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AUSTRONESIAN DIASPORA
A NEW PERSPECTIVE

The National Research Centre of Archaeology
The Agency of Research and Development
The Ministry of Education and Culture

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Proceedings the International Symposium
on Austronesian Diaspora

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PREFACE OF PUBLISHER

This book is a proceeding from a number of papers presented in The International Symposium on Austronesian Diaspora on 18th to 23rd July 2016 at Nusa Dua, Bali, which was held by The National Research Centre of Archaeology in cooperation with The Directorate of Cultural Heritage and Museums. The symposium is the second event with regard to the Austronesian studies since the first symposium held eleven years ago by the Indonesian Institute of Sciences in cooperation with the International Centre for Prehistoric and Austronesia Study (ICPAS) in Solo on 28th June to 1st July 2005 with a theme of "the Dispersal of the Austronesian and the Ethno-geneses of People in the Indonesia Archipelago'' that was attended by experts from eleven countries.

The studies on Austronesia are very interesting to discuss because Austronesia is a language family, which covers about 1200 languages spoken by populations that inhabit more than half the globe, from Madagascar in the west to Easter Island (Pacific Area) in the east and from Taiwan-Micronesia in the north to New Zealand in the south. Austronesia is a language family, which dispersed before the Western colonization in many places in the world. The Austronesian dispersal in very vast islands area is a huge phenomenon in the history of humankind. Groups of Austronesian-speaking people had emerged in ca. 7000-6000 BP in Taiwan before they migrated in 5000 BP to many places in the world, bringing with them the Neolithic Culture, characterized by sedentary, agricultural societies with animal domestication.

The Austronesian-speaking people are distinguished by Southern Mongoloid Race, which had the ability to adapt to various types of natural environment that enabled them to develop through space and time. The varied geographic environment where they lived, as well as intensive interactions with the outside world, had created cultural diversities. The population of the Austronesian speakers is more than 380 million people and the Indonesian Archipelago is where most of them develop. Indonesia also holds a key position in understanding the Austronesians. For this reason, the Austronesian studies are crucial in the attempt to understand the Indonesian societies in relation to their current cultural roots, history, and ethno-genesis.

This book discusses six sessions in the symposium. The first session is the prologue; the second is the keynote paper, which is Austronesia: an overview; the third is Diaspora and

Inter-regional Connection; the fourth is Regional highlight; the fifth is Harimau Cave: Research Progress; while the sixth session is the epilogue, which is a synthesis of 37 papers.

We hope that this book will inspire more researchers to study Austronesia, a field of never ending research in Indonesia.

Jakarta, December 2016
Publisher

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PROLOGUE

Truman Simanjuntak, Bagyo Prasetyo, Titi Surti Nastiti, and M. Ruly Fauzi

One of the most spectacular phenomena in the history of human migration comprising vast and diverse geographic area must be addressed to the diaspora of Austronesian speakers. Prior to AD 1500 the Austronesian languages belonged to the most widespread language family in the world, with a distribution extending more than half way around the globe from Madagascar in the west to the Easter Island in the east (Bellwood, Fox, and Tryon 2006; Bellwood 1985). For Peter Bellwood, as one of researchers who has dedicated many years on studying Austronesian, the development on methods and theories in this study have growth incredibly fast. New methods involving powerful scientific techniques which is supported by sophisticated equipment recently have brought an incredibly important result on this study, especially during the last few years. Hence, several important solution for the questions regarding the form, spatial distribution, and chronological aspects related with Austronesian Speaking Peoples have been produced, not only by senior researchers but also many young researchers. Nowadays, the study of Austronesian peoples and their diaspora is almost impossible for not involving biological aspects which is even reach its molecular aspect such as represented by and DNA study.

In just several hundreds of years since the development of the earliest agriculture in Formosa Island in ca. 6000 BP, Austronesian have successfully reached the northernmost island (the Philippines) and most of major islands in Southeast Asia. Their arrivals have made a major impact in the development of subsistence and technology in Southeast Asia as well as habitation in the remote area of the Pacific and Indian Ocean. We have to be grateful to the linguistic studies because the connection between the homeland of Austronesian and its descendant population was not yet clear until 70's and 80's. It is Robert Blust who have produced an important linguistic-based of work related with the origins, variation, and distribution of Austronesian language family, even the hypothetical timing of their language split (Blust 1976; Blust 1984). Subsequently, archaeology have become the major study of this vast language family which comprise of many tribes and ethnic groups. It was just a few decades ago since the term 'neolithic package' related with Austronesian diaspora became widely known and used to describe the appearance of Neolithic in several sites. This cultural package consists of Austronesian language, knowledge on domestication of edible plants and animals, and also technology on producing polished stone-adze and body ornaments (bangle and pendant). Amongst several contemporaneous sites, their artifacts are considerably diverse rather than merely similar. This is simply marking a successful adaptation and local innovation that emerged amongst each population which now represented by incredibly high cultural diversity within Austronesian language family.

The most favorable habitation for Austronesian peoples situated within the tropical zone with its archipelagic characteristics. There is no doubt that the mastering on maritime technology have supported their vast and rapid movements from one island to another since the configuration of Southeast Asian Archipelago and global sea-level after the last glacial period were similar with today. Technology on maritime resources exploitation have flourished in relation to the occupation of coastal area by the earliest group of Austronesian. This logic even became very clear as what we can see on the rock-art images depicting aquatic animals such as fish and tortoises as well as their boat images (Pyatt, Wilson, and Barker 2005). However, their habitation is not only limited to the coastal area but also deep into the heart of the tropical rainforest in several major Island in Indonesia and Malaysia (Sather 2006; Simanjuntak et al. 2015; Simanjuntak et al. 2008; Datan and Bellwood 1991). Interaction among different communities were well established although the distance between each population could reach hundreds even thousands of kilometers (e.g. Bellwood and Koon 1989).

