

natural selection more complex than the examples shown. Modern evolutionists tend to speak in terms of "ecological niches" and better "reproductive strategies" to incorporate the multitude of factors that determine how life might evolve in one or more different directions.

Nevertheless, the basic principle of natural selection as envisioned by Darwin is still the cornerstone of evolutionary theory: Parents produce offspring that are different; those that are best equipped to survive in the existing environment or to exploit new ecological opportunities thrive and multiply; over time or in isolated areas the changes slowly accumulate to produce new forms of life and new species.

OBSERVATIONS OF EVOLUTION

Do actual observations of changes over time substantiate Darwin's theory of evolution? The answer is both yes and no. Let us first look at *micro*-evolution -- variations among different populations of the same species, as in the variation between the different human races of the world. We will then take a look at *macro*-evolution or major changes in life forms as exemplified by the Cambrian explosion.

During the latter half of the nineteenth century, the countryside surrounding the coal-burning factories of England underwent a dramatic change. Air pollution from coal smoke and soot caused the lichens on trees to disappear and the trees turned black. During the same period, the peppered moth underwent a marked change. Prior to the 1840s, the population of peppered moths was made up of individuals that were almost exclusively a speckled gray color (the light form). By 1895, in the areas surrounding the factories, 98% of the peppered moths were almost completely dark in color (the dark or melanic form). Why?

The answer is obvious when one visualizes how easy it is for birds who eat the moths to spot the light form against tree trunks that are black and lacking in the camouflage pattern of lichens (see figure 8.9). The light-colored moths stand out "like a sore thumb." They are easy prey for hungry birds. Thus, over a fifty-year period, the light-colored moths became rare. The black-colored forms had taken their place. This is a classic example of micro-evolution, or small change over time to fit changing environmental conditions.

Another example of observed change over time is improved breeds of milk- or beef-producing cattle. In the first example of the peppered moth, birds carry out the natural selection. In the second example,