Background: Interpreting the symbols found in the rock art of an extinct culture is hampered by the fact that such symbols are culturally determined. How does one break the circularity inherent in the fact that the knowledge of both the symbols and the culture comes from the same source? In this study, the circularity is broken for the Bradshaw rock art of the Kimberley by seeking anchors from outside the culture.

Methods: Bradshaw rock art in the Kimberley region of Australia and Sandawe rock art in the Kolo region of Eastern Tanzania were surveyed in six visits on foot, by vehicle, by helicopter and from published or shared images, as well as from the published and online images of Khoisan rock art.

Results: Uniquely shared images between Bradshaw and Sandawe art, such as the ‘mushroom head’ symbol of psilocybin use, link the two cultures and indicate that they were shamanistic. Therefore, many mysterious features in the art can be understood in terms of trance visualisations. A number of other features uniquely link Bradshaw and Sandawe cultures, such as a special affinity for small mammals. There are also many references to baobabs in early Bradshaw art but not later. This can be explained in the context of the Toba super-volcano, the likely human transport of baobabs to the Kimberley and the extraordinary utility of the baobab.

Conclusion: Many more mysterious symbols in Bradshaw rock art might await interpretation using the approaches adopted here.
Bradshaw rock art is narrowly confined to Kimberley sandstone in North West (NW) Australia. The first Western description, with a remarkably accurate drawing of a large mural, was by the Melbourne landowner, Joseph Bradshaw, who was searching for his pastoral lease in the Kimberley in 1891 and after whom this rock art is internationally known. It is thought that there are around 100,000 Bradshaw art sites, all confined to the Kimberley and the subject of much study and debate. The age and originators of the art are obscure but a Pleistocene origin is very likely, based on three independent measures that include thermoluminescence studies of wasp nests overlying the art (17,000 to 30,000 years), but the age of boabs that appear to have been brought from Africa to Australia by this culture (less than 100,000 years). The much more recent Holocene age given by radiocarbon studies of the art (3,000 years) is completely out of line with the three others, probably because the paint of Bradshaw art has been replaced by a living layer of fungi and bacteria, the continuous replenishment of which would not show the expected decline of radiocarbon levels that normally occurs at death. That the biofilm which would not show the expected thermoluminescence evidence of wasp nests overlying the art, (17,000 to 30,000 years), but the age of boabs that appear to have been brought from Africa to Australia by this culture (less than 100,000 years). The much more recent Holocene age given by radiocarbon studies of the art (3,000 years) is completely out of line with the three others, probably because the paint of Bradshaw art has been replaced by a living layer of fungi and bacteria, the continuous replenishment of which would not show the expected decline of radiocarbon levels that normally occurs at death.

In the present study, evidence is sought from outside the Bradshaw culture in an effort to constrain interpretation of its icons by means of external references, such as the study of another, extant culture with overlapping iconography, the exponents of which can therefore act as witnesses to the symbols that can be found in their rock art. This is found to be true for the Sandawe culture, one of the three surviving click-language speaking remnants of the San peoples who were once widespread in Africa and now occupy isolated areas in the South (Khoisan), North West Tanzania (Hadza) and East Tanzania (Sandawe). The Sandawe use some icons that are also found unmistakably in Bradshaw art but are not known for other African rock art in the Khoisan tradition. Exact parallels between the icons of Bradshaw and Sandawe rock art show that the two cultures shared many shamanist features, of which the use of hallucinogenic mushrooms is a key. An identical, specific icon as a foundation that requires no specific icon as a foundation that requires no further analysis is an important component of the rock art in both cultures. Using this specific icon as a foundation that requires no circular inference from within Bradshaw art, one can interpret a wider range of Bradshaw symbols in the light of Lewis-Williams’ thesis about the diverse forms of trance visualisations experienced and depicted by shamans.

EXTERNAL REFERENCE I: SHAMANISTIC ICONS IN BRADSHAW AND SANDawe CULTURES

‘Mushroom head’ depiction is shared by both Sandawe and Bradshaw rock art

The use of trance is widespread among all the branches of the San (such as Khoisan, Hadzabe and Sandawe, as well as the Saharan tribes responsible for similar rock art that were also likely to have been San) and this was probably true when the San were more widespread over Africa and the Bradshaw culture was alive. Chemical inducement of trance with ‘magic’ mushrooms (Psilocybe spp.) seems to have been confined to the Sandawe in Africa (and perhaps also to Saharan tribes, who have specifically depicted the mushroom itself). Psilocybe mushrooms might have been used as a rapid technique of trance induction to help shield the older, more frail shamans from the physical rigours of the usual method of inducement involving many hours or days of chanting and stamping. The ‘mushroom head’ depiction is striking and unmistakable and is found in both the Bradshaw and Sandawe (from the Kolo panels, near Kondo in Tanzania) rock art but not in the Khoisan or Hadzabe rock art. Sandawe shaman witnesses testify that this depiction (Figure 1) represents the feeling that one can experience while in a psilocybin-induced trance. Since the icon is identical in both Sandawe culture and the extinct Bradshaw culture, we can infer that psilocybin-induced trances were a feature of both cultures and that trance might be evident in the rock art. In fact, ‘mushroom...
head’ depictions are not uncommon in Bradshaw art, while associated trance visualisations are even more widespread, as described below.

