

Bio 112 Handout for Evolution 5

This handout contains:

- Today's iClicker Questions
- Handouts for today's lecture

iClicker Question #2A - before lecture

Which of the following scenarios describe an event involving selection (fitness depends on genotype) and not founder or bottleneck effects (fitness is a matter of chance)?

- A. Tusk length in elephants is inherited. Some elephants have shorter tusks and some have longer tusks. Hunters prefer to kill elephants with long tusks. Over time, hunting results in a population of elephants with shorter tusks on average.
- B. Color in a species of bird is inherited. There is an island with blue and red birds. Originally, the majority of the population was red with a few blue birds. A hurricane floods the island and kills all but 10 birds; 2 red birds and 8 blue birds. The birds re-populate the island. The resulting population is now mostly blue.
- C. Another island has palm trees on it. The mountain in the center of the island shades one side of the island for most of the day. The trees in the shade are shorter than the trees in the sunny parts of the island.
- D. more than one of the above
- E. none of the above.

iClicker Question #2B - after lecture

In 1848 in England, a species of moth was mostly light in color; this allowed it to blend in with light-colored trees. Over the next 50 years, the trees became darker due to soot from factories. In 1898, those same moths were mostly dark. Which of the following explanations for the increase in frequency of dark moths **do not** involve selection?

- A. The soot from the factories is more toxic to light moths than dark moths.
- B. The climate in England was cooling over that time period, and dark moths are more cold-tolerant than light moths.
- C. Many dark moths flew in to England from France, where the population is mostly dark.
- D. All of these involve selection.
- E. None of these involve selection.

