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Rethinking the Neolithic in Island Southeast Asia, with Particular Reference to the Archaeology of Timor-Leste and Sulawesi

*Repenser le néolithique en Asie du Sud-Est insulaire, avec une référence
particulière à l'archéologie de Timor-Leste et de Sulawesi*

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Rethinking the Neolithic in Island Southeast Asia, with Particular Reference to the Archaeology of Timor-Leste and Sulawesi

Introduction

The last few years have seen what can only be described as a radical overhaul of the Neolithic in Island Southeast Asia (ISEA) (Anderson 2005; Blench 2012, 2014; Bulbeck 2008; O'Connor 2006; O'Connor and Veth 2005; Spriggs 2011; Szabó and O'Connor 2004). This has come about as researchers have critiqued the orthodox model of “Neolithisation” against new data and found it wanting. The orthodox model is primarily derived from Peter Bellwood’s vision of an expansion of Austronesian-speaking farming communities out of Taiwan about 4500 years ago (eg. Bellwood 1997: 219-30, 2002: 26; Bellwood et al. 2011). These early farmers supposedly transported pottery, rice and millet, the domestic pig, dog and chicken, stone adzes, bark cloth beaters, net sinkers and a suite of shell artefacts such as fish hooks, arm rings and beads into ISEA, and ultimately the Pacific. While recent critiques of the archaeological, linguistic and biological evidence accommodate aspects of the orthodox model, such as an Austronesian linguistic homeland in Taiwan

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Fig. 1 – Map of ISEA with inset showing Flores, Roti and Timor Leste showing sites mentioned in the text.

and subsequent expansion of Malayo-Polynesian into ISEA, they are united in denying the agricultural impetus for expansion and the movement of a suite of Neolithic material culture. The researchers questioning an agriculturally-driven expansion and package of traits have also proposed a number of alternate visions of “a Neolithic” or “Neolithics” for the archipelago. These have included an emphasis on advanced maritime capacity as the facilitator, if not the driver, of the migration from Taiwan (Anderson 2005; Blench 2012; Bulbeck 2008), and a charismatic ideology for accomplishing the rapidity and reach of Austronesian colonisation (Blench 2012; Spriggs 2011). For example, Blench (2012: 144) has recently discussed the archaeological and linguistic evidence and suggested that the term fisher-forager-traders more accurately sums up the enterprise of the Austronesian expansion. Bulbeck (2008: 32) goes as far as to suggest that the early Austronesians were “terrestrially challenged.” He suggests that rather than farming, adaptability, high-level maritime skills, the ability to exploit maritime environments and trade, were the key components of successful Austronesian expansion throughout ISEA.

Here I evaluate some of these ideas in the light of evidence from recent excavations in Timor-Leste and Sulawesi (fig. 1). I make no assumption that the spread of material cultural items associated with the Neolithic in ISEA is linked to the migration of Austronesian language-speakers, but rather seek to

evaluate this hypothesis by examining the archaeological data. While I am primarily concerned with the archaeological evidence, linguistic and genetic research will be mentioned where it is relevant to the archaeology. I follow Bulbeck (2008: 32) in using the term Neolithic within the context of ISEA for “assemblages with pottery or polished stone tools which pre-date *c.* 2500 BP.”

Anything but an Agricultural Revolution

Almost every paper that critiques the Neolithic in ISEA concludes that there is precious little evidence for agriculture in the earliest pottery-bearing assemblages, but for the sake of completeness and to highlight the variability across the region I will discuss what little there is.

There is evidence for rice at Andarayan in the Cagayan Valley, northern Luzon in the form of carbonised inclusions of rice husks and stem parts in earthenware vessels (Snow et al. 1986: 5). One grain has been directly dated to 3400 ± 125 BP (3933–3380 cal. BP). Rice has also been found in Sarawak at Gua Sireh cave in a sherd and dated to 3850 ± 260 BP (4891–3563 cal. BP) (Datan and Bellwood 1991:393; Bellwood et al. 1992). When first published, Datan and Bellwood (1991) stated that it was not possible to say whether rice was grown locally or if the pottery with the rice inclusions had been imported. New finds of charred rice husks used as temper at Gua Sireh and at many other sites in Sarawak indicate that rice was grown locally at this time (Doherty et al. 2000; but see Spriggs 1989: 590-598). In addition, moulds of complete single rice husks were found in three sherds from Bukit Tengkorak in Sabah; one of these was in a sherd with a context date of *c.* 3000 cal. BP (Doherty et al. 2000: 152). Bulbeck (2008: 32) suggests that the early uptake of rice in northern Luzon and northern Borneo may be due to their respective proximity to Taiwan and the Southeast Asian mainland where rice agriculture was already well established. Another claim for early rice comes from Ulu Leang in South Sulawesi where some charred grains and spikelets, supposedly dating to *c.* 4000 BP, were identified, but as no information on the context or provenance of the rice remains is provided this report requires verification (Paz 2005: 111-113) (Fig. 2). In contrast, the Neolithic-aged botanical assemblage at nearby Leang Burung 1 revealed only nuts, fruits, yams and possible legumes. No evidence for cereals, wild or cultivated, was found (Paz 2004: 205).

As Spriggs (2011) and others have emphasised, one of the biggest problems in characterising the Neolithic in ISEA is due to the paucity of open settlement sites which would have been the focus of settled habitation, as opposed to cave and shelter sites which may have been used opportunistically and for special purposes. For this reason the Neolithic open air settlements of Minanga Sipakko and Kamassi in the Karama River valley, West Sulawesi, are extremely important as they provide a basis for comparison with open settlements in mainland SEA, and the Lapita settlements of Island Melanesia and the Pacific (fig. 2). Dates

Fig. 2 – Map of Sulawesi showing archaeological sites and places mentioned in the text.

for the Karama valley sites indicate an occupation range between 3500 to 2800 years ago, but Anggraeni and colleagues (2014: 46) believe first occupation may be up to a century earlier. The Karama sites have good preservation and as they are in river valley locations we might expect them to have evidence of crops, field systems or clearance, if agriculture formed the basis of the Austronesian diaspora. Anggraeni et al. (2014: 750) report a small number of rice (*Oryza* sp.) phytoliths in the lower sediments, but it is uncertain whether an endemic wild rice or an imported domesticated rice is represented. If rice was being widely cultivated around these valley settlements the phytolith evidence should arguably be more abundant. The phytolith record more generally indicates a

vegetation around the site dominated by palms giving way over time to grasses, shrubs and trees which may signal disturbance and clearance in the vicinity of the settlement (Anggraeni et al. 2014: 750), but it is unclear at what phase during the site's occupation this clearance took place. The pollen record at Minanga Sipakko suggests that clearance occurred only in the final phase of the site's occupation. Sparse remains of the *Aleurites* candlenut were found in the early Neolithic levels, but this species is common in pre-pottery assemblages throughout ISEA and may have been collected from wild groves (Simanjuntak et al. 2008: 70-71).

If we are dealing with Neolithic rice farmers in Sarawak and northern Luzon, Bellwood (1997, 2005: 130), Paz (2002, 2005: 114) and Mijares (2007) have pointed out that tubers and tree crops would have become increasingly important as Austronesians moved south and east through the archipelago, due to the unsuitability of the climate in the equatorial zone for cereals. But we are left with the question of how Austronesians were able to rapidly switch from grain to root and arboreal crops. Blench (2012) has suggested that the Austronesians did not make the switch as they were not farmers in the first place, but rather acquired their carbohydrate staples through trading with resident horticulturalists who were already exploiting root and tree crops. In the last few years a number of researchers have raised the influence of Melanesia and eastern Maluku on the crop base of ISEA and suggested it may have considerable antiquity (eg. Denham 2011; Denham and Donohue 2009; Oliveira 2008: 343).