Confirmation of the inference about ‘mushroom head’ comes from depictions of ‘mojo bags’ in Bradshaw art. These are small drawstring bags on a short leash, which means they can be worn from the shoulder but are hidden in the armpit. In the Sandawe culture they contain the shamans’ repository of hallucinogenic herbs and mushrooms. Mojo bags are quite common in Bradshaw depictions where they are unmistakable in axillary position and size when compared with a larger, lower ‘dilly bag’ on the same figures (Figure 2). Shared icons in Bradshaw and Sandawe rock art are consonant with other less-specific shared features of the two cultures, such as a special relation with small mammals (well documented in Sandawe lore and evident as small marsupials on Bradshaw headdresses), use of nets for hunting, and close-cropped curly hair observed on Bradshaw figures in rare cases (L. Scott-Virtue, personal communication).

**Pervasive influence of trance visualisations in Bradshaw depictions**

On the basis of the evidence of ‘mushroom head’ and ‘mojo bag’, if one accepts the possibility that the Bradshaw culture was shamanistic and used hallucinogenic trance visualisations in its depictions, many of these latter can now be deciphered.

David Lewis-Williams11 made a major contribution to this line of study, concentrating on Khoisan rock art, and set out the following general topics that cover most images from hallucinogenic trance. Since the first listed depictions of geometrical patterns are derived from entopic experiences that are common to all human brains and can be elicited by a variety of means, it is not surprising to find them in a variety of cultures. Their presence nevertheless indicates a culture that was familiar with the practice of trance visualisation. The other examples can have a cultural overlay, which can be revealing or obscuring of the culture like the eland transformation famously explained by Lewis-Williams11 and the baobab transformations described for the first time here. These depend on the external constraints, as argued here for ‘mushroom head’, which seems to have been restricted in its distribution to link
Sandawe and Bradshaw cultures more strongly than other trance visualisations. There are numerous depictions based on trance visualisations, namely:

1. seeing bright geometric patterns (grids of dots, spirals, concentrics)
2. floating or flying (‘astral travel’)
3. transformations, from one thing into another (for example, body part to tree, dendrianthropes, hind limb attenuation)
4. transformations into animal forms (therianthropes)
5. micropsia/macropsia (‘little people’; giants)
6. polyopsia (repeated objects in a line)
7. passage through a tunnel
8. ability to see mercurially, although vividly (altered perception of time).

Examples of most of these trance phenomena can be found among Bradshaw depictions, with the exception of clear examples of tunnel passage, complete darkness and altered time perception, all of which are difficult to depict. The last might be replaced by an alternative symbol that we cannot decipher at present.

Some of these trance visualisations are examined:

**GEOMETRICAL PATTERNS**

Geometrical patterns are not unusual in Bradshaw art. Some bear a striking resemblance to similar patterns in Sandawe rock art, such as the concentric-headed figures shown in Figure 3, which are also called ‘onion skin’ figures.

**ASTRAL TRAVEL**

Hallucinogen-induced sense of travel is a striking feature of the trance experience that attracts recreational use, particularly for the out-of-body (astral) component that usually accompanies it. The many examples of horizontally positioned figures in Bradshaw art are likely to represent this visualisation. A large number of such flying/swimming figures are also found together in the famous Saharan, ‘Cave of Swimmers’, rock art discovered at Gelf Keber by Almasy and popularised in Ondaatje’s novel, *The English Patient*. Almasy thought that the figures represented actual swimming but this is unlikely to be the case for the horizontal Bradshaw figures, which are inappropriately dressed for swimming, with complex costumes, several accouterments, large headdresses and elaborate hairstyles. The Saharan rock art figures are unclothed, so it is not so easy to reject a true swimming role for them on the basis of an attire that is too complex, as we have done for the horizontal Bradshaw figures, but they do have very unusual postures, such as legs bent at the knees, that seem more fitting to trance visualisations than to real swimming.

The ‘grid of dots’ depiction is also common in Bradshaw art and two examples (Figures 4 and 5) are shown to the left of human figures that also show signs of trance visualisation, such as therianthropes (kangaroos) and micropsial figures. There is a strong association between such a grid and death in some cultures (A Weiler, personal communication).

