Other Homework or Classroom Exercises

Natural Selection vs. Artificial Selection:

Humans have domesticated many plants and animals (corn, dogs, chicken, cattle, etc.). In doing so, we have bred many plants and animals to have characteristics we like. The result is that many domesticated plants and animals are incapable of surviving on their own in the wild because we have selected for characteristics that are good for us, rather than characteristics that help them survive.

Have students research one domesticated plant or animal (they can do their favorite dog breed, or their favorite fruit, vegetable or grain) and write an essay about the history of its domestication; when and where it was first domesticated, for what purpose it was bred, what physical or behavioral characteristics humans have selected, and why it can or cannot survive in the wild. This will help students begin to understand artificial selection, or how humans have altered the natural selection process in these domesticated species to our own benefit. This in turn can help them understand how selecting for specific characteristics in a population of plants or animals can lead to the development of a new breed or even species.

Design your own plant:

Divide students into small groups and have each group design a plant. It can be any kind of plant. Let your student's imaginations go wild. Tell the students to draw the plant and describe the environment it lives in. This should include climate (arctic, tropical, temperate etc.), humidity (arid, wet etc.), what kind of community (forest, grass prairie, wetland etc.) and to mention the plants major predators (beetles, deer, rodents etc.). Then write down two or three survival characteristics it should have for that environment (succulent stems, spines, prop roots, climbing adaptations, leaf hairs, toxins, red undersides for light capture etc.– or make up an adaptation). If the students cannot use their imaginations to create a plant, encourage them to describe a plant that they already know something about.

Make up some pieces of paper that describe random mutations and put them in a hat. For example: 'your plant develops succulent stems through mutation', or 'your plant develops toxins through mutation', or 'your plant develops spines through mutation' etc. Have students pick one or two mutations from the hat. If the student draws a characteristic that the plant already has, he/she should draw again.

Make up some pieces of paper that describe environmental changes on them and put them in a hat. For example: 'your environment becomes extremely dry', or 'your environment becomes extremely cold', or 'becomes flooded', or 'becomes heavily forested', or 'becomes infested with leaf eating insects' etc. Have each group draw an environmental change from the hat. If the environmental change they draw is the same as the plants current environment, have them draw again.

Finally, determine which plants survive and which do not. If the mutation turns out to be advantageous for the environmental change (i.e. – the environment becomes dry and the plant develops succulent stems through mutation, or the environment becomes infested with leaf eating insects and the plant develops toxins) than the plant will likely survive. If it looks like the plant will not survive, discuss what mutations it would have needed in order to survive.

Debate/discussion:

Have students debate the following question: **Are humans subject to natural selection?**

Consider: we have many inventions that help us "cheat" natural selection (eyeglasses, modern medicine, dentures if your teeth fall out, etc.) In the Stone Age, if you had poor eyesight, you might not survive. Once your teeth fell out, you could no longer eat solid foods and could die of malnutrition. Today, people can live just fine with poor eyesight and no teeth. Modern medicine also allows us to cheat natural selection in many ways. Discuss some of these ways. How else do we cheat natural selection? Are we at all affected by natural selection? Think about antibiotics, vaccines, operations and organ transplants, etc.

To take this topic further, bring up the following point: **Are people in third world or underdeveloped nations more subject to natural selection because they have less access to modern health care?**

Consider: many people in underdeveloped nations know a lot about ethnobotany and know how to treat the sick, but is this as effective as western medicine?

For more mature students, bring up the following point: **Humans may not be subject to natural selection the way animals are, but are we still subject to sexual selection?**

Consider: think about how we select mates. Do we select mates based mostly on their physical characteristics, health and beauty or is there more at play? One of our greatest survival characteristics as a species is intelligence. Do you think most people select mates with high intelligence? If so, why? Do you think any negative characteristics are weeded out of our population, or any positive characteristics carried on through sexual selection?