Glover (1986: 169, 194) reported one seed of the cereal Job's Tears (*Coix* sp.) at Uai Bobo 2 in Timor-Leste in layers dated between approximately 17,000 – 14,000 cal. BP. This specimen was only assigned a "probable" identification but even if identification was verified, its small size, uncharred condition and good state of preservation raise questions about whether this find was *in situ* in these lower levels or was vertically displaced. It is known that this cereal is edible and it is possible that it may have been more widely used in the past than it is today; however, its presence in Timor at this early date begs caution. A half-seed case, also from Uai Bobo 2 Horizon X dated to about 4000 to 3500 cal. BP, was tentatively identified as millet (*Setaria*) (Glover 1986: 169, 194), but here again the identification needs to be confirmed and the specimen directly dated. A possible *Piper* sp. (Betelnut) was found in layers dated to c. 14,000 – 13,500 cal. BP but since the identification is tentative and the dates for this layer are extrapolated this sample also requires verification. Horizon V at Uai Bobo 2 dated to c. 8000 to 7000 cal. BP contained two broken and carbonised examples of Polynesian chestnut (*Inocarpus*), and half a seed case of a Cucurbitaceae which Yen identified as pumpkin or *Mormordica* (Glover 1986: 169, 193-194). *Celtis* sp. seeds were found in all the sites but decline and disappear in tandem with the demise of the giant Timor murids (Glover

Fig. 3 – Stone lined oven from Matja Kuru 2 dated to c. 9000 cal. BP.

1986: 193-194). Glover suggested that this might be because the *Celtis* seeds were collected by the murids as food and thus stopped accumulating following their demise. I believe that the decline of both the *Celtis* and murids is more likely attributable to forest clearance around the sites following the introduction of metal tools in the last few thousand years.

Oliveira's (2008) palaeobotanical study at Bui Ceri Uato Mane in the Baucau region found no evidence for cereals in Timor even in the pottery-bearing layers. Instead he states that the "archaeobotanical record points to the presence of a diverse range of tree crops (and possibly tubers) in use throughout the Holocene and across the pottery-transition boundary" (Oliveira 2008: 211). Species identified include *Pandanus* sp., *Aleurites moluccana*, *Terminalia* sp., *Pometia* cf. *pinnata*, *Inocarpus* sp. and Piperaceae. Fragments of *Dioscorea* spp. parenchyma were also found in layers dated to c. 5800 cal. BP but it is unknown if these were wild or cultivated yams. Significantly, many of the tree nuts and seeds were associated with a specialised cooking oven dating to c. 7000 cal. BP (Oliveira 2008: 114, 211-219). A similar stone-lined cooking oven has been documented at Matja Kuru 2 in Timor-Leste, dated to c. 9000 cal. BP (fig. 3; O'Connor 2006). Interestingly, similar features have been reported in the northern Moluccas and at similar dates. At the coastal cave Um Kapat Papo on Gebe Island

(fig. 1), Bellwood and colleagues (1998: 247-9) excavated a large cooking oven containing over 26 kg of volcanic cooking stones from a preceramic level dated to between 5000 and 7000 cal. BP. Golo Cave also contained an abundance of volcanic and coral cooking stones in the preceramic levels dated to between c. 5000 and 13,000 cal. BP (fig. 1) (Bellwood et al. 1998: 250-1).

Based on genetic and linguistic data it seems likely that many of the key starchy cultigens, such as at least one type of banana, taro, sugar cane and some species of yam were originally domesticated in New Guinea and dispersed westwards into eastern ISEA, well prior to Austronesian expansion or the appearance of pottery (Blench 2012: 124; Denham 2011; Denham and Donohue 2009; Denham et al. 2003, Donohue and Denham 2010; Lebot 1999). Various species of trees were also domesticated or apparently translocated from island to island westwards in the pre-Austronesian period (Blench 2004: 46). Melanesian cooking methods also seem to have been employed in ISEA in the pre-Austronesian period as the stone-lined ovens in Matja Kuru 2 and Bui Ceri Uato Mane demonstrate, but the direction of transmission is unclear. It is possible that the practice of cooking in ovens was invented independently in both areas or transmitted from eastern Indonesia into Melanesia rather than the other way round (O'Connor 2006). "In this version of prehistory, early ISEA would have been occupied by multiple distinct groups, including scattered foragers, settlers from the mainland in the west and "Papuans" in the more eastern regions" (Blench 2012: 131). Thus the Austronesian immigrants to ISEA could have learnt about these new crops and ways to cook them without pottery from indigenous horticulturalists in ISEA, and rapidly adopted the practices. Blench (2012, 2014) has even questioned the non-cereal crop reconstructions in Proto-Austronesian (PAN) and Proto-Malayo-Polynesian (PMP) and shown that the linguistics suggest that many of the trees planted in ISEA seem to have originated in Maluku, Melanesia or mainland Asia, and have been transported east and west across ISEA prior to Austronesian colonisation. For example, Blench (2012: 139) argues that "Austroasiatic speakers were the original domesticators of taro" and that it played an important role in the early expansion of Austroasiatic. Austronesian speakers subsequently "borrowed it during an early phase of contact, with the southern Philippines/Borneo being the most likely zone for such contact" (Blench 2012: 141).

Pottery in ISEA: Origins and Dating

There is widespread agreement that pottery is one of the traits that attends the ISEA Neolithic. As aptly summed up by Spriggs (2011: 523) "the process of 'Neolithisation' did not necessarily involve agriculture at all. But it certainly *did* involve pottery; its complex vessel forms and surface finish surely betokening new social relations." While pottery is without a doubt the most

consistent marker of the Neolithic, its appearance is uneven through space and time. Even within a single island there can be a significant time lag between the earliest appearance of pottery in one area and its appearance in another.

In a review of the early pottery assemblages and chronology of ISEA, Anderson (2005: 37) proposed that there were at least two separate Neolithic dispersals into ISEA, which he called Neolithic I and II. Neolithic I is characterised by basket or cord-marked ceramics and is argued by Anderson (2005) to correspond with an early spread of Austroasiatic languages out of South China through Thailand and Vietnam; down through Peninsula Malaysia and into Borneo. Red-slipped pottery is rare or absent in early Neolithic I assemblages but polished stone adzes occur. Neolithic II is characterised by the expansion of red-slipped pottery out of Taiwan and into the Philippines, Sulawesi and elsewhere in eastern Indonesia, and later into Borneo.

In the sites of Chaolaiqiao and Donghebei in southeastern Taiwan, red-slipped plain ware is the dominant pottery type by 4200 cal. BP and continues through to 3500 cal. BP (Fig. 1) (Hung 2005, 2008). Undecorated red-slipped ware also dominates the earliest assemblages in the Batanes Islands between Taiwan and Luzon of the same period (Bellwood and Dizon 2008, 2013). In northern Luzon the sites of Nagsabaran and Magapit also show an early focus on red-slipped plain ware. Additionally, there are commonalities in rim and vessel form amongst these early red-slipped assemblages (Anggraeni et al. 2014).

Moving south into Sulawesi, the pottery from the earliest levels of Minanga Sipakko and Kamassi is argued by Anggraeni et al. (2014: 754) to show strong affinities with that in Taiwan and the Philippines “consistent with the theory of Austronesian expansion” and a direct population migration from Taiwan into the Philippines and Sulawesi (fig. 2). Red-slipped sherds with tall and or concave rims dominated the basal levels dating to *c.* 3500 cal. BP, and gradually gave way to unslipped ware (predominantly plain) in the middle and upper levels (Anggraeni et al. 2014: 745; Simanjuntak et al. 2008: 64-5). Schist and slate adzes with similar morphology to Neolithic specimens from Taiwan and the Philippines, as well as their manufacturing debris, were also recovered. While lithic debris from the manufacture of flaked stone tools was found throughout the Minanga Sipakko and Kamassi sequences it was sparse (Anggraeni 2012). Anggraeni et al. (2014) interpret this scarcity of flaked lithics as firm evidence that this was not a site used by endemic hunter-gatherers who adopted items of Austronesian technology following contact with Austronesians, but rather one used by settlers who arrived with a fully developed suite of material culture and the knowledge about how to reproduce it in their new surroundings.