**TRANSFORMATIONS**

One of the most compelling effects of a hallucinogen is the blurring of object boundaries that takes place, so that, for example, one’s hand lying on the table becomes continuous with the table. The expansive feeling that results can lead to the perception of a connection to the cosmos and God, hence the modern, preferable term for these chemicals, namely, ‘entheogen’ (evoking God). One consequence of this expansion of consciousness is that transformation visualisations are possible, with hybrid depictions between animals and humans (therianthropes) and between trees and humans (dendrianthropes). In some cases, it might be difficult to distinguish between such transformations and mere dress decoration but kangaroo heads with long arms leave no other interpretation (Figure 4), as does the transformation of a human limb into a baobab branch illustrated later. This latter...
depiction is a striking transformation that has not, as far as is known, been put forward before and has an important implication for the thesis that baobabs played a saviour role for ancestors (detailed below). Lewis-Williams’ insight\(^\text{11}\) that transformation plays such an important role in Khoisan rock art removed many of its most mysterious elements, like the depiction of a human figure with hooves on its legs lying next to an eland. No doubt it will aid further interpretation of Bradshaw art, now that we know that trance visualisation and transformation play a role there too.

MICROPSIA/MACROPSIA

‘Little people’ alongside larger human figures have always been a talking point of discussions about Bradshaw art (Figure 6). While a minority of observers attribute giantism to the larger figure (for example, Bednarik\(^\text{15}\)), the more usual attribution is the reverse, with the tiny, more simply drawn, more dynamic figures thought to be the miniature versions, while the figures with the usual apparel and accoutrements considered to be normal, unmodified size. The polarity matters little in this context, because both micropsia and macropsia can occur on different occasions in a hallucinogenic trance. A second set of figures with a dramatically different size usually occurs alongside other hallmarks of trance visualisation, such as therianthropes and geometrical patterns (Figures 3 and 4).

Those with a penchant for the improbable might propose the alternative explanation that ‘mushroom head’ has appeared independently in two widely separated cultures. Apart from the striking similarity between the icons, there are several reasons that argue against their convergent evolution in this way. The icon seems to be unique to the Sandawe among all the other San tribes in Western Tanzania (Hadzabe) and Southern Africa (Khoisan) that also practise various forms of shamanistic trance visualisation. There is no evidence that these related groups have discovered the use of psilocybin or have used the ‘mushroom head’ icon. Instead, they used prolonged chanting and stamping to attain the trance state,
the features of which are shared between mania and chemical hallucination because they all share the same fundamental human neural apparatus. Therefore, parallel, separate evolution of psilocybin use with the same icon in rock art in Australia, far from Africa, seems less likely than a direct link between the Sandawe and Bradshaw cultures.

This seems to be reinforced by a number of other parallels between the two cultures. Sandawe have the unusual ‘peppercorn curls’ and small stature that characterise the San groups and this also seems to apply to the Bradshaw people, as can be deduced on those rare occasions when hair is depicted in Bradshaw art and from the use of familiar objects such as scales to estimate stature from paintings. These estimates, using the size of the boab pod and the lesser bilby as a scale, give a short stature of around five feet for the human models used for human figures that were unambiguously paired with one of the scales in Bradshaw art. Estimates from San and Sandawe art using the shoulder height of adjacent cattle also give values around five feet, in contrast to measurements of Bantus and Australian Aborigines’ height, which are closer to six feet. Sandawe also had an unusual feature of their folk tales that involved identifying with small mammals, the characters of which are believed to have imbued the Sandawe with great resourcefulness and cunning. These character traits stand in contrast to traits imbued from the African fauna by other tribes, such as the Masai character of pride that can be linked to lions. Small animal traits of deviousness and resourcefulness seem to have given considerable difficulty to German conquerors of the Sandawe. We do not have any direct evidence of the folk tales of the Bradshaw culture but a striking feature of their depictions, so far unexplained, is the frequent depiction of small marsupials in direct association with human figures, either suspended ritually in the air nearby or walking on the headdress of a human figure (for example, Figure 2). This is contrary to Bednarik who has apparently seen these depictions, many of them in the public record. These depictions of small mammals can often be identified with the lesser bilby, *Macrotis leucura*, which is extinct, but the measurements and features of which are nevertheless well known, namely, long pointed ears and uniform pale tail in contrast to the black–white partition of the greater bilby’s tail. The striking and unusual predilection for small mammals in both cultures seems unlikely to be a coincidence. Sandawe also worshipped the praying mantis, for which there is a whole class of less-than-veridical depictions in Bradshaw art, also otherwise unexplained, but possibly another common feature to add to the growing list of parallels between the cultures.

**Awkward corollary**

Accepting a direct connection between the two cultures has an apparently awkward corollary, namely, that they had somehow bridged the gap between them.