The main issue being well-established and frequently discussed recently are the migration route, adaptation, the development of cultural diversity with multiple ethnogenesis, and a potentially shared of DNA among earlier inhabitants and Austronesian speakers (Simanjuntak 2015). The first was rely on significant results yielded on several new and rediscovered sites such as Xuntangpu (Taiwan), Harimau Cave and Minanga Sipakko (Indonesia), Sireh Cave and Niah Cave (Malaysia), and Batangas (the Philippines). Many of these sites produced a complete history of habitation supported with highly accurate radiocarbon dating results which is important on the establishment of Austronesian migration and cultural developments during Neolithic. At the other hand, a long history of site occupation in several areas provide clues on cultural adaptation to the environment. The last subject was just flourished in the past few years. Our capability on establishing not only genomic study on present day communities but also extracting ancient DNA from human and animals took us on a leap into much better understanding about the origins of the Austronesian and their interaction with earlier inhabitants (e.g. Lansing et al. 2011; Kusuma et al. 2015; Karafet et al. 2010). It seems that the ancestor of today's Austronesian speakers were not only sharing their idea and knowledge, but also shared biological affinities with the earlier inhabitants. This facts have brought us into more complex problematic issue of interaction amongst different population rather than just understanding the cultural-entity of Austronesian speakers a few decades ago which is still rely on narrow perspectives.

This book compiles 37 papers written by experts from various fields such as linguistics, genetics, art, material culture, technology, palynology, palaeclimatology, palaeo-antthropology, which were all related Austronesia.

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AUSTRONESIA: AN OVERVIEW

AUSTRONESIAN STUDIES IN 2016: WHERE ARE WE NOW?

Peter Bellwood

My first introduction to the Austronesians came in 1967, when I began research in eastern Polynesia. This is almost 50 years ago, and since then I have witnessed many debates, sometimes quite excited ones, over questions of Austronesian origin, migration history and identity. Nowadays, powerful scientific techniques are being applied to answer such questions, especially in fields such as genomics, craniometrics, computational linguistics, and the many branches of archaeological science. What have we learnt? How does the modern debate differ from that of 50 years ago, and where is it likely to go in the future?

The Austronesian Dispersal

The most dynamic series of events in Holocene prehistory in Southeast Asia and Oceania were the dispersal activities of the Austronesian-speaking peoples, associated initially with a spread of Neolithic technology in ground stone and pottery together with domesticated plants and animals. There are more than 1000 Austronesian languages today, making it the second-largest language family in the world in number of languages, after the Niger-Congo family of Africa. In extent, the Austronesian language family was the most widespread in the world before AD 1500. An outpouring of modern genomic research also tells us that Austronesian-speaking populations with Asian genomes and craniofacial morphologies, such as Polynesians, Filipinos and Malays, do not share a common recent (i.e., within the past 4000 years) biological origin with Australo-Papuan populations. This is as apparent now as it was to the naturalist Johann Reinhold Forster, who accompanied James Cook on his second voyage through the Pacific in 1772–75. A careful look at the people who speak Austronesian languages, however, indicates that the primary dispersal was not one uniform and continuous migration, inbred and insulated from the rest of the world. Migration and admixture went hand in hand.

Absolutely central to the whole Austronesian dispersal process is the fact that Austronesian is a family of genealogically related languages that share a common ancestor and have spread outwards from a homeland region. Thus, Austronesian history must in the first instance be linguistic history. But it must also be a comparative and multidisciplinary history if the past is to make sense. The archaeological record is crucial, since it tells us about the spread of material objects and economic indicators such as artifact types, production systems and domesticated crops and animals. Archaeology also provides absolute dates; something that the linguistic record is not well placed to do. The biological record is also of fundamental importance, especially with the dramatic growth in the past few years of genomic research and ancient DNA analysis.

We must now ask a fundamental question: are the prehistoric records of dispersal derived from comparative linguistics, genetics and archaeology likely to tell the same story of the human past, or completely different ones? The answer will be "the same" if we can be sure that languages and native speakers spread together, as in many recent situations of European colonization in Australasia and the Americas. But there must have been occasional (and by no means universal) situations in which people changed or shifted languages, so that the native speaker link down through the generations was broken. That such situations occurred in the Austronesian past is suggested by human biology and genomics. In some regions, the biological data seem to correlate only partially with the linguistic and archaeological records, and sometimes even contradict them, a situation perhaps to be expected whenever speakers of one language or members of one ethnic group have mixed with speakers or members of another.

All of this points to a prehistory that has been extremely complex. Many thousands of people, over a vast area of the Earth's surface, have moved and interacted over several thousand years to form the ethnolinguistic patterns that we today term "Austronesian." So, who are the Austronesians? They are, of course, the people who speak Austronesian languages, regardless of biological affinity. This is an easy group to identify since within the main Austronesian distribution (excluding most of New Guinea and some adjacent regions) there are virtually no surviving pockets of other indigenous languages, which suggests that the spread of the language family was quite decisive in world prehistoric terms. Furthermore, where Austronesians settled, few foreign populations have successfully overlain or replaced the Austronesian cultural and linguistic foundations, although they have certainly modified them, as with the successive Hindu and Buddhist, Islamic and European cultures that have influenced the region since AD 500. However, apart from some of the colonized territories in Oceania where native populations were greatly reduced in numbers as a result of European-introduced diseases, Austronesia is still quintessentially Austronesian.

From Forster to Early Bellwood – 1774 to 1975

I now move to examine the current status of Austronesian origins and migrations studies, setting the context by looking at two preceding statements two hundred years apart in time. I begin around 1774, when the German scholar and explorer Johann Reinhold Forster, travelling on the *Resolution* with Captain James Cook on his Second Voyage, noted clear biological similarities between Tahitians, Malays, the people of the Marianas and Carolines, and the Tagalogs of Manila. He went on to suggest:

> that we may now trace the line of migration by a continued line of isles, the greater part of which are not above 100 leagues [278 km] distant from each other.

Forster then went on to consider languages, employing a concept of divergence from a common origin that was to be used again, rather more famously, by William Jones for Indo-European languages about a decade later:

> I am therefore inclined to suppose, that all these dialects [i.e., Austronesian languages – Polynesia, Melanesia, Philippines, Malay - PB] preserve several words of a more antient language, which was more universal, and was gradually divided into many languages, now remarkably different.

