

In the 1800's naturalists in England were familiar with the peppered moth. This moth gets its name from its speckled, light-colored wings. The peppered moths that naturalists had observed all looked similar and were usually found on lichen-covered tree trunks and rocks. However, there were two types of peppered moths: light and dark (alleles for the same trait of wing color). The light variation was simply found more frequently in the population. Unusually, in 1845, one black speckled moth was caught in Manchester, England. At that time England was becoming industrialized. Manchester, like many other cities, had factories pouring out smoke and soot and other forms of pollution. The pollution spread to the surrounding countryside and killed the lichens. The soot covered tree trunks, rocks, and even the ground, making everything black. During this time, more and more black peppered moths were found by naturalists. By 1950, very few light-colored moths could be found—almost all of the moths were black-colored.

How did the peppered moth population change so much in just 100 years? The moth had changed as its surroundings had changed. Trees and rocks covered with lichens had been light colored. Covered with soot, they became black. Against the light background, the light-colored moths were camouflaged, and hard to see. But against the dark, sooty background, the light-colored moths were easy for birds to find and eat. In these new dark surroundings, the dark moths more often survived and produced offspring—the black moths were able to pass their genes from generation to generation because they survived. Thus, within this period of 100 years, the moth population completely changed. The frequencies of the black-winged allele was much higher in the population at the end of the 100 year period, while the frequencies of the light-winged allele was much higher before the Industrial Revolution.

**Directions:** Observe Table A on the back of this sheet, which contains data of a ten year study of the peppered moth. The numbers represent the moths which were captured in traps located in the same positions in each of the ten years. Graph these numbers in Graph 1 using different colors to represent each form of the peppered moth.

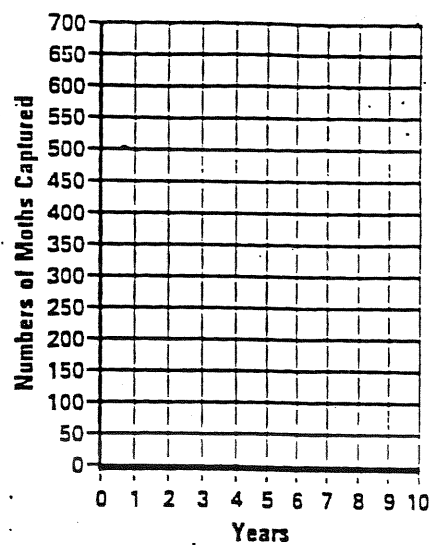
Are you able to spot the black peppered moth in this image?



Table A

Year	Numbers of Light Moths Captured	Numbers of Dark Moths Captured
1	556	64
2	537	112
3	484	198
4	392	210
5	246	281
6	225	357
7	193	412
8	147	503
9	84	594
10	56	638

Graph 1



Analysis Questions

1. Peppered moths are preyed upon by birds. Using this fact, give a possible explanation for the change in the frequencies of the different forms of the peppered moth during the Industrial Revolution.
2. How do the peppered moths' population changes during the Industrial Revolution illustrate natural selection?
3. What is the role of variation in natural selection? What are the two variations of wing color in the peppered moth population?
4. The frequency of certain traits in a population is a reflection of the frequencies of certain genes present in a population. How did the frequencies of genes change in the peppered moth population during the Industrial Revolution?
5. What may have happened to the peppered moth population in England had it not shown variation?