

LETTERS TO THE EDITOR

Comments on "Universidad Nacional de Ingenieria (Peru) Ancient TL Dates - 1983."
(Ancient TL, v.l., n.l, 1983)

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I have had the opportunity of seeing your "Ancient TL", Vol.1, No.1 (January, 1983) and I have found information about a site in Huarmey which I excavated years ago. This information is not correct (p.9, c, Sample UNI-TL-4).

- 1) The correct situation of the site is $10^{\circ}02'45''S, 78^{\circ}10'21''W$.
- 2) The site is not Chavin de Huantar. The exact name is Los Gavilanes (PV35-1).
- 3) Fragments of the same sample delivered to the U.N.I. laboratories in Lima, have been treated by Laboratoire de Cristallographie et de Physique Cristalline of the Faculty of Sciences of the University of Bordeaux in France, and the dating was checked two times for security. The result was 4800 ± 500 years BP (BOR 20).
- 4) For control, samples of charcoal from the same strata was processed by the C14 method, and the date obtained was 4140 ± 160 (GX-5076). With Damons et al. calibration (I) the date become 4730 ± 90 years BP. This coincides with thermoluminescence dating. The report of Rouanet (1976) quoted by López Carranza, et al., is only a thesis. But in any case the data are correct.
- 5) The archaeological context of the site is in complete agreement with those datings.
- 6) The results of my research in Huarmey, informing of the thermoluminescence dating was published in a preliminary report in Nature (II) and in a final report in my last book (III). In this book the reader can not only find the datings (p.73-75) but also a lengthy discussion on this topic (p.275-276; 280).

"References"

- (I) Damons, P.E.; Ferguson, C.W.; Long, A.; Wallick, E.I. (1974) "Dendrochronologic calibration of the radiocarbon time scale" American Antiquity Vol. 30, No 2, part 1, April. Washington. pp.350-366.
- (II) Grobman, Alexander and Bonavia Duccio. (1978) "Pre-ceramic maize on the north-central coast of Peru" Nature, Vol. 276, No. 5686, 23 November. London. pp. 386-387.
- (III) Bonavia, Duccio. 1982
Preceramico peruano. Los Gavilanes. Mar, desierto y oasis en la historia del hombre.
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1. Prof. Bonavia is right in the correction of the exact geographical situation of the excavation site.
2. "Chavin de Huantar (?)" in our paper is a designation of the predominant Peruvian culture in the time 90 BC (our datation). I understood that in this place in the paper should appear a culture designation. The reference of the site PV35-1 is given also by us.
3. Our datation 90 BC was communicated to Professor Bonavia before publication. I showed him the first manuscript of our paper and he was unopposed to its publication. He assured me that the sample which we dated was not the same sample BOR 24 dated at Bordeaux. The last datation, 4979 years, was communicated in the second version of our paper but was dropped in the final version for reasons of space.
4. We believe that the Bordeaux datation (1976), communicated to us by Professor Bonavia, is right and our datation (1979) is also right, because it comes from a different sample (in the hypothesis which we assumed). The annual doses of both samples are almost the same but the difference in age comes from a factor 2 in the accumulated dose. We feel reasonably confident of the general correctness of our procedures. Dates from this laboratory agree in most cases with results from other labs obtained by different methods.

SOME RECENT BIBLIOGRAPHY *

W. Wang (1982) Ultrathin TLD system for beta dose determination in thermoluminescent dating. Kexue Tongbao, 27, 1139-1141.

H. Valladas (1983) Estimation de la temperature de chauffe de silex prehistoriques par leur thermoluminescence. C. R. Acad. Sc. Paris, 296, Serie II, 993-996.

For burnt flints, the thermoluminescence sensitivity to radiation of the 380°C peak increases with the heating temperature. Thus a flint that has been heated at 500°C in the laboratory emits, for a given dose, twice as much thermoluminescence as the same flint after heating at 400°C. This property makes it possible to propose a procedure to give an approximation of the temperatures reached in the past by prehistoric flints. This method has been applied to various Mousterian flints from Southern France and shows that they have been heated between 400 and 600°C.

S. Charalambous and F. Hasan (1983) Regenerated thermoluminescence. Phys. Letters A, 95, 259-262. A regenerated, non-radiation induced TL was observed. Results versus dose, storage time, storage temperature, maximum first heating, are presented. For the phenomenon a theoretical model is given, based on the

* Abstracts from the quoted papers are given here to inform readers on contents.

formation of a peculiar composite defect from migrated defects and trapped electrons.

- S. V. Moharil and S. P. Kathuria (1983) On the general order kinetics in thermoluminescence. J. Phys. D, 16, 425-429.

In view of the recent debate on the order of kinetics in LiF TLD-100, the physical significance of the term is discussed. It is shown that the general order equation of May and Partridge is only empirical, and Antonov-Romanovski's equation is more appropriate to describe the non-integral order of kinetics. A method is proposed to obtain a parameter in this equation which is physically more relevant than the order of kinetics.

- A. F. Skinner (1983) Overestimate of stalagmitic calcite ESR dates due to laboratory heating. Nature, 304, 152-154.

