

Radiation: Effects on Animals

- May affect animal life cycles and activity cycles
 - For example, birds singing in the morning
 - Slugs may be active during the day rather than at night
 - Mosquitoes may bite during the day rather than at night
- Aphids produce sexual generation
- Birds migrate EG flamingo
- Hedgehogs hibernate
- If radiation flux changes, activity could be enhanced or reduced
 - EG bees will stop flying
 - Slugs will come out at a different time of the day
- Animals prefer particular radiation levels

Radiation: Environment Change

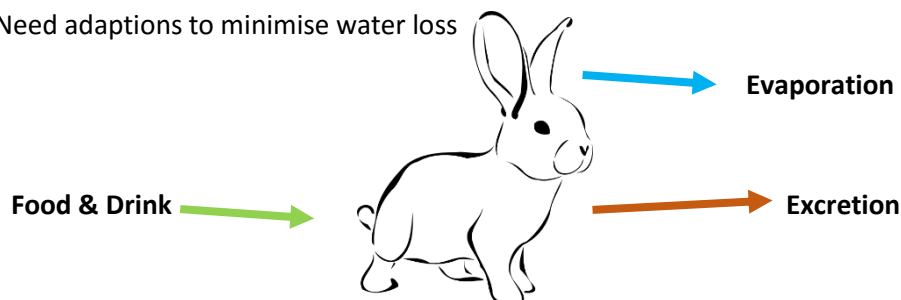
- Ozone in:
 - Stratosphere: filters out harmful UV rays
 - This ozone is being destroyed by CFCs that contain chlorine
 - There are now holes above the arctic & Antarctic
 - This means more radiation reaches the Earth's surface
 - UVB causes burns & cancer and UVC can cause damage to proteins

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- Gas must be in solution to reach cells
- Gas exchange is linked to water loss

Moisture

- Availability linked to temperature EG freezing/evaporation
- Great microclimating variation
- Some sensitive EG mosses & molluscs
- Some tolerant EG arthropods, desert vertebrates & cacti
- Life originated in the sea therefore biochemical & physiological processes take place in solution
- Need adaptations to minimise water loss



- Plants are rich in carbon but poor in protein
 - This carbon is burnt off as carbon dioxide which is rich in energy
- Herbivores waste products which consume plants are carbon rich compounds
 - Carbon dioxide
 - Fibre
- Most herbivore are limited by nitrogen
- Only a few herbivores have celluloses

Organisms with Celluloses

- many fungi, some bacteria and a few protozoa have celluloses
- some bacteria are found in symbiotic association with herbivores
 - EG ruminants in the gut
- Microorganisms are the first detritivores to colonise plant detritus, animal detritivores follow later

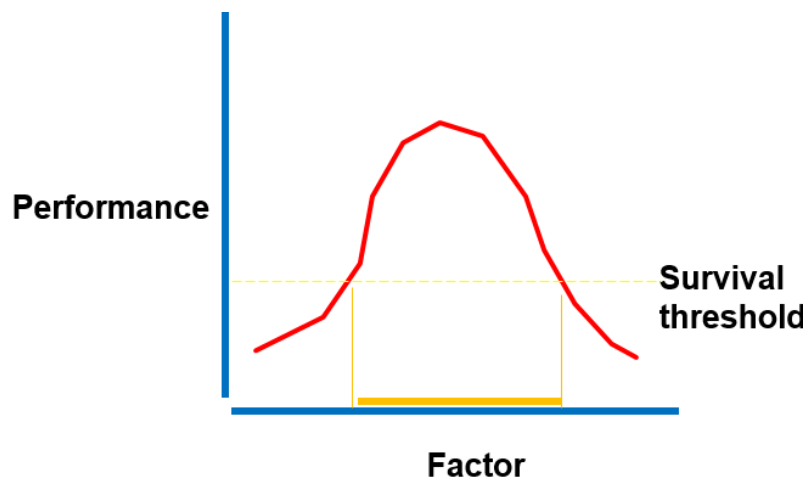
Animals as Food

- In nutritional terms herbivores & carnivores have similar body composition
- Animal tissues:
 - No structural carbohydrate or fibre
 - Rich in lipids and protein
- Main excretion is nitrogenous
- Animals may be generalists
 - Feeding on a range of foods
- Some may specialise on a food source
 - May attack certain parts of prey
 - Target several or just one prey species
- Carnivores don't have digestion problems but have to find, catch and handle their prey