Forster also noted that the populations who spoke these related languages in his day were very varied in physical appearance. He gave a clear opinion on this by comparing Tahitians and Vanuatuans (Tanna Island), two populations of different genetic ancestry (as we now know), but who both spoke clearly-related Austronesian languages.

I suspect Forster was quite close to the truth, far closer perhaps than many of his successors. Through the next 150 years, knowledge grew very slowly in the absence of any coherent archaeological record. In my *Man's Conquest of the Pacific* I provided an account of many 19th and early 20th century opinions relating especially to Polynesian origins and migrations, running from John Williams and Horatio Hale through to Thor Heyerdahl and the Kon-Tiki. Some were rather rich in imagination and some were downright wrong, but Heyerdahl does deserve credit as the organiser of the first high-publicity archaeological project in the Pacific, on Easter Island in 1955-56. Of course, he was preceded within the Austronesian region on a smaller scale by others, including Evans, Collings and Tweedie in West Malaysia, van Stein Callenfels and van Heekeren in Indonesia, Harrison in the Niah Caves, Gifford in Island Melanesia, and Emory in Polynesia. But Heyerdahl promoted public awareness on a grand scale.

In 1975, I published in the pages of *Current Anthropology* what I considered at that time to be a fairly succinct account of the state of knowledge relating to Island Southeast Asian and Pacific prehistory. At this time, comparative linguistic knowledge was distracted by an obsession with lexicostatistics and glottochronology; genetic evidence was restricted to blood groups and serum proteins and henceforth of only marginal utility; and archaeological knowledge about Island Southeast Asia was still dominated by the research of Beyer, Heine Geldern and van Heekeren, together with Chang in Taiwan. Some of these pioneers were of course often right, as we know from the burgeoning data of the present day, and most of them had a very deep knowledge of Southeast Asian cultures beyond the purely archaeological record.

When I re-read Bellwood 1975 now, together with the comments published with it, I am surprised to realise how little we then really knew. In 1975, there was as yet no clear linguistic indication that the Austronesian languages had spread initially from Taiwan. This came for archaeologists with a paper by linguist Bob Blust published in *World Archaeology* in 1976, at a time when a large amount of confusion over excessive chronology and the red-herring of Austronesian origins in the Bismarck Archipelago was still in circulation. In 1975 I dated the whole Austronesian dispersal, from an unspecified origin region in Island Southeast Asia to eastern Polynesia, to between 3000 BC and AD 1000. This was not far off the mark in terms of the current chronology (nowadays with Taiwan included), but more by good luck than good dating since the date of 3000 BC was derived from a brand of glottochronology that was using a fast Island Melanesian rate of linguistic change, a point driven home by Bob Blust in 2000.

In 1975 also, there was precious little Neolithic archaeology in Island Southeast Asia dated older than 1300 BC, which was also the date for the arrival of Lapita pottery in Melanesia. In fact, the excessive chronology offered by glottochronology led me to suggest in 1975, admittedly rather tentatively, that Austronesian languages were spread into Melanesia over 5000 years ago by Australo-Papuan (then termed "Australoid") populations, with Polynesians arriving later. The new results from the Lapita skeletons at Teouma in Vanuatu tell us just how wrong was this idea. We now know that Polynesians in craniofacial and mtDNA terms arrived in Remote Oceania first, before migrating onwards into western Polynesia. The current Melanesian population mosaic beyond the Solomons was created by later admixture due to powerful gene flow from Near Oceania.

Many other understandings back in 1975 were also wrong. For instance, pigs were thought to have arrived in New Guinea 5000 years ago (errors in dating cave sediments), eastern Polynesia was thought to have been settled by AD 300 (more errors with C14 dating), and Palaeolithic human settlement east of New Guinea was thought only to date from 6000 BC (lack of research). On the other hand, some major observations could be made, even then, about various topics, including the independent development of agriculture in the New Guinea Highlands; Lapita links with Taiwan[1], the Philippines and the Marianas (although almost nothing was then known of archaeology in southern China, so links further back were impossible); and the high likelihood that Lapita people were essentially Polynesian in phenotype and genotype. Indeed, I still agreed then with Bill Solheim's view that Austronesians evolved within Southeast Asia, mainly because so little was known about southern China and Taiwan. On this, I was wrong.

[1] At that time with only the Yuanshan culture of the Taipei region available for direct comparison.

1975 is now 41 years ago. What have we learnt since about Austronesian origins and migrations?

A Basic History of the Austronesian Languages

The Austronesian language family first "crystallized" in Taiwan, where nine of Blust's ten primary subgroups of Austronesian still exist. Taiwan thus has a strong claim to be recognized as the "Austronesian linguistic homeland" on the grounds of genealogical diversity. The tenth subgroup of Austronesian, defined by Blust as Malayo-Polynesian, is characterized by a number of widely shared linguistic innovations and was spread by human colonists from Taiwan to the Philippines and onward, eventually to reach all points of the Austronesian world from Madagascar to Easter Island.

The ultimate homeland of the Austronesian languages, according to many linguists, must have been the southern Chinese mainland, before ancestral groups actually migrated to Taiwan. Unfortunately, linguistic ancestry at this remote time is so faint that few worthwhile details can be added, apart from the very important observation that the languages most directly ancestral to Austronesian were probably spoken somewhere in coastal central or southern China. The expansion of the Sinitic (Chinese) languages into southern China during the past 2000 years means that no unequivocal traces of such ancient languages remain today.

An examination of the proto-language reconstructions of lexical items and meanings that refer to the early Austronesian way of life allows linguists to infer that the "Proto-Austronesians" who lived in Taiwan were agriculturalists who grew foxtail millet, sugarcane and rice (having separate terms for growing, husked, and cooked rice). They doubtless grew some tubers and fruit crops, but linguistic reconstructions for these at the Proto-Austronesian level in partly temperate Taiwan are not as strong as for the cereals. They made boats of some form (canoes and rafts – it is not certain if they had sails) and lived in timber houses; they kept pigs and dogs (chickens are uncertain), and used bows and arrows, some form of loom for weaving, and pottery. They did not cast copper or smelt iron. In archaeological terms, they appear to have been fairly classic East Asian Neolithic societies, with a material culture similar to that of many Austronesian communities in the Pacific Islands that survived to European contact without a knowledge of metallurgy.