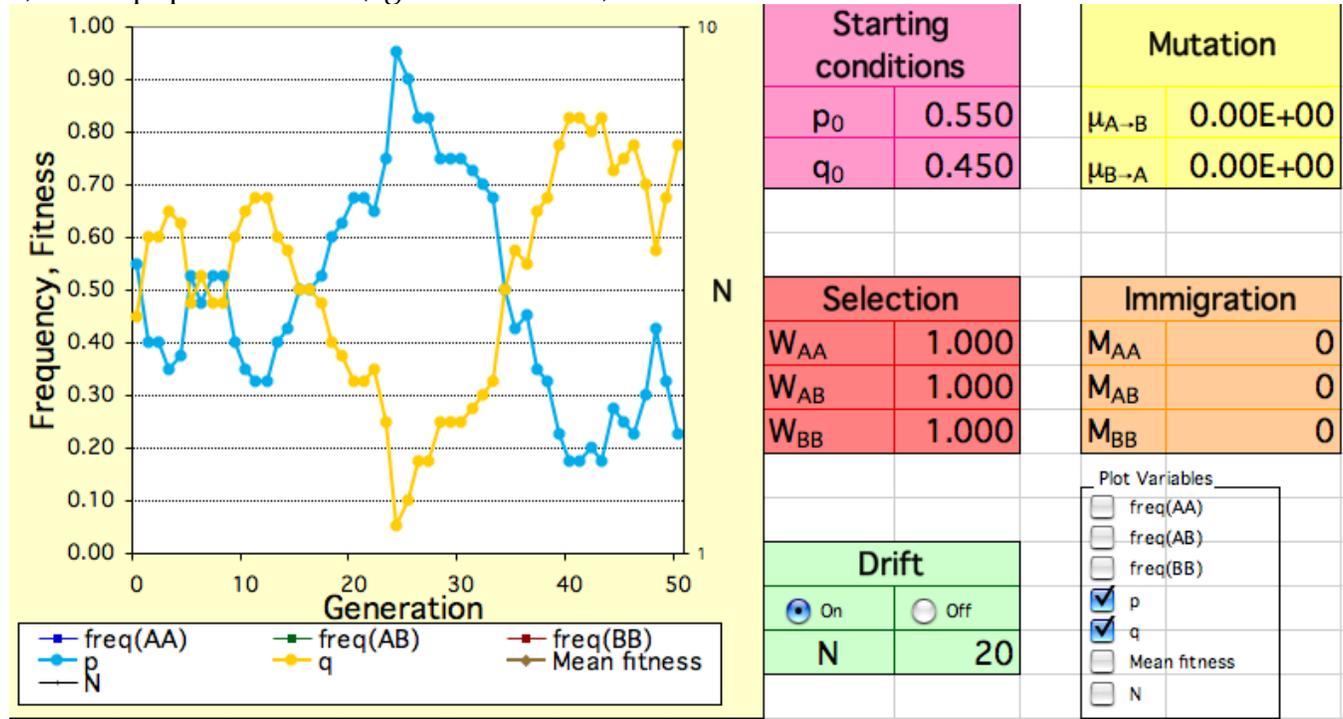
Beaming in your answers

1. Figure out your answer and select the appropriate letter (A-E).
2. Turn on your iClicker by pressing the "ON/OFF" button; the blue "POWER" light should come on. If the red "LOW BATTERY" light comes on, you should replace your batteries soon.
3. Transmit your answer as follows:
 - a. Press the button corresponding to the answer you've selected (A thru E).
 - b. The "STATUS" light will flash green to indicate that your answer has been received. If the "STATUS" light flashed red, your answer was not received; you should re-send it until you get a green "STATUS" light.

Population Genetics Simulations II

Violations of the Hardy-Weinberg Assumptions:

a) Small population size ("genetic DRIFT")



e) Natural Selection:

- for example “Industrial Melanism” in the Peppered Moth in England

color controlled by one gene with two alleles

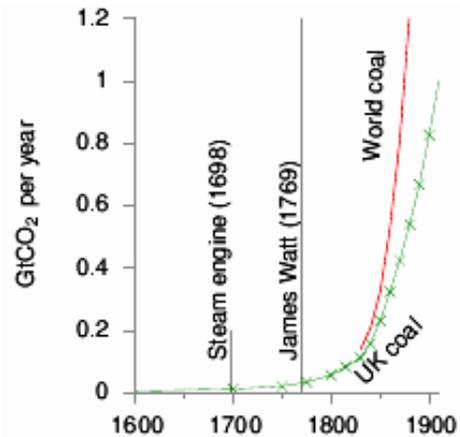
| allele | contribution to phenotype | frequency |
|--------|---------------------------|-----------|
| A | dark body (dominant) | p |
| B | light body (recessive) | q |

| Genotype | Phenotype |
|----------|-----------|
| AA | dark |
| AB | dark |
| BB | light |

| Data: | % of moths that are DARK | % of moths that are LIGHT | freq (A) (p) | freq (B) (q) |
|-------|--------------------------|---------------------------|--------------|--------------|
| 1848 | 1% | 99% | 0.005 | 0.995 |
| 1898 | 95% | 5% | 0.776 | 0.224 |

- In 1848, the trees had clean light bark ⇒ dark moths eaten ⇒ moths mostly light
- Industrial revolution ⇒ coal burning ⇒ soot accumulates on trees ⇒ trees have dark bark ⇒ light moths eaten ⇒ moths mostly dark.

Can simulate in Deme:



| Starting conditions | | Mutation | |
|--------------------------|--------------------------------------|---------------------------------------|---------------------------------------|
| p_0 | 0.005 | $\mu_{A \rightarrow B}$ | 0.00E+00 |
| q_0 | 0.995 | $\mu_{B \rightarrow A}$ | 0.00E+00 |
| Selection | | Immigration | |
| W_{AA} | 1.000 | M_{AA} | 0 |
| W_{AB} | 1.000 | M_{AB} | 0 |
| W_{BB} | 0.820 | M_{BB} | 0 |
| Drift | | Plot Variables | |
| <input type="radio"/> On | <input checked="" type="radio"/> Off | <input type="checkbox"/> freq(AA) | <input type="checkbox"/> freq(AB) |
| N | 20 | <input type="checkbox"/> freq(BB) | <input checked="" type="checkbox"/> p |
| | | <input checked="" type="checkbox"/> q | <input type="checkbox"/> Mean fitness |
| | | <input type="checkbox"/> N | |

Evolution 5 - 4

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