



ANTIQUÉ AUTHENTICATION

authenticating antiques  
through science

## Radiocarbon Dating Explained

**Conventional radiocarbon years are not the same as calendar years.**

Radiocarbon years are estimations based on the measurement of how many carbon 14 isotopes are found to be in a sample compared to the ratio of carbon 12 and carbon 13 isotopes. These isotope ratios are converted into a conventional radiocarbon age (CRA) and that **radiocarbon age is converted into a calendar date through calibration.** While we can determine radiocarbon age with an error margin of  $\pm 20$  years, we cannot provide such a precise age in calendar years. A range of calendar years is given within which the radiocarbon years could fall after calibration.

Calendar dates from radiocarbon ages less than 200 years are much less precise than older ones because of the burning of coal and petroleum which began in the early 17th century. This disrupted "normal" isotope ratios. So although we are able to measure a precise radiocarbon age for objects dating from 1650 to 1950, we cannot calculate a precise calendar date. Most of the objects we work with have radiocarbon ages older than 200 years so this is usually not a problem.

Nuclear weapons testing between 1945 and 1970 released huge quantities of carbon 14 into the atmosphere, with a peak in 1963. This excess C14 has been carefully measured, and as a result, we know how much excess C14 there was in the atmosphere for any given year since 1950. This can be plotted on a graph of calendar years which is called the bomb curve. The bomb curve can be used to precisely date objects made from organic materials after 1950 which is very useful for our purposes in detecting fakes.