A millennium after this initial Austronesian colonization, the language ancestral to all the Malayo-Polynesian languages (Proto-Malayo-Polynesian) was carried from Taiwan by a seaborne migration to the northern Philippines. The chicken and new tropical crops were added at this time, presumably in the Philippines, Indonesia and Island Melanesia, including breadfruit, coconut, sago and bananas. Yams and aroids (*Colocasia* taro, *Alocasia*) were certainly cultivated by this time and perhaps earlier. Unambiguous cognates now appear for the use of sails to power canoes – a very significant development for what was to come.

After the move to the northern Philippines, a veritable tide of Malayo-Polynesian language dispersal seems to have been unleashed, as indicated recently by computational linguistic analyses. The early Malayo-Polynesian languages that spread from the Philippines through Indonesia and into the western Pacific were all very closely related in terms of their reconstructed vocabularies, sharing 80–90 percent of common, everyday words. This situation points very strongly toward rapid dispersal with very high rates of population growth, leading to a continuous distribution of fairly homogeneous ancestral Malayo-Polynesian dialect chains. A boat-borne human diaspora flowed through the Philippines into Borneo, Sulawesi and the Sunda Islands of Indonesia, eastwards to the Mariana Islands in Micronesia, through the Admiralty Islands to Island Melanesia (but not via New Guinea), and onwards to Tonga and Samoa in western Polynesia. The flow might have been slowed a little by the presence of non-Austronesian agricultural populations in parts of central Vietnam and the Malay peninsula, and of course in Papuan-speaking New Guinea, since it is far easier for agricultural colonists to establish themselves where there are only small pockets of hunter-gatherers, rather than in an area already quite densely settled by other farmers.

Following the rapid language spread through Island Southeast Asia and into the central Pacific there seem to have been several pauses, prior to further dispersals to Vietnam, the Malay Peninsula, and eastern Polynesia beyond Samoa. The languages of Madagascar contain Sanskrit loan words that only spread to Indonesia from India after AD 400. The Polynesian languages share so many unique linguistic features, none occurring in the Melanesian islands to the west, that a very long period of gestation in western Polynesia (Tonga and Samoa) is indicated prior to their final dispersal through eastern Polynesia. This gestation apparently lasted for almost two millennia before any other Polynesian islands to the east were initially settled, around 1000 years ago, perhaps reflecting the difficulties created by much wider sea crossings to new islands. These gaps would have been exacerbated because the Pacific atolls were still drowned at 1000 BC by the high mid-Holocene sea level, and this challenge perhaps induced major innovations in canoe technology, particularly the capacious and seaworthy double canoe.

These successive stages of Austronesian dispersal, it will be realized, are based essentially on linguistic reasoning. The absolute dating for them, together with many other details of the material cultures and economies involved in the population dispersal process, can only be provided securely by archaeology. As we shall see, the overall trajectories of the archaeological and linguistic records, in terms of major expansions and terminations, correspond with remarkable precision.

Some Observations about Human Biology

In this presentation I will not become involved in technical discussions about craniofacial and genomic population history in Island Southeast Asia and I do not claim professional expertise in these disciplines. But there are two very important new sources of data that must be mentioned:

1. The demonstration by Hirofumi Matsumura and Marc Oxenham that craniofacially-analysable pre-Neolithic folded (squatting, seated, crouched, flexed) skeletons in both Island and Mainland Southeast Asia, including southern China, are of Australo-Papuan[2] morphology. Neolithic skeletons are generally supine and of Asian Neolithic morphology. A major population shift thus occurred across much of Southeast Asia, but not in New Guinea or Australia, between 3000 and 1000 BC.
2. The demonstration, through numerous genomic identifications of ancestry components in living and ancient DNA[3], that Austronesian biological ancestry can be traced back substantially into Taiwan and the Philippines. The most recent observation in this regard is that Lapita people in Vanuatu were of Asian Neolithic and not Australo-Papuan affinity. However, during the early migrations of Austronesian speaking peoples in Island Southeast Asia, admixture occurred with Philippine Negritos, Papuans, and with Mainland Southeast Asians of a presumably Hoabinhian and pre-Neolithic identity who spread across the Sunda shelf when it was emergent in the early Holocene. The genomic evidence thus indicates that Austronesians both migrated and admixed, except when they entered the empty islands beyond the Solomons.

The Archaeology of Early Austronesian Dispersal

The Neolithic in both Mainland and Island Southeast Asia was variously (not homogeneously) associated with domesticated plants and animals, new forms of elaborately shaped and decorated pottery, flaked and ground stone adzes, body ornaments of precious stones such as nephrite (jade), and large open settlements (one hectare or more) of village size, potentially sedentary. Such developments of settlement complexity are most evident in Thailand and Vietnam, but 3500 year old Neolithic settlements of village size have been excavated in northern Luzon and West Sulawesi, and much older ones in Taiwan.

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[2] I prefer this term to the more generally used "Australo-Melanesian", simply because many Island Melanesian populations reflect admixture and recent settlement. Aboriginal Australians and Papuans (interior New Guineans, speakers of Papuan languages) descend *in situ* in a genetic sense more directly from Pleistocene forebears.

[3] i.e., plotted statistically from single nucleotide polymorphisms (SNPs) across the nuclear genome.

Taiwan

The oldest Neolithic complex on Taiwan is termed the Dabenkeng, after a coastal site in the northern part of the island. Currently, Dabenkeng sites date between 3000 and 2000 BC and occur all around the coastal regions of Taiwan. Their incised and cord-marked pottery is very homogeneous in terms of shape and decoration, this in itself being a clear indication that the Dabenkeng people belonged to a relatively unified cultural milieu and were perhaps immigrants into Taiwan from Fujian or Guangdong, where similar pottery occurs at the same general time. The only archaeological assemblages in Taiwan older than the Dabenkeng are the flaked pebble tools left by the inhabitants of the Changbin caves and other sites in eastern and southern Taiwan, but these assemblages show no signs of direct evolution into the Dabenkeng Neolithic.

