

U-Th analysis and rock art: a response to Pike et al.

By ROBERT G. BEDNARIK

The implicit purpose of the recent paper by Pike et al. (2012) appears to be to clarify or refine the chronology of the cave art of south-western Europe, most especially of the early phases of that sequence of traditions. The following is intended to show that the results they report will not necessarily rewrite that chronology any more than the efforts to refute the dating work at Chauvet Cave (Clottes et al. 1995, et passim) have succeeded in this. The reasons are as complex as a constructive discussion of the individual claims made, and their respective merits, but a small contribution to this will be attempted here.

The uranium-series 'dates' Pike et al. provide from fifty samples of 'thin calcite flowstone growths'



Figure 1. Ceiling petroglyphs in Malangine Cave, South Australia, reappearing after the thick reprecipitated calcite lamina, seen on the left, exfoliates naturally. This lamina, of about 15 mm thickness, bears itself shallowly incised engravings, thus effectively separating two phases of cave petroglyphs. Photographed in 1981.

collected in eleven Cantabrian caves range from 164 to 40 800 years BP. Only those from three of these sites are discussed (Pike et al. 2012). No details were given of the speleothem deposits sampled, but they are all reported as being directly and physically related to pigment residues. Therefore they clearly constitute 'direct dates' in the sense of that definition, but they do not, as the authors emphasise, date the rock art concerned. Nevertheless, if their validity were accepted, they would provide valuable minimum dates where the calcite skin is superimposed on the rock art; while in the cases where underlying calcite was sampled, the results should be maximum ages.

Precisely the same method was used more than thirty years earlier in Malangine Cave, South Australia, but with certain differences. Firstly, the rock art occurring both below and above a much more substantial calcite skin consisted of petroglyphs rather than paintings (Fig. 1). In the Australian study (Bednarik 1984), the reprecipitated calcite deposit was not 'thin', but averaged a thickness of 15 mm, providing very large samples, and it did not have to be removed forcibly, because naturally exfoliating material was amply available (in a quantity of several kilograms). More importantly, these samples were not only subjected to uranium-series assay, but simultaneously also to carbon isotope analysis, specifically for the purpose of testing one method against the other. This work, conducted in 1981–82, in fact constituted the first attempt to 'direct-date' rock art (Bednarik 1984, 1985, 1986, 1997, 1998, 2001: 120 [2007: 125]). The results were that the bulk sample of the entire lamina showed a carbon ratio implying a carbon age of 5550 ± 55 years BP (Hv-10241) whereas the very same speleothem yielded a U-Th result of 28000 ± 2000 BP. This massive discrepancy remained unexplained, and although there may have been some carbon 'rejuvenation', it was assumed that post-depositional mobility of the uranium content was in all probability responsible for much of the difference. The U-Th result was therefore only published much later and reluctantly, essentially just for the record (Bednarik 1997).

Decades later Pike et al. (2012) would have greatly benefited from the findings of this work, and from applying the same care to their samples. Perhaps they felt that the sample amounts available to them were too small for carbon analysis, but they could have easily removed a larger sample from undecorated flowstone to check the reliability of their method. They propose that the internal consistency in some samples, taken from inner and outer sections of a calcite skin, supports their contentions, but this would obviously be irrelevant if there are systematic distortions of the uranium-series isotope ratios: they would be expected to affect all sampled deposits similarly.

The early Australian work was followed by a similar attempt in Borneo to apply the two methods in tandem to rock art, with much the same result (Causse et al. 2003). Yet both studies were completely ignored