19.10.15

The Chemical Environment II: Pollutants

Pollutant: a substance that contaminates, chemical produced from industrial waste



Effects of Pollutants

- Sulphur
 - Deposition from the atmosphere has maintained input to agricultural land
 - As pollution levels decrease the rate of deposition decreases
 - Some plants need sulphur to grow and so additional has to be applied to crops
- Zinc

- Found around mines and from industrial processes
- Can reach fatal levels for organisms in polluted areas

Direct Effects

Natural Selection

- Pollutants having a direct effect will exert selection pressure
- Tolerant individuals survive and non-tolerant individuals may die out because they're unable to survive the conditions
- This could ultimately result in local extinction
- The selection pressure will lead to optimum genotype selection
- Ecotypes are a genetically determined local match between organisms and their environment within species

Trophic Accumulation

- The pollutant is retained after consumption and so accumulates
- Consumption in the next trophic level leads to further cycles of concentration
 - Called **BIOMAGNIFICATION**
 - EG Insecticides in Clear Lake, California
 - These accumulated in the lake which was then consumed by plankton, these plankton are then consumed by fish
 - The Insecticides then move up the food chain, gradually increasing in size
 - Results in birds producing weak egg shells & are unable to reproduce successfully
 - Fluoride on Insects
 - Insects are contaminated with fluoride
 - Predatory species, EG spiders, have higher fluoride concentration than herbivores EG aphid

Indirect Effects

- In Industrial areas trees were blackened by soot
- Normally Peppered Moths had a pale colour with black peppered effect, these were eventually replaced by much darker moths
- Selection pressure due to bird predation caused the paler moths to decrease in numbers as they were much easier to detect
- After the Clean Air Act, the cleanliness of the air increased and trees became cleaner, this meant that the lighter coloured moths returned

Acid Rain

- Sulphur and nitrogen oxides from the burning of fossil fuels causes acid deposition in the atmosphere
- This dissolves in the clouds producing acid rain which affects the pH of rain and water bodies
- This then affects the organisms in water bodies
 - EG diatoms

- Survivors may compensate for losses
- Individuals that are preyed upon are those that are least likely to:
 - Survive
 - Reproduce
- Populations may compensate for loss through reduced intraspecific competition
- Shooting wood pigeons doesn't increase winter mortality
 - Limited by food
 - Shooting reduces competition
 - Density dependent migration occurs

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Predator Prey Interactions II

Effects on Natural Enemies

Consumption Rate

- An increase in the amount of food available/the amount consumed, leads to an increase in:
 - Survival
 - Growth
 - Reproduction
- It reduces the effects if competition
- Consumption must exceed the lower threshold

Diet Width



- True predators and grazers usually have relatively broad diets
- Parasites and parasitoids are often highly specialised in terms of their diet
- Specialists avoid interspecific competition and are at risk if the food source becomes scarce
- Generalists may be exposed to interspecific competition but their diet can be varies to suit the food availability

Functional Responses

- The relationship between an individual's consumption rate and food availability is the consumer's functional response
- There are 3 types recognised
 - Type 1
 - Consumption rate rises linearly with prey density
 - The capture rate is determined by prey density
 - At high prey densities the consumption rate will remain constant
 - The handling time is limiting
 - Type 2
 - Consumption rate rises with prey density
 - Finding prey becomes easier
 - At high prey densities the consumption rate will remain constant
 - Handling time is limiting

