THE PEPPERED MOTH IN 19TH CENTURY ENGLAND

The peppered moth (species name: *Biston betularia*) provides perhaps the best known story in evolutionary biology. The moth exists in two different colors—“typical” or “dark”. In collections made in Britain before the industrial revolution, the moths were almost always a light, peppered color (“typical”). The moth was found mostly in areas where trees were covered with lichen— a grayish algae/fungus that covers the bark of trees. Smoke pollution from the factories in the major cities killed these lichens near industrial areas, exposing the dark black tree branches.

The dark form was first recorded in 1848 near Manchester, and then it increased in frequency until it made up more than 90% of the populations in polluted areas in the mid-twentieth century. In unpolluted areas, the light form remained common. A man by the name of Kettlewell explained the change as being due to selection by visually hunting birds. The dark form of the moth was better camouflaged on the tree trunks in polluted areas, where soot killed the lichen; but the peppered form remained better camouflaged in unpolluted areas. Kettlewell finally convinced the skeptics that camouflage reduces predation by birds when he put the two forms on trees in different areas, photographed birds in the act of taking the moths, and measured the rate at which birds took the two forms. Light-colored moths were indeed taken more in polluted areas, and dark moths were captured more in unpolluted areas. The evolution of dark forms also took place in many other moth species through this period, but *Biston betularia* is the most thoroughly studied example.

When the coloration in the environment of the peppered moth changed, the population of moths changed in form over time. In other words, the moth population evolved. Natural selection is the mechanism that causes evolution when the environment changes. The principles causing the observed “microevolution” of moth coloration are extrapolated to explain the large changes that have produced the diversity of life observed today.

In a paragraph, explain the evolution of color in the peppered moth population.

To help you write a complete answer, be sure to address each of the following:

1. Describe what trait evolved.
2. Describe how each of the 4 factors required for natural selection existed in the moth example:
   a. Variation
   b. Inheritance
   c. Population limits
   d. Environmental selection