by Pike's team, here as well as in their preceding similar work in Church Hole, United Kingdom. In their controversial attempt to apply uranium-series analysis at that site (Pike et al. 2005; cf. Pettitt et al. 2007; Bahn and Pettitt 2009) the sampling site was not even related to any rock art, being located some distance from any supposedly final Pleistocene wall markings. Therefore it remains unclear in what way the Church Hole analyses are relevant to any of that site's rock art. Moreover, the claims that engraved figures in that cave are of a Palaeolithic tradition range from mistaken iconographic interpretation (Bahn et al. 2003) to the description of about a hundred entirely natural features as rock art (Ripoll et al. 2004). When their unfounded claims, including the contention that the ceiling of this 'Sistine Chapel' constitutes the 'most richly carved and engraved ceiling in the whole of cave art', were challenged (Bednarik 2005), the Church Hole team responded with personal abuse (Ripoll et al. 2005). Nevertheless, its members did tone down their capricious claims subsequently (but without formally acknowledging that they had been wrong; see Montelle 2008), and the quantity of supposedly Palaeolithic art in Church Hole was quietly reduced by some 90%, and replaced with the equally capricious uranium-series analysis of irrelevant accretionary calcite skin.

Pike and Pettitt are the members of the Church Hole team now proposing a large number of 're-datings' for a series of caves in Spain's north, and anyone querying them should anticipate an intemperate reaction; this team does not welcome the stating of alternative views. The prospect of a terse response should not, however, deter a critical review of their data and propositions.

Pike et al.'s (2012) statement that the Proto-Aurignacian represents the arrival of *Homo sapiens* presumably refers to *Homo sapiens sapiens*, because other sub-species, such as *Homo sapiens neanderthalensis*, also belong to this species, and existed well before the so-called Upper Palaeolithic (Bednarik 2008). The authors' statement that paint residues often lack binders implies that they are unaware that nearly all carbon dates from rock paintings are unreliable, because all rock surfaces and substrates contain organic and non-organic contamination (derived from micro-organisms, aerosols, fungi, algae, humic or oxalic acids etc.; Bednarik 1979), and so far there has been only one attempt in rock art age estimation to identify the analysed matter, be it at the molecular or object level (Ponti and Sinibaldi 2005). Unless this can be accomplished, carbon ratios can only be accepted from charcoal pigment and beeswax art (Bednarik 2002).

The authors' support for the 'long chronology' is certainly laudable but they seem unaware of the many previous publications proposing or documenting that model. In their discussion of Chauvet Cave they overlook that the early phase of its rock art has for some years been attributed to a period predating any credible presence of 'anatomically modern humans' (see Latour 1993 concerning this irrelevant definition),

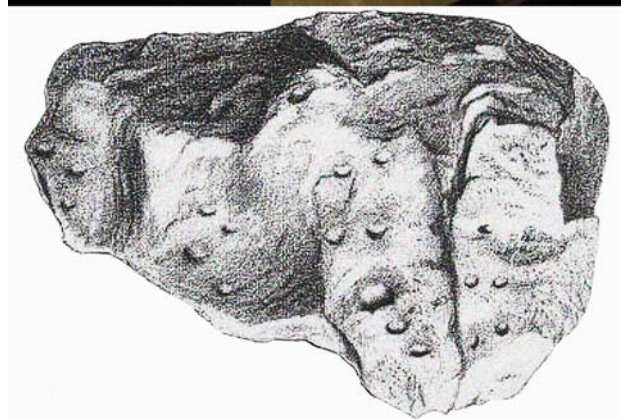


Figure 2. The cupule slab of 'Neanderthal' interment No. 6 in La Ferrassie, France.

at least in Europe, and has been proposed to be up to in the order of 40 000 years old (Bednarik 2007; cf. Sadier et al. 2012). Similarly, their suggestion that so-called Neanderthals might be responsible for some of the early Franco-Cantabrian rock art is not in the least new; it has been proposed for many decades, from the early part of the 20th century (the sepulchral slab from a Robust child's grave in La Ferrassie is surely the work of 'Neanderthals'; Peyrony 1934; see Fig. 2) through to recent years (Bednarik 2007). Again, the author's lack of familiarity with the relevant literature is disconcerting (e.g. when they claim that the purportedly oldest of their analysed motifs are the oldest rock art of Europe), and this extends to their comments concerning Chauvet Cave. The dating of the rock art in that site is, after all, significantly better supported than their own work, which uses a method unproven in rock art age estimation and burdened with previous failures. And yet one of the authors, Paul Pettitt, has recently rejected all of the hundreds of datings from Chauvet, and claimed without empirical evidence that the rock art is much more recent than the Aurignacian traditions (Pettitt and Bahn 2003, 2007; Pettitt et al. 2009). Here he supports a claim for essentially similar antiquity as that of the older Chauvet paintings, apparently unaware that his team's claims would confirm those from Chauvet and contradict his own objections to them. After all, the 'discs' or dot markings occur not only in the Cantabrian