Until recently, attempts to link the spread of the Dabenkeng culture through Taiwan with the early Austronesians were problematic, owing to the absence of any direct evidence for agriculture, even though Dabenkeng sites are large, numerous, and mostly close to good agricultural land. Several also occur in the Penghu (Pescadores) Islands in the Taiwan Strait, where there are sources of excellent basalt for adze-making. But most Dabenkeng sites have been found on the ridges and hills that rise immediately inland from the modern coastal plain that runs down the western side of Taiwan. Such locations are excellent for archaeological visibility, since sherds are strewn everywhere, but very poor for organic preservation.

With discoveries at Nanguanli, in the southwestern coastal plain near Tainan, the difficulty in linking the Dabenkeng culture to the early Austronesians has been resolved. Rescue excavations here by Taiwanese archaeologists led by Tsang Chenghwa during factory construction in 2000 exposed waterlogged deposits dating between 3000 and 2500 BC, 7 m below ground level and 1.5 m below modern sea level. They yielded Dabenkeng pottery with cord-marked, red-painted, and red-slipped decoration. Other Nanguanli artifacts include stone bark cloth beaters, perforated slate projectile points, shouldered stone adzes (some of Penghu basalt), baked clay spindle whorls, tanged shell reaping knives, and shell bracelets and earrings. Nanguanli also has complete dog burials, and large quantities of carbonized rice and foxtail millet.

By 2200 BC, Middle Neolithic sites such as Chaolaiqiao on the steep coastline of eastern Taiwan, excavated by Hsiao-chun Hung, were associated with rice cultivation (through phytolith evidence), red-slipped but otherwise plain pottery with declining cord-marking, and a use of Hualian nephrite (jade) for adzes and ornaments. Eastern Taiwan is a region of extreme tectonic instability owing to subduction, and uplift rates are estimated at 10 metres per millennium – a sure recipe for deep river incision and resulting soil erosion (current research by Mike Carson). This landscape instability could have been a major factor behind the further spread of Neolithic settlers into the Cagayan Valley of Luzon, leading especially to a search for suitable wet rice-growing terrain.

Dispersals into Island Southeast Asia and Madagascar

In Island Southeast Asia, archaeological traces of the Austronesian expansion of the 2nd millennium BC are visible in a number of rock shelters and open sites with red-slipped and stamped pottery, polished stone adzes with quadrangular/trapezoidal rather than lenticular cross-sections, dogs and domestic pigs, found through the Philippines, Borneo, Sulawesi, Nusa Tenggara (Lesser Sundas) and the Moluccas. These sites, according to radiocarbon dating, are oldest in the north (Taiwan) and become gradually younger toward the south and east. In the Batanes Islands, fine cord-marked pottery of Taiwan type dates from 2200 BC in Reranum Cave, and plain red-slipped (non-corded) pottery in Torongan Cave from 2000 BC onward, following the same sequence of stylistic change as in southeastern Taiwan. The Batanes open sites of Sunget, Anaro and Savidug all have circle-stamped pottery commencing before 1200 BC, associated with pottery human figurines and use of Taiwan jade.

In the Cagayan Valley on Luzon, the Magapit and Nagsabaran shell mounds and the alluvial layers beneath the shellmound at Nagsabaran have yielded pottery with fine punctate-stamping dating from **c**.1500 BC onward, related in vessel form and decorative motifs to the early Batanes pottery, the dentate-stamped Lapita pottery of Melanesia, and especially the contemporary punctate-stamped pottery of the Mariana Islands of western Micronesia. Linguistically, the Chamorro language of the Marianas can be derived from the Philippines, and the first settlers appear linguistically to have taken rice (but not pigs) with them, the only occasion this crop was transported into Oceania. The Mariana Islands were thus settled by a slightly earlier movement than that indicated for Lapita, and the open-sea crossing to the Marianas from the Philippines, at least 2300 km, justifiably ranks as the first “great voyage” known to us in Austronesian cultural history. The Palau (Belau) Islands to the west of the Carolines have also yielded signs of occupation perhaps back to 1500 BC, or even earlier, and it is possible (if so far unattested) that the early settlers of the Marianas passed through there. However, the islands of southern Micronesia, especially the Carolines (mostly atolls), were settled only after AD 1 when slightly reduced sea-levels allowed the atolls to emerge. Like Polynesians, the people of southern and eastern Micronesia also soon abandoned the use of pottery.

Some long-distance connections within the Southeast Asian Neolithic are very striking. For instance, the red-slipped pottery at the site of Bukit Tengkorak in Sabah (1300 BC onward) was found with two rather surprising occurrences of a lithic nature: an industry of agate microblade drills with possible Yangzi Neolithic (e.g., Tianluoshan) parallels apparently used on shell artifacts, and obsidian imported from sources in New Britain in

Melanesia, located over 3500 km to the east. This obsidian probably represents one of the longest-distance transfers of a Neolithic commodity in world prehistory. Taiwan jade from the Fengtian source near Hualian was also imported into the Batanes and Luzon, and a little later to Palawan and central Vietnam.

Concerning the food producing economy at this time, many sites in Taiwan, Luzon and Borneo have yielded traces of rice in grain, husk or phytolith form, possibly dating as early as 2300 BC with impressed pottery in the cave of Gua Sireh in Sarawak. Sites with rice phytoliths associated with red-slipped pottery include Chaolaiqiao in eastern Taiwan at 2200 BC, Nagsabaran in the Cagayan valley at 1800-1500 BC, and Kamassi in West Sulawesi at 1500 BC (research by Hsiao-chun Hung, Deng Zhenhua and Anggraeni). Domesticated pigs of the species *Sus scrofa* were widespread by at least 2000 BC in Luzon, together with dogs (research by Philip Piper).

