Bio 3

10-06-11

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OT:

for Lab Project, elevation is key to hitting all the biocommunities

-you will hit all the bio communities if you keep going 'up'

OCT 27: LAB DUE/EXAM2

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What is Life? A Guide to Biology

**Ch. 14: Population Ecology**

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**Ecologists/Ecology:** understanding how all the levels of animals interact and effect each other (organisms and environment)

difficult challenge: managing natural populations, difficult to count numbers of things in wild (even human being are difficult to count)

-diff levels of ecology: individuals, populations, communities, ecosystems

-one of reasons why studying ecology gets so complex

**POPULATION** - characteristics cannot be determined by studying only an individual of the species

-**Exponential Growth**: when each individual produces more than replacement for self.

-does NOT last forever

-limited by the fact that resources always limit the population

-term: **Carrying Capacity**: limited resources cut off the growth

-can change

-**Logistic Growth**: pop. growth that gradually reduces as the pop. approaches the Carry Capacity of that population's habitat

**Carry Capacity (cont.) Factors:**

-**Density-*Dependent* Factors**

-food supply (calories and how much nitrogen (protein) is available)

-habitat for living/breeding

-parasite/disease risk

-predation risk

-**Density-*Independent* Factors**

-natural disaster (flood, earthquakes, fire)

(-Make sure you are able to ID things on the exam as either Density-Dependent/Independent)

**Population Oscillations**

-Some populations naturally vary greatly over years

-ex. Lynx/Snowshoe Hares

-hare pop goes up = lynx eat more = lynx pop goes up = lynx eat too many = hare pop goes down = lynx don't have food = lynx pop goes down = lynx not eating as many hare = hare pop goes up = repeat

-demonstration of good principle of ecology: when prey pop increase/decrease, the predator increases/decreases accordingly

-thus it is the PREY population that controls the predator population, NOT the predator population controlling the prey population

-predator help take out the Slow, Sick, and Stupid of the prey species

-thus help the prey species get strong

-which causes the pred. to adapt

-evolution!

-reason less deer available for human hunting in California, in the past, ballot initiative that made it illegal to shoot mountain lions

-thus hunters start pushing for hunting mountain lions

-which doesn't make sense!

-reductions in predators will not cause lasting increase in prey species

-actually what limits deer carrying capacity is winter habitat (which lower in the mountain/foothills)

-humans have invaded that habitat

-thus humans become a density-*dependent* factor on the carrying capacity of those deer

**Lemmings:**

-old tale: that they ran off the cliff and commit suicide when their population gets too large

-not true!

-limited by Density-Dependent/Independent factors

-life-cycle =1 1/2 yr.

-term: predator swamping

-species produces a huge number then goes long time without producing (so predators go down) then the sudden population explosion happens and the predators can't eat enough of them (a good number of the prey will survive)

-ex: bamboo, cicadas

-if your life cycles are based around prime numbers (not divisible by 2), predator's life cycles can't match up with them

-they do predator-swamping in their reproduction cycle

-when there are enough resources around, they have population explosion

**Survivorship Curves:**

-Type I, II, III

-not important to know all those types for exam

-just know there are different ways species develop to survive

Type I: high survivorship until old age, then rapid decrease

-ex: giant tortoise, humans

Type II: survivorship decreases at a steady, regular pace

-ex: birds

Type III: High mortality early in life, those that survive those years live long time

-ex: fish

**Experiment: fruit flies!**

-read about experiment in book

-scientists were able to increase the live expectancy of flies by steady advancement (time-wise) of food/egg collection procedures over generations

-ex: evolution!

**Age pyramids**

-one of the big national/global topics: how do we provide for the aging population?

-bc. in Industrialized countries (like US, England, Norway, etc), age pyramids that look more/less rectangular = bc. low birth rates/low death rate

-unlike in Developing Countries (like Kenya) have age pyramids that appear triangular = bc. high birth rates/high death rates

-problem in US: Baby Boomers (born post WWII, population boom)

-but we had lower birth rates after, so less people working to support them

**Demographic Transition**

-pattern of pop. growth experienced as country industrializes.

1. First: Slow Growth (unindustrialized)

-high birth rates/death rates

2. Second: Fast Growth (developing)

-high birth rates/low death rates

3. Third: Slow Growth (industrialized)

-low birth rates/death rates

**Historical Human Pop. Growth**

-in 8,000 BC until 5,000 BC: 5 million

-then invention of agriculture

-5,000 BC to about 1500 AD slow increase

-then half pop die: Black Plague

-then steady, then huge growth in humans

1850: 1 billion

1930: 2 b

1960: 3b

1975: 4b

1987: 5b

2005: 6.5b

2011: 7b

**Human Carrying Capacity:**

-we keep increasing our carrying capacity

-by inhabiting new areas, using new resources, using new technologies to help with that

-though we still have trouble making sure these advancements are applied for the welfare of humans in a all-encompassing manner

-things like transport/politics effect our ability to provide food to everyone

-amount of food is not yet a factor for our carrying capacity