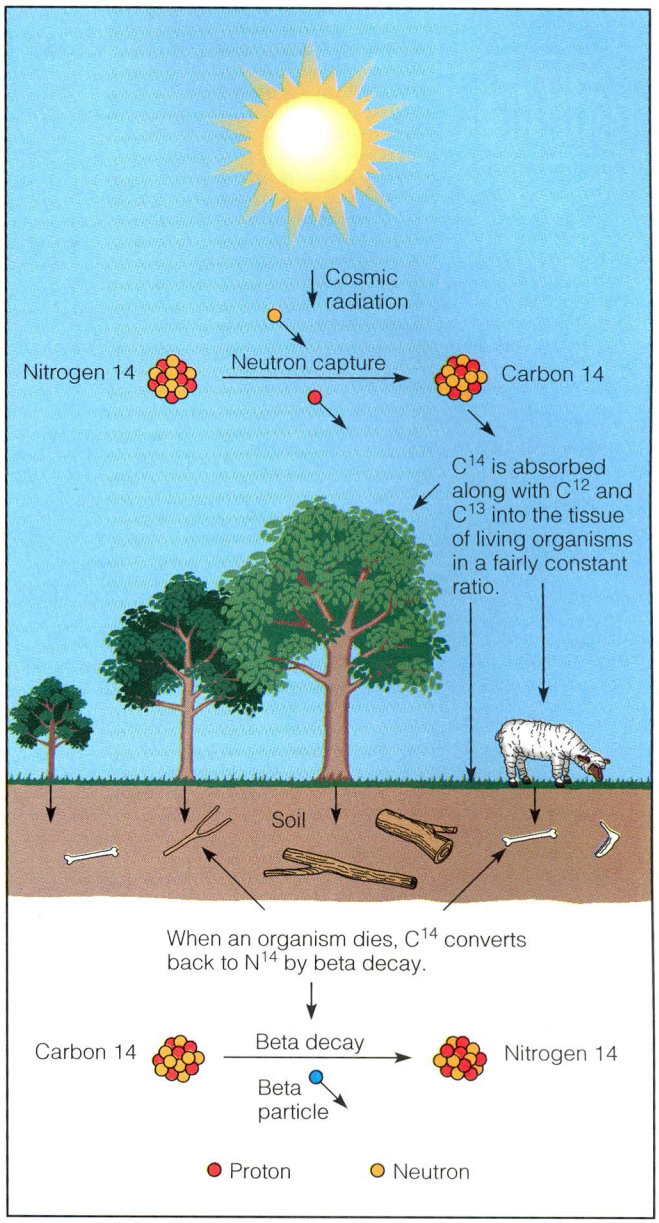

FIGURE 9-23 (right) The carbon cycle showing the formation, dispersal, and decay of carbon 14.

powered microscope and only after etching the mineral with hydrofluoric acid. The age of the sample is determined by the number of fission tracks present and the amount of uranium the sample contains. The older the sample, the greater the number of tracks (Fig. 9-26).

One of the problems in fission track dating occurs when the rocks have been subjected to high temperatures. If this happens, the damaged crystal structures are "repaired" by annealing, and consequently, the tracks disappear. In such instances, the calculated age will be younger than the actual age.

THE DEVELOPMENT OF THE GEOLOGIC TIME SCALE

The geologic time scale is a hierarchical scale in which the 4.6-billion-year history of the Earth is divided into time units of varying duration (Fig. 9-2). The geologic time scale was not developed by any one individual, but rather evolved, primarily during the nineteenth century, through the efforts of many people. By applying relative dating methods to rock outcrops, geologists in England and western Europe defined the major geologic time units without the benefit of radiometric dating techniques (Fig. 9-27). Using the principles of superposition and fossil succession, they were able to correlate the various exposures and piece together a composite geo-

FIGURE 9-24 (below) Discrepancies exist between carbon 14 dates and those obtained by counting annual tree rings. Back to about 600 B.C., carbon 14 dates are too old, and those from about 600 B.C. to about 5,000 B.C. are too young. Consequently, corrections must be made to the carbon 14 dates for this time period.