CENOZOIC GEOLOGY

d13 Recognition of Cenozoic sediments

< friable, lignite, unsurprising marine fossils >

> ... if actual causes were to be used to explain the "former world" and to reconstruct its history, the Tertiaries [as originally defined by Arduino in 1760] were clearly the best place to start. If the Tertiaries could be understood in terms of processes that were observably active in the 'present world', it would extend the scope of causal explanation in geology; and it would allow geologists to 'burst the limits of time' [Cuvier's famous phrase in 1827] not just at an isolated spy-hole such as Kirkdale Cave [*recall* Topic *b35*, p. 130] but quite generally for this most recent [ignoring the Quaternary defined by Desnoyers in 1829] era of geohistory. And if the Tertiaries could be linked onto the present in this way, then they in turn might act as a key for understanding the still deeper past of the [underlying and so deemed older] Secondary formations. —Rudwick.[1]

Cenozoic (Quaternary and Tertiary or today Quaternary, Neogene and Paleogene) sediments can be recognized in the field because for the most part they are just that, sediments (rocks composed of unconsolidated materials). Where lithified, Cenozoic sandstone is usually friable and shale is mechanically weak. However, included shelly limestone and evaporite limestone Cenozoic strata are in places (example: southern Florida) lithified well enough to be used as building stones.[2] In Cenozoic sediments, plant debris is peat where young, or lignite where older (and is rarely coal). To the casual observer, most late Cenozoic marine shells and land fossils (for example: the first modern animals (beaver) and plants along with extinct animals as indigenous American horses in the 3.5 million year old Hagerman Fossil Beds NM, Idaho)[3] do not look strange. However, the bones of land animals in these sediments can be surprising when they are of large animals that no longer occupy an area. The discovery of the skeleton a mammoth usually causes a sufficient stir to be locally newsworthy. Noticeably different are the bones of the head (with long horns on the snout) but not the body of Oligocene titanotheres. The bones of Eocene dawn horses, even for experts, look like those of living hyraxes. ❑

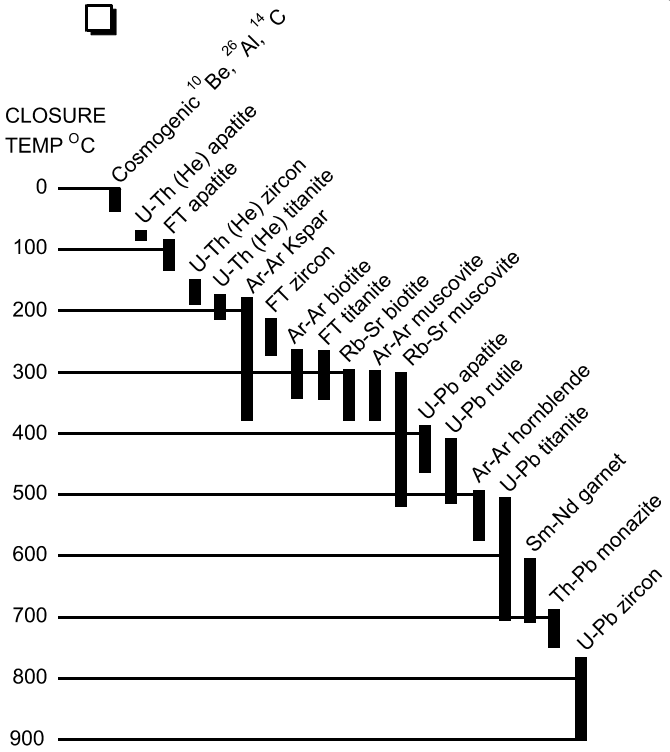

Figure d12.3 Geologic thermo-chronometers that are in current use, and their effective closure temperatures (*adapted from* P. Fitzgerald, S. Baldwin, G. Gehrels, P. Reiners, and M. Ducea).[9]