

A spiral-bound notebook with a light beige, textured cover. The metal spiral binding is visible on the left side. The text is centered on the cover.

Evolution

Chapter 10

- Living things are suited to their environment
- For example, a cactus has needles to reduce the amount of water loss – this is helpful b/c water is rare in the desert



• Can you tell how these living things are suited to their environment?

–Polar bear



–Rabbit



–Duck




–Butterfly



–Dandelion





- What is an adaptation?
 - A trait that makes a living thing able to survive in its surroundings
 - Any trait can be an adaptation
 - A trait can be an adaptation in one environment, but bad in another

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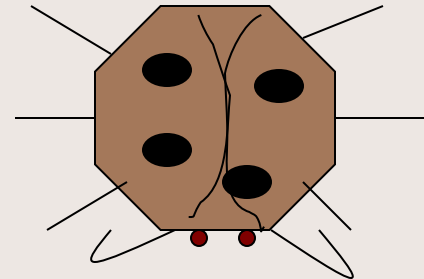
• **Scenario:** A group of beetles live in a forest. Some are blue & red, others are brown & black. Birds also live in the forest. The birds like to eat beetles. Which beetles get eaten more often?




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- Answer: The blue & red beetles should get eaten more often than the brown & black beetles.
 - Why? Birds can more easily see blue & red against the forest floor.

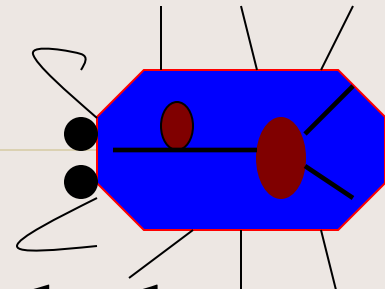
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- A silver metal spiral binding is visible on the left side of the page, winding through a series of holes in the paper.
- 1. What trait is the adaptation?
 - 2. Do you expect to see more blue/red beetles or brown/black beetles?
 - 3. Which will live longer?
 - 4. Which will have more offspring?

- 1. Brown/black color
- 2. More brown/black beetles
- 3. Brown/black beetles
- 4. Brown/black beetles

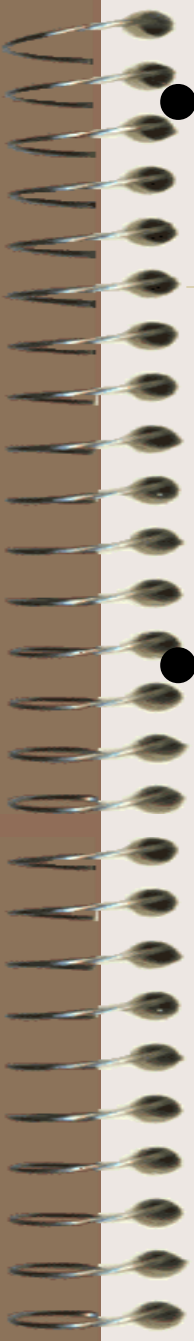


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- Suppose the same group of beetles & birds live in a field of colorful flowers. Which beetles will be better suited to the new environment? Which get eaten more easily? Why?

- The blue/red beetles are better suited.



- The brown/black beetles will be eaten more
- The brown/black beetles do not blend in to their environment very well.

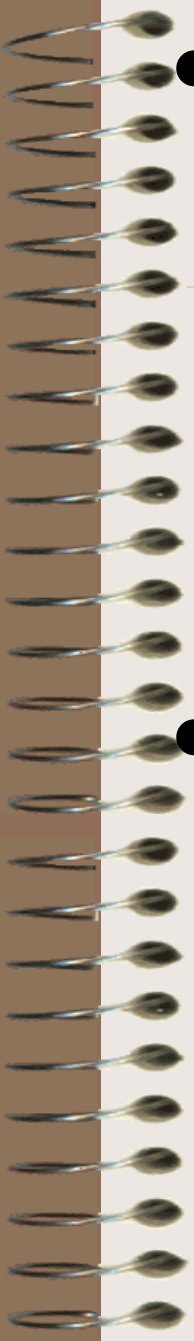
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- The adaptation in the second scenario is red/blue coloring
 - Blue/red beetles would live longer, produce more offspring and you would see more of them




- The process described above is called **natural selection**

- Natural selection says that organisms that are better suited to their environment will live longer, produce more offspring, and therefore their genes will be more prominent in the population

- **Natural selection** is the process in which something in a living things' environment determines if it will survive – something in the environment does the selecting

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- The organisms themselves cannot decide if they will survive – they cannot change their traits
 - In our beetle example, what part of the environment did the selecting?