Figure 6. Micropsia in a figure with a loop (of unknown significance), adjacent to a partially-obscured larger figure with boomerangs and waist pouch. Note that some observers reverse this size polarity, attributing abnormal larger size (giantism) to the larger figure (micropsia). Both perceptual directions are possible in trance, so this difference of opinion is of little consequence here. The simplified outline and dress of the small figure is more in keeping with micropsia, since accoutrements on the larger figure are like those on normal figures in panels, where there is no micropsia/macropsia.
across the Indian Ocean. Apart from the obvious geographic fact that the Sandawe would have had ready access to their east coast and thereby to an Indian Ocean pathway to Australia, there does not seem to be any suggestion, at first sight, that this might have been possible. There is presently no evidence that the Sandawe had seafaring expertise, although the very long history of sea faring from the nearby port of Kilwa in Eastern Tanzania hints that a co-operative venture so long ago might have been possible between Sandawe and coastal tribes, given that the Sandawe might have had enough baobab seed to trade with starving tribes that lacked access to these trees. Against the lack of evidence of boat use by the Sandawe, there are depictions in Bradshaw art of large seafaring boats, probably of fibre construction based upon the horizontal striations in the depicted hull. A boat in one such depiction had a three-metre prow and 29 passengers and crew (M Myers, personal communication).

An ancient African–Australian voyage?

Many commentators have considered it ludicrous to suggest that a Palaeolithic culture, without navigational skills or geographic knowledge of other continents, could have found their way by sea to Australia from Africa. This is understandable speculation in the negative sense but it tends to be countered by irrefutable facts that point in the opposite direction. As in any great mystery to solve, we need motivation, means and opportunity.

MOTIVATION

The Toba event, the largest mega-eruption in the previous two million years, occurred around 74,000 years ago in Sumatra. Its ash cloud and sulphate cloud had devastating consequences for humans, which are described in more detail below. The timing of this supervolcano eruption was appropriate for these early human migrations and its magnitude meant that the sun was completely blocked by the sulphate cloud for a numbers of years, impacting savagely on hunter gatherers.

MEANS

The depictions of boats in Bradshaw rock art suggest that they were large, ocean going and constructed of bundles of reeds (Figure 7).

OPPORTUNITY

In February, opportunity arises when the prevailing Indian Ocean easterlies reverse direction to give way to vigorous westerlies that are capable of driving even sluggish raft-like reed boats to the Kimberley in feasible time, with judicious paddling and canoe sails (no depicted boats have masts, but one cannot rule out small, personal canoe sails, which are still used by islanders in the north east Indian Ocean).

MAGIC

Because the present thesis concerns the shamanistic rituals of both the Sandawe and Bradshaw peoples, it is highly likely that shamans would have been urged to deal with the catastrophic darkness post-Toba. For San people like the Sandawe, who had great sensitivity and knowledge of the sun, moon and stars, years of darkness would have had a devastating impact on their psyche, putting aside the horrors of the famine. Magical practice, ‘to bring the sun back’, would no doubt have taken advantage of the Sandawe’s known proficiency with the heavens and perhaps have led to a seafaring expedition in a sunrise direction towards the known usual source of the sun, and therefore coincidentally to NW Australia.

NAVIGATION

In the month of February, the sun is still around eight degrees south of the equator in the southern hemisphere, so a bearing for sunrise from the Tanzanian coast, from a latitude of say, 9 degrees south, would head unknowing voyagers directly to the Kimberley in NW Australia (at 17 degrees south).

Food would not have been a problem no matter how long the voyage turned out to be, because the Sandawe lived in the heart of one of the most abundant baobab forests on the continent at that time, before the evolution of the modern coastal species. The convenient natural packaging of baobab pods is very long lasting (years if stored away from the damp) and provides seeds that are sustaining for an adult at 300 gram per day (half a pod). Fresh water would have been more of a problem for many reasons. It would be difficult to predict in advance how much to take. Storage on board would probably be a problem in a Palaeolithic culture without suitable large containers. Finally, the weight of water might seriously burden the boat (one would need roughly one’s own weight in water for every fortnight of travel under present conditions on the equator, although this would have been less in the overcast, cool, ice-age conditions that probably prevailed post-Toba).

Fortunately, the voyagers might not have needed to carry much fresh water because rain was plentiful in the ice age conditions that prevailed 70,000 years ago. This seems perverse, because it is well known that the continents were drier during the ice age but apparently there was some sort of global equilibrium so that reduced continental rainfall was balanced by increased rainfall over the oceans, particularly over the more eastern Indian Ocean, which would have made up the latter part of such a voyage.

ICE AGE WESTERLIES?