cave art they believe they have minimum dated, they are very numerous in Chauvet Cave also. However, in Chauvet they were produced as prints (paint applied to hands and then pressed against the wall), whereas Pike et al. claim that in El Castillo Cave, this motif type was produced by blowing pigment onto the wall.

Similarly, the authors' laudable support for the gradualist model of recent human technology and symbolising ability indicates that they are distancing themselves from the misguided replacement hypothesis, but they seem unaware of the Oldisleben 2 object, which – although portable rather than rock art – is of the Micoquian and thus currently the earliest known two-dimensional and supposedly figurative depiction (Bednarik 2006). Yet in spite of all these qualifications, the principal propositions of Pike et al. (2012) are far from refuted, and their key claim, that the early Franco-Cantabrian cave art is probably the work of Robusts, is in all probability correct. It is, however, not a new idea and has been better justified previously (Bednarik 2007). It also confirms previous findings concerning Chauvet rock art. Therefore the most recent propositions by Pike et al. are not essentially refuted, and may in fact be correct. However, this is far from established and their work would have benefited greatly from testing the analytical method they used against carbon isotope analysis, as has been done by this author several decades ago. It is also essential that their sensationalist claims be presented in the context of an impeccable knowledge of the relevant previous literature, which in this case is sadly lacking.

Robert G. Bednarik
P.O. Box 216
Caulfield South, VIC 3162
Australia
robertbednarik@hotmail.com