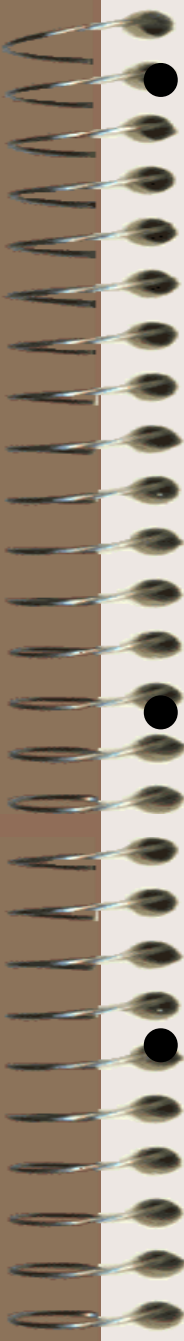
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- A silver metal spiral binding is visible on the left side of the page, looping through a series of holes.
- The birds did the selecting – they either could or could not see the the beetles based on their coloring
 - What else in the environment could select different beetles?

- If certain beetles had to nest in or around water, the amount of water could be a selecting factor
- If certain beetles had to eat only certain types of plants, the vegetation would be the selecting factor



What adaptations do these beetles have?



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- Natural selection usually works over a long period of time (100's-1,000,000,000's of years)
 - Natural selection needs variation to work
 - How is variation introduced in a population?

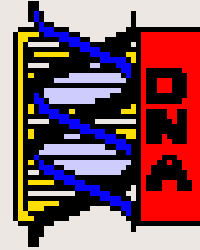


- Variation is introduced through **MUTATIONS**

- Mutations can cause new traits, and therefore new adaptations

- A mutation could be good in one environment but bad in another

- Remember that mutations are changes in the DNA of an organism





- Mutations can therefore be passed on from parent to offspring – this is important to natural selection

- Natural selection can produce a new species
- What is a species?
- A species is a group of living things that can mate together to produce fertile offspring

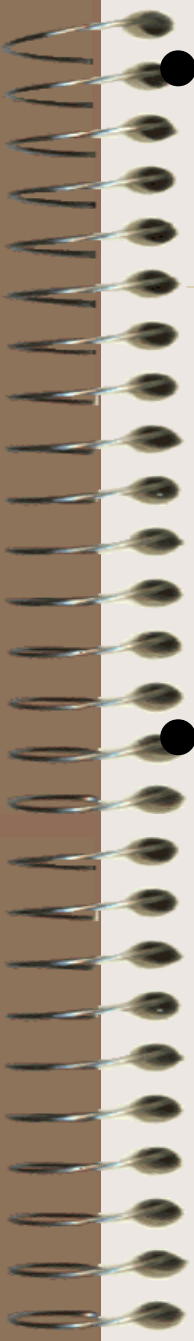
- For example, onions and garlic are closely related plants – they even look very similar – but if they were to mate, the offspring would not be fertile





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- Garlic and onion are not the same species of plant!
 - How do new species arise?

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- A group of organisms in the same species may be separated somehow by a barrier – river, canyon, etc
 - The environments on either side of the barrier are different (cold/warm)


- Natural selection occurs on each group, but because the environments are different, natural selection occurs differently
- Different traits appear in each group

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- Much time passes without the two groups coming into contact with each other
 - They can become different species & cannot produce fertile offspring if brought back together

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- Charles Darwin traveled around the world on a ship called the Beagle
 - On the trip, he collected and studied various living things from each place he visited

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- On the Galapagos Islands he studied the different finches
 - Some finches ate insects, some ate berries, others ate nuts
 - They all lived on different islands

- They were similar to each other and also similar to the finches on the main land
- Darwin proposed the theory of **natural selection** to explain this phenomenon



- There are 4 main points to Darwin's Theory of Natural Selection

- 1. Living things **overproduce**

- 2. There is **variation** among the offspring

–3. There is a **struggle** to survive (predators, space, resources, etc)

–4. Natural selection is always taking place

• Natural Selection is the **mechanism** for evolution

- **Evolution** is the changing over time of a species to be more suited to its environment through natural selection

Survival of the Fittest

- A simple way to explain evolution through natural selection is the phrase – survival of the fittest.
- Basically, those organisms best suited to the environment are the ones who live the longest and pass on their genes

Survival of the Fittest

- As time goes on, more and more of the members of a species are “fit” to their environment, and traits that make them unfit will be seen less and less
- Less desirable traits may even go away for good

Survival of the Fittest

- The fittest does not mean the fastest or the strongest or even the smartest
- What “fittest” means is determined by the environment – it could be color or mating call