It might be argued that the Pilot Chart-derived equatorial westerlies, making a west-east voyage more favourable, are not indisputable facts, because they apply to present-day weather conditions and not to those that prevailed during the last glacial age when the proposed voyage would have taken place. This is a valid objection, because both simulations and indirect measures of temperature and other climatic conditions show how different the last glacial age was, with mean equatorial temperatures up to 10°C cooler, depending on location and altered monsoonal wind patterns in the Indian Ocean. Fortunately for the present proposal, the ice age simulations show that February westerlies on the African coast and along the Indian Ocean equator were enhanced, reaching wind velocities double what they attain today. At the predicted Pleistocene wind speeds of 10 to 25 knots, even a slug-
gish raft-like fibre boat might approach four knots, particularly if it had a wind-catching profile, with a prow three to four metres high and a 1.5 metre beam like that depicted in the Bradshaw rock art. At four knots, the 6,000-mile journey from East Africa to NW Australia would take approximately two months, which should have been attainable if there was sufficient rain to provide fresh water. The chances of reaching Australian landfall would obviously be increased if there were multiple boats, something it is impossible to estimate.

EXTERNAL REFERENCE II: IMPACT OF A MAJOR CATASTROPHE

It is a tenuous exercise to attempt to reconstruct the possible impact on an ancient culture of a catastrophe, such as a super-volcano eruption. In contrast, this would clearly be an external influence that helps remove the circularity of inferences about the meaning of cultural icons. In the present case, references to boabs in Bradshaw art are recognised for the first time as a direct result of considering these trees in the broader context of the Toba event. These references are not rare in Tassel Bradshaw art but might not have been recognised in the absence of the contextual cues that have been provided by considering the possible impacts of this well-defined, if remote, external event.

Toba catastrophe

Physical science gives us a precise date and magnitude for the Toba super-volcano19 but there is presently no known icon that might enable the direct recognition of this event in rock art. Instead, we must resort to indirect inferences.

The Toba eruption, 74,000 years ago, puts the discussion in the right time frame for the first human migrations to Australia from Africa, particularly if we allow for the extra delays and disruption to migration produced by the widespread aftermath of the volcano itself (Figure 8). At the time of the eruption, Africa was populated by Stone Age hunter-gatherers, probably ancestors of the San peoples, well before herdsmen appeared. Toba’s gigantic ash...
cloud spread west from its origin in Sumatra, atypical for a volcanic plume because its huge mass, so close to the equator, was subject to Coriolis forces. Plumes below this mass threshold are subject to stratospheric winds rather than Coriolis forces, which tend to disperse and drive such smaller volcanic eruptions roughly eastwards. Therefore, the ash cloud was right in the migratory path of humans from Africa to the Indies, with significant ash coverage in Northern Africa, the Middle East and India. In India, the ash covered the sub-continent, where it was at least three metres thick. Dating studies of human stone tools found above and below the ash layer have shown that the layer immediately below the ash has an age of 74,000 years, as expected, but the tools resting just above the ash were only 55,000 years old, indicating that it took 19,000 years before the area was recolonised after the eruption. The earliest evidence of human habitation found so far in Australia is 60,000 years old, very much in keeping with a migration that started close to the time of the Toba event but was somewhat delayed by post-Toba disruptions. This delay might have been 10 or more millennia as the migrants passed through the Indies, just as recolonisation was delayed until after vegetation and game returned to ash-covered India. Because the size of the Toba ejecta is known from the size of its crater in Sumatra, an estimate can be made of the amount of sulphur released from the ejecta to yield the likely magnitude and duration of the sulphate cloud. Different studies give somewhat different results according to the size of the modelled sulphate particles, which settle faster when larger, but all agree that the sun would have been completely blacked out for years by the sulphate cloud. Some argue that Toba must have caused mass extinction of humans, on the basis of the reduced genetic variance now seen in the descendants of the migrants who left Africa compared with those who stayed behind. Others are sceptical that there were any major effects of Toba on the human population. In response to the sceptics, it is difficult to argue that years of complete darkness would have had no effect on hunter-gatherer bands, whose game and plant food were dependent on photosynthesis. Of course, the cooperativeness and ingenuity of humans would have lessened Toba’s impact. Also important would have been local mitigating factors, such as the baobab forests, in which the Sandawe lived and which provided the protein-lipid-rich seeds from their fruit, which could be kept for years and perhaps enabled defeat of the post-Toba famine. Seafood harvested without natural light might also have saved some bands from the famine, although we do not know whether the marine food chain would have survived years of darkness unscathed. Therefore, Toba’s effects would have been highly idiosyncratic and dependent on local conditions, but it seems reasonable to expect some evidence of its negative impact on hunter-gatherers, even when they escaped the worst climatic effects because they lived south of the ash cloud and north of the bitter cold.