However, as allowed for by Anggraeni et al. (2014), other sites in Sulawesi do not show such a clear-cut picture. In Southeast Sulawesi the rockshelter Gua Mo'o hono has a sequence spanning the last 6500 years (O'Connor et al.

2014a) (fig. 2). In contrast to the Karama valley sites, pottery at Gua Mo'o hono is found only in the last 2000 years of the sequence, and is likely to be Metal Age or more recent. It would seem that there is a marked disparity between the archaeological records of the open-air sites of the Karama valley where pottery is present in the earliest occupation levels and rockshelters and caves such as Gua Mo'o hono which appear to show a continuity of hunting and gathering lifeways but with an overlay of pottery after 2000 cal. BP. At this stage it is difficult to determine with certainty whether Gua Mo'o hono was continuously occupied by indigenous hunter gatherers who acquired pottery in exchange for wild produce from farming populations nearby, or whether by the late Holocene the population was mostly living in sedentary farming communities with caves and shelters used only on an opportunistic basis by hunting parties from the settlements who occasionally bought pots to use during their transitory forest forays. I believe that the general paucity of material remains in the pottery bearing levels at Gua Mo'o hono, compared to the early to mid Holocene levels, suggests the latter scenario.

Mijares (2007) notes a similar disparity between the caves and open sites in northern Luzon in the Philippines. While sedentary communities with an agricultural lifestyle and pottery were settled in the fertile lowland river valleys by 4000 years ago, the cave sites in the Peñablanca region close to the Cagayan Valley continued to be occupied (fig. 1). Pot sherds with a restricted range of types are found in the caves but do not appear until much later in time (Mijares 2007). In Luzon indigenous hunter-forager communities such as the Agta and Ati persisted into historic times (Reid 2013), and Mijares (2007) believes the caves of the Peñablanca region continued to be occupied by hunter-foragers who maintained their traditional lifeways, but in the late Holocene began to trade forest goods for pottery with their Neolithic neighbours.

South of Sulawesi the pottery has been less well described and dated and the published ages are often highly contentious. Most early dates for pottery have been based on radiocarbon ages for charcoal or shell from the excavation units (spits) in which the lowest sherds were recovered. In his 1986 monograph on the archaeology of Timor-Leste, Glover argued for the appearance of pottery at the caves Uai Bobo 1 and 2 and Bui Ceri Uato sometime between 5000 and 4000 years ago (1986: 197) (fig. 1). However as I and others have repeatedly warned, accepting these dates at face value is problematic due to the high probability that disturbance and bioturbation have resulted in the downward vertical movement of a small number of sherds (O'Connor et al. 2002, 2011a; Spriggs 1989, 2001). For this reason few cave sequences are reliable in recording the date of the initial appearance of pottery (eg. O'Connor et al. 2011a). For example at Lene Hara Cave two of the excavated areas, Pits A and B, while less than 1 m deep, have Pleistocene sequences with thin units of late Holocene material directly overlying the Pleistocene horizon. In Pit A,

pot sherds occur in the upper Holocene horizon from spit 2, between 4 and 8 cm below the surface with a single date of 600 cal. BP. However sherds occur in some numbers in spits dated between 35,000 and 37,000 cal. BP, with small numbers found down to spit 15 (depth 56 – 60 cm below the surface) dated to between 35,000 and 39,000 cal. BP. These parts of the site have clearly been subject to a degree of mixing as two shell beads from Pit A from spits 10 and 7 produced mid-Holocene dates of 4559 ± 74 cal. BP and 3517 ± 57 cal. BP respectively (O'Connor et al. 2010). The cultural sequence in Pit B mirrors that of Pit A, with pottery occurring predominantly in the upper 20 cm but a small number of sherds continue into the Pleistocene horizon. In both squares modern roots were recorded in plan and section penetrating to the basal levels and some large voids encountered during excavation appear to mark the former course of larger roots (O'Connor et al. 2010).

A third excavation pit at Lene Hara Cave, F, near the entrance in the northern chamber of the cave, had 2.2 meters of depth of deposit spanning the Holocene (O'Connor et al. 2010). Here the rapid rate of deposition appears to have ensured better stratigraphic integrity with minimal disturbance. Pottery in this pit was predominantly found to a depth of 70 cm below the surface, although as in the other pits small numbers of sherds were recovered below this (Fig. 4). The charred convex surface of one sherd in spit 16 was dated to *c.* 3500 cal. BP (3200 ± 240 ANU 12029). This date is in good agreement with a marine shell date from the same level and with the marine shell dates from the bracketing spits. The pottery at Lene Hara consists mostly of small sherds from globular vessels with rounded bases – most likely simple undecorated cooking pots. Some thin-walled red-slipped sherds occur in the assemblages although plain ware is dominant and accordingly the Timor-Leste sites differ from the lower Neolithic units in the open settlement sites in the Karama River valley, Sulawesi.

If the radiocarbon dates are accepted at face value we have similarly early evidence for pottery in the caves Matja Kuru 1 and 2 which are located on the northern side of the large lake Ira Laloro, also at the eastern end of Timor-Leste (fig. 1). For example, in Matja Kuru 1, Pit A, pottery occurs down to spit 12 with a date of *c.* 4000 cal. BP but small numbers of sherds occur below this date, and older dates for marine shell were obtained for spits above this level. Matja Kuru 2 pottery occurs in reasonable numbers down to spit 11 bracketed by dates of 2450 ± 40 NZA 16136 and 3190 ± 40 OZG 538, but small numbers of sherds continue to spit 26 dated to 9650 ± 55 NZA 16137. At Matja Kuru 2 a ready explanation for the presence of these small sherds in early Holocene layers is disturbance and vertical displacement caused by the burial of a dog found in spits 26 and 25, which is thought to have been interred from a higher level (Gonzales et al. 2013: 14). The sherds were likely incorporated in the sediment fill with the dog burial. In view of this I suggest that a date of *c.* 3500 years for the introduction of pottery at Matja Kuru 2 is realistic.

The Introduction of Domestic Animals and Humanly Translocated Non-Domestic Species in ISEA

The arrival of domestic animals in ISEA also seems to be extremely uneven across time and space. Piper (in press) has recently reviewed the evidence for the origins and arrival of the earliest domestic animals in mainland and ISEA and Blench (2012) has summarised many of the problems with the package of domesticated pig, dog and chicken, as envisioned by the orthodox model, but I will revisit them briefly here in the context of new evidence from Timor and Sulawesi. In essence the problem lies in the fact that, with the exception of the dog, the mainstays of the Austronesian domesticates (pig and chicken) are sparse or absent from early archaeological contexts outside of Taiwan and the Philippines.

Pig has been recorded at the Savidug Dune site in the Batanes Islands, between Taiwan and Luzon, at about 3200 cal. BP and dogs by 2400 cal. BP (Piper et al. 2013) (fig. 1).

In the Philippines site Nagsabaran, where the earliest Neolithic levels date to c. 4400 cal. BP (3940 ± 40 Wk 23397), a large faunal assemblage has been analysed and found to contain a domestic pig species morphologically consistent with *Sus scrofa* (Amano et al. 2013: 320; Piper et al. 2009). However while domestic pig is present, the bulk of the Nagsabaran assemblage consists of endemic wild pigs (*Sus philippensis*) and an endemic deer (Amano et al. 2013: 321, 329). Dog occurs in the late Neolithic/Metal Age levels by about 2500 cal. BP, as does water buffalo as a minor component, but chicken is entirely absent from this large assemblage (Amano et al. 2013: 329). Amano and colleagues (2013: 328-9) describe the Neolithic faunal assemblage as indicative of a mixed economy with subsistence requirements met largely from fishing and hunting, and suggest that domestic pig may have been used exclusively for ritual and ceremonial feasting much as water buffalo is in many areas of ISEA today.

