## THE STATISTICS OF LOW-LEVEL COUNTING USING THE NEW GENERATION PACKARD SCINTILLATION COUNTERS

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The new generation of liquid scintillation counters with low-background count-rate capability raises questions concerning the application of standard Poisson statistics to the resulting counts. In addition, the stability of these systems must be verified over long time periods. In this paper, we investigate the suitability of Poisson statistics applied to count rates derived from the Packard 2260XL and 2000CA/LL counters. We consider their long-term stability and discuss the implications of this new technology for minimum age calculations.

## **RADIOCARBON DATING OF IRON ARTIFACTS**

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During the late 1960s, N J van der Merwe (1969) obtained radiocarbon measurements on 11 iron pieces, ranging in carbon content from medium carbon wrought iron (1.2 kg used) to high carbon cast iron (30 g), thereby demonstrating the feasibility of the technique for iron. In the early 1980s, Sayre *et al* (1982) repeated two of van der Merwe's measurements and carried out two analyses on a recently re-recovered Elizabethan (?) iron bloom. Thirty grams were required of this medium carbon wrought iron to obtain an age using small proportional counters.

A number of iron artifacts were analyzed recently at IsoTrace using accelerator mass spectrometry (AMS). Samples ranged in size from 3.4 g of a medium carbon ( $\sim 0.4\%$ ) wrought iron bloom to 274 mg for a high carbon (1.79%) wootz steel fragment. This reduction in sample size posed no problem for accelerator dating, which now permits analysis of samples that previously were too small or too valuable to be analyzed. For larger samples, multiple analyses can reveal variations that may aid the evaluation of a sample's history.

## REFERENCES

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Sayre, EV, Harbottle, G, Stoenner, RW, Washburn, RW, Olin, JS and Fitzhugh, WW 1982 The carbon-14 dating of an iron bloom associated with the voyages of Sir Martin Frobisher. *In Currie*, LA, ed, Nuclear and chemical dating techniques: Interpreting the environmental record. *ACS Symposium Series* 176: 441-451.