Lab: Survivorship

Background: Within a population, some individuals die very young while others live into old age. To a large extent, the pattern of survivorship is species dependent. Three general patterns of survivorship have been identified. These three have been summarized by survivorship curves, which are graphs that indicate the pattern of mortality (death) in a population. A Type I curve shows high survivorship until old age, then high mortality. A Type II curve shows near-constant, moderate survivorship of all different ages of a population. Type III curves show low survivorship at the younger ages, with survivorship increasing as the population ages.

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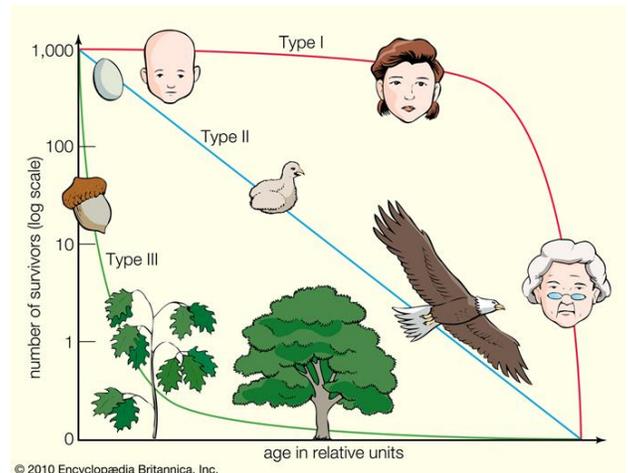
Procedure:

Bubble Population #1 (sink or swim babies)

1. Dip the wand into the solution and blow gently through the wand to create one bubble at a time. If extra are created, you must *immediately* select one and kill the rest.
2. Once a bubble leaves the wand, group members do NOTHING prevent it from popping (dying).
3. Note the "age at death" of the bubble and tally of survivorship times in data table 1.
4. Repeat until 25 bubbles are successfully created.

Bubble Population #2 (bottleneck babies)

1. Set up a "Survivorship Frame" by having one person in your group hold a frame 50 cm in front of the bubble blowing birther. The frame represents reaching the age at which the bubbles reach maturity. Dip the wand into the solution and blow gently through the wand to create one bubble at a time. If extra are created, you must *immediately* select one and kill the rest.
2. Once a bubble leaves the wand, group members do NOTHING prevent it from popping (dying).
3. Note the "age at death" of the bubble and tally of survivorship times in data table 2.
   a. Bubbles that burst prior to passing through the frame are included in the data. These bubbles died as children.
   b. Bubbles that burst hitting the frame are included in the data. These bubbles died as adolescents.
   c. Bubbles that fall below the frame without passing through the frame ARE NOT INCLUDED.
   d. Bubbles that burst after passing through the frame are included. These bubbles died as adults.
4. Repeat until 25 bubbles are successfully created.

Bubble Population #3 (nurtured babies)

1. Dip the wand into the solution and blow gently through the wand to create one bubble at a time. If extra are created, you must *immediately* select one and kill the rest.
2. Once a bubble leaves the wand, group members wave, blow, or fan in an effort to keep the bubble in the air and prevent it from popping (dying).
3. Note the "age at death" of the bubble and keep a tally of these times in data table 3.
4. Repeat until 25 bubbles are successfully created.

Summarize the Bubble Population Data

   a. Within each data table, count the number of tally marks (bubbles dying) at each age and record the total number of tally marks in the column "Total Number Dying at This Age"
   b. Subtract the number dying at each age cumulatively from 25 and record the number in the column "Total Number Surviving to This Age"
   c. Calculate the percentage surviving at each age by dividing the number surviving by 25 and multiplying by 100.
   d. Plot the percentage surviving for each population on logarithmic graph paper as a triple line graph. The x-axis is age (in seconds) and the y-axis is percent surviving (in %).

Data:

Data Table 1: Bubble Population 1

AGE AT DEATH	TALLY MARKS OF AGE OF DEATH	TOTAL # DYING AT THIS AGE	TOTAL # SURVIVING TO THIS AGE	% SURVIVING
0				
1				
2				
3				
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Data Table 2: Bubble Population 2

AGE AT DEATH	TALLY MARKS OF AGE OF DEATH	TOTAL # DYING AT THIS AGE	TOTAL # SURVIVING TO THIS AGE	% SURVIVING
0				
1				
2				
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Data Table 3: Bubble Population 3

AGE AT DEATH	TALLY MARKS OF AGE OF DEATH	TOTAL # DYING AT THIS AGE	TOTAL # SURVIVING TO THIS AGE	% SURVIVING
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Analysis Questions:

1. How was the shape of the curves influenced by the conditions of each population?

2. Identify each curve as Type I, Type II or Type III.

3. Identify each population as r-selected or K-selected.

4. Do any of the soap bubble populations show a constant death rate for at least part of their lifespan? Is so, which?

5. Bubble population 1, the sink-or-swim population, was provided no parental care. Give three examples of species that use this strategy.

6. Bubble population 2, the bottleneck population, was forced to travel through the frame to survive. In nature, what situations would create a type of population bottleneck?

7. Give three examples of species that use the strategy simulated by bubble population 2.

8. Bubble population 3, the nurtured population, was provided parental care. Give three examples of species that use this strategy.

9. Why is semi logarithmic graph paper used in lieu of standard graph paper?

10. Identify two possible sources of error in this lab.