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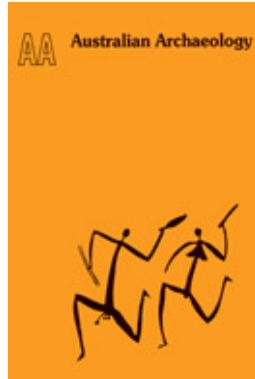
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THE DISCOVERY AND PRELIMINARY THERMOLUMINESCENCE DATING OF TWO ABORIGINAL CAVE SHELTERS IN THE SELWYN RANGES, QUEENSLAND

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Two apparently undisturbed cave shelters near Selwyn in the Selwyn Ranges in Queensland were discovered by one of us (G.G.) during 1977. The first of these, referred to as Site 1 is located at Lat. 21°23'; Long. 140°32'. The second referred to as Site 2, is located approximately 10km SE of the first. Rock paintings were present in both shelters but were not recorded in detail.

At Site 1 the paintings consisted of finger (?) paintings in faded red ochre of a figure 25cm high, two boats 20cm long with figures in them, and smaller symbols. Near this site there was a flaked edge stone tool and numerous flakes.

At Site 2 there were numerous paintings in red ochre similar to some at Site 1 (not boats) plus many others in yellow, white and red of (among other things) rainbow snake; kangaroo; dingo (?); birds (?), and hand silhouettes. The yellow and white paintings cover some of the red and are more complex, suggesting they are younger.

Small fire hearth samples were carefully taken from each site, wrapped in aluminium foil and forwarded to Canberra for trial thermoluminescence dating. This was carried out using the now well-known quartz grain inclusion method. In the present case after washing in HCL acid the separated grains were finally etched for 20 minutes in concentrated HF acid to remove the near-surface alpha radiation dose. The identity of these grains was established by XRD. Glow curves associated with these samples are shown in Figures 1 and 2. The derived plateaux, which are required to be flat if the thermoluminescence is induced by radioactivity, are displayed in Figure 3. It will be observed that the general characteristics of these are good in the region of the read-out temperature, namely 375°C.

Measurements of the U, Th and K for the two samples were made at the ANU by XRF. The concentrations are listed below:

	Site 1	Site 2
U	17 ppm	17 ppm
Th	51 ppm	37 ppm
K_2O	2.16%	1.35%

The calculated annual dose rates using these data and assuming burial in surrounding soil of the same composition were:

