The global implications of the early surviving rock art of greater Southeast Asia

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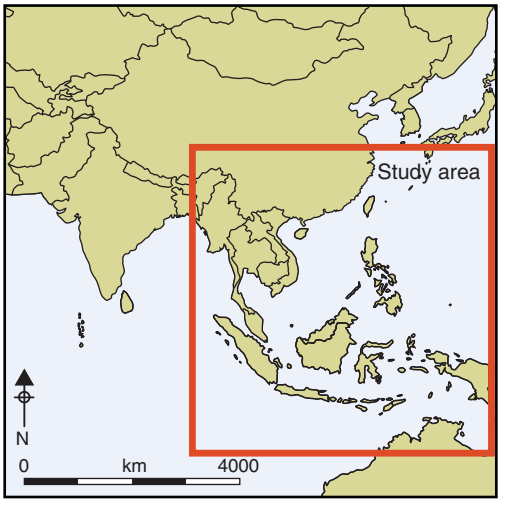

The rock art of Southeast Asia has been less thoroughly studied than that of Europe or Australia, and it has generally been considered to be more recent in origin. New dating evidence from Mainland and Island Southeast Asia, however, demonstrates that the earliest motifs (hand stencils and naturalistic animals) are of late Pleistocene age and as early as those of Europe. The similar form of the earliest painted motifs in Europe, Africa and Southeast Asia suggests that they are the product of a shared underlying behaviour, but the difference in context (rockshelters) indicates that experiences in deep caves cannot have been their inspiration.

Keywords: rock art, hand stencils, painted caves, rockshelters, animal motifs, uranium-series dating

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Introduction

The oldest surviving rock art of Europe, northern and southern Africa, India and Australia includes naturalistic depictions of key species of animal that would have been economically and symbolically important for past populations of hunter-gatherers, as well as geometric designs and, in some areas, hand stencils. The rock art of greater Southeast Asia is not as well known, but recent field investigations in various countries have revealed a comparable pattern, as well as similarities in form between widely separated rock art bodies (e.g. Taçon & Tan 2012). The practice of making naturalistic pictures of animals on rock was one way that hunter-gatherers transformed natural landscapes into places charged with human meaning, identity and history, as was the creation of hand stencils in many locations. The fact that these modes of depiction persisted for tens of thousands of years in various parts of the world attests to their adaptive value no matter what specific indigenous meanings they once held. Here we report results of new research on the earliest surviving rock art of Southeast Asia, based on superimpositions and numerical dates, particularly for south-west China, Malaysia, Cambodia and Indonesia (Figure 1). Discussion focuses on both paintings of wild animals and human hand stencils in order to illuminate debate about art origins and to regionally situate recently announced early dates from sites in Sulawesi, Indonesia (Aubert *et al*. 2014).

Jinsha River rock art, Yunnan Province, China

A broad investigation into the ancient rock art, archaeology and palaeoanthropology of Yunnan Province began in 2008 (e.g. Curnoe *et al*. 2012). Rock art studies focused on the dating, description, animal species identification and environmental context relationship of painting sites in north-west Yunnan, near the Jinsha River (Taçon *et al*. 2010c, 2012). Since 1976, almost 70 rock art sites have been found in this region. Just over 40 sites contain naturalistic paintings of wild animals and human-like forms, mostly in outline and in profile. Common subjects include deer, wild goat, bison, wild cattle (aurochs), horse and human-like forms, some holding artefacts. Less commonly, there are monkeys, *bharal* (Himalayan blue sheep), bear, boar, donkey, snake-like designs, a tapir and a tiger. Sometimes only the heads of animals are depicted, especially deer and goat.

Animals are depicted as if running, standing, climbing or leaping, either on their own or as part of a group. Colours range from orange to red and brown to dark purple. At many sites there are clusters of overlapping designs. Their condition varies from very poor to fair, with a few paintings relatively well preserved. At many sites they are so faded that they can only be viewed clearly by using digital enhancement techniques. At other sites the rock wall is heavily weathered, cracked and crumbling, with only fragments of some paintings left *in situ*. In a few locations flowstone covers parts of paintings, with the potential for dating.

