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Yes, Virginia, there is a Santa Claus; He just doesn't bring presents to children who don't believe in him

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and that dates can be *accurate* without being *precise*. His 'discovery curves' provide a new way of considering the probability of more sites of similar ages or older being discovered, but one might quibble as to whether site discovery is subject to such mathematical formulation. In any case, his argument that '60–70k ka may prove to be a good estimate for the arrival of people' is in line with Veth's reasoning.

Wood (below), as a dating expert albeit C^{14} rather than OSL, concludes that the statistical uncertainties inherent in the dating allow an interpretation of the occupation of Madjedbebe to be overlapping with that at other sites, namely, Boodie Cave, Warratyi and possibly Riwi. It is evident that a consensus is forming here, with only Allen representing a different view in this small sample. Wood also draws attention to the implications of this new dating scenario of *Homo sapiens sapiens* in Australia at 65–70,000 ka for some current models for the dispersal of modern humans as suggested but not explored in the original article (Clarkson et al. 2017).

Expanding on evolutionary issues, Dortch and Malaspinas (below) discuss current genetic models for the dispersal of modern humans and compare them to this new dating scenario. They find that the *range* of time suggested by the Madjedbebe dates accords well with the time frame within which anatomically modern humans first occupied Sahul. They argue that the unequivocal dating for the first human occupation at Majedbebe is in fact 53 ka, with 65 ka being a less certain first date, and suggest how further clarification is needed, and, in the longer term, more precise dating.

Of course, scientific paradigms represent consensus positions, but they are always susceptible to overthrow by new evidence: this is the nature of science, and particularly of archaeology. If this new overall chronology is accepted, it raises further questions about the Australian archaeological record. Hiscock (below) asks why sites of this antiquity are so uncommon. Of four such examples (including Riwi for argument's sake), why is only one of them found where it might be expected, i.e. Boodie Cave, on an offshore island? Why do other similar Arnhem Land sites not have similarly old deposits? Do we really have modern humans sharing a basic stone technology that is unchanging for over 50,000 years? Is a date of 65,000 KY for human occupation surprising in 2017? The consensus would seem to be that, while it demands a new paradigm, it is not.

Disclosure statement

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Yes, Virginia, there is a Santa Claus; He just doesn't bring presents to children who don't believe in him

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Given the current total obeisance to 'archaeological science', it is easy to forget that the science is only as good as the data that come out of the ground. Yet it seems that frequently there is a gap between the robusticity that science assumes for its archaeological data and what the evidence actually says or implies—one that seems often bridged only by faith. I am reminded of the cartoon of the long and intricate math formula that has in small print in the middle 'Then a miracle occurred'.

The third excavation of Madjedbebe (previously Malakunanja II) was undertaken in the belief that

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the site is both very old (~60 ky) and intact (as shown by a deep hearth or pit). Unsurprisingly it has confirmed both expectations; the site is even older, as well as intact.

The *AA* editors asked for 'short-term reactions' rather than considered, detailed responses. These were mine.

Having read the article and the 95 pages of SI and noted a myriad of errors and contradictions, I wondered whether any of the people associated with its publication had actually read it. It is certainly a difficult paper to examine critically, this possibly related to the now common publication policy of separating text (that increasingly consists only of interpretations and conclusions rather than argument), 'extended data' and fundamental data hidden away as Supplementary Information, a great recipe for errors both to creep in and pass by the reader; but here it is also possibly related to the use of the phase age model that creates a disjunction between the radiometric ages and the depositional histories of the dating samples and associated artefacts, and especially site features like hearths.

Almost inevitably an in situ hearth is reported in Phase 2, the earliest claimed occupation, but where is the detailed stratigraphic evidence and description? Not in the SI, where it is said to be small, to date to ~55 ka and to contain charcoal identified to at least six taxa, as well as 'parenchymatous tissue'. This charcoal was apparently not dated. Why not? Charcoal is said to decrease with depth in the site; of the 22 dated C14 samples the oldest is c. 34 ka. The discrepancy between the presence of charcoal in this hearth, minimally at 215 cm below surface, and the claimed disappearance of charcoal in the site at 160 cm below surface is not explained.

On several occasions, Phase 1 is said to be archaeologically sterile or to contain 'a few' artefacts. This phase is dated between 87.4–72.9 kya and 76.6–65.4 kya by OSL. SI Table 15 lists 2,070 artefacts for Phase 1 in Square B6. I assume this is an error, because SI Table 13 lists 78 artefacts for the same phase in the same square. There are a further 65 artefacts for Phase 1 in Square C4. At least some of these artefacts appear to be up to 70 cm below the bottom of Phase 2 (eyeballing ED Figure 2a). B6 and C4 are the only squares of 19 excavated for which these data are provided, so we might reasonably conclude that Phase 1 could contain many hundreds of artefacts that go unexplained. If they are in situ were humans in Sahul earlier than 65 ka and possibly 20 ky earlier? Why is this possibility not examined here? If the Phase 1 artefacts are considered not in situ what mechanism has disturbed them downwards without also affecting the primary deposition of the artefacts above?

