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THERMOLUMINESCENCE OF METEORITES; RELATIONSHIPS WITH THEIR K-Ar AGES AND THEIR SHOCK AND REHEATING HISTORIES

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The observations of Komovsky (1961) and Liener and Geiss (1968), that the thermoluminescence (TL) sensitivity* of meteorites correlates with their K-Ar age, has been confirmed using a suite of 22 ordinary chondrites. In order to interpret this observation, meteorite samples have been exposed to doses of α, β and γ radiation comparable with those experienced over the lifetime of the meteorites and given a dose of protons comparable to the total dose received from cosmic rays. There was no increase in TL sensitivity, suggesting that, contrary to the ideas of earlier workers, the TL mechanism does not involve radiation damage. The TL sensitivity of meteorites is therefore time-independent. On the other hand, samples of meteorite annealed in a furnace at temperatures between 450 °C and 1250 °C for one hour suffered up to an order of magnitude decrease in TL sensitivity. Similarly, samples of meteorite artificially shocked to pressures in the order of 400 kbar suffered a comparable decrease in TL sensitivity. It seems, therefore, that the correlation between TL sensitivity and K-Ar age is entirely a result of the low K-Ar age meteorites being shocked or reheated (Heymann, 1967). A comparison of literature data on the thermal and mechanical histories of these meteorites and their TL sensitivities also seems to suggest a relationship.

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Komovsky, G.F., 1961. Thermoluminescence of stony meteorites (in Russian). *Meteoritika* **21**, 64-69.

Liener, A. and J. Geiss, 1968. Thermoluminescence measurements on chondritic meteorites. In: *Thermoluminescence of Geological Materials*. D. McDougall (ed.), Academic Press, New York, 559-568.

*The TL induced by a standard laboratory radiation dose in a sample which had previously been heated to 500 °C to remove its natural TL.