During 2008, eight sites were recorded and one, Baiyunwan, was sampled for uranium-series dating (Taçon *et al*. 2010c, 2012). A further three sites were documented in detail in 2011—Biziyanbu, Xianrendong (Figure 2; not the famous Xianrendong site in Jiangxi Province) and Hua Yan—fleshing out an initial rock art sequence. At many sites, natural features of rock surfaces have been incorporated into rock painting designs. These include,

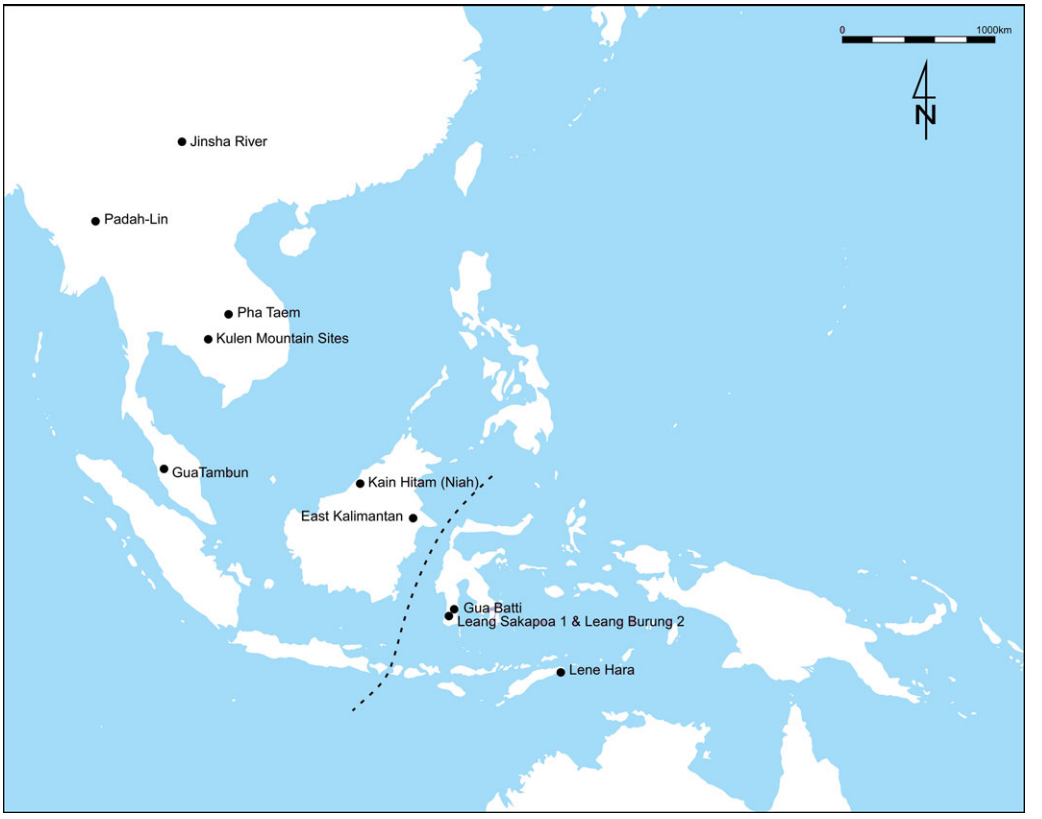

Figure 1. Map of Southeast Asia with sites discussed indicated in relation to the Wallace Line, a boundary separating Asian and Australian faunal regions.

at Xianrendong, adding a body and details of the head to the rock wall where a projection gave the impression of a bull head and back (Figure 3); and, at Hua Yan, a large boar in dark red line infill painted to fill much of an oval concavity that defines its outline (Figure 4) 5m above the ground surface, as well as a purple outline of a goat positioned on a small rock projection so that it appears to be standing on a cliff edge. A five-phase sequence was established, with large deer heads being the most recent. Uranium-series and radiocarbon dating of flowstone above and below a large painted deer head at Baiyunwan yielded a maximum age of 5738 years BP and a minimum of 2050 years. Deer heads consistently overlie small naturalistic outline paintings, indicating that the latter are older. Dating results show that the naturalistic figures have a minimum age of 3400 years, but just how much older they are is yet to be resolved (Taçon *et al*. 2012).

Gua Tambun, Perak, Malaysia

Gua Tambun ('Tambun Cave') is a cliff-side rockshelter located near Ipoh, the capital of Perak in north-central Malaysia. It is the largest rock art site in Peninsular Malaysia, containing over 600 paintings in 11 panels across 80m of rock wall. The rock art of Gua

Figure 2. The Xianrendong panel with large, naturalistic elk and deer outline paintings, Yunnan, China.

Figure 3. The Xianrendong bull (Yunnan, China) is a natural projection of stone that resembles an animal in profile. It was painted with red ochre to highlight the head, front legs and side of the body. The head has a natural hole for an eye. The image was enhanced with DStretch.

Figure 4. The Hua Yan boar was painted in a natural boar-shaped hollow high up on the panel, Yunnan, China.