The baobab tree: a Stone Age shopping mall

The Australian baobab tree, or boab, *Adansonia gregorii*, is an unmistakable member of the genus, the other members of which are all located far away in Africa and Madagascar. How did it make the 6,000 mile journey? A popular hypothesis explains this in terms of continental drift but Australia and Africa have not been close for 100 million years, while the genetics show that the African and Australian baobabs are almost identical, having separated less than 100,000 years ago. An exact figure is currently being sought using the very large database necessary to

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Figure 8. Reconstruction of the catastrophic sulphate cloud of the Toba megavolcano, replotted from Robock et al., who calculated the volume of ejecta from the Toba crater lake, which is still extant, and the amount of sulphur from representative rock in other volcanic eruptions. The darkness was worldwide but may have been less than shown in some locations, such as the poles. Most hunting would have been severely impacted by this level of darkness, but foraging for seafood and for baobab fruit could have continued with torchlight. This spike of five years of total darkness is known to have been magnified to tens of thousands of years in India, where metres of ash added further disruption to the darkness.
study plant genes, which are notoriously ‘slow’ compared with mammal genes. The timing of the African–Australian baobab separation is compatible with the timing of human migration out of Africa, which is also uncertain, but likewise is less than 100,000 years.

The geographic distribution of boabs is almost exactly the same as the distribution of Bradshaw paintings, if we make allowances for apparently recent eastward extensions on the Victoria River and for the ‘holes’ in the distribution of this extremely frost-sensitive tree on the Kimberley plateau where there are both Bradshaws and occasional frosts.\textsuperscript{129} This is a very narrow distribution compared with the much larger stretch of the NW Australian coastline, where boabs could readily grow. For this reason, it would seem very unlikely that baobab pods floating in from Africa would choose this narrow piece of coastline, in this narrow time frame (baobabs had been around for more than a million years), when this was also the time and place of the Bradshaw culture. We know that boabs were an important part of the Bradshaw culture because

Table 1. Unusual Sanawae–Bradshaw parallels

<table>
<thead>
<tr>
<th>Type of reference to baobab</th>
<th>Number of exemplars</th>
<th>Source</th>
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<tbody>
<tr>
<td>Boab frieze</td>
<td>&gt;100</td>
<td>Baobab site, DRNP</td>
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<tr>
<td>Leafless tree plus fruit (dry season boab)</td>
<td>~80</td>
<td>Baobab site, DRNP</td>
</tr>
<tr>
<td>Roughly drawn naked tree with fruit</td>
<td>~80</td>
<td>Baobab site, DRNP</td>
</tr>
<tr>
<td>Fruit on leafy tree (wet season boab)</td>
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<td></td>
</tr>
<tr>
<td>Boab leaves fruit</td>
<td>5</td>
<td>Bichrome rock, DRNP</td>
</tr>
<tr>
<td>Leaves and fruit</td>
<td>9</td>
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<td>Suspended ‘ceremonial’ fruit</td>
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<td>Double decoration</td>
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<td>Plates 21, 48 Walsh\textsuperscript{1}</td>
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<td>1</td>
<td>Boab Bay, Faraway Bay</td>
</tr>
<tr>
<td>No decoration</td>
<td>5</td>
<td>Bradshaw Alley, DRNP</td>
</tr>
<tr>
<td>Striated halo</td>
<td>1</td>
<td>Walsh\textsuperscript{1}</td>
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<tr>
<td>Fusion-transformation of limb to pod</td>
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<td>Pod from hand</td>
<td>12</td>
<td>Plates 12, 17, 26 Walsh\textsuperscript{1}; Boab Bay</td>
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<tr>
<td>Pod from foot</td>
<td>2</td>
<td>Plate 20 Walsh\textsuperscript{1}</td>
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<td>Boab garland</td>
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<td>Tree headdress and dendrianthropes</td>
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<td>Branching tree headdress</td>
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<td>Parallel fibre headdress</td>
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<td>Lost City; Plate 11 of Walsh\textsuperscript{1}</td>
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</tbody>
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DRNP: Drysdale River National Park

Table 2. References to baobabs in Bradshaw rock art

Mushroom head icon
Mojo armpit drawstring bag
Affinity with small mammals
Praying mantis worship
Baobab references in rock art
Also in other San peoples
‘Peppercorn’ curly hair
Small stature
Exquisite delineation of fauna in art
there are frequent, reverential or ritual, references to boabs in their art (as detailed and illustrated below). There are depictions of the tree itself, either heavily laden with fruit (‘dry season’ aspect) or with leaves and fewer fruit (‘wet season’). More frequent are depictions of the pod or nut, which is an important food source, both because its pulp and seeds are nutritious but because they are very long lasting, keeping for years if kept dry. Underlining the significance of boab pods to the culture are depictions of transformations that are likely to have been the result of a hallucinogenic trance, where the forelimb of a human figure has been transformed into a leafy boab branch bearing a pod. Lewis-Williams11 has shown how this kind of transformation is more likely to involve a highly significant object in the culture, such as the eland, a large antelope, which was the single most important food source for the San. The transformation can be regarded as revealing what was on the mind of the shaman at the time. The boab-arm transformation suggests that shamans, with the role of advising and guiding the culture, had placed boabs in a place of importance.

