



Contents lists available at ScienceDirect

## Quaternary International

journal homepage: [www.elsevier.com/locate/quaint](http://www.elsevier.com/locate/quaint)

## Commentary

## Answer to “Comment on Uranium–thorium dating method and Palaeolithic rock art” by Sauvet et al. (2015, in press) by Pons-Branchu E. et al.



Georges Sauvet <sup>a,\*</sup>, Raphaëlle Bourrillon <sup>a</sup>, Margaret Conkey <sup>b</sup>, Carole Fritz <sup>a</sup>, Diego Garate-Maidagan <sup>a</sup>, Olivia Rivero Vila <sup>a</sup>, Gilles Tosello <sup>a</sup>, Randall White <sup>c</sup>

<sup>a</sup> Centre de Recherche et d'Etudes pour l'Art Préhistorique (UMR 5608 TRACES, UTM/CNRS/EHESS/Culture/Inrap), 5 Allée A. Machado, 31058 Toulouse cedex 9, France

<sup>b</sup> Department of Anthropology, University of California, Berkeley, CA 94720-3710, USA

<sup>c</sup> Center for the Study of Human Origins, Dept. of Anthropology, New York University, New York, NY 10001, USA

It is important to recall the chronology of events: Pike et al. (2012) published a series of dates for calcite deposits covering Cantabrian Palaeolithic paintings, focussing their attention on the oldest ones that could be attributed to Neanderthals. Convinced of the danger of accepting these dates without discussion by archaeologists, we undertook to write a methodological answer and invited specialists of the LSCE (Gif-sur-Yvette) to join us (Pons-Branchu et al., BSPF\_2014). Then we, as archaeologists, presented the same line of arguments during the UISPP international symposium in Burgos, 2014 (Sauvet et al., QI\_2015). We are therefore extremely surprised that some of the LSCE (hereafter EPB\_et\_al) co-authors of the first article, have now written a very aggressive critique of the second, while the basic arguments have not at all changed. Is it because we forgot to quote BSPF\_2014 in our QI\_2015 paper?

One subtle reason for this change in attitude may be explained “*by the fact that the authors are archaeologists who do not concretely practice this dating method*”. In other words, archaeologists are not entitled to discuss the dating method. They should receive and accept the results without trying to understand the causes of error. On the contrary, we think that the absence of interdisciplinary exchange could be very damaging.

We will restrict our answer to some points accepted by geochronologists in Pons-Branchu et al., 2014 but now considered by them to be erroneous in 2015:

1) According to EPB\_et\_al, the claim that “*speleothems stopped during much of the Upper Palaeolithic*” is incorrect in spite of the fact that this has been confirmed by the cited references including those of a researcher of the LSCE in the case of Chauvet and Villars (Genty et al., 2004, 2005; Genty, 2008). As our

concern was limited to Western European Palaeolithic caves, the cited counter-examples from Turkey and Israel are irrelevant.

- 2) When we said that the possible presence of initial <sup>230</sup>Th might falsify the ages, we did not speak of detrital materials (containing both <sup>230</sup>Th and <sup>232</sup>Th) for which a correction may be applied, but of *soluble* <sup>230</sup>Th alone, as shown by Whitehead et al. (1999), a situation unjustifiably dismissed by EPB\_et\_al.
- 3) The main point concerns the possible loss of Uranium leading to overestimated ages as shown in the case of a stencilled hand in Borneo, published by Plagnes et al. (2003). The paper was cited both in BSPF\_2014 and QI\_2015. EPB\_et\_al contest our statement that an age cannot be calculated when <sup>230</sup>Th/<sup>234</sup>U activity ratios are higher than 1 and they produce a classical isochron graph (Fig. 1). We were aware of that and this is why we added «*whereas the <sup>234</sup>U/<sup>238</sup>U remained close to 1*», which is of course an essential condition. We have reported the data obtained by Borsato et al., 2003 (cited both in BSPF\_2014 and QI\_2015) on Fig. 1 in EPB\_et\_al., which demonstrates that they can only be explained by an *open system* (see Fig. A). We are grateful to EPB\_et\_al for their suggestion to use isochrones to highlight borderline cases in which calcite behaves indisputably as an open system. Unfortunately, many authors do not provide <sup>234</sup>U/<sup>238</sup>U values.
- 4) Finally, the main discrepancy between EPB\_et\_al and us remains in very different judgements of the scientific interest of a minimum age. We do indeed understand the meaning of *terminus ante quem* and it is quite offensive to suppose the opposite. EPB\_et\_al's conclusion that «*although in some cases, the dating of the calcite crusts overlying paintings or engravings may be distant in time from the creative act itself (terminus ante quem), this information remains important in the absence of other dating tools.*» is quite debatable. Except in very special cases, where a fake is suspected or the attribution of an isolated drawing to the Palaeolithic period is questioned, obtaining a Holocene *terminus*