Tambun contains a complex mix of rock paintings in different styles, of which the paintings of large, naturalistic animals are among the earliest in the sequence. It was first reported by Matthews (1959, 1960) and reinvestigated by Tan (Tan 2010; Tan & Chia 2010, 2011, 2012). The main panel covers an area about 10m wide × 6m high, approximately 6m above the present shelter floor (Figure 5). It contains about 500 paintings and from superimpositions provides the chronology for the site. Some form of scaffold was probably constructed to paint the highest images. Numerous animals and human figures are depicted, although the vast majority of the paintings are 'abstract' or 'geometric'.

There are 58 depictions of animals on the panel—9 per cent of the total number of paintings from the site—but they take up just over 50 per cent of the total used surface area of the rock art panel. Most animals are painted in a solid, single-colour silhouette form, in profile or overhead view. These paintings tend to be large—over 0.5m in width, with some reaching up to 2.0m. The majority of identified animals are terrestrial, including deer, boar, bear, civet, bovids and lizards of different shapes and sizes, but there are also fish. Superimpositions and the spatial relationships of the paintings reveal at least seven phases of painting (Tan 2010; Tan & Chia 2010, 2011). The earliest phases, Phases 1 and 2, coloured red-orange and purple respectively, contain the majority of the deer (Figure 6), fish and boar depictions.

The rock art has not been scientifically dated, but Phase 1 is generally hard to see with the naked eye, and must have faded over a considerable period of time. Superimpositions between Phases 1 and 2 are slight, with small overlaps between the edges of paintings. The

Figure 5. Gua Tambun main panel, Ipoh, Malaysia.

site chronology indicates that painters first began with larger-sized, naturalistic paintings at higher elevations, before graduating to smaller figures at lower heights. The final phase of paintings is that of mountain goats rendered as stylised line paintings, consistently painted on top of the earlier solid figures.

Myanmar, Thailand and Cambodia

The oldest surviving rock art of Myanmar, Thailand and Cambodia also consists of outline and/or solid infill paintings of naturalistic wild animals, mainly catfish, deer and an almost life-size elephant in Pha Taem National Park, Thailand (e.g. see Thaw 1971; Khemnak 1996; Taçon 2011; Taçon & Tan 2012). At Padalin Cave, Myanmar, the figures are small

Figure 6. Gua Tambun naturalistic profile deer with solid infill, Ipoh, Malaysia.

outline and silhouette forms as in north-west Yunnan Province, China, while in Thailand and Cambodia the naturalistic animal paintings are much larger silhouettes, as seen at Gua Tambun, Malaysia. Many sites in Thailand contain hand stencils (e.g. see Solheim & Gorman 1964), including Pha Taem, although these are unusual for Mainland Southeast Asia (the only others are a few hand stencils at sites in south-western China).

Over a dozen Cambodian rock art sites were discovered as recently as 2010–2012 at Kulen Mountain, north-east of Siem Reap. The first were discovered during a ground survey conducted by the Authority for the Protection and Management of Angkor and the Region of Siem Reap (APSARA) for the Living Angkor Road Project. Further sites were found in 2011 and 2012. The sites consist of sandstone rockshelters with ochre paintings of animals, human figures and abstract designs. Later, charcoal drawings were added at some sites. A five-phase sequence was established in 2011 based on superimposition analysis. Small and large naturalistic deer (Figure 7) and catfish (Figure 8) are the earliest in the sequence (Taçon 2011; Tan & Taçon 2014: 69–71), but none of the art has been numerically dated.

Indonesia

The island of Borneo has at least nine rock art traditions, some of them similar to bodies of rock art in others parts of greater Southeast Asia (Taçon *et al.* 2010d; Taçon 2013). The earliest are in east Kalimantan and consist of stencils (human hands, hands-and-arms) and ochre paintings of animals and some humans. The stencils, one minimally dated to about 10 000 years ago (Plagnes *et al*. 2003), were placed in rockshelters on walls and ceilings as at sites across Indonesia, Papua New Guinea and Australia, but many had painted infill designs added later (Fage & Chazine 2009). The animal paintings consist of naturalistic depictions of deer, wild boar (especially at Gua Jufri) and a tapir (at Liang Karim).

Figure 7. Poeung Dayrei 1 solid infill painted deer, Kulen Mountain, Cambodia.

Figure 8. Poeung Komnou solid infill painted catfish, Kulen Mountain, Cambodia.

Figure 9. Leang Sakapao hand stencils, Sulawesi, Indonesia.

