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Short articles



DATING OF ROCK PAINTINGS IN THE AMERICAS: a Word of Caution

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Pictograph dating has been commonplace for two decades. Many good results have been obtained. But, verification needs to become more frequent in rock art dating studies – at least until a new dating method has been proven. Although I speak here only about pictographs, it applies to petroglyphs as well, perhaps even more so. How can we know we are getting accurate dates?

Standards are used to verify experimental techniques. However, there is only one American group of known-age pictographs that can be considered to be standards: Maya calendar dates written in paintings at Naj Tunich Cave, Guatemala. The drawings there utilized charcoal and hence test only dating of charcoal-pigmented pictographs. Interlaboratory comparisons, essential to test a new method, are almost non-existent in American pictograph dating studies. When they have been done, agreement has generally been found lacking. I discuss here one case where the Texas A&M University laboratory and a Brazilian laboratory were involved and there is total disagreement. Radiocarbon standards should be dated routinely, as should radiocarbon-free materials – standard procedure in radiocarbon laboratories. Blind tests help verify new techniques. Archaeological inferences can validate a new technique when inferences are strong chronologically. Finally, publication of experimental procedures should include enough details that other scientists can reproduce their experiments. Too often, however, few experimental details are included in pictograph dating publications.

Guidon and Arnaud wrote two decades ago: “The chronology of the earliest periods of occupation in the New World [Brazil] is a subject of intense controversy.” It is still true. Guidon *et al.* maintain that humans arrived in Brazil > 50 000 years ago, but some argue that the stone “artifacts” that support the antiquity were altered by natural processes, not by human activity. That objection fails with pictographs. An enormous discrepancy occurs in an interlaboratory comparison at Toca do Serrote da Bastiana. Rowe and Steelman failed to confirm Watanabe *et al.*’s dates. Resolving this issue is crucial because of archaeological implications of the Brazilian ages. Additional **independent** studies are essential to solve this dilemma. Pessis and Guidon summarized Brazilian pictograph dating at Bastiana: The first date (17 000 years ago) for a calcite layer covering two anthropomorphic images by Oswaldo Baffa (University of São Paulo) used electron paramagnetic resonance (EPR). That was followed by two EPR dates by Watanabe at 33 000 and 35 900 years and then, using thermoluminescence (TL) and EPR, 48 286 and 39 442 years. These techniques were new to rock art. EPR and TL are not independent of one another, being based on similar assumptions. Their conclusion: the calcite layer was > 35 000 years old. This would confirm that human occupation of that area of Brazil occurred > 35 000 years ago as argued by Guidon and her coworkers.



The red anthropomorphic image on the left was the focus of our radiocarbon project at Toca do Serrote da Bastiana. The calcite layer also discussed is clearly visible on the left side of the figure as viewed, and originally covered the two central motifs.

Dr. Guidon invited us to date the same calcite layer dated by Watanabe *et al.* So we radiocarbon dated calcium oxalate in the calcite, a well-established technique. Assumptions involved in our technique are totally different from those of TL and EPR. We obtained ages of 2540 ± 60 and 2470 ± 40 BP.

Guidon also sent us a sample of a red anthropomorph covered by the calcite layer to date directly (left motif in figure). We have demonstrated that our technique works using all the tests mentioned above. We dated the pictograph at 3730 ± 90 BP by radiocarbon analysis. We collected samples of other nearby paintings, within the Bastiana shelter and from other shelters. Ocher-pigmented paintings dated to 2280 ± 110 BP at Bastiana; 2700 ± 110 BP at Sitio do Maio; and 3570 ± 50 BP at Extrema. All our ages are consistent with an age of the calcite covered pictograph being < 3820 BP.

We dated samples of charcoal paintings within Bastiana (3320 ± 50 ; 1880 ± 60 ; 2970 ± 300 BP) and from other shelters (1230 ± 50 BP at Extrema; 2120 ± 110 BP at Pedra Furada). Our charcoal pigment dates are consistent with < 3820 BP. Ten radiocarbon dates from these sites all dated < 3820 BP.

W. White wrote concerning ESR dating:

"An alternative [to well established U/Th dating] dating technique that also makes use of the uranium incorporated in speleothems [calcite layers]... [is] electron spin resonance (ESR) spectroscopy [also known as EPR]... Comparisons between ESR dates and U/Th dates are sparse but agreement between the methods has not been particularly good... No systematic evaluation of thermoluminescence dating seems to have been applied to speleothems [calcite]."

I think this situation cannot be resolved by additional dates from either of the two laboratories using the same techniques used before. As Guidon and Arnaud wrote in a broader context: "In the endless debate one might reflect that everything seems to have been said already. The situation does not change: each time there is a discovery, unfailingly the debate takes up again with the same arguments". That describes the present situation. An independent technique, preferably from another laboratory, is necessary to resolve the discrepancy. We eagerly await such determinations. The age of the painting in Bastiana covered by the dated calcite layer is too important to leave unresolved. Probably the best method for dating calcite is U/Th dating, a well accepted technique.