Simanjuntak et al. (2008: 70-73) paint a very similar picture of the economy at the Minanga Sipakko open settlement in the Karama valley as one focused on hunting of forest animals and fishing. The dominant species is the endemic Sulawesi warty pig *Sus celebensis* although bats, rats, monkeys and endemic bovids are also recorded as present in the earliest levels. Bulbeck (2008) notes that in this respect the Karama valley sites resemble the Toalean sites in the Maros region, Sulawesi, in their emphasis on *Sus celebensis*, and while this remains the case recent re-examination of the Minanga Sipakko faunal assemblage has detected small numbers of domestic pig (*Sus scrofa*) in the basal or near basal levels at 3500 cal. BP (Anggraeni et al. 2014). Dog bones are only found in the Karama River sites from c. 1000 cal. BP (Hull and Piper in press). Other translocated species include the Javan *rusa* deer (*Cervus timorensis*) and Asian palm civet (*Paradoxurus hermaproditus*). Simons and

Bulbeck (2004) noted the presence of the Javan *rusa* deer in stratigraphic contexts predating 4000 BP at Leang Burung 1 in South Sulawesi, but concluded that the dog and common palm civet probably arrived after *c.* 3500 BP in association with the arrival of agricultural communities to the region. Currently, the only directly radiometrically dated specimen of any of these introduced animals is a deer terminal phalange from Minanga Sipakko that returned an age of 2810 ± 50 BP or 2789–3059 cal. BP (OZE 132) (Bulbeck and Nasruddin 2002).

The cave site Gua Mo'o hono in southern Sulawesi is similar to the Maros caves and Minanga Sipakko in having a dominance of suids; *Sus celebensis* and the Sulawesi Babirusa or "pig deer," but while *S. scrofa* plays a minor role at Minanga Sipakko there is no evidence for it whatsoever at Gua Mo'o hono, even in the late Holocene levels. Hunting and foraging strategies appear to have persisted with little change within the equatorial rainforest environments surrounding Gua Mo'o hono through to historical times (O'Connor et al. 2014a).

In Timor-Leste, a dog burial at Matja Kuru 2 is securely dated to 2867 ± 26 BP Wk-34931 (2921 – 3075 cal. BP) (Gonzales et al. 2013: 14), although evidence for other domestic species of this age is absent. Isotopic and morphometric analyses indicate that the Timor dog was well nourished and had a diet very similar to Pacific pig suggesting that it lived its life in a sedentary agricultural community (Gonzales et al. 2013: 14-15). Glover (1986: 192) reported pig from between Horizons VII and XIII at Uai Bobo 2 in Timor-Leste and therefore believed that there could "be no doubt about the presence of pig after about 4000 – 5000 BP". He attributed a similar antiquity to the introduction of *Phalanger*, *Paradoxurus* and *Capra/Ovis* based on their earliest occurrence in Horizon VII with a date of 5520 ± 60 BP ANU187 (Glover 1986: 167, 192). However recent archaeological excavations in Timor-Leste have found no data to confirm the presence of *Sus scrofa* or *Capris/Ovis* at this date. Glover's "early" finds may result from disturbance leading to mixing of materials from late and mid Holocene levels and require AMS dating of the bones themselves. Although chickens appear in the earliest levels of Lapita sites in the Bismarcks and Vanuatu, no specimens have been identified in early Neolithic levels in ISEA, thus at present their pathway into the Pacific is uncertain (Spriggs 2011: 514).

At Liang Bua in Flores, van den Bergh et al. (2009: 530) report that *S. scrofa* appears by *c.* 4000 cal. BP along with the Javanese porcupine (*Hystrix javanica*), the Asian palm civet *Paradoxurus hermaphrodites* and the Long-tailed macaque *Macaca fascicularis* "at the same time as the hallmarks of the Neolithic, ground adzes and pottery, first appear in the sequence." Interestingly, the endemic Sulawesi warty pig, *Sus celebensis*, occurs even earlier by *c.* 7000 cal. BP. Deer, cattle, dog and horse are documented only as isolated finds in the uppermost levels of the site in layers dated more recently than 500 cal.

BP (van der Bergh et al. 2009: 530, 534). None of these dates, however, were obtained on specimens of the species themselves so must be treated somewhat circumspectly. The translocation of the Sulawesi warty pig from Sulawesi to Flores at such an early date is surprising in view of the fact that the oldest specimens of deer, which is found quite early in Sulawesi, have a much later date in Flores and Timor (Glover 1986: 122).

In Timor-Leste, the tooth of a marsupial *Phalanger orientalis* (Northern Common Cuscus) from Matja Kuru 2 spit 25 which was reported in an earlier publication as dating to 9600 BP based on its association with marine shell dates from bracketing excavation units (O'Connor 2006), has now been radiometrically dated and returned an AMS age of 3111 ± 29 Wk 31505 (3366 – 3179 cal. BP). The date overlaps with the dates on the dog bone from the same level of the site and is clearly at odds with the shell dates from the spits above and below. This suggests that the *Phalanger* remains were displaced from higher levels, or that older shell was moved upward, at the time of the dog interment. A bone of *Phalanger orientalis* from Matja Kuru 1 recovered from spit 31 and associated with a marine shell age of 5680 ± 110 ANU 11623 was also dated using the *Phalanger* bone itself, and returned an age of 2749 ± 28 BP Wk 31509 (2865 – 2753 cal. BP). In Lene Hara, Pit F, a specimen of *Phalanger* in spit 34 is directly dated to 2387 ± 27 (Wk-31507), while the marine shell dates from the spits above and below this returned ages of *c.* 6000 cal. BP (6200 ± 90 ANU 12044 and 6140 ± 100 ANU 12043) (fig. 4). The current evidence therefore suggests that the *Phalanger* spread to Timor-Leste at about the same time that the dog was introduced. *Phalanger orientalis* is native to New Guinea but today it is found in the Bismarck Archipelago, the Solomon Islands, southeast and central Maluku and Timor. It is known to have arrived in the Bismarck Archipelago during the Pleistocene presumably as the result of human translocation (Leavesley 2005), but the timing of its westward spread and pathway through Maluku and into Timor is not yet known. Today, *P. orientalis* is found on Buru, Leti and Wetar but it is uncertain when it was introduced as little archaeological work has yet been carried out on these islands.

Excavations at a number of sites in northern Maluku have also produced evidence of pig and dog. At the open site Uattamdi on Kayoa Island pig bones were recovered from layers dating between 3260 ± 70 BP (ANU 9323) and 2330 ± 70 (ANU 9322) and dog was recorded in the later deposits (Bellwood et al. 1998). In the Banda Islands, Lape (2000) reports pig at the site PA1 on Ay Island dated to *c.* 3100 cal. BP in association with red-slipped pottery with decorations similar to incised Lapita ware. Gebe Island also has evidence for a *Dorcopsis* wallaby. The wallaby is directly dated in Golo Cave to *c.* 8000 cal. BP and is also found in Um Kapat Papo in the preceramic levels. It is thought to be a translocation from Papua New Guinea however this is somewhat difficult to establish with certainty due to the absence

Fig. 4 – Stratigraphic section of Lene Hara Pit F with radiocarbon dates marked on the section.

of bone in the lower levels of the caves (P. Piper pers. comm. Feb. 2015). It remains possible that the *Dorcopsis* is endemic. The *Dorcopsis* wallaby and an as yet undescribed bandicoot are also found in the preceramic levels at the site Siti Nafisah in the southern arm of Halmahera, which is dated between 5500 and 3000 years BP. Both species appear to go locally extinct in the late Holocene (Bellwood et al. 1998: 251-253).