In addition to Kalimantan, painted rock art is found in various parts of Indonesia. Many pigment art sites in eastern Indonesia have been assigned to the 'Austronesian Painting Tradition' (APT), believed to postdate the 4000 BP expansion of Malayo-Polynesian speakers (Ballard 1988). However, there are indications of a much older rock art tradition on some islands. In the Maros and Pangkajene regions of south-west Sulawesi, caves containing two distinct painting traditions are recognised, respectively assigned to pre-APT and APT (Bulbeck 2008). The earlier painted art, comprising large naturalistic animals and hand stencils, is found at some of the oldest occupation sites (Van Heekeren 1957: pl. 31; 1972: 118–20; Bulbeck 2004).

Two of these, Leang Sakapao 1 and Leang Burung 2, were first occupied about 30 000 years ago and exhibit evidence of occupation from then to about 20 000 years ago, after which they appear to have been abandoned, whether permanently (Leang Sakapao 1) or until around 2000 years ago (Leang Burung 2) (Bulbeck *et al.* 2004). Both sites have evidence for art: pieces of ochre, three of them with signs of abrasion, at Leang Burung 2 that were sealed in occupation deposits; hand stencils at both sites (Figure 9); and paintings of large animals at Leang Sakapao 1. The large animals at Leang Sakapao 1 (Figure 10) are either the endemic pig *Sus celebensis* or babirusa (pig-deer), up to 1.2 × 0.9m in size. They were depicted in profile with red line infill in a technique similar to the Hua Yan boar (China; Figure 4) and the earliest naturalistic animal paintings of Kakadu/Arnhem Land, Australia (e.g. see Chaloupka 1993). Some of these have considerable build-up of carbonate flows over the art. Further support for the antiquity of large, naturalistic animal art in this region is found in the fact that zoomorphs (apart from fish) are absent from the numerous rockshelters with Holocene occupation and parietal art in the same region (Sumantri 1996). Thus, the painted rock art in Leang Sakapao 1 is argued to be probably of Pleistocene age based on the age of the cultural deposits and the fact that there is no evidence of APT art.

Figure 10. Leang Sakapao line infill painting of a boar partially covered by flowstone, Sulawesi, Indonesia.

In the early 2000s, work commenced in the Bone region of south-west Sulawesi with the discovery and excavation of a cave site, Gua Batti, by Budianto Hakim and an Indonesian team from Balai Arkeologi, Makassar. Gua Batti is an enormous limestone cave—the north–south running entrance is about 40m wide and the cave is approximately 60m deep east–west. In common with Leang Burung 2, Gua Batti has evidence of at least two distinctive painted art traditions. Black drawn figurative and geometric motifs fit well into the stylistic criteria of the APT, but near the northern entrance is a clear depiction of an *Anoa* sp., an endemic pygmy water-buffalo, painted in red pigment. It is shown in profile, and is approximately 1.2m long with head, eye and horns clearly discernible. In common with the animal figures in the Maros caves, the body is infilled with red lines and appears to have been placed on the cave wall to take advantage of the natural contours of the rock and to emphasise the muscled shoulder and curve of the horns (as in the Jinsha River region, China). Red stencils are also found in three separate areas of Gua Batti, including a cluster of at least 10 hands.

Scientific dating

For over a decade, direct rock art dating has suggested some Southeast Asian rock art has its origins in the Pleistocene, with a minimum age of about 9900 years obtained for a hand stencil and a painted 'blob' at Gua Saleh, East Kalimantan, Borneo (Plagnes *et al.* 2003). At Lene Hara Cave, East Timor, an engraved human-like face near the cave entrance is bracketed by U-Th ages of 12 000 and 10 000 years (O'Connor *et al.* 2010). Also at Lene Hara, a pigment layer, possibly the remnant of an old painting, was sandwiched between layers of calcite dated to 24–29.3 ka (Aubert *et al.* 2007). Most recently, uranium-series dating of speleothems over and under 12 hand stencils and two naturalistic animal depictions from seven sites in the Maros area of Sulawesi has revealed much older ages. These dates also indicate that the early tradition of pigmented rock art persisted for at least 12 000 years

in this area. The earliest minimum age for a hand stencil is 39.9 kyr at Leang Timpuseng and the oldest animal painting, of a babirusa 'pig-deer' at the same site, dates back to at least 35.4 kyr. A second animal painting (probably of a pig) at another site has a minimum age of 35.7 kyr but is potentially much older (Aubert *et al.* 2014). This challenges the view that figurative rock paintings and stencils first emerged in Europe and indicates that rock painting was practised in both Spain (El Castillo red disc geometric design; Pike *et al.* 2012) and Sulawesi (hand stencil; Aubert *et al.* 2014) at about 40 000 years ago.