DOIs of original article: <http://dx.doi.org/10.1016/j.quaint.2015.03.053>, <http://dx.doi.org/10.1016/j.quaint.2015.10.015>.

\* Corresponding author.

E-mail address: [georges.sauvet@sfr.fr](mailto:georges.sauvet@sfr.fr) (G. Sauvet).

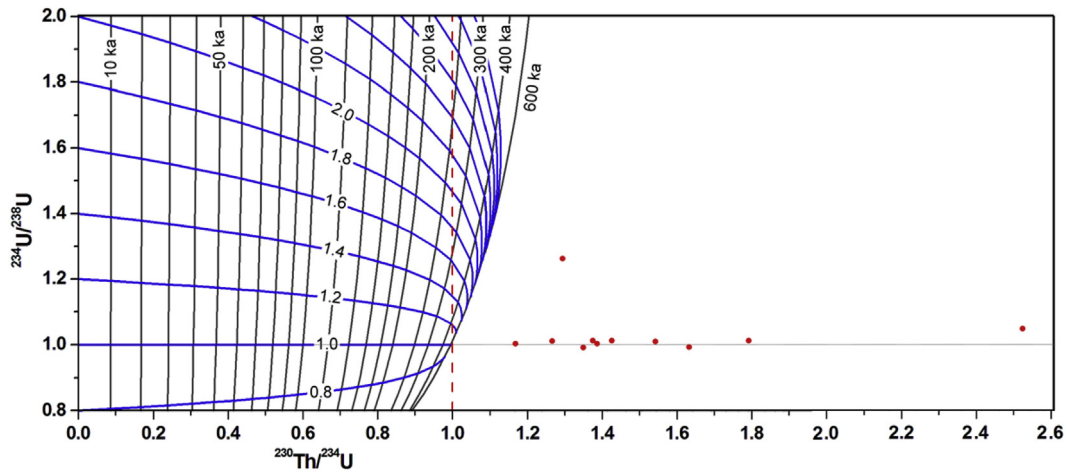
<http://dx.doi.org/10.1016/j.quaint.2015.10.016>

1040-6182/© 2015 Elsevier Ltd and INQUA. All rights reserved.

*ante quem* for a Palaeolithic painting is of no archaeological interest.

The demonstrable lack of the archaeological value of *terminus ante quem* very distant in time from the archaeologically accepted period under consideration explains our indignation in the face of the damage caused by sampling (see Fig. 5 in Sauvet et al., 2015).

Why would one endanger such precious artworks in order to obtain useless dates in the majority of cases? This is the key reason why we advocate more fundamental studies to ensure 1) that the amount of sampled material be substantially reduced, and 2) that sampling is undertaken only when the results are expected to be significant (under the conditions of a closed system, and accompanied by a demonstration of no interruption in speleothem growth).



**Fig. A.** Figure adapted from Pons-Branchu et al., 2015. The red points falling outside the isochron lines represent data from Italian speleothems, which can only be explained by an open system (after Borsato et al., 2003).