The Asian Palm Civet, *Paradoxurus hermaphroditus*, is directly dated at Matja Kuru 1 to 2741 ± 27 BP Wk-31508 and appears to have been introduced into Timor-Leste at about the same time as the *Phalanger*, but from the west, although currently only one reliable date has been obtained for the presence of this species. A program of direct dating is underway on all introduced species found in the recent excavations in Timor-Leste and Sulawesi which will better establish the timing of human translocations through the Wallacea region.

Aside from the introduced species, the fauna in the Timor-Leste caves and shelters indicate that the occupants were hunter-foragers who focused on marine resources including fish, marine turtle, a broad range of shellfish, crabs and sea urchin. The fish remains in the Holocene levels of Jerimalai and Lene Hara indicate that reef fish were the mainstay of the diet in the mid to late Holocene after the establishment of reef environments following sea level stabilisation. At the inland Matja Kuru sites a variety of game, including large murids, and reptiles such as snakes and freshwater turtles, make the most significant contribution to the diet, although fish and marine shellfish are also present in small quantities (O'Connor et al. 2014b).

Shell Artefacts and Jewellery in ISEA

Although various authors have pointed to the presence of shell beads in ISEA assemblages and these have occasionally been recognised as occurring in pre-ceramic contexts (Mahirta 2003, Mahirta et al. 2004; O'Connor et al. 2002) there has been no systematic dating program using the shell artefacts themselves or detailed description of the nature of shell artefact assemblages with the exception of the recent analysis of the beads from the Matja Kuru caves in Timor-Leste (O'Connor 2010).

The excavations in Timor-Leste at Jerimalai, Lene Hara and Matja Kuru 1 and 2 have produced an abundance of shell items, including fish hooks and a variety of bead types, and these are currently under analysis. Two of the three bead types include those made on whole gastropod shells of *Oliva* sp. and *Nassarius* sp., and those which I have elsewhere called “disc beads,” made on flat tabs of shell removed from the body whorl of large gastropods, predominantly of *Nautilus* sp., which have a drilled central perforation (O'Connor 2010: 222) (fig. 5). Occasional disc beads with two symmetrically placed holes are also found, and these may have been sewn onto articles of platted plant fibre such as basketry, barkcloth, or fabric rather than strung.

Fig. 5 – Shell artefacts from Matja Kuru 1 and 2 in Timor Leste.

Another variation on flat beads made from tabs of shell are oval pieces of *Nautilus* sp. with a drilled hole offset at one end, which were presumably worn as pendants strung singly or combined with other shells. A fourth type is made using a distinct technique from the other disc beads. They were produced on the apical whorl of a gastropod species, *Strombus luhuanus*. They were made by grinding away the conical spire rather than drilling. The side of the whorl removed from the body of the shell was also ground and the result was a small regular disc bead (O'Connor 2010: 225) (fig. 5). Examples of *Oliva* sp. and *Nautilus* sp. beads have been directly dated, using the shells themselves, to the terminal Pleistocene/early Holocene. The oldest Olive shell bead was found in Jerimalai Pit B spit 43 and returned an age of 13901 ± 45 Wk-30502 (16461 – 16057). A *Nautilus* bead at Matja Kuru 2 from spit 31 was dated to 9190 ± 50 OZG 899 (10155 – 9801 cal. BP) and an Olive shell bead from the spit below returned a similar age of 9260 ± 60 OZG 897 (10215 – 9890 cal. BP) (O'Connor 2010: 228). A *Tridacna* clam shell adze of early Lapita form, but from Timor-Leste, has also been directly dated to the early Holocene, but it was a surface find, with no provenance against which to cross-check the age, so it is possible that it was manufactured on old shell (O'Connor 2006). However the presence of adzes made on *Tridacna* and *Hippopus* shell at Golo Cave on Gebe Island, northern Maluku, in layers dated to between 13,000 and 8,000 BP, would seem to confirm that shell adzes were being made across ISEA by the terminal Pleistocene (Bellwood et al. 1998: 251). Another large *Tridacna* adze was also found in Buwawansi shelter B1 where it was dated to c. 9000 cal. BP (fig. 1) (Bellwood et al. 1998: 259). Similar *Tridacna* adzes have also been recovered at Pamwak shelter in the Admiralty Islands, Bismarck Archipelago, and at roughly the same date (fig. 1) (Fredericksen et al. 1993).

Shell fish hooks have been directly dated to the terminal Pleistocene at Lene Hara Cave, and by association with marine shell from over and underlying levels at Jerimalai shelter to between 23,000 and 16,000 cal. BP (O'Connor et al. 2011b; O'Connor and Veth 2005). The hooks are made from the base of the shell of the marine gastropod *Trochus niloticus*. The Timor fish hooks are of two types; concentric hooks and jabbing hooks with a straight shaft. The shafts have no notches for line attachment. The examples from the east end of Timor-Leste at Lene Hara and Jerimalai are all of the latter variety. Glover (1986: 116-9) recovered a complete concentric hook and the straight shaft section of a U-shaped jabbing hook from his excavations in Bui Ceri Uato, Baucau. Both were made on *Trochus niloticus*. Glover had problems dating the sequence at Bui Ceri Uato, but the hooks and beads were found in the middle levels upward and as these levels also contained the bones of domestic species they were presumed to be Neolithic (1986: 96-7, 118). With the exception of the small disc beads made from the apex of *Strombus*, Glover (1986) identified the same range of shell beads in his excavations in Baucau

and Venilale as were found at Lene Hara Cave, Matja Kuru 2 and Jerimalai (Glover 1986: 116-9; 131, 151-3) (fig. 5). He did report several fragments of *Trochus* shell rings at Uai Bobo 1 and 2 which appear to be elements of the Austronesian decorative shell set, but in view of the fact that they have not been found in other sites (Glover 1986: 152, 184-5), these small fragments require re-examination and direct dating to determine whether they are Neolithic or Metal Age ornaments.

Two types of shell ornament have also been found in Roti to the west of Timor (Mahirta 2003; Mahirta et al. 2004). At Pia Hudale cave Mahirta et al. (2004: 373) report “flat shell beads similar to those reported by Glover (1986) from East Timor” which have a single perforation (fig. 1). A second type was a “perforated shell pendant in a shape of a fish with a hole as an eye” (Mahirta et al. 2004: 373). The photos in Mahirta (2003: 62) of the disc bead from Pia Hudale suggest it is made of *Nautilus*. Mahirta et al. (2004: 373) liken the fish-shaped ornament to one excavated by van Heekeren (1972: 146) from Liang Rundung on Flores, described simply as made of “shell.” Pia Hudale is a Pleistocene-aged site, with layers 1 and 2, from which the shell ornaments derive, dating to $10,440 \pm 500$ (ANU-11102) and $11,290 \pm 150$ (ANU-10912) respectively. However goat dung and dried leaves were found throughout layer 1 and continued into layer 2, 15 – 20 cm below the surface (Mahirta et al. 2004: 367) so the possibility remains that Holocene-aged material from near the surface could have worked its way down into lower levels and direct dating is needed to establish the age of these ornaments. Beads were also reported at Lua Meko and Lua Manggetek in Roti in preceramic layers (Mahirta 2003: 80, 89-90, 102). *Oliva* sp. and *Dentalium* sp. are the only species mentioned but the photographs of the “round” beads (Mahirta 2003: 102, fig. 5.14; a-e, i, k, l) and “pointed shell bead” (fig. 5.14; f) suggest that they are made on *Nautilus* sp. Van Heekeren (1972: 146) also reports finding a “lozenge-shaped pendant” made of “mother-of-pearl” at Liang Rundung but this is more likely made on *Nautilus* shell. It would seem that the choice of raw material, the morphology and the methods of manufacturing of the shell ornaments in Roti, Flores and Timor are very similar (O'Connor 2010).