REFERENCES

- BAHN, P. and P. B. PETTITT 2009. Britain's oldest art: the Ice Age cave art of Creswell Crags. English Heritage, London.
- BAHN, P., P. PETTITT and S. RIPOLL 2003. Discovery of Palaeolithic cave art in Britain. *Antiquity* 77: 227–231.
- BEDNARIK, R. G. 1979. The potential of rock patination analysis in Australian archaeology – part 1. *The Artefact* 4: 14–38.
- BEDNARIK, R. G. 1984. Die Bedeutung der paläolithischen Fingerlinientradition. *Anthropologie* 23: 73–79.
- BEDNARIK, R. G. 1985. Parietal finger markings in Australia. *Bolletino del Centro Camuno di Studi Preistorici* 22: 83–88.
- BEDNARIK, R. G. 1986. Cave use by Australian Pleistocene man. *Proceedings, University of Bristol Spelaeological Society* 17(3): 227–245.
- BEDNARIK, R. G. 1997. Direct dating results from rock art: a global review. *AURA Newsletter* 14(2): 9–12.
- BEDNARIK, R. G. 1998. Direct dating results from Australian cave petroglyphs. *Geoarchaeology* 13: 411–418.
- BEDNARIK, R. G. 2001. *Rock art science: the scientific study of palaeoart*. Brepols, Turnhout (2nd edn 2007, Aryan Books International, New Delhi).
- BEDNARIK, R. G. 2002. The dating of rock art: a critique. *Journal of Archaeological Science* 29(11): 1213–1233.
- BEDNARIK, R. G. 2005. Church Hole: a controversial site. *International Newsletter on Rock Art* 42: 19–21.
- BEDNARIK, R. G. 2006. The Middle Palaeolithic engravings from Oldisleben, Germany. *Anthropologie* 44(2): 113–121.
- BEDNARIK, R. G. 2007. Antiquity and authorship of the Chauvet rock art. *Rock Art Research* 24: 21–34.
- BEDNARIK, R. G. 2008. The mythical Moderns. *Journal of World Prehistory* 21(2): 85–102.
- CAUSSE, C., V. PLAGNES, J. M. CHAZINE and L. H. FAGE 2003. Cross-dating (Th/U-14C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60: 172–179.
- CLOTTES J., J.-M. CHAUVET, E. BRUNEL-DESCHAMPS, C. HILLAIRE, J.-P. DAUGAS, M. ARNOLD, H. CACHIER, J. EVIN, P. FORTIN, C. OBERLIN, N. TISNERAT and H. VALLADAS 1995. Les peintures paléolithiques de la Grotte Chauvet-Pont d'Arc, à Vallon-Pont-d'Arc (Ardèche, France): datations directes et indirectes par la méthode du radiocarbone. *Comptes Rendus de l'Académie des Sciences de Paris* 320, Ser. II: 1133–1140.
- LATOUR, B. 1993. *We have never been modern*. Harvard University Press, Cambridge, MA.
- MONTELLE, Y.-P. 2008. Review of Mazel et al., 'Art as metaphor: the prehistoric rock-art of Britain'. *Rock Art Research* 25: 234–236.
- PETTITT, P. and P. BAHN 2003. Current problems in dating Palaeolithic cave art: Candamo and Chauvet. *Antiquity* 77: 134–141.
- PETTITT, P. B. and P. BAHN 2007. Rock art and art mobilier of the British Upper Palaeolithic. In A. Mazel, G. Nash and C. Waddington (eds), *Art as metaphor: the prehistoric rock art of Britain*, pp. 9–38. Archaeopress, Oxford.
- PETTITT, P. B., BAHN, P. and RIPOLL, S. (eds.) 2007. *Palaeolithic cave art at Creswell Crags in European context*. Oxford University Press, Oxford.
- PETTITT, P. B., P. BAHN and C. ZÜCHNER 2009. The Chauvet conundrum: are claims for the 'birthplace of art' premature? In P. Bahn (ed.), *An enquiring mind: studies in honor of Alexander Marshack*, pp. 239–262. Oxbow Books, Oxford, and American School of Prehistoric Research Monograph Series, Cambridge, MA.
- PEYRONY, D. 1934. La Ferrassie. Moustérien, Périgordien, Aurignacien. *Préhistoire* 3: 1–92.
- PIKE, A. W. G., M. GILMOUR, P. PETTITT, R. JACOBI, S. RIPOLL, P. BAHN and F. MUÑOZ 2005. Verification of the age of the Palaeolithic rock art at Creswell. *Journal of Archaeological Science* 32: 1649–1655.
- PIKE, A. W. G., D. L. HOFFMANN, M. GARCÍA-DIEZ, P. B. PETTITT, J. ALCOLEA, R. DE BALBIN, C. GONZÁLEZ-SAINZ, C. DE LAS HERAS, J. A. LASHERAS, R. MONTES and J. ZILHÃO 2012. U-series dating of Paleolithic art in 11 Caves in Spain. *Science* 336: 1409–1413.
- PONTI, R. and M. SINIBALDI 2005. Direct dating of painted rock art in the Libyan Sahara. *Sahara* 16: 162–165.
- RIPOLL, S., F. MUÑOZ, P. PETTITT and P. BAHN 2004. New discoveries of cave art in Church Hole (Creswell Crags, England). *International Newsletter on Rock Art* 40: 1–6.
- RIPOLL, S., F. MUÑOZ, P. PETTITT and P. BAHN 2005. Reflections on a supposed controversy. *International Newsletter on Rock Art* 42: 21–23.
- SADIER, B., J.-J. DELANNOY, L. BENEDETTI, D. L. BOURLÈS, S. JAILLET, J.-M. GENESTE, A.-E. LEBATARD and M. ARNOLD 2012. Further Constraints on the Chauvet Cave artwork elaboration. *Proceedings of the National Academy of Sciences of the U.S.A.* doi: 10.1073/pnas.1118593109.