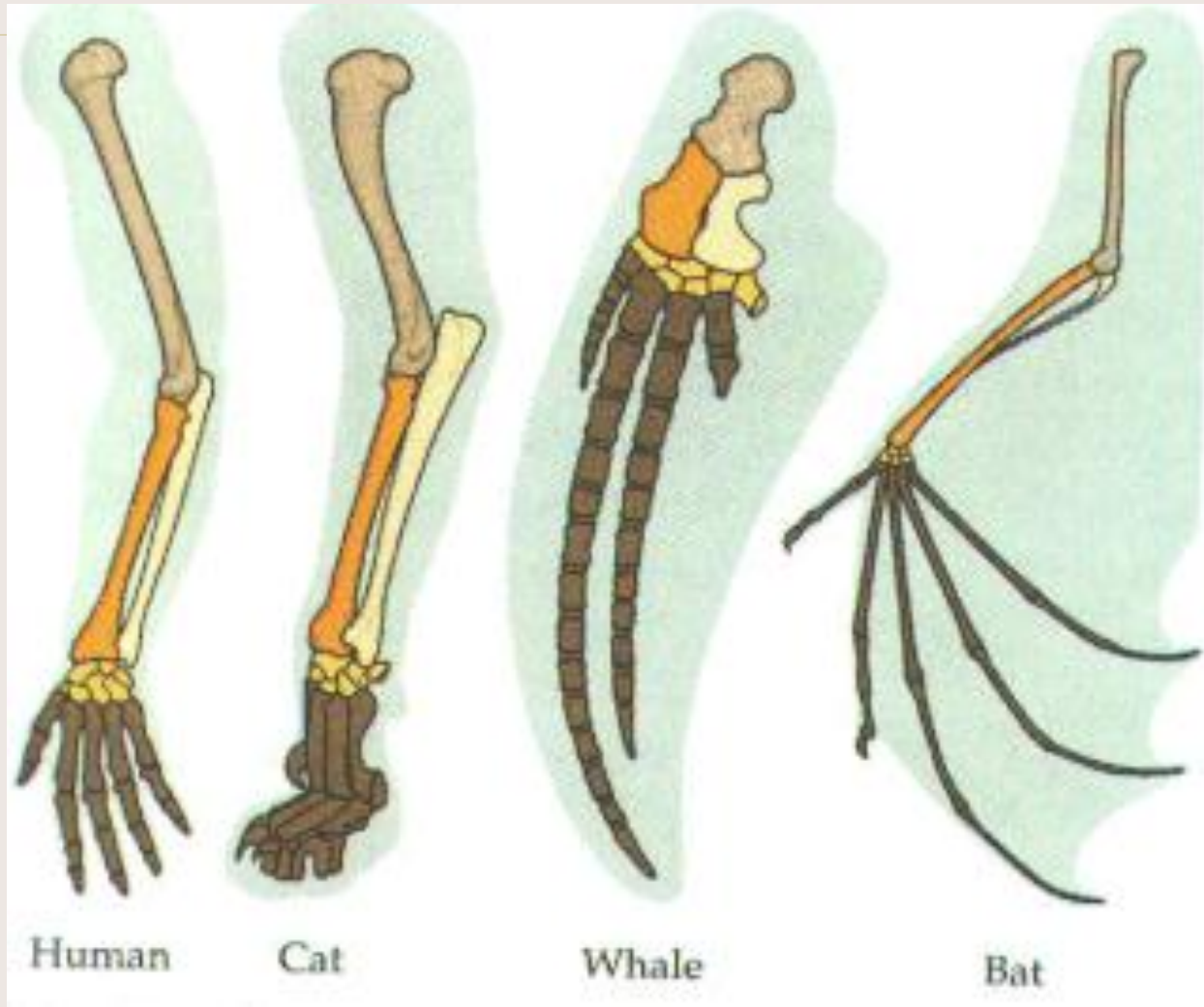
Survival of the Fittest

- Remember, we do not live in a one dimensional world
- Everything that can interact will interact and the term “fittest” will not have a specific definition in most cases – IT’S COMPLICATED!

Anatomy

- **Homologous Structures:**
features that are similar in structure but appear in different organisms and have different functions
- EX: Human Hand Bones vs. Bat Wing Bones (pg 312)