Baobabs have extraordinary utility. The list of uses that I keep continues to grow, having reached 39 so far. Apart from the variety of foods available from the edible leaves, from pulp around the seeds and from the seeds themselves, which are high in fat and protein, baobabs yield a variety of drugs, including an antidote for the arrow poison used by the San, in addition to glue, dye, fibre, oil, soap, starter/curdler, shelter, containers, bee hives, et cetera. The pod’s longevity should also be noted, yielding unspoiled seed after a year on the tree and further years in storage, a key property that would enable survival in the years of darkness of the post-Toba famine. Many of these uses have been lost with the advent of ‘corner stores’ all over Africa but it is not too much of an exaggeration to call the baobab the ‘Stone Age shopping mall’. The only other natural object in the Kim-

Figure 9. Baobab frieze. A repetitive pattern of baobab pods and branches that was part of a much larger panel, now deteriorated, onto which was later painted the baobab trees shown in Figures 10A and 10B.
berley that is even vaguely similar is the emu egg, the ovoid of which has a different, fatter, more symmetrical and much less variable outline without an acuminate end.

An unusual depiction of baobab fruit forms a repeated pattern (Figure 8), with attached branches, that covers, or at least once covered before deterioration, a large area of the same rock wall on which are overpainted exquisite baobab trees loaded with pods (Figure 10). The term ‘frieze’ seems appropriate to describe this large, regular decorative panel, in keeping with the extensive decorative panels that adorn ancient Greek structures, rather than ‘tapestry’ or ‘mosaic’, which might also apply to repetitive artistic creations.

BAOBAB TREES
Depictions of four different baobab trees can be recognised in Bradshaw art by the characteristic fruit. Two are depicted in the ‘dry season’ phase (Figure 10) when there are no leaves and abundant fruit. Two further trees are depicted in the ‘wet season’ phase when leaves are abundant and most fruit has fallen.

SANDAWE FIGURATIVE BAOBAB DEPICTION AND PARALLEL FIBRE HEADDRESS
Although such depictions do not feature in the publications that detail Sandawe rock art, my personal examination of the Kolo site revealed unmistakable baobabs, in keeping with the importance of the tree for this culture and its prevalence in that area (Figures 11 and 12). Adjacent to the baobab depiction was a figure with a parallel-fibre headdress. These are common throughout the Kolo site and tend to be discounted on any specific basis because many tribes, like the Masai, might adopt a similar hairstyle. In this case, a particular point can be made because of a deep similarity between the depiction of the baobab and the depiction of the nearby parallel-fibre headdress. The similarity arises because the baobab is depicted a little figuratively, with parallel branches that are curved to follow the curved crown of the tree (Figure 11a). Because the nearest painted image to the baobab is a human figure with a parallel-fibre headdress, and because the parallel fibres are similar in both cases, it is hard to avoid the conclusion that the artist intended the comparison.

Similar parallel-fibre headdresses occur in Bradshaw art (Figure 12). It seems reasonable to assume these also represent a reference to the baobab.

CEREMONIAL BAOBABS
Walsh recognised that these depictions were united by the same object at their core, despite the variations in the decorations and the uniform reverentially suspended treatment of each. He called them Ceremonial Oval Objects, in which the oval resembles a boab pod (nut or fruit) more than any other natural object, including the fatter, less variable outline of an emu egg (Figure 11). Walsh did not venture any opinion about their identity, which is obvious to me because of the many strands of the boab’s wider context that might recommend the approach taken here.

Tree headdresses and dendrianthropes
Headdresses are ubiquitous in depictions from the Tassel and Sash styles. Some of
these headdresses are unmistakeable trees, such as the one shown in Figure 13. This example is taken from a site where there were four other figures with the same style of branched headdress. These obvious trees do not bear a Linnaean label of their species but we are entitled to assume that they represent the baobab, because of the context that has been woven here for this tree and because there is no conceivable tree from NW Australia with greater utility and significance to a Stone Age culture. If visualisation of one’s head being replaced by a mushroom is possible, what about a head replaced by the most significant species of tree? Figure 13 shows what might be an example of this phenomenon, a dendrianthrope, which refers to a tree–human hybrid, just as therianthrope refers to a mammal–human hybrid. The branching in this depiction is so elaborate that the head, if it is present at all, is not visible and we might interpret this depiction as a dendrianthrope rather than the figure with a tree headdress that first comes to mind.