There is little overlap between the shell artefact assemblages from the eastern Indonesian sites (both pre-Neolithic and Neolithic) and those from Taiwan, the Philippines or the Lapita sites of the western Pacific. Sites in Taiwan and northern Luzon contain shell fish hooks but these occur in Neolithic levels whereas in Timor-Leste they are found from the terminal Pleistocene through into the mid Holocene. Sites in the Philippines and Palawan have *Nassarius* beads and small *Strombus* sp. disc beads manufactured in the same manner as those from Timor-Leste (Szabó 2004: 256-7), but here again the Timor examples occur far earlier in time. Significantly, the Timor sites lack the distinctive perforated *Conus* spires and rings, and *Tridacna* rings and

bi-perforated units found in sites in the Philippines and Lapita sites (Szabó 2004: 261-2). Flaked *Turbo marmoratus* opercula occur in Timor-Leste and Maluku, where they are found in Pleistocene and Holocene levels at Jerimalai and Golo Cave on Gebe Island (Szabó 2004: 261-2). These appear to be opportunistically produced tools which I suspect have been overlooked in many shell assemblages and future investigations will likely find them to be more widespread.

Shell tools and ornaments were originally identified by Bellwood (1997: 219-235) as one of the type-markers of the Taiwanese Austronesian tool kit. Shell artefacts said to be part of the Austronesian repertoire included shell fish hooks, shell adzes and ornaments made of *Tridacna* spp. and *Conus* spp., the latter including bracelets and rings. The orthodox model continues to see shell artefacts as a marker of Austronesian migration pathways although there are major problems with this interpretation. First of these is the generic use of terms such as “shell ornaments” and “shell artefacts” (eg. Bellwood 2002: 26), which mask the diversity in the assemblages being compared. Second is the fact that shell ornaments and fish hooks are clearly present in Timor-Leste at least 10,000 years prior to the appearance of pottery.

Spriggs (2011) has countered the latter point arguing that while Timor has evidence for a well developed repertoire of shell jewellery and technology prior to the Neolithic, this does not rule out the possibility that the Austronesians moving out of Taiwan and through ISEA took with them a predesigned set of shell artefacts which they “reproduced” in the newly settled regions. While this may be the case in sites from the Philippines to the Bismarck Archipelago and east, it is difficult to find examples of this decorative set in sites within the Indonesian islands and Timor-Leste. If Austronesian settlers arrived in Timor-Leste with a new shell kit made on a different array of mollusc species it is not evident in the sites, which show remarkable stability and continuity at the local level from the terminal Pleistocene through to the Metal Age (O’Connor 2010). Glover (1986: 131, 152, 169, 184) reports two fragments of *Trochus* shell arm rings at Uai Bobo 1 in a level dated to c. 2500 cal. BP and another small piece from Uai Bobo 2 dated to between c. 5700 and 6000 cal. BP; however, none has been identified in any of the recent excavations despite the availability of large *Trochus* which are found in the deposits. *Conus* species suitable for manufacture of jewellery are also locally available but were apparently not utilised.

The Sulawesi sites contain little evidence for the manufacture or use of specialised technological or personal marine shell items. This would not appear to be due to poor preservation since freshwater shellfish are preserved and while distance from the coast may be a factor, value items such as jewellery might be expected to travel some distance. The islands of the Nusa Tenggara chain appear to have their own distinct shell working tradition and

based on the evidence from Timor-Leste this dates back to at least the terminal Pleistocene. Perhaps this indicates that the Austronesian shell set was part of a tradition that travelled west from the Philippines and into Island Melanesia but not south into ISEA.

Becoming Austronesian: The Transformative Power of Ideology and its Material Manifestations

Spriggs (2011) and Blench (2012, 2014) both consider what it may have meant to “become” Austronesian. Both argue that the evidence points to a rapid and explosive spread of new people and ideas and suggest that “powerful ideologies backed by new material symbols and practices” must have underwritten this rapid spread and call for a broadening of our perspective on the Neolithic (Spriggs 2011: 524).

Blench (2012, 2014) develops the idea that Austronesian expansion was driven by a powerful and pervasive ideology and points to the commonality of iconography found across the Austronesian world. These include a “highly distinctive set of iconographic elements in figurative art... the *linglingo*, the jade/nephrite earpieces which occur from Taiwan to New Zealand...” and the “*bulbul*, a seated figure with either the arms crossed or held up to the chin” (Blench 2012: 129).

While I concur wholeheartedly with Spriggs (2011) and Blench (2012, 2014) about the transformative role of ideology in achieving the rapid movement of people, goods and language throughout the islands, the evidence for *linglingo* is spatially restricted and these ornaments are not found in most of the islands of ISEA where pottery marks the Neolithic transition. *Bulbul* figures may have a wider distribution but there is no evidence that these figures accompanied the first transformative wave of new “Neolithic” settlers, or even that they have any antiquity. In this context I would like to reflect on some of the ideas of previous researchers regarding the parietal art in this region.

Rock art appears to be a long lasting and widespread manifestation of Austronesian ideology, and one that with new advances in rock art dating we have a good chance of dating across the Austronesian world. As opposed to *Bulbul* figures which, if they were made at all in prehistory, were made of perishable materials, and thus are unlikely to survive, the red haematite used to create painted art has the potential to survive over the long time scale of human occupation as the Pleistocene ages recently obtained for painted art in the Maros region of Sulawesi has demonstrated (Aubert et al. 2014: 223). In addition, rock art uniquely has the potential to tell us, the viewer, something about how the people who created it configured their world.

Ballard (1992: 98) was the first to draw attention to the fact that there was “a unity in the painted art” of the islands from Timor in the west through to Tonga/Samoa in the east which encompassed geographic and contextual

placement of the paintings as well as “a commonality of techniques, colours and motifs.” He also noted that the painting sites showed a high co-occurrence with Austronesian speaking areas. Thus Ballard (1992) suggested that this class of art constituted an element “of a single symbolic tradition of cultural and historical significance” which may have accompanied “the spread of Austronesian speaking communities” through ISEA and into the Pacific (1992: 98). Ballard (1992) proposed the term “Austronesian Painting Tradition” (APT) to characterise this widespread body of painted art.

The positioning of some paintings up to ten meters or more above the floor of the shelters, in inaccessible cliff edge locations often overlooking the sea, was identified as a prominent feature of the APT. It was suggested that this placement may have had significance in terms of visual signalling of rites/beliefs and also that there may be a co-association of painted art with human burials, including boat/canoe burials. The potential for symbolic signalling implicit in the locational context of the paintings was further developed by Ballard and colleagues (2004). Ballard’s (1988) detailed analysis of the Dudumahan rock art site in Kai Kecil, southeast Maluku, showed that aside from a range of geometric motifs, small anthropomorphic figures often in active poses, dominated the art corpus (fig. 1). Boats were the next most frequently occurring motif group. In terms of geometrics, motifs featuring variations on concentric circles, rayed circles or sun motifs, and scrolls were common. In terms of colour the earliest examples of the APT are red pigment.

Following on from this, Wilson (2002) undertook a detailed study of the rock art of Vanuatu in the context of the western Pacific, which extended from Timor-Leste in the west through eastern Indonesia. In particular she demonstrated that in Vanuatu the earliest painted art could be directly dated to *c.* 3000 cal. BP and that this art largely conformed to the APT as defined by Ballard. Her work thus supported Ballard’s association of this style of art with the movement of Austronesians through the region and early spread of this iconography through ISEA and into the Pacific (Wilson 2002: 216). Wilson (2002: 225) noted that after about 1500 BP the rules governing motif location, context, colour and style began to break down as art styles started to diverge regionally.