Dates for Neolithic colonization in the large islands of Sumatra and Java remain uncertain owing to the sparseness of the archaeological record and the great depth of recent alluvial sediment in the lowlands, but settlements in the mid-2nd millennium BC seem very likely. The Malay Peninsula, which still today has many interior regions populated by Austroasiatic-speaking (Aslian) populations, was probably first settled in coastal areas by Austronesians during the Metal Age, less than 2500 years ago. These new arrivals would have found Neolithic agriculturalists already present, with strong cultural links with Neolithic populations in southern Thailand. Austronesians arriving in central Vietnam, perhaps before 3000 years ago, would also have found themselves among existing Austroasiatic-speaking agricultural populations.

In one of the most extraordinary feats of long-distance colonization in history, Austronesians sailed across the Indian Ocean west to Madagascar and the Comoro Islands (the latter now Bantu-speaking), probably in the mid-1st millennium AD. Madagascar was settled from southern Borneo according to current linguistic and genomic analyses, and its archaeological record commenced after AD 500, although earlier hunter-gatherer settlement there from Africa remains a possibility. The Austronesian settlement, which included an estimated 30 Indonesian women, was thus fully Iron Age, belonging to the period of trade across the Indian Ocean associated with Indic influence in Indonesia.

The Colonization of Island Melanesia and Western Polynesia

In the western Pacific, Austronesian colonists between 1200 and 750 BC left an extremely clear-cut trail of pioneer Neolithic sites belonging to the so-called Lapita cultural complex across about 6500 km of ocean and islands, from the Admiralty Islands north of New Guinea to as far east as Samoa in western Polynesia). This impressive migration correlated linguistically with the spread of Proto-Oceanic, the founder dialect chain in the Oceanic subgroup of Malayo-Polynesian, which today includes all the languages spoken in the Pacific Islands from the Admiralty Islands and parts of coastal Papua New Guinea eastwards. Although pre-Austronesian populations had reached the Solomons, all islands from New Caledonia and Vanuatu eastwards were subjected to initial human colonization by canoe-borne Austronesian-speaking groups, as far as we know.[4] Like highland New Guinea, these islands were malaria-free beyond Vanuatu, and thus not subject to the very high infant death rates that probably afflicted contemporary populations in malarial regions of Southeast Asia and lowland New Guinea. Site sizes and numbers indicate that these populations grew rapidly during the early stages of colonization, even if the initial founder groups were quite small in number.

Lapita sites are generally well dated and well-studied in terms of artifacts and economy. Key features include pottery with sand or crushed-shell tempers; forms include globular cooking pots and open bowls, some with flat bases and others on high pedestals with cut-out decoration. Some vessel profiles are sharply carinated, and pots might have lug or strap handles and knobbed lids. Vessel surfaces are often red-slipped and the decoration includes an intricate range of incised, circle- and dentate-stamped motifs that included anthropomorphic faces, perhaps indicating a concern with ancestors that was common to all Austronesian populations. A remarkable parallel for these face motifs exists on an undated stone carving at Bulili in central Sulawesi, adding an intriguing element of mystery. It is likely that the idea of dentate stamping, which replicates body tattooing and was probably carried out with a tool like a tattooing chisel, originated somewhere in the Philippine region, with a possible extension into Sulawesi. However, the bulk of Lapita pottery was made locally, and a theory that Lapita pottery was essentially a trade ware no longer has support.

Later Lapita pottery tends to have simpler designs, and dentate stamping faded in popularity after 750 BC in favour of plain ware in western Polynesia, although other styles of incised, appliqué, and carved paddle-impressed pottery continued until late prehistory in many of the Melanesian islands. Apart from pottery, other items of Lapita material culture include stone adzes (all untanged) and chisels, shell adzes, a range of shell ornaments including beads and arm rings similar to those found in contemporary sites in the Philippines and eastern Indonesia, and fishhooks for trolling and angling. Bait (angling) hooks of shell are also found in Neolithic sites in Taiwan, Timor and the Mariana Islands.

[4] Some contemporary settlers beyond the Solomons might have spoken Papuan languages initially, but no traces of any appear to exist today.

Lapita Economy

The Lapita economy is of great interest because it indicates which crops and animals passed through the equatorial filter of non-seasonal Island Southeast Asia to reach the western Pacific. Annual cereals such as rice and foxtail millet disappeared, leaving dominance to a range of fully tropical fruits and tubers. Pigs, fowl, and dogs are all present in the Lapita record, although not all sites or island groups have yielded them, and it is clear that Lapita settlers, for a while at least, would have been distracted away from their domesticated food supplies by prolific wild resources in the areas they colonized, until these became reduced by extinction and local extirpation. Plant remains from waterlogged sites in the Arawe and Mussau Islands include taro, coconut, candlenut, pandanus and the canarium nut, most exploited as well (with bananas) by pre-Lapita populations in New Guinea.

Village settlements, in some cases of stilt houses over shallow lagoons as in waterlogged Yangzi basin Neolithic sites, occupied zones marked by sherds, earth ovens, hearths, postholes and other features; they average about 1 ha in size in coastal and small offshore island locations, growing to a maximum of 7–8 ha in the Mussau Islands. A fairly healthy inter-island exchange of obsidian from New Britain and Admiralty Islands sources was carried out in western Melanesia, and some was carried in limited quantities much further afield, to Vanuatu, New Caledonia, Fiji, and even (as we have seen) to Sabah.

The Settlement of Polynesia

Lapita colonists reached Tonga and Samoa in western Polynesia by about 900 BC. As in Melanesia, the decorated forms of Lapita pottery lasted for only a few centuries, with continuing simplification, eventually turning into a rather basic plain ware of increasing thickness before the eventual demise of pottery in Samoa and southern Micronesia **c**.AD 300. Of course, pottery was difficult to make on coralline islands that lacked clay. But this cannot be the whole story, since Remote Oceania has many volcanic islands with good clay sources but no potsherds. Oceanic cuisines, focused on fish, meat and tubers, could manage perfectly well with earth ovens rather than pottery, although this does not explain why pottery-making continued until ethnographic times in some parts of New Guinea and Island Melanesia.