Hunter-gatherer rock art and the questions of age and origin(s)

The Jinsha River naturalistic outline rock paintings are unlike rock art of any other part of China in terms of style, form and subject matter, while the naturalistic paintings of Gua Tambun are unlike other rock art of Peninsular Malaysia. The early rock art of Cambodia and Indonesia (Kalimantan, Sulawesi) is also distinct from that produced in the past few thousand years. Curiously, the early art of all of these areas resembles early rock art of Western Europe, although direct relationships have been discounted (Taçon *et al.* 2010c: 78–82). The earliest surviving Southeast Asian rock paintings of animals and hand stencils are more likely the surviving evidence of what was once a widespread Southeast Asian and perhaps global hunter-gatherer 'practice' shared by many groups, rather than a cultural tradition of one specific group of people (see also Taçon *et al.* 2010a). Aspects of shared human physiology, neurobiology, artistic capability and perception, as well as a similar life-style (i.e. hunting/gathering), may account for some of the similarity we recognise today. For instance, Halverson (1992: 390, 402) and Watson (2009: 178) note that early animal depictions in world rock art are usually in profile and often in outline form, as can be seen in both Europe and Southeast Asia. They argue for a neuroscientific explanation that accounts for independent invention.

Hodgson (2012) has published the most recent review of neuroscientific research undertaken in relation to the Upper Palaeolithic art of Europe, concluding that "caves were special places of resonance where questing for animals in various guises took place" (2012: 189). This is in keeping with similar ideas expressed by Clottes and Lewis-Williams (1998; Lewis-Williams 2002), and others. These authors have suggested that Upper Palaeolithic art in Europe was inspired by fleeting misperceptions of encounters with animals due to the dark, dangerous and ambiguous deep cave environment; actual animals that might be living there (e.g. cave bears); and, for later visitors, paintings of animals made by previous generations. Hodgson (2012: 188), again following Clottes and Lewis-Williams, then argues that "the natural suggestive features of the cave provided important trigger cues that led to the first depictions" and that this is why naturalistic depictions of animals appear early in sequences.

Unlike Europe, in much of Southeast Asia (and northern Australia) animals were more often depicted in open rockshelters and seldom in deep, dark caves. Further, and as noted above, at many open rockshelter sites rock paintings are closely aligned with natural rock features. In Indonesia and East Timor there are some deep caves with a few animal depictions but more often the deep caves contain only hand stencils; for example, Leang Lambattorang and other nearby caves, in the Maros district, South Sulawesi and Lene

Kici and Lie Siri in East Timor (Van Heekeren 1972: 119; O'Connor 2003: 114, 124; others in Aubert *et al.* 2014). Furthermore, many deep, dark Southeast Asian caves, such as Gua Sireh and Kain Hitam (Niah Cave complex) in Sarawak, contain no naturalistic animal imagery at all. Instead, they contain depictions of human figures, abstract designs, watercraft and so forth (Harrison 1958a: 588, 1958b; Datan 1993; Szabó *et al.* 2008). These are motifs of late Holocene APT rock art that reflects a different sort of cave rock art engagement to that which occurred in Europe. This contrast suggests that it was the shape of rock surfaces, rather than ambiguous darkness, that was important for guiding where to paint early naturalistic pictures of wild animals in both Southeast Asia and Europe.

Recent studies at Blombos Cave, South Africa, have revealed that humans were making complex paints and using shell containers for mixing and holding paint about 100 000 years ago (Henshilwood *et al.* 2011). In southern Africa, some naturalistic Namibian animal paintings have been dated to about 25 500–27 500 BP (Wendt 1976), while in northern Africa (Egypt) naturalistic animal petroglyphs have a minimum age of about 15 000 years (Huyge *et al.* 2011). A relationship between rock surface variation and the nature of animal depictions is evident at many African hunter-gatherer sites. This leads to the question of whether naturalistic animal rock art had an African rather than a European origin. Or was this form of mark-making independently invented by Pleistocene hunter-gatherers in many parts of the world?

