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**Metamorphism, brecciation and shock of the eucrite association meteorites: A study by thermoluminescence techniques.** J. D. Batchelor and D. W. G. Sears. Dept. of Chem. & Biochem., Cosmochem. Group, Univ. of Arkansas, Fayetteville, AR 72701, USA.

The meteorites of the eucrite association have been shown by a variety of textural, chemical, and isotopic factors to be closely related. A number of them have undergone regolith gardening, and some are gas-rich. Variations in pyroxene composition, the presence or absence of exsolution lamellae, and the wide variety of textures demonstrate the variety of thermal histories represented. A detailed understanding of these should aid our understandings of the parent body and its heat sources, radiogenic data, and regolith and ejection processes. We have studied the thermoluminescence (TL) properties of homogenized 150–300 mg samples of 16 HED's and 4 mesosiderites. All had low TL sensitivity due to the virtual absence (diogenites) or calcic nature of their feldspar (1). Among the eucrites, the brightest sample was the cumulate, followed by the equil., then the unequil. eucrites. We believe that the metamorphic equilibration leads to an increase in TL. The howardites have TL similar to the unequil. eucrites, probably due to dilution by a low TL component, *e.g.,* diogenitic material. The eucritic clasts from Bholghati show TL as high as the equil. eucrites. The mesosiderites show a wide range of sensitivities, possibly related to their classification in the metamorphic sequence.

The TL glow curves for most samples show two peaks (115 ± 5 °C, 195 ± 9 °C), the first peak dominating in all but two unequil. eucrites (both peaks comparable) and LEW85303 (one resolved peak at 200 °C). The 115 °C peak of the eucrites was unchanged after annealing for 96 hours at 400 and 600 °C, but moved to higher values after annealing at 800 and 1000 °C, reaching a peak position of 160–200 °C. Annealing caused little change in the peak position of LEW85303. It seems clear that LEW85303 has been heated to at least 1000 °C, and that the last sustained temperature of the others was below 800 °C.

In conclusion, variations in TL reflect (1) impact reworking, with formation of glasses and occasional addition of low TL material (*e.g.,* diogenitic or CM chondrite), and (2) subsequent metamorphism and devitrification. LEW85303 has been heated to at least 1000 °C. Since it has suffered Ar-degassing (2) and contains silicates with undulose extinction (3, 4), we suggest that this heating is the result of shock 1 Ga ago. The metamorphism experienced by most eucrites, howardites and the present mesosiderites, resulted in equilibration temperatures <800 °C. Clayton and Mayeda (5), recently determined an O-isotope temperature of 820 ± 80 °C for the eucrite-related LEW86010 meteorite. Estimates of metamorphic temperatures of equilibrated eucrites based on px thermometry have been 747–1080 °C, depending on the calibration used. Miyamoto *et al.* (6) assumed a temperature of 1000 °C and calculated burial depths of 150 m using a thermal model for the regolith. Using 800 °C, we calculate burial depths of 350 m. The previous estimate for unequilibrated eucrites (<50 m) remains unchanged.

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