Together with the disappearances of rice, millet and loom weaving (and the associated clay spindle whorls for spinning fibers), the loss of pottery making suggests that early Austronesian societies underwent "bottleneck" losses as small groups pushed ever further east, gradually losing contact with their more complex homeland cultures and leaving behind aspects of cultural knowledge. Nevertheless, although Polynesians might well have lacked rice, pottery and woven cloth, not to mention bovids, metals and the wheel, they reversed inexorable cultural loss by inventing the double sailing canoe, a remarkable construction that allowed the discovery and colonization of islands located thousands of kilometers over the horizon, with a full suite of transported crops and animals. They also honed bark cloth and stone adze production to rarely-equaled fine arts, and developed complex forms of terraced-field and canal-fed taro irrigation, as well as palisaded earthwork fortification, the latter reaching an apogee in New Zealand. Eastern Polynesians also constructed massive stone platforms associated with competitive chiefly levels of society in the Hawaiian, Society, and Marquesas Islands. On Easter Island they adorned such platforms with those famous rows of top-knotted statues, carved and erected entirely with Neolithic technology.

Linguistically, the settlement of the islands in central and eastern Polynesia that lay beyond the Lapita zone – the Marquesas, Societies, Cooks, Australs, Tuamotus, Hawaii, Easter Island, New Zealand and many others – occurred after a long period during which population dispersal paused in western Polynesia. The archaeological record is now in perfect accord with this. Current interpretations of radiocarbon dates from archaeological sites suggest that none of the island groups just named were settled before AD 900, and some not until several centuries later. During this migration standstill, Proto-Polynesian society and culture developed in western Polynesia out of its Lapita (Proto-Oceanic) roots – the basic configuration ancestral to all the ethnographic societies of Polynesia, and one subsequently modified in each island group by differing processes involving chance, environmental variation, and interaction.

The Polynesians who eventually settled New Zealand **c**.AD 1200 were the first Austronesian-speakers for over 4000 years to set foot in the temperate zone since the settlement of northern Taiwan at **c**.3000 BC. The response of the majority of the South Island Maori, finding themselves living beyond the climatic range of their North Island and Marlborough sweet potato agriculture, was to return to a purely hunter-gatherer lifestyle that survived until European contact.

Once the process of eastern Polynesian settlement began, there is good reason to assume very rapid population growth in such healthy and disease-free environments, with so much marine food available to the first settlers together with their transported crops and animals. Demographic profiles from similar situations of first-farmer colonization, for instance from Pitcairn Island following settlement by the Bounty mutineers and their families in 1790, and from the colonial frontiers of the United States and Australia, leave no doubt about this. Just how fast early eastern Polynesian populations might have grown can be seen from an analysis of the numbers of archaeological radiocarbon dates (as proxies for human population size) through Hawaiian prehistory. In this case, human arrival a little before AD 1000 was followed by a very rapid population increase for the first few centuries. Population later declined, reflecting in part the devastating effects of introduced diseases in the 18th and 19th centuries, although radiocarbon dates are not accurate enough to separate this factor from an indigenous late prehistoric leveling-off of population resulting from resource stress.

In terms of interaction between different islands, recent research has shown that early central and eastern Polynesian cultures were connected over thousands of kilometers by the long-distance transport of basalt, a volcanic rock used for adzes and other tools. Basalt from Samoa has been found widely in Tonga and the Cook Islands, and that from the Marquesas also in the Societies, southern Cooks, Tuamotus, Mangareva and Fanning Island. Whether these connections involved regular two-way voyages is uncertain, but in the early years of human settlement such return voyages would certainly have been assisted by the large flocks of homing birds with each sunset. As these flocks diminished with increasing human predation, this aid would have been compromised. Nevertheless, we know from European explorers' and ethnographic records, and from comparisons of late prehistoric artifact styles (especially stone adzes), that some inter-island contact was still occurring in the 18th century, and indeed until the 20th century in the Caroline Islands of Micronesia using traditional canoes and sailing methods.

Why Migrate?

Why did all this island migration come about? Simply looking for new islands for agricultural land or other resources does not explain everything, given the huge sizes of many of the islands of Southeast Asia, even now underpopulated in some remote equatorial situations. It has been suggested that periodic increases in the frequencies of westerly winds due to El Niño-Southern Oscillation (ENSO) climatic cycles would have encouraged sailing to the east, but westerly winds alone are unlikely to have started the whole migration process. There must also have been something cultural, including perhaps advances in navigation and canoe construction. Let us not forget also that an island over the horizon will not exist in the human mind until someone becomes aware of its presence, either by watching migrating birds or by getting there in person. In the latter case, getting back home again, perhaps by sailing out towards the wind and back with it in the rear, could have opened an opportunity for many others to attempt to migrate.

A further suggestion here is that like the youth of today, so the youth of millennia ago needed outlets for their energies, ways to gain self-esteem, success, and peer-recognition. The founding of new communities became a high-status activity and a major source for the embellishment of epics and mythology. In tribal agricultural societies with institutionalized forms of land ownership, where status and rights to land were to some degree determined by ancestry, gender and birth order, there would always have been situations in which younger sons, able to found only lineages of junior rank at home, would have sought to establish a new senior line by the colonization of new territory. If such desires are institutionalized and given formal social approval (for instance, the New Zealand Maori named many of their tribes after their founder figures), then a very powerful motivating force for active colonization will be unleashed. In the case of the Austronesians, this force appears to have become more significant as populations moved further and further east toward Polynesia.

Postscript

I suspect that two other perspectives on the Austronesian past will be discussed in Nusa Dua:

1. That the Austronesian-speaking populations of Island Southeast Asia are of indigenous genetic ancestry, and that dispersal through Taiwan either did not occur at all, or was of minimal significance. This perspective reflects some mitochondrial DNA research on living populations and some linguistic ideas about language shift.
2. That there was a Mainland Southeast Asian Neolithic and "Austroasiatic" settlement of at least western and central Indonesia before the arrival of Austronesian-speaking settlers. This research reflects certain linguistic observations.

I have opinions about both perspectives, and agree that there may well be some people living now in Indonesia for whom such ancestral explanations could work. An existence of Neolithic contacts between the Thai-Malay Peninsula and Sumatra would not be at all surprising. But I also have many misgivings about the overall significance of these two perspectives, especially from an archaeological perspective.