In the use of ESR for dating stalagmitic calcite from palaeolithic caves it has recently been reported that to obtain reliable ages the samples should be heated before measurement, for example, for 24 h at 170-190°C. Specifically this procedure has been used by Yokoyama et al. for samples from the lowest stalagmitic floor in Caune de l'Arago, the site of the Tautavel man in southern France, and an age of ~700 kyr obtained. However, the results presented here indicate that straight-line extrapolation involved in finding the age is not valid if this heating procedure is used and that its use leads to a substantial overestimate of the age, by nearly a factor of two in the application mentioned.

- N. C. Debenham (1983) Reliability of thermoluminescence dating of stalagmitic calcite. Nature, 304, 154-156.

The dating of stalagmitic calcite at the early hominid site of Caune de l'Arago, France, by the ESR technique of Yokoyama, et al., has yielded ages for the underlying floor of $\sim 7 \times 10^5$ yr. These are in serious disagreement with the chronology obtained by thermoluminescence (TL), which indicates a date of around 3×10^5 yr. The discrepancy has been attributed to instability of the TL 280°C dating signal, for which a mean life of 2×10^5 yr was proposed. Here the arguments on which this claim is based are criticized, and evidence is presented that corrections to TL age measurements incurred by signal fading are, even for the oldest stalagmites from the site, probably <15%. The conflict between the TL and ESR chronologies at Caune de l'Arago is explicable in terms of the ESR results reported by Skinner.

- A. V. Sankaran, K. S. V. Nambi and C. M. Sunta (1983) Progress of thermoluminescence research of geological materials. Proceedings of the Indian National Science Academy, 49A, 18-112.

The phenomenon of thermoluminescence (TL) in some minerals has been observed for many centuries, but its systematic and scientific evaluation started only during the fifties of the present century. When its potential applications in the field of geochronology was recognized, detailed basic studies regarding the build up, stability and several other facets of thermoluminescence were taken up. Over the past few decades, many applications of this phenomenon to probe geological problems and processes were attempted. Among these can be mentioned the studies on sediments, stratigraphy, ore-prospecting, palaeoclimates and meteorites. This paper reviews the observations made regarding thermoluminescence in a number of

minerals and also its application in some of the important branches in geology. Pertinent areas in the context of Indian geology is also furnished at the end, along with the methodology in field collection and laboratory practice.

- S. R. Sutton and G. Crozaz (1983) Thermoluminescence and nuclear particle tracks: Evidence of a brief transit time for ALHA-81005. Geophys. Res. Let., Vol.10, No.9, 809-812.

Thermoluminescence and nuclear particle track measurements were made on the Antarctic meteorite ALHA-81005. No nuclear particle tracks were found in lithic fragments indicating that the clast material never resided at the very surface of the parent body. The unusually low natural thermoluminescence of this material is interpreted as being due to a combination of anomalous fading and thermal decay. The thermal decay could be due to very long terrestrial age or heating either during atmospheric entry, in a near sun orbit or during a parent body impact event. Impact heating is considered the more likely of these possibilities for this meteorite. If the impact heating interpretation is correct the thermoluminescence data constrains the space exposure time of the object to be less than 2,500 years. Such a brief Earth transit time is consistent with a lunar origin for this meteorite.

- G. Poupeau (1983) Recent advances in quaternary geochronology. Anais do XXXII Congresso brasileiro de Geologia, Salvador, Bahia, Vol.4, 1442-1450.

Significant progress has occurred in quaternary geochronology. These include both (i) improvements in Fission Track and Thermoluminescence dating, as well as (ii) new technologies for short-lived (i.e. with half lives $\leq 10^6$ yrs) radionuclide measurements as with the ^{14}C or uranium series disequilibrium dating, and finally (iii) the emergence of entirely new dating approaches as the Electron Spin Resonance Method. The aim of this paper is to review these progresses and the new areas they open to geochronology for the past-miocene times.

Two papers presented at the 1st International Symposium "Archeologic Africaine et Sciences de la Nature Appliquees a l'Archeologie" 26-30 Septembre, 1983, Bordeaux, France:

- M. Schvoerer, F. Bechtel and P. Guibert, "Datation par Thermoluminescence de Céramiques Neolithiques Sahariennes Provenant d'Hassi Movillah et de Ti-N-Hanakaten (Algerie)."
- P. Guibert, M. Schvoerer and F. Bachtel, "Datation par Gamma-thermoluminescence: Recherche Théorique et Nouveaux Resultats Expérimentaux."

Presentation at X^{ème} Congrès International d'Etudes des Civilisations Précolombiennes des Petites Antilles, Fort de France, Martinique, 25-30, Juillet, 1983:

- M. Schvoerer, P. Guibert, F. Bechtel, M. Mattioni, and J. Evin. "Des Hommes en Martinique Vingt Siecles avant christophe colomb? ou, Contribution à la résolution, grâce à une nouvelle méthode de datation, la GAMMA-THERMOLUMNESENCE (-TL, d'un problème chronologique au Lorrain-Fond Brûlé (Martinique).

Extended abstracts of the preceding three papers may be obtained from:
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