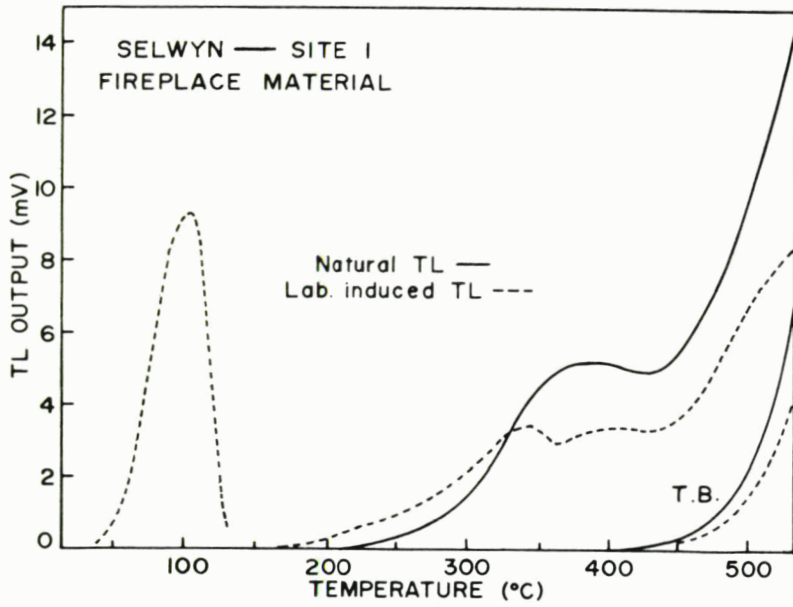Site 1:   1.04   rads/y
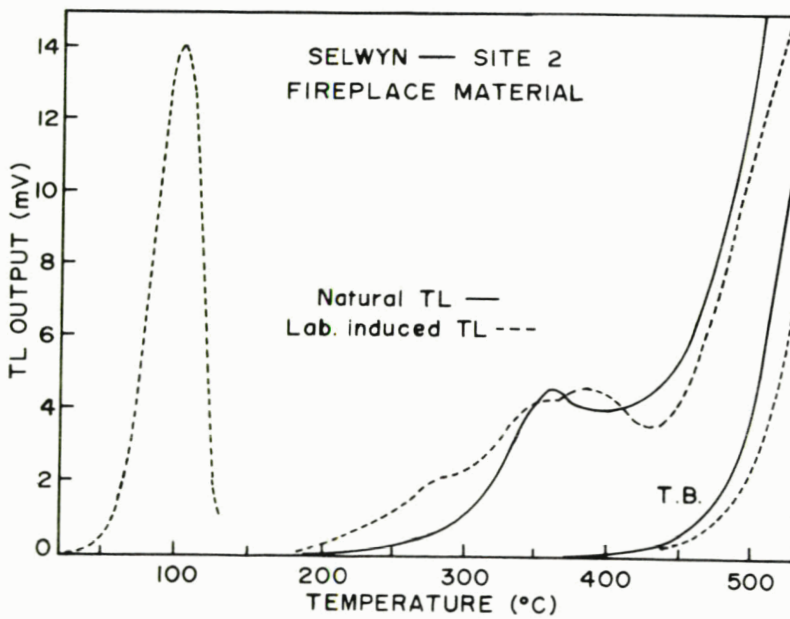Site 2:   0.86   rads/y
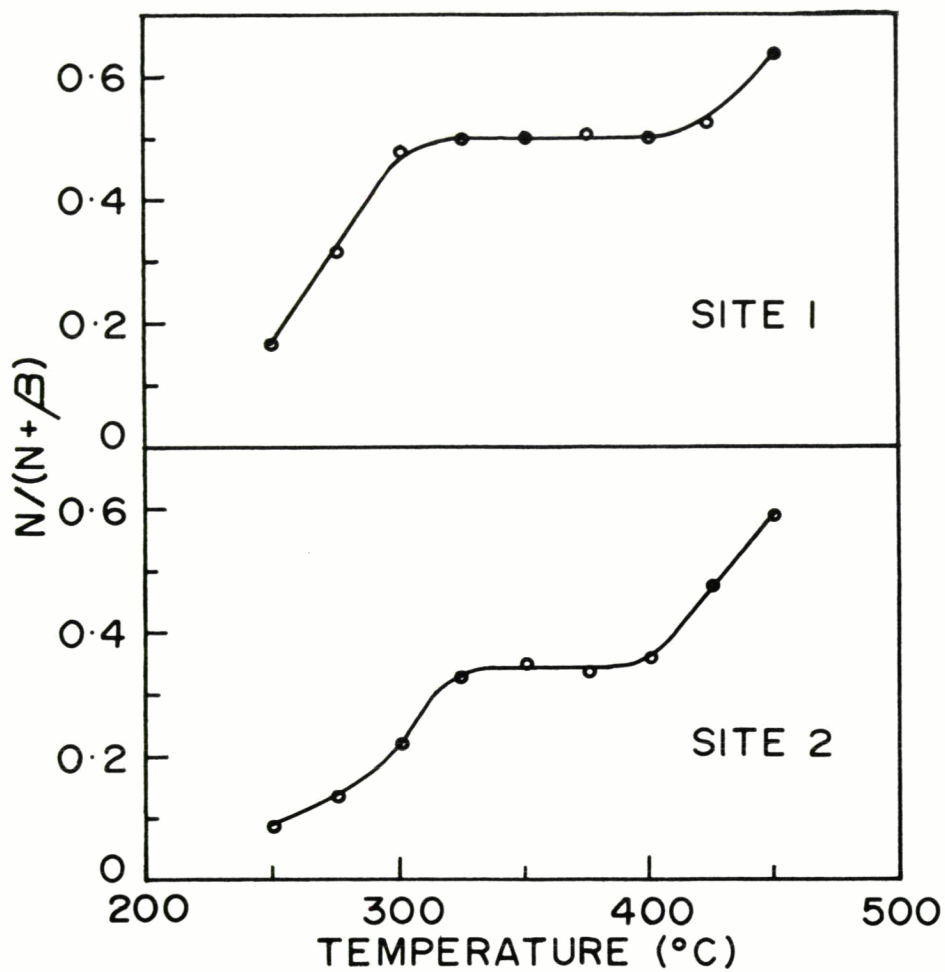
Figure 1

Figure 2

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Figure 3

Because of the nominal nature of the calculations at this stage and lack of relevant experimental data, no correction has been made for the possible effects of the water content of the soil and, also, any radon gas loss that might have taken place. The direction of these corrections, if operative, would be to <u>decrease</u> the calculated annual dose rate.

Apparent thermoluminescence ages were calculated on this basis to be approximately:

    Site 1:   1900 y BP
    Site 2:   1100 y BP

Two additional factors possibly produce further systematic errors in these age figures. Firstly, the sample material was not baked hard and, on arrival in Canberra, was relatively loose. This could mean that light had reached the inner quartz grains and drained some thermoluminescence. If so, the apparent ages would be <u>lower limits</u>. This statement remains true when the two corrections already mentioned for water content and radon loss are included.

Unfortunately the last and final factor which cannot be accounted for numerically may go either way in its effect on the calculated age, particularly for Site 1. The test sample for this was taken from the bottom of the overlying soil layers, the substrate being rock. This rock may be of higher or lower radioactive content than the nearby soil. If lower, then the calculated annual dose rate used is too high and the age figure for this site remains a <u>lower limit</u>. However, the radioactive content could be <u>higher</u>. In that case this meaning can no longer be attached to this particular age figure. The fact that the calculated age for Site 2 is lower than that for Site 1 is consistent (all things else being equal) with the radioactive content of the substrate rock being higher than that of the nearby soil. The test sample for Site 2 was taken 10cm from the rock substrate, which is still within the range of gamma rays from the rock but should be less affected than the test sample from Site 1.

From what has been said the weight of the evidence is that the ages of both fire hearth samples are not less than 1000 years. The ages of the wall paintings may very well be different from this, and cover a range of years. Clearly a further visit to the sites made with cameras and other appropriate survey equipment such as in-field radiation dosemeters would be worthwhile. Additional experimental information could then be obtained to remove the limitations on the present results.

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