My own analysis of the painted rock art from Timor has largely supported Ballard’s (1992) schema² (O’Connor 2003). An analysis of the images from Timor-Leste indicates that the most common figurative motifs are small active anthropomorphic figures, and, in areas where detailed recording has been

2. I have noted however that in Timor-Leste there are other stylistically distinct images which occur deep within caves and which may pre-date the APT-style paintings (O’Connor 2003). Uranium Thorium dating of pigment encased in layers of calcite suggests that older art was executed in the caves in Timor and older engraved art has also been found (Aubert et al. 2007; O’Connor et al. 2010).

Fig. 6 – Boat with small red anthropomorphs from Lene Kici 1 cave near Tutuala.

carried out, these are often shown wearing head-dresses and holding weapons, or possibly ritual paraphernalia. They are shown in both frontal stance and profile. Aside from small anthropomorphs, boats dominate the figurative rock art repertoire and vary from simple schematised boats to more representational examples often showing details such as high raked prows and/or decorated prows, central sails and steering oar (fig. 6). Some of the boats incorporate human figures. Other reasonably common figures are zoomorphic crocodile/lizard/human figures and a variety of birds and fish. There are such striking parallels between the rock art motifs of Timor-Leste and some recorded by Röder (1956, 1959) in the MacCluer Gulf region of Papua that contact between these regions is certain (O'Connor 2003: 120). Interestingly while wild boar feature in the Pleistocene art of Sulawesi, neither wild or domestic mammals are prominent in the APT.

But what is the evidence for Austronesian diffusion of this painting style from Taiwan through the Philippines? No painted art sites occur in Taiwan where the rock art consists entirely of engraved motifs dominated by face-like forms, concentric circles, spirals and lattices. The largest and best known of the Taiwanese sites is Wanshan in southern Taiwan (Bureau of Cultural

Affairs Kaohsiung City Government, heritage.khcc.gov.tw) (fig. 1). Petroglyph sites are uncommon in ISEA south of Taiwan but they are prolific in Island Melanesia and the Pacific (Saidin et al. 2008; Specht 1979; Wilson 2002). Specht (1979) noted that the widespread body of engravings in Island Melanesia and throughout the Pacific shared a number of characteristics, in particular an emphasis on circles, curvilinear motifs and face-like forms, an association with open locations and water sources and a distribution corresponding with Austronesian language-speaking areas. This style of art has become known as the “Austronesian engraving style” (Wilson 2002: 46). Rosenfeld (1988: 131-134), reviewing the art of the western Pacific, suggested that the painted and engraved art might represent two separate “artistic traditions.” She also noted some coherence amongst the painted art in terms of the focus on geometric and anthropomorphic motifs. Wilson’s (2002: 66, 70, 154) detailed quantitative analysis of petroglyphs in Vanuatu identified the “face” as the most common figurative motif. Petroglyphs are also extremely common in the eastern Pacific in the Marquesas, Hawaii, New Zealand, Easter Island and Fiji with simple human face designs being amongst the most common motif in these areas (eg. Lee and Stasack 1999: 164). The Austronesian Engraving Style of Island Melanesia and the western Pacific has strong similarities in terms of style, content and locational characteristic with the Taiwan engraving complex at Wanshan and perhaps tracks alongside red-slipped pottery and the “Austronesian shell artefact suite” out-of-Taiwan and into Island Melanesia. Interestingly the Lapita design complex produced on pottery also features face motifs made by incision, and thus has both visual and processual parallels with the Wanshan faces which appear to have been pecked and then abraded.

In the Philippines both engraved art and painted art occur, but neither are common. The largest engraving site in the Philippines, the Angono petroglyphs in Rizal Province, does contain anthropomorphs however these are predominantly angular static figures with rounded or rectangular heads, triangular or rectangular torsos, splayed or straight legs and outstretched arms (Tan 2014; National Commission for Culture and the Arts, whc.unesco.org/en/tentativelists/5018/; Artes de las Filipinas, www.artesdelasfilipinas.com/archives/152/the-angono-binangonan-petroglyphs). These static carved figures bear no similarity to the small red painted anthropomorphs of the APT, and are also quite distinct from the Taiwanese engravings. The fact that they are carved into soft volcanic rock, which weathers rapidly, suggests their execution may post-date the Neolithic. The pigment rock art of the Philippines consists almost entirely of black drawn art which does not feature anthropomorphs, boats or the geometric motifs found in the Nusa Tenggara and eastern Maluku sites. Examples are found in at least 12 caves in Peñablanca, Cagayan Province. They comprise simple linear motifs such as crosshatched and divided circles, squares and rectangles sometimes with central dots,

arrows, feathers, meandering lines and comb-like patterns. The only definite figurative motifs seem to be spiders and a spider-web although there are a few possible schematised human figures (Peralta 1997). Another group of similar black drawings have been reported from Singnapan Caves in southern Palawan (National Commission for Culture and the Arts, whc.unesco.org/en/tentativelists/5018/). The colour, motifs, composition and style all set these black drawn images apart from the red pigment small active figures, boats and geometric corpus that characterise the early APT (O'Connor 2006). Some red hematite hand stencils are known from the Anda Peninsula in Bohol Province (Tan 2014) and while hand and arm stencils occur in the early APT repertoire, they cannot be used as a distinguishing marker as they also feature in the Pleistocene art of Sulawesi and East Kalimantan where they have been dated back to around 39,000 cal. BP and 10,000 cal. BP respectively (Aubert et al. 2014; Fage and Chazine 2009). Thus it would appear that the APT body of art as described by Ballard (1988) does not derive from an ancestral artistic tradition in Taiwan or the Philippines. So where does this style originate? It is possible that the APT originated in ISEA itself south of the Philippines, in the vicinity of the Banda Sea (Bulbeck 2008). The significance of the boat in life and its central place in ideology has been widely noted (Ballard et al. 2004; Szabó et al. 2008). Glover (1972: 42) suggested that the boat paintings in Timor-Leste "invite comparison with the 'ships of the dead' paintings at Niah...and...in this part of Timor today coffins are regularly made in the form of a boat for the journey of the spirit to its ancestors over the sea." While the Kain Hitam paintings to which Glover refers are clearly linked to the mortuary remains in the cave which span the early to late Metal age, Szabó et al. (2008: 165) argue that the belief systems underlying the ship of the dead imagery were present in Neolithic ISEA. Perhaps the ideology that underpinned the APT had its origins in the north but developed its own distinctive identity and artistic expression through practice in the island world.

Discussion and Conclusion

So in summary it would seem that there is compelling evidence for a rapid influx of new settlers into ISEA about 3500 years ago or slightly earlier. Blench (2014) adds that this type of rapid dispersal fits well with the linguistic evidence which shows multiple parallel branches of PMP. Most recent reviewers (eg. Blench 2012, 2014; O'Connor 2006; Spriggs 2011) have pointed out that this rapid expansion does not fit well with the "demic diffusion" model of agriculturally-based communities as outlined in Bellwood (2005, 2011: 364). Most recent reviews have also commented on the scarcity of direct evidence for agriculture or any major role for domestic animals in the early stages of the ISEA Neolithic (Anderson 2005; Anderson and O'Connor 2008; Blench 2012, 2014; O'Connor 2006; Paz 2002, 2004; Spriggs 2011).

