

THE RELIABILITY OF ARCHAEOLOGIC INTERPRETATION OF  $^{14}\text{C}$  DATES

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ABSTRACT.  $^{14}\text{C}$  dates of a medieval settlement with archaeologically well-dated strata are compared with the true ages of the respective layers. The  $^{14}\text{C}$  values indicate that each layer may contain older material reaching up to the beginning of settlement. Therefore, the  $^{14}\text{C}$  measurement of only a few wood or charcoal samples may lead to age estimations several hundred years too old.

The excavations of the medieval village of Starigard at Oldenburg, Schleswig-Holstein, northwest Germany, provided a rare opportunity of comparing  $^{14}\text{C}$  ages of wood and charcoal samples with the age of the surrounding layer determined by archaeological methods.<sup>1</sup> Figure 1 shows the results. On the lower x-axis, the conventional  $^{14}\text{C}$  age is given. The bars equal 1 $\sigma$  lying, in most cases, between 50 and 70 years. The upper x-axis gives the age corrected for variations of the recent activity. Instead of the calibrations of Bruns, Münnich, and Becker, (1980), this scale is simply shifted against the lower scale by a mean value of 35 years. This may be justified because the samples of Starigard usually consisted of charcoal containing a mixture of many tree rings. On the y-axis, the archaeological age is given with a precision of ca 25 years. The accuracy is still better, eg, for the "separation layer," assigned to AD 967 or 968, when the Slavonic fortification was destroyed by fire and subsequently reconstructed as a bishop's see. Other strata can be clearly differentiated and dated by ceramic finds.

The  $^{14}\text{C}$  values have a rather poor correlation to the real age. At the younger side, except for statistical variations, no value is younger than expected archaeologically (see the diagonal lines in figure 1). But at the left (older) side, excepting one sample, all  $^{14}\text{C}$  ages found in the different strata end within a common short period near AD 600, possibly indicating the beginning of the settlement.

There are several well-known reasons for the difference between the (older)  $^{14}\text{C}$  age and the real age of the layer in question (cf Waterbolk, 1971). Also, the excavation of Starigard shows that every stratum contains material from the beginning of the settlement to contemporaneous samples in spite of the difference of >3m between the lowest and uppermost layer. In this case, the obvious reasons are frequent burning and reconstruction of fortifications, digging new ditches, or leveling the ground. On other excavation sites, such "anthropogenic bioturbation" usually can be expected to produce large errors in age estimation.

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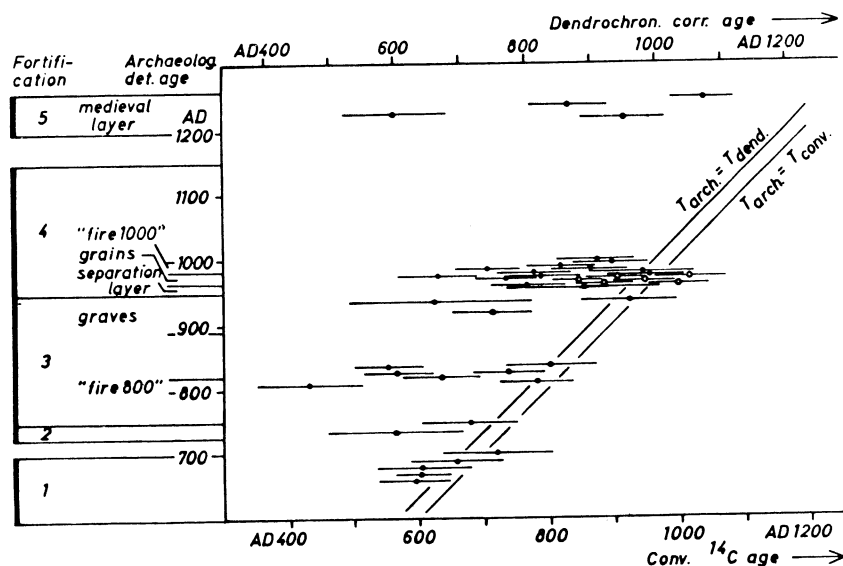


Fig 1. Comparison of  $^{14}\text{C}$  values with archaeologically determined ages. ● = wood and charcoal; ○ = carbonized cereals.

For a single layer with different  $^{14}\text{C}$  ages, it is interesting to decide on the basis of these values, whether the samples belong to a single common age or whether the real ages are spread over a larger time span. Only if there is a single common age, it is justified to calculate a mean value giving a more precise estimation of the real age. In the other case, the mean value is of no practical use.

On the basis of measured values only, it is impossible to decide between these two cases. Consequently, it is invalid to combine several ages to get a more exact mean except when there are strong archaeological or stratigraphic reasons indicating that the samples really belong to the same age. Mere coincidence of measured ages is not enough.

#### ACKNOWLEDGMENT

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