Timing of baobab references

Walsh was able to define a temporal relationship between Tassel and Sash Bradshaw styles by using superposition, observing which style was painted over which when they were both found together. Although later students of Bradshaw art have found a degree of temporal overlap, there seems to be general agreement that the Tassel style preceded the Sash style. In this regard, it is of great interest that whenever one can attribute the baobab reference to a particular style, it is always the earlier Tassel style (Table 1). In the case of the four depicted baobab trees, there is no way to link them definitively to a particular style, although the simple depictions of human figures that are nearby on the same wall might also be linked tentatively to the Tassel period (J Schmiechen, personal communication).

The disappearance of baobab references at the transition from the Tassel to the Sash epochs could indicate that the perceived importance of baobabs waned with time as the culture developed from beginnings where baobabs (or their...
memory) were more important, consistent with the scenario of a post-Toba and baobab-enabled start.

Contra-opinion on trance visualisations
Walsh rejected the idea that the Bradshaw images, with which he had such detailed familiarity, might represent trance visualisations à la Lewis-Williams. His expressed opinion was based on a consideration of the grid of dots image, but not on any of the many other hallucinatory visualisations listed above. The specific image with dots that was chosen by Walsh was not actually an example of the hallucinogenic type of grid and might explain his scepticism about this approach. The image he chose, from Bradshaw Alley in Drysdale National Park, has well-separated, linear arrays of dots rather than a regularly spaced array. In this case chosen by Walsh, the rows of dots probably represent a previous pattern of lines that were punctuated with coloured ochre (like a row of beads) and where the interrupted ochre has weathered away. It is instructive to compare Walsh’s chosen example with the two examples of the grid of dots illustrated here that conform more to expectations about this phenomenon, if it were based on trance (Figures 3 and 4). Notice that the more likely candidates have larger diameter dots in relation to the dots on the human figure (for example, in the hair) and that they occupy a uniform grid, with no hint of the linear arrangement that is obvious in Walsh’s choice, and there is no evidence of order that might betray an earlier pattern before the ochre wore off. If Walsh considered different examples of possible trance visualisation apart from the grid, he has not set them out in any of his books. Based on the example he described, Walsh appears to be wrong on this issue, because there is abundant evidence of different depictions of trance visualisations in Bradshaw art.

Bradshaw shamanism in other studies
Observations in rock art of the ubiquitous practice of shamanism are not new. Michaelson and colleagues inferred shamanism from completely different Bradshaw icons to those put forward here, such as ‘ecstatic postures’, bifid antenna-like headdresses and depictions of eucalyptus leaves, which they suggest are mild psychedelics. These arguments are a little tenuous, like many made here, and illustrate the inherent circularity, if there is no external anchor. In contrast, Michaelson and colleagues seem to be correct about shamanism in Bradshaw culture, if one adds the extra information put forward here. They appear to have learned a gestalt for the recognition of shamanism in Bradshaw art without specifically identifying any of the icons on the list in this paper.

Need for dating
The link between baobab references and the Toba event would obviously be much improved with more precise dating of the depictions, which we predict will have an age around 70,000 years, close to the time of the Toba event, with the Tassel Bradshaws baobab references earlier, by some more precise amount, than the Sash Bradshaws, where we can find no references. A new approach to dating of individual paintings uses microorganisms that have replaced the original paint. This discovery helps explain how paintings can look young but be very old (infinite replenishment of the microorganisms is possible) and why radiocarbon and similar methods

Figure 13. Tree-on-head depictions: Although we do not have the diagnostic outline of baobab fruit in these depictions, we are entitled to assume that the depictions represent baobabs. Many details of the baobab context have been established for the Bradshaw culture and this tree, of all the trees in the forests of north west ice-age Australia, would be the number one priority for a hunter-gatherer on account of its extreme utility (more than 40 uses for foods, pharmaceuticals, fibre, dye, glue et cetera). These depictions were found on the eastern edge of the Kimberley escarpment, close to the Timor Sea. Depiction (A) was found alongside four other depictions of human figures with similar branched headdresses. The branching pattern in depiction (C) is so elaborate that it completely obscures the head, if indeed a head is present at all. It is possible that this is a dendrianthrope, part-human part-tree, where the head has been replaced by a tree, just as the head was replaced by a mushroom in the first example in this paper.
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Corresponding author:
Professor Jack Pettigrew
School of Biomedical Sciences and
Queensland Brain Institute
University of Queensland
Brisbane QLD 4072
AUSTRALIA
E-mail: j.pettigrew@uq.edu.au