They suggest different drivers lay behind the ISEA Neolithic or Neolithics. Anderson et al. (2006) emphasise the significance of probable advances in maritime technology and propose that the advent of the sail coupled with periods of sustained changes in wind direction and velocity of the El Niño – Southern Oscillation may have provided an impetus for migration (see also Anderson 2005: 39-40). Blench (2012: 133) also sees advanced maritime technology as essential and draws a parallel between the Neolithic mariners and the Viking “raiders and traders who spread over quarter of the globe in a short period of time.” He also draws parallels with the “sea nomads such as the *Orang Laut* in western ISEA” (Blench 2012: 133). Blench (2012), Spriggs (2011) and myself herein have also argued for a strong ideological element in the Austronesian expansion, and I have suggested the painted rock art of the APT could be used to track this. There are commonalities in the later red pigment art of Sulawesi, Timor-Leste, the Kei Islands, Papua, the Bismarck Archipelago and Vanuatu and recent reconnaissance survey work has extended this distribution to include Flores and Alor to the north of Timor (pers. observation). The APT would not appear to derive from Taiwan or the Philippines since no red painted art conforming to Ballard’s (1988) definition of the style has yet been located in the Philippines or Taiwan.

The evidence for a direct population migration from Taiwan to the Philippines and south into Sulawesi would also appear fairly compelling based on the striking similarities between the pottery in the Philippines and the Karama valley sites. In Timor-Leste pottery is present in the cave sequences from at least 3500 cal. BP, but red-slipped ware is only a minor component in the early Neolithic assemblages and the complex vessel forms found in the open sites in the Philippines and Sulawesi are lacking. This may be due to the fact that we are dealing with cave sequences where only coarse ware was taken, rather than open sites where a greater range of domestic activities and wares would be anticipated. Sequences of pottery from open sites in Timor-Leste are needed to clarify this issue.

Even the spread of pottery was not uniform across time and space; within single islands and in many inland locations pottery is not found until much later in Metal Age contexts. Some authors have suggested that this indicates the late interaction of hunter-foragers and farmers exchanging goods but maintaining separate lifestyles focused on cave and open villages, respectively. However, I have argued herein that in Timor-Leste and Sulawesi the overall decrease in cultural material in the levels containing pottery reflects a change in settlement at this time, and that after the introduction of pottery most people spent most of their time living in open villages and visiting caves only for special purposes. Even today local villagers in Timor and Sulawesi use the caves as overnight bivouacs or places to cook or dry meat when out on hunting trips and to perform ritual activities (Pannell and O’Connor 2005, 2012). While pottery was no doubt

used for cooking and serving food in villages, in many areas of ISEA today cooking in a bamboo and earth oven is still the *modus operandi* of local culinary practice and food is served on large leaves. This is particularly so in areas where root crops and nuts make up a significant proportion of the diet. As noted herein, this method of cooking has some antiquity in Timor-Leste (O'Connor 2006).

The evidence for the introduction of domestic animals appears just as complex. The genetic evidence indicates multiple pig domestication events in Mainland SEA and ISEA. Using modern and archaeological specimens Larson et al. (2005, 2007) identified the Pacific clade as the domestic pig found in Sumatra, Java, Wallacea and Melanesia and suggested this as the likely migration route for people moving into the Pacific. Significantly no specimens with this unique haplogroup have been found in Taiwan so it seems certain that domestic pig did not disperse with Austronesian-speaking populations moving out of Taiwan (Larson et al. 2007). Yang et al.'s (2011) recent mtDNA analyses also indicate that the pig was domesticated via multiple separate small scale *in situ* episodes; however contra Larson et al.'s study (2007) identifies ISEA as the likely locus for domestication of the Pacific clade (D6 and subgroup M3 in Yang et al.'s study). It seems plausible that in transporting pig from Java and Sumatra where it is endemic, to the islands to the east, translocation may have led to human controlled breeding within the confines of the village and thus eventually to domestication. However Yang et al. (2011) also found that major subgroup M1 pigs found in SEA, ISEA and in the Pacific were probably domesticated in SEA and subsequently moved through ISEA and into the Pacific with humans. They note that this "conclusion was reached without reference to the Pacific clade." In short their findings indicate that pigs may have been translocated more than once from the mainland, with domestication of subgroup M1 pigs occurring prior to translocation somewhere in SEA and a separate translocation resulting in domestication within ISEA of the Pacific clade.

If these recent genetic findings are correct they are difficult to reconcile with the sparse archaeological distribution of domestic pig and its scarcity in the early Neolithic levels of sites in Sulawesi and the few other islands where it has been claimed to occur. In Flores, *S. scrofa* is dated to *c.* 4000 cal. BP (van den Bergh et al. 2009), although this claim should be treated circumspectly until direct dating is carried out on the pig remains. Although Glover (1986: 204) reported pig in Timor-Leste by *c.* 5000 BP, recent excavations in Timor-Leste have failed to find any evidence for it in the early pottery levels, and so Glover's claim also requires direct dating to substantiate it. The new excavations in the Karama sites show that introduced *S. scrofa* was present in the early Neolithic levels, albeit as a very minor component (Anggraeni et al. 2014), and overall the subsistence evidence at both the open sites and the cave sites in the Philippines and Sulawesi "would strongly suggest that the Austronesian Neolithic expansion... essentially involved a

foraging economy” (Bulbeck 2008). In short it is difficult to understand why domestic pig is not more widely distributed in ISEA if the Pacific clade was domesticated somewhere in this region and thence introduced by at least 3200 cal. BP into Near Oceania.

Dog is dated to *c.* 3000 cal. BP in Timor-Leste and in Sulawesi it is found in the earliest Neolithic levels of the Karama valley sites. Its absence from the Neolithic levels of Liang Bua is surprising and could be a sampling issue.

The picture for translocated animals is equally patchy with *rusa* deer reaching Sulawesi early in the Neolithic but apparently not Flores or Timor until historic times, despite the fact that *Sus celebensis* apparently arrived in Flores by *c.* 7000 cal. BP. Macaque is found in Flores in the early Neolithic levels (van den Bergh et al. 2009), but in the sites of Timor-Leste where it has been identified, it occurs only in the uppermost levels (Glover 1986). The civet cat and *Phalanger orientalis* are both introduced early into Timor-Leste by *c.* 3,000 cal. BP and while the civet is also in Flores by this time there is no evidence that the *Phalanger* ever gets to Flores. Also of interest is the fact that the translocations are not unidirectional. *S. celebensis* travelled south from Sulawesi to Flores, the civet travelled from mainland Sunda east into the Nusa Tenggara island chain, and the *Phalanger* moved west from New Guinea to reach Timor, supporting the view that there was a great deal of maritime movement throughout the archipelago at this time.

If we look closely at the traits or material sets which are supposed to attend the arrival of the Neolithic into ISEA, the important elements aside from pottery are said to be shell artefacts and small polished adzes of stone (Spriggs 2011: 515). In terms of shell artefacts, while there is no doubt that they do appear to be a component of the Austronesian tool kit in Taiwan and the Philippines, and that some of these forms also appear in Lapita sites extending out into the Pacific, shell artefacts have a long tradition of manufacture dating back to the Pleistocene in Timor, and possibly Roti, where they show their own distinct trajectories which include shell adzes, fish hooks and a number of decorative bead and ornament types. Significantly, there is no evidence for the introduction of the new “Austronesian” shell artefact types marking the Neolithic transition in islands such as Timor where an earlier shell tradition was established.³ The shell beads and other decorative items perhaps indicate shared artistic or technological traditions or spheres of interaction. For example, Timor, Flores and Roti show an emphasis on the use of *Nautilus pompilius* as a medium for the manufacture of disc beads and pendants which is not found outside east Nusa Tenggara and Timor-Leste, and this is unlikely to be due to the availability of the shell of this

3. The single exception may be the small completely polished rectangular shell adze found by Glover (1986: 118) in Bui Ceri Uato in Baucau, Timor-Leste, however, adzes of this style continued to be made into the ISEA Metal age.

species as a raw material (van den Bergh et al. 2009: 530). Clearly a great deal more archaeological sampling of different site types on different islands is needed to understand the cultural interaction spheres that preceded the Neolithic, and the pathways and inspiration behind Neolithic migration throughout ISEA.

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