I have other significant quibbles along these lines, such as questionable arguments about lithic raw materials, but I will turn to some of the implications. These include:

1. A gap of 15 ky and possibly 35 ky between first human occupation at Madjedbebe and the remainder of Sahul.
2. No *credible* evidence for *Homo sapiens* at this age in Wallacea or SE Asia from which to derive the Madjedbebe folk, in either the genetic, archaeological or human skeletal data.
3. Claims for seed grinding and edge-ground axes at an age that has no precedent in any SE Asian hominin assemblages, nor indeed elsewhere in the world.

All three points could be elaborated in some detail.

While much is known about the geomorphology and especially mobility of tropical sand sheets that are subject to annual monsoonal rains, it remains a difficult task to identify related taphonomic indicators in the archaeological record beyond their suggested presence, called to mind by the doubts raised by extraordinary claims such as these. For Madjedbebe, bioturbation is both acknowledged and denied as important on equivocal evidence and here again faith takes over from science. Such taphonomic questions are problems that certainly require long-term and extensive experimental research. For myself I remain sceptical about deep tropical sand sections that lack definable stratigraphy beyond gradual colour change, and about the locational integrity of archaeological data within them. Again the many vectors of potential taphonomy could be detailed.

One fundamental cornerstone of the scientific method is the reproducibility of a study. Given the likely but uncontrollable taphonomic problems related to tropical Australian sand sheets, demonstrated for example by earlier assessments of the now (apparently) scientifically abandoned Nauwalabila, if the extreme antiquity claimed for Madjedbebe is reproduced from sites on different landforms, early human history in our part of the world will require quite a rewrite. On current evidence, it doesn't.

I give the final word to Michael Wreen (1987) who analysed the self-fulfilling fallacy that is my title:

'Not stupidity, and not lack of logical acumen, explains the superficial and defective treatment of informal fallacies frequently found in logical texts, but an uncritical acceptance of a tradition coupled with a feeling that something is wrong in the illustrative examples that come complete with Latin handles. But, as Socrates himself would say, only an examined fallacy is worth having'.

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Reference

Wreen, M. 1987 Yes, Virginia, there is a Santa Claus. *Informal Logic* 9:31–39.

Breaking through the radiocarbon barrier: Madjedbebe and the new chronology for Aboriginal occupation of Australia

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Breaking the shackles of the radiocarbon barrier

Two recent publications on the age and integrity of Madjedbebe (Clarkson et al. 2015, 2017) make a compelling case for Aboriginal occupation of Greater Australia by 55,000 cal BP and certainly well before 47,000 cal BP. They amplify recent findings from other Australian sites including Boodie Cave (Veth et al. 2014, 2017; Ward et al. 2017), Parnkupirti (e.g. Veth et al. 2009), Waratayi (Hamm et al. 2016) and Serpent's Glen (McDonald 2017; McDonald and Veth 2016), that provide OSL and radiocarbon ranges which statistically overlap with the earliest conservative date for the first occupation of Sahul at 47,000 cal BP (after Allen and O'Connell 2014). As Wood et al. (2016:21) have recently argued, the 47 ka threshold has privileged the central tendency of dates over their precision which must necessarily consider uncertainties in age ranges. Given that there is now an increasing number of radiocarbon and OSL dates returned from Australian sites, and cross-checked by different laboratories, with age ranges that clearly breach the 47 ka 'barrier' (e.g. Veth et al. 2009, 2017), the time to break free from the shackles of the radiocarbon barrier has surely arrived. Residual and important issues concerning association, taphonomy, Bayesian modelling and sedimentation raise final questions which merit further attention at this and other early colonisation sites.

Size of excavation does matter

It is well recognised that the richness and diversity of implements recovered from a site is a function of sample size. Equally, the representativeness and accuracy of chronologies for elucidating occupational patterns is also strongly correlated with excavation sample size and configuration, for both behavioural and taphonomic reasons (see O'Connor et al. 2010). Although some past criticisms of 'telephone box' archaeology during the exploratory phase of Australian archaeology have been somewhat gratuitous, there is no doubt that the resurgence of larger, multi-year excavations at both known and new sites, is now providing earlier and more robust chronologies. Madjedbebe is a prime example of this trend, and it is no coincidence that some of the largest and most intensive excavations over the last five to ten years have been funded by large Australian Research Council grants. Other recent examples include Boodie Cave, Riwi, Carpenter's Gap 1, Nwarla Gabarnmang and Serpent's Glen. These ongoing excavations have allowed multi-disciplinary teams including archaeozoologists, geoarchaeologists, micromorphologists and dating specialists to tackle a range of cultural and chronological issues with unprecedented scale and focus. These projects also have the capacity to host significant postgraduate cohorts whose analyses significantly add value in specialised areas such as residue studies and anthracology. Mike Morwood impressed on archaeologists the need to excavate through apparently basal 'bedrock', and as a result was successful in recovering *Homo floresiensis*. Here we can herald the call in Australia to excavate once again, and more routinely, larger and/or more representative deposits to address fundamental issues of association and age. These will inevitably produce the most reliable dates for colonisation.

Strength of the case for pre-55,000 year old occupation of Madjedbebe

The careful 3D plotting of flaked and ground lithics, and ochres, at Madjedbebe reveals a large and well-defined lower 'band' of artefacts within a compact brown to light brown sand unit. Radiocarbon dates

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