In contrast, hand stencils have a limited distribution at rock art sites in Africa and are found only in Mali and Egypt, especially in the 'Cave of Beasts' (Wadi Sura, south-west Egypt—e.g. see Le Quellec *et al.* 2005), although there are hand prints and engraved human hands in many parts of Africa (Bahn 1998: 115; Coulson & Campbell 2001). Outside Africa, hand stencils are also more restricted to specific regions than are naturalistic animal paintings. Stencils are found mainly in Europe, some parts of the Americas (especially Argentina), some locations in Indonesian Borneo, Thailand and south-western China (see above), many areas east of the Wallace Line in Southeast Asia and throughout Australia. They appear very early in rock art sequences wherever they are found (as with Europe and Egypt), but continued to be produced for thousands of years. In Europe and Sulawesi, the oldest hand stencils we know of were made close to the time when modern humans settled those areas (Pike *et al.* 2012; Aubert *et al.* 2014). Thus, hand stencilling may have been an important way of putting a human stamp (the hand) on new land, as well as for communicating other messages of human presence and symbolism in a performative manner (Dobrez 2013). Alternatively, some have suggested that ritual engagement with rock surfaces was a motivating factor (e.g. Lewis-Williams 2002).

A shared legacy

The oldest surviving rock art of Southeast Asia has a consistent theme of naturalistic animal depictions, associated with hand stencils in some places, as is the case in Europe, and occasionally with depictions of human-like figures and/or geometric designs. Across Southeast Asia (and at many locations in northern Australia) we find rock art imagery placed in relation to and sometimes incorporating natural rock features. Here again there

is a parallel to many painted European cave sites. The emerging picture suggests that humans have a shared rock-marking legacy that includes the production of naturalistic depictions of animals and that motifs of these kinds should not be viewed as evidence of particular ethnicities. These are testimony to a worldwide behavioural practice among early modern humans, not the isolated cultural invention of specific regional communities and populations. That early tradition of rock art persisted for tens of thousands of years, but rock art changed dramatically throughout the world during the Holocene as a consequence of changing environmental conditions, the adoption of agriculture in various regions, and the resulting cultural changes that they together brought about. In Island Southeast Asia this culminated in the development of the 'Austronesian Painting Tradition' after 4000 BP and a major shift away from naturalistic animal designs to stylised depictions of some animals, human-like figures, watercraft and geometric designs. The practice of making naturalistic animal rock paintings probably continued longer in some areas than in others, reflecting the persistence of hunter-gatherers in parts of Southeast Asia until recent times. Across Southeast Asia there may have been many geographical and temporal traditions employing naturalistic imagery, but this variability needs better detection and articulation, as does the Austronesian Painting Tradition itself, which also should not be regarded as a monolithic whole.

Future research should thus focus on the differing ways rock art changed or did not change over time across the greater Southeast Asian region. New dating programs will certainly better determine the antiquity of more Southeast Asian rock art, but the emerging picture from Sulawesi is that the practice of making hand stencils and naturalistic animal art began as early or earlier in Southeast Asia than it did in Europe (Aubert *et al.* 2014). This challenges theories about rock art origins, about where and when the fundamental human development of figurative art-making began, and the nature of 40 000-year-old global human practices. It has implications not only for our understanding of rock art in Southeast Asia and Europe but also Australia. For instance, in Kakadu-Arnhem Land and other parts of northern Australia the oldest surviving rock art consists of naturalistic animals and stencils (e.g. see Chaloupka 1993; Taçon *et al.* 2010b). This opens up the possibility that the practice of making these sorts of designs was brought to Australia at the time of initial colonisation, but it may alternatively have been independently invented or resulted from as yet unknown forms of cultural contact. All three possibilities are equally intriguing.

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References

Aubert, M., S. O'Connor, M.T. McCulloch, G. Mortimer & M. Richer-Laflèche. 2007. Uranium-series dating rock art in East Timor. *Journal of Archaeological Science* 34: 991–96. http://dx.doi.org/10.1016/j.jas.2006.09.017

Aubert, M., A. Brumm, R. Ramli, T. Sutikna, E.W. Saptomo, B. Hakim, M.J. Morwood, G.D. Van Den Berg, L. Kinsley & A. Dosseto. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature*. 514: 223–27. http://dx.doi.org/10.1038/nature13422

Bahn, P. 1998. *Cambridge illustrated history of prehistoric art*. Cambridge: Cambridge University Press.

Ballard, C. 1988. Dudumahan: a rock art site on Kai Kecil, S.E. Moluccas. *Bulletin of the Indo-Pacific Prehistory Association* 8: 139–61. http://dx.doi.org/10.7152/bippa.v8i0.11274

Bulbeck, D. 2004. Divided in space, united in time: the Holocene prehistory of South Sulawesi. *Modern Quaternary Research in Southeast Asia* 18: 129–66.

– 2008. An integrated perspective on the Austronesian diaspora: the switch from cereal agriculture to maritime foraging in the colonisation of Island Southeast Asia. *Australian Archaeology* 67: 31–51.

