experience for people
- Non-specific increase in physiological activity and has a negative subjective experience
- But it is an adaptive response to stress
- Two adaptive strategies for short term stress and long term stress
- Short term:
 - Fight or flight response
 - Rise in the inner part of the adrenal gland (adrenal medulla)
 - Secretes epinephrine and norepinephrine
- Chronic stress:
 - Hypothalamus - Pituitary - Adrenal response (HPA) increases (adrenal cortex - outer part of adrenal gland) - Uses the endocrine system

Study of anxiety in guppies stressed out by bass fish predators

- Most anxious guppies would hide as soon as bass were presented
- Ordinary guppies would swim away from the bass but not hide
- Bold guppies would be vigilant and keep an eye on the bass but not swim away

- 40% timid guppies were alive
- 15% ordinary guppies were alive
- No bold guppies remained after 6 hours

- Not many people have thought about the implications of anxiety medication

Diseases of Civilization

- Mismatch between the design of the organism and the modern environment
 - Cause of much preventable disease
 - Like high fat diets: used to be good, we associate it with tasting good, but now with unlimited access it can give us diabetes
- Toxins: cancer (increase of cancer rates in the modern environment which wouldn't have happened in ancestral environments)
- Competition for resources, social status, and romantic partners is much more intense nowadays - this can lead to chronic activation of HPA stress reaction
- Wasn't that long ago when they separated the mother and child right after birth to do tests, etc. and put the infant to sleep in a separate room (this could lead to insecure attachment)
 - Now newborns are given to the mother to cuddle placenta and all

Substance Abuse

- Opiates stimulate endorphin receptors in the brain
- THC (marijuana) stimulates receptors in the brain
- Alcohol increases GABA Activity
- Cocaine increases catecholamine activity

End of Session