

ECOLOGY 8 :

SIMULATION OF THE
INTERACTIONS BETWEEN
PREY AND PREDATOR

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Aim of the activity : simulate ten generations of interactions between prey and predator under various conditions.

Time : about 30 minutes for both practice and real run. Add 15 minutes if you want each group to present its results to the class.

Material : * 1 bag per 2 students containing 100 objects in 2 different colors (or shapes) , 50 of each. One color represents preys, the other predators. Red and white beans work fine and are cheap.

* cardboard cards on which is written a condition such as :

"birth rate of preys : 2; birth rate of predators : 1";

"birth rate of preys : 5; birth rate of predators : 1";

"birth rate of preys : 1; birth rate of predators : 2";

"birth rate of preys : 2; birth rate of predators : 1; a disease kills 4 out of 5 preys in 3rd generation";

"birth rate of preys : 2; birth rate of predators : 1; a disease kills 4 out of 5 predators in 3rd generation";

"birth rate of preys : 2; birth rate of predators : 1; due to limitations in the food supply of preys, preys cannot number more than 75 (i.e. take away any prey above this amount)";

"birth rate of preys : 2; birth rate of predators : 1; a forest fire leaves only the first five individuals in your line alive on generation 7;"

"birth rate of preys : 5; birth rate of predators : 1; the weather is too cold in 5th generation : all the young preys that year die;"

* sets of transparencies and pens to write down each generation's results and present to class on overhead;

* transparencies of graph paper;

Method : Each group of two students receives one bag containing objects in two colors. Decide which color is prey, and which is predator, and instruct students to stick to it.

Practice run : each group lines up 50 objects without looking before

taking them out of the bag. They leave a small space between each pair of objects. They count the number of "preys" and "predators" in their line, and write it down : this is generation 0. Then starting from one end of the line, they take away or add objects according to the following rules :

a) if the pair consists of a "prey" and a "predator", the predator eats the prey, and reproduces : replace the prey with one predator (this is for a birth rate of one on the cards);

b) if the pair consist of 2 predators, take them away : they did not eat, and died of hunger without reproducing;

c) if the pair consist of 2 preys, they reproduce : add 2 more preys (again for a birth rate of one on the cards);

Students then count the number of preys and predators left after they have dealt with their 50 objects. They write this number : this is generation 1. Briefly ask for results : any variation from generation 0 to 1? Could more change be expected in further generations? This is what the real run of this activity will try to show...

Real run : hand out one card to each group (make sure they are different), and instruct the students to follow the same rules as before, starting with 50 objects, as well as respecting the instructions on the card, for 10 generations. The only exceptions are the birth rates : if it says "2" on the card, add 2 objects instead of one as before. If the group runs out of objects before the 10th generation, they are done. Discuss how students could easily collect results generation after generation (they'll come up with the idea of a table generation/number of preys/number of predators anyway). If you want them to present their results on the overhead, instruct them to copy the card on their transparency. Also ask that they write a short conclusion at the end of their transparency outlining major changes over time. Instruct students who are done early to draw their results on the graph paper transparencies to add interest to their presentation...

Wrap-up : in which condition(s) is equilibrium reached and maintained?