Bulbeck, D., P. Hiscock & I. Sumantri. 2004. Leang Sakapao 1, a second dated Pleistocene site from South Sulawesi, Indonesia. *Modern Quaternary Research in Southeast Asia* 18: 118–28.

Chaloupka, G. 1993. *Journey in time*. Sydney: Reed.

Clottes, J. & J.D. Lewis-Williams. 1998. *The shamans of prehistory: trance and magic in the painted caves*. New York: Harry N. Abrams.

Coulson, D. & A. Campbell. 2001. *African rock art: paintings and engravings on stone*. New York: Harry N. Abrams.

Curnoe, D., X. Ji, A.I.R. Herries, K. Bai, P.S.C. Taçon, Z. Bao, D. Fink, Y. Zhu, J. Hellstrom, Y. Luo, G. Cassis, B. Su, S. Wroe, S. Hong, W.C.H. Parr, S. Huang & N. Rogers. 2012. Human remains from the Pleistocene–Holocene transition of southwest China suggest a complex evolutionary history for East Asians. *PLoS ONE* 7(3): e31918. http://dx.doi.org/10.1371/journal.pone.0031918

Datan, I. 1993. The charcoal drawings at Gua Sireh. *The Sarawak Museum Journal* 45(66): 137–61.

Dobrez, P. 2013. The case for hand stencils and prints as proprio-performative. *Arts* 2: 273–327. http://dx.doi.org/10.3390/arts2040273

Fage, L.-H. & J.-M. Chazine. 2009. *Bornéo: la mémoire des grottes*. Lyon: Fage.

Halverson, J. 1992. The first pictures: perceptual foundations of Paleolithic art. *Perception* 21: 389–404. http://dx.doi.org/10.1068/p210389

Harrison, T. 1958a. The caves of Niah: a history of prehistory. *The Sarawak Museum Journal* 12(8): 549–90.

– 1958b. The great cave, Sarawak. A ship-of-the-dead cult and related rock paintings. *The Archaeological News Letter* 6(9): 199–203.

Henshilwood, C.S., F. d'Errico, K.L. Van Niekerk, Y. Coquinot, Z. Jacobs, S.-E. Lauritzen, M. Menu & R. García-Moreno. 2011. A 100,000-year-old ochre-processing workshop at Blombos Cave, South Africa. *Science* 334: 219–22. http://dx.doi.org/10.1126/science.1211535

Hodgson, D. 2012. Emanations of the mind: Upper Paleolithic art as a visual phenomenon. *Time and Mind* 5(2): 185–94. http://dx.doi.org/10.2752/175169712X13276628335041

Huyge, D., D.A.G. Vandenberghe, M. De Dapper, F. Mees, W. Claes & J.C. Darnell. 2011. First evidence of Pleistocene rock art in North Africa: securing the age of the Qurta petroglyphs (Egypt) through OSL dating. *Antiquity* 85: 1184–93.

Khemnak, P. 1996. *Prehistoric cave art in Thailand*. Bangkok: Fine Arts Department (in Thai).

Le Quellec, J.-L., P. de Flers & P. de Flers. 2005. *Du Sahara au Nil. Peintures et gravures d'avant les Pharaons*. Paris: Fayard/Soleb.

Lewis-Williams, J.D. 2002. *Mind in the cave: consciousness and the origins of art*. London: Thames & Hudson.

Matthews, J.M. 1959. Rock paintings near Ipoh. *Malaya in History* 5(2): 22–25.

– 1960. A note on the rock paintings recently discovered near Ipoh, Perak. *Man* 60: 1–3. http://dx.doi.org/10.2307/2797896

O'Connor, S. 2003. Report of nine new painted rock art sites in East Timor in the context of the western Pacific region. *Asian Perspectives* 42: 96–128. http://dx.doi.org/10.1353/asi.2003.0028

O'Connor, S., K. Alpin, E. St Pierre & Y. Feng. 2010. Faces of the ancestors revealed: discovery and dating of a Pleistocene-age petroglyph in Lene Hara Cave, East Timor. *Antiquity* 84: 649–65.

Pike, A.W.G., D.L. Hoffman, M. García-Diez, P.B. Pettitt, J. Alcolea, R. De Balbín, C. González-Sainz, C. de las Heras, J.A. Lasheras, R. Montes & J. Zilhão. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–13. http://dx.doi.org/10.1126/science.1219957

Plagnes, V., C. Causse, M. Fontugne, H. Valladas, J.-M. Chazine & L-H. Fage. 2003. Cross dating (Th/U-^{14}C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60: 172–79. http://dx.doi.org/10.1016/S0033-5894(03)00064-4

SOLHEIM, W.G. II & C.F. GORMAN. 1964. Archaeological salvage program; northeastern Thailand—first season. *Journal of the Siam Society* 54(2): 111–210.

