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"Study the past if you would divine the future." Confucius

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THE REPRODUCIBILITY OF TL DATA FROM FINE GRAIN DISCS

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In the course of studying the TL characteristics of pottery it has occasionally been necessary to sample the same potsherd more than once, and to make up and measure different sets of discs at different times from different pieces of the same sherd. It has been found that although the TL data obtained from these different sets of discs from one sherd may have excellent internal reproducibility with linear growth curve characteristics both on first and second glow, and a good plateau region, nevertheless the values obtained for the equivalent dose, ED , intercept, I , and a value are not compatible. To illustrate this, data from 4 archaeological samples from different sites, and one modern gamma irradiated sherd are presented in table 1. It must be emphasized that,

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considered on its own merits, each of these evaluations for each sherd would be considered entirely acceptable, and yet it can be seen that there are significant variations in all three of the parameters obtained from TL data. In addition it has been found that some sherds, which on one deposition appear to give good linearity in the first and second glow growth curves, may show unacceptable non-linear behaviour on a subsequent deposition, although still with good disc to disc reproducibility.

All of these samples appeared homogeneous, and there was no observable difference in the radioactivity measurements (alpha counting and β TLD) made on the different samples from the same sherd. Thus it must be concluded that the differences in the values of \overline{ED} , \overline{I} and \overline{a} obtained are, at least in part, due to some unknown differences in experimental procedure, rather than to intrinsic differences in the TL behaviour of different portions of the sherd. Fortunately the effect of these variations on the age is often within the experimental error, partly because the spread in the archaeological dose ($\overline{ED} + \overline{I}$) is nearly always less than the variation in the individual values of the \overline{ED} and \overline{I} , are partly because the variation in the \overline{a} value usually tends to compensate for the variations in the \overline{ED} . Nevertheless this data serves to illustrate the often repeated warning that all of the TL measurements necessary for a fine grain date should be obtained from discs from a single deposition only. It is very unsafe to use, for instance, an \overline{ED} from one deposition, and an \overline{I} from another.

Table 1

TL data obtained different depositions of the same potsherd

Sample	ED(rads)	σ	I(rads)	σ	a	σ	Age(years)	σ
1 i)	1610	80	0	50	0.140	10	5965	510
ii)	1136	56	258	100	0.100	5	5720	770
2 i)	990	60	0	60	0.170	5	785	75
ii)	660	20	0	50	0.100	5	625	60
3 i)	20565	825	0	500	0.10	1	48000	3700
ii)	18110	725	3000	1000	0.12	1	46000	4000
4 i)	3020	150	280	100	0.125	5	6870	650
ii)	3140	180	0	50	0.130	5	6450	700
γ irradiated sherd	643	13	30	50	A			
(modern	650	60	145	20	B			
Peruvian)	657	40	54	15				

- Notes:
- a) the gamma irradiated sherd was given a total dose of 690 ± 10 rads
 - b) i and ii represent the same worker at different times; A and B represent different workers
 - c) the errors in the ages are experimental errors only
 - d) errors are in the least significant figures