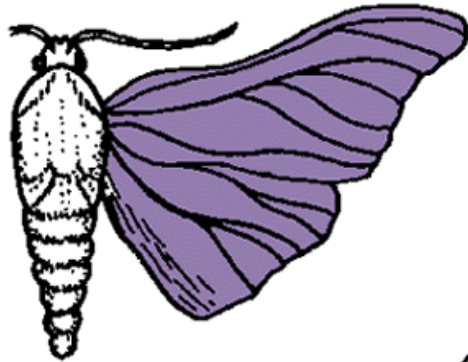
Homologous Structures



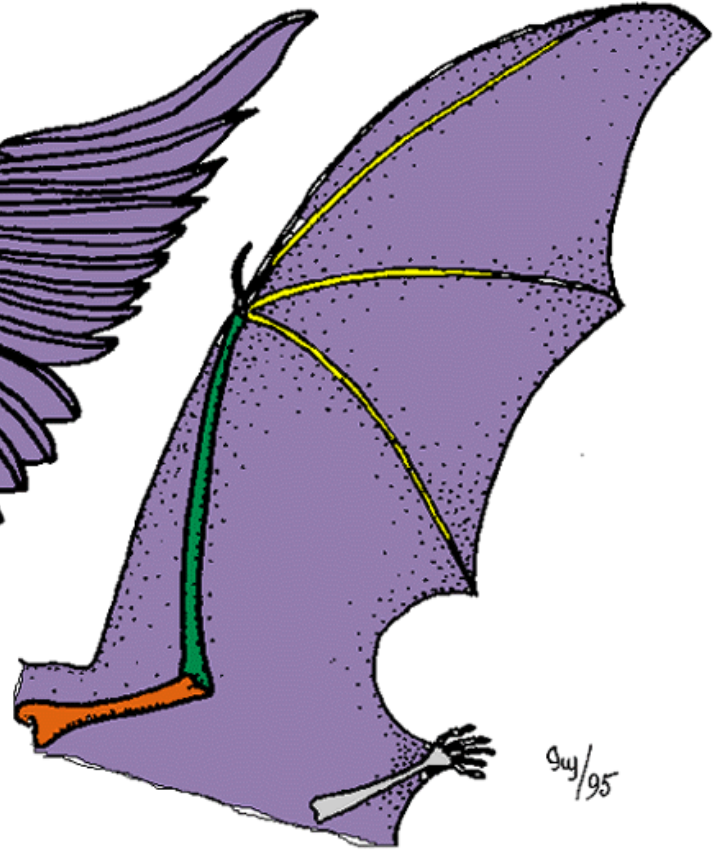
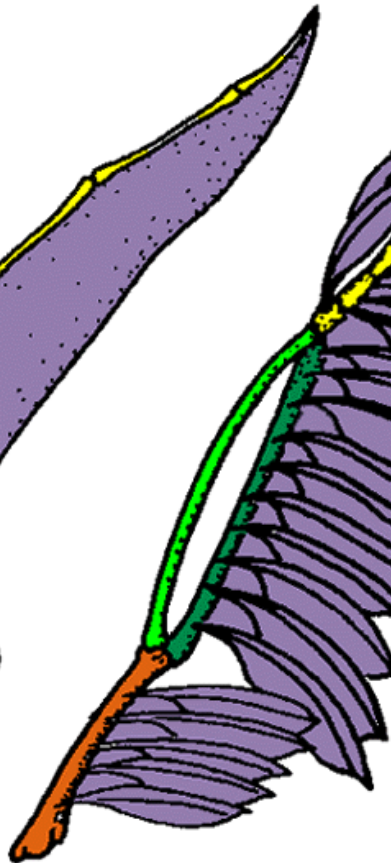
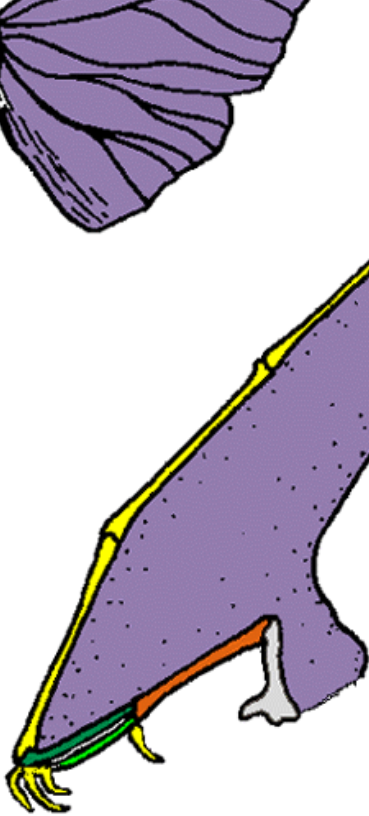
Anatomy

- **Analogous Structures**: features that are similar in function but are not similar in origin
- EX: Wings of a Bird vs. Wings of a Butterfly
- Have similar needs therefore a similar solution

Analogous Structures



analogous =



9/4/95

Anatomy

- **Vestigial Structures**: features that used to be needed on an organism but are no longer used
- EX: Human Appendix, Wings of an Ostrich, Pelvic/Limb Bones of Snakes