

Lab: Peppered Moth Simulation

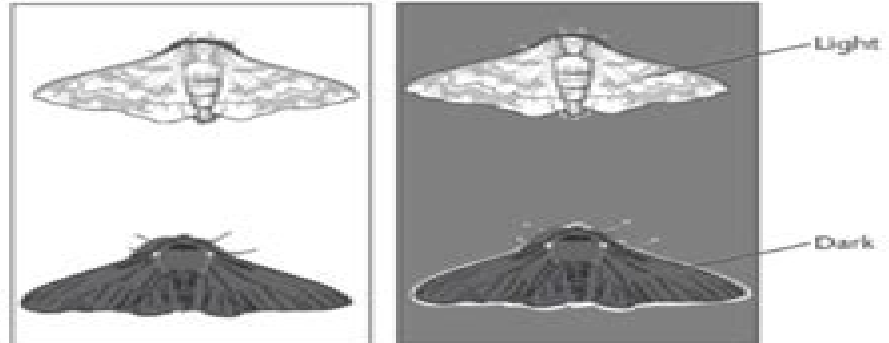
BIOLOGY: CHAPTER 10-PRINCIPLES OF EVOLUTION

Objectives:

- Describe the importance of coloration in avoiding predation
- Relate environmental change to changes in organisms
- Explain how natural selection causes populations to change

Materials

- 8½" x 11" sheet dark background
- 8½" x 11" sheet light background
- Forceps
- Clock with second hand
- 30 light circles (made with hole punch)
- 30 dark circles (made with hole punch)



Purpose: In this lab, you will simulate how predators locate prey in different environments. You will analyze how color affects and organism's ability to survive in certain environments.

Background: The usual form of the peppered moth *Biston betularia* in northern Europe has a light "peppered" pattern of coloration. The moth rests on tree branches and its color pattern **camouflages** it against predatory attack. The camouflage only works against the right background: birds are more likely to eat poorly camouflaged moths, which therefore have a lower **fitness**.

The light coloration of tree branches is mainly caused by lichens that grow there. Smoke pollution in the industrial revolution in the UK killed these lichens near to industrial areas, leaving tree branches black. At about this time, around 1830, a '**melanic**' form of the peppered moth becomes increasingly common in contemporary moth collections. The melanic form is camouflaged on dark tree branches. Through the 19th century, the melanic form increased in frequency until, near industrial regions, it was the normal type of the moth. The increase was almost certainly driven by natural selection.

The moths satisfy all four conditions for natural selection:

- they reproduce;
- their color pattern is inherited;
- there is variation in their color patterns;
- the different forms have different fitnesses.

Before you begin the lab, complete the hypothesis below:

Hypothesis: If the color of the prey matches the background color then

Peppered Moth Survey Lab Answers

M Carnoy



Peppered Moth Survey Lab Answers:

Cognitive Science for Educators: Practical suggestions for an evidence-based classroom Robert

Hausmann, 2020-02-28 The purpose of this book is to catalyze a conversation between Cognitive Scientists and Educators

Toward that end we need a shared vocabulary This book will introduce you to 48 commonly used terms from Cognitive

Science **Biology** Goodman, 1989 Biology, 1999 *High School Biology: The laboratory* Biological Sciences

Curriculum Study, 1961 Laboratory Investigations for Biological Science; Molecules to Man Biological Sciences

Curriculum Study, 1963 **Arrival of the Fittest** Andreas Wagner, 2014-10-02 Natural selection can preserve innovations

but it cannot create them Nature's many innovations some uncannily perfect call for natural principles that accelerate life's

ability to innovate Darwin's theory of natural selection explains how useful adaptations are preserved over time But the

biggest mystery about evolution eluded him As genetics pioneer Hugo de Vries put it natural selection may explain the

survival of the fittest but it cannot explain the arrival of the fittest Can random mutations over a mere 3.8 billion years really

be responsible for wings eyeballs knees camouflage lactose digestion photosynthesis and the rest of nature's creative

marvels And if the answer is no what is the mechanism that explains evolution's speed and efficiency In *Arrival of the Fittest*

renowned evolutionary biologist Andreas Wagner draws on over fifteen years of research to present the missing piece in

Darwin's theory Using experimental and computational technologies that were heretofore unimagined he has found that

adaptations are not just driven by chance but by a set of laws that allow nature to discover new molecules and mechanisms in

a fraction of the time that random variation would take Consider the Arctic cod a fish that lives and thrives within six degrees

of the North Pole in waters that regularly fall below 0 degrees At that temperature the internal fluids of most organisms turn

into ice crystals And yet the arctic cod survives by producing proteins that lower the freezing temperature of its body fluids

much like antifreeze does for a car's engine coolant The invention of those proteins is an archetypal example of nature's

enormous powers of creativity Meticulously researched carefully argued evocatively written and full of fascinating examples

from the animal kingdom *Arrival of the Fittest* offers up the final puzzle piece in the mystery of life's rich diversity

Inquiry Skills Development Holt Rinehart & Winston, 1998-01-27 *Advances in Insect Physiology*, 2019-05-20

Advances in Insect Physiology Volume 56 provides readers with the latest interdisciplinary reviews on the topic It is an

essential reference source for invertebrate physiologists neurobiologists entomologists zoologists and insect chemists with

this new release focusing on the Effects of resource limitation on the strengths of tradeoffs in insect lifecycles The circadian

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Cryptonephridic system in Lepidoptera Subsocial insects and the physiology of parental care Mechanisms regulating

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Contains important comprehensive and in depth reviews on insect physiology Magill's Survey of Science: A-Central and peripheral nervous system functions Frank Northern Magill,1991 **Intermittent Frontiers** Robert B. Finley,2005 Life is variable and undergoing continual change Studying life sometimes requires viewing it as a condition of steady state with little or no change but we should recognize that such a condition is not natural A more realistic approach is to view life as a system of constant change and to try to understand those changes The explanations for life and especially for evolution lie in the differences and their changes

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