SUMANTRI, I. 1996. Pola pemukiman gua-gua prasejarah di Biraeng Pangkep, Sulawesi Selatan. Unpublished MA dissertation, University of Indonesia, Jakarta.

SZABÓ, K., P.J. PIPER & G. BARKER. 2008. *Sailing between worlds: the symbolism of death in northwest Borneo* (Terra Australis 29). Canberra: ANU Epress.

TAÇON, P.S.C. 2011. Kulen Mountain rock art: an initial assessment and report to APSARA, Siem Reap, Cambodia. Gold Coast: Griffith University.

– 2013. Interpreting the in-between: rock art junctions and other small style areas between provinces. *Time and Mind* 6(1): 73–80. http://dx.doi.org/10.2752/175169713X13500468476682

TAÇON, P.S.C. & N.H. TAN. 2012. Recent rock art research in Southeast Asia and southern China, in P. Bahn, N. Franklin & M. Strecker (ed.) *Rock art news of the world 4*: 207–14. Oxford: Oxbow.

TAÇON, P.S.C., N. BOIVIN, J. HAMPSON, J. BLINKHORN, R. KORISETTAR & M. PETRAGLIA. 2010a. New rock art discoveries in the Kurnool District, Andhra Pradesh, India. *Antiquity* 84: 335–50.

TAÇON, P.S.C., M. LANGLEY, S.K. MAY, R. LAMILAMI, W. BRENNAN & D. GUSE. 2010b. Ancient bird stencils in Arnhem Land, Northern Territory, Australia. *Antiquity* 84: 416–27.

TAÇON, P.S.C., G. LI, D. YANG, S.K. MAY, H. LIU, M. AUBERT, X. JI, D. CURNOE & A.I.R. HERRIES. 2010c. Naturalism, nature and questions of style in Jinsha River rock art, northwest Yunnan, China. *Cambridge Archaeological Journal* 20(1): 67–86. http://dx.doi.org/10.1017/S0959774310000053

TAÇON, P.S.C., M.S. SAUFFI & I. DATAN. 2010d. New engravings discovered at Santubong, Sarawak, Malaysia. *The Sarawak Museum Journal* 67(88): 105–21.

TAÇON, P.S.C., M. AUBERT, G. LI, D. YANG, H. LIU, S.K. MAY, S. FALLON, X. JI, D. CURNOE & A.I.R. HERRIES. 2012. Uranium-series age estimates for rock art in southwest China. *Journal of Archaeological Science* 39: 492–99. http://dx.doi.org/10.1016/j.jas.2011.10.004

TAN, N.H. 2010. Scientific reinvestigation of the rock art at Gua Tambun, Perak [two volumes]. Unpublished MA dissertation, Universiti Sains Malaysia, Penang.

TAN, N.H. & S. CHIA. 2010. 'New' rock art from Gua Tambun, Perak, Malaysia. *Rock Art Research* 27(1): 9–18.

– 2011. Current research on rock art at Gua Tambun, Perak, Malaysia. *Bulletin of the Indo-Pacific Prehistory Association* 31: 93–108.

– 2012. Revisiting the rock art at Gua Tambun, Perak, Malaysia, in M.L. Tjoa-Bonatz, A. Reinecke & D. Bonatz (ed.) *Crossing borders: selected papers from the 13th International Conference of the European Association of Southeast Asian Archaeologists, Volume 1*: 181–98. Singapore: NUS Press.

TAN, N.H. & P.S.C. TAÇON. 2014. Rock art and the sacred landscapes of mainland Southeast Asia, in D. Gillette, B. Murray, M. Greer & M. Hayward (ed.) *Rock art and sacred landscapes*: 67–84. New York: Springer.

THAW, U.A. 1971. The 'Neolithic' culture of the Padah-lin Caves. *Asian Perspectives* 14: 123–33.

VAN HEEKEREN, H.R. 1957. *The stone age of Indonesia*. The Hague: Martinus Nijhoff.

– 1972. *The stone age of Indonesia* [second edition]. The Hague: Martinus Nijhoff.

WATSON, B. 2009. Universal visions: neuroscience and recurrent characteristics of world palaeoart. Unpublished PhD dissertation, University of Melbourne.

WENDT, W.E. 1976. 'Art mobilier' from Apollo 11 Cave, south west Africa: Africa's oldest dated works of art. *The South African Archaeological Bulletin* 31(121–122): 5–11. http://dx.doi.org/10.2307/3888265

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