DIASPORA AND INTER-REGIONAL CONNECTION

OCCUPATION AND DIASPORA OF AUSTRONESIA: LEARNING FROM GEO-OCEANOCLIMATOLOGY PERSPECTIVE IN INDONESIAN MARITIME ISLAND ON ENHANCHING RESILIENCE LIVING IN THE COASTAL PLAIN AND SMALL ISLAND

Wahyoe S. Hantoro

Introduction

Background

On the living world map appears the spots of the occupation area of group or tribe which physical and its culture are at similarity. Concerning Austronesia, principal question must be arised, what and who Austronesia is. It is interesting to be questioned how Austronesia as the group that posses almost perfect similarity occupies the large area at almost one fourth equatorial zone. The larger part of the area physiographycally is an open sea, Indian and Pacific Ocean and its ilsland. What the reason is the existence? Does the diaspora's coverage begins from just the small area then propagate trough time? Both principals questions above will be discuss in this paper. But the other question is still possible to be discussed based on the data so far had been found. It can be assumed that the last change on physiography in SE Asia region following the eustatic sea level may contribute to the selection of the more permanently occupation of the group. Dispersal of Austronesia is estimated had to be started since the last glacial period to Upper Holocene (Present Day). This could happen soon the sea level starts to increase and lasts through long period and happens on several time although continues when sea level almost reachs close to the present day level. Austronesian occupasion covers almost one fourth of world surface which Indonesia is supposed to be almost in the center of its dispersal (Fig. 1-1). This large dispersal is still being questioned on why, how and when does Austronesia migrate? Under what situation they lives until the decision to move? Where and at which environment does the Austronesia prefer to live? Which way Austronesia use to disperse? Then, does Austronesia return to the previous habitat? Does they all use the same route? Why does the larger part of diaspora being a marine coverage? Part of those questions, the answer may related to the, physiographical, geological as well climatological background of where Austronesia lives. This idea allows us to propose a new sight through updating data, giving new approach and perspective to understand the reason of diaspora. Though the discussion focus to the negative driving force, there could be positively reason of diaspora as well as looking for new social contact to open new market of their goods.

Isotopic data from cave's speleothem and coral's core indicate that there were several spikes in the climatic signal belong to the long drought in Indonesian region (Morwood., et al., 2004., Gagan et al., 2004, Abrams et al., 2007, Griffiths et al., 2009., Griffiths et al., 2013). This extreme event could induce serious forest fire as we observe present day. Other geological extreme event leaves and prints signal of volcanic euption in the past (Scroxton et al., 2016).

The article is the elaboration of previous one that had been published almost 10 years ago (Hantoro, 2006). It tries to see and looking for relationship whether the disaster and environmental stress are the important role triggering the people taking important decision to explore unknown destination to be settled. This insight discussion of the Austronesia diaspora which the principal area is in Indonesia may bring advantage to the future develpment of archeological research (Simanjuntak et.al., 2006) especially to open opportunity to find archeological sites that actually immerged below sea level (Hantoro., 2006). Aims of this synthesizes may bring advantage to the present life of Austronesian descendant that now being a big nation, name as Indonesia, describing their future culture among the global trend of human kind evolution.

Approach metodology

The idea to approach understanding of Austronesian Diaspora is to use multy dicipline (tematic) data and information. One that could give important contribution is geological information through understanding classic concept in geology proposed by Hutton (1785) in Lyell (1830) " the present is the key to the past". Present geological as well meteorological process could happend similarly in the past during diaspora of Austronesia.

The approach of this paper is to answer the question related why and how the Austronesian disperses and what the driving forces they have to or willing to leave their habitation. In this paper, there is not any more discussion on what and who the Austronesian is, except to assume the origine, the occupation place in the island arc and when doe diaspora start.The approach to discuss the relationship between diaspora and the possible driving force, is to try to trace back and understand the environmental situation where Austronesian lives and how serious this stress situation forces to leave. Despite the assumption that Austronesia starts from the island arc, that the starting point of diaspora could be from the place somewhere outside the island arc too. Leading to that hypothesis, it needs another reasoning why that moving out from the origin homeland has to be done. Are there any reason of extreme event too, but whats is the driving force? Natural or anthropogenic forces?

Other hypothesis is the diaspora had been discussed in many ways and times. So when did the migration take place? How did they go? What kind of transportation did Austronesia use. Anyhow, the long migration traversing dense forest and most probable the sea, should be supported by an advance navigation at that period. In order to test that assumption and to obtain more enlightment to the Austronesia diaspora, the approach metodology to be proposed are:

- Estimation to the possible locus of Austronesia's settlement, in the single large occupation or in the several dispersed location in island arc region but could be outside of Indonesia teritory.
- Estimation to the timing of the starting migration, the way and the path of dispersion
- Estimation to the negative driving force that induces diaspora
- If there an environmental problem, what serious situation to Austronesia's life related to the lost of carrying capacity of the local resources
- What the extreme event such calamity which negative impact is an environmental stress induces the vulnerability on the food stock and water or outbreaking the disease.
- Is there any relation between the stress condition with the social conflict
- Instead the driving force, there should be positive driving force as well eagerness to open new sight on social or commercial contact to offer their goods.

The better understanding to the diaspora may be achieved by describing and analyzing those above mentioned points. The configuration may be far from the real (situation and process) of diaspora. Anyhow new data information may bring enlightment and encouraging scientist towards better understanding on how, why and when diaspora happens.

General setting:

Refer to the present situation of the general setting of the island arc, so the anomalous of those parameters in the past might control the dispersal of the Austronesia. There is close similarity the past with the present physiographical and climatologically conditions that control the changes of the environment where the life is so depend on. Extreme event of those natural situation is an important driving force that influence to the human living as well other living creatures that might be an essential food stock of Austronesian. Sea level variation must be considered as other potential control in the longer time that had changed the physiographic of the Indonesian Island Arc.

Physiographical setting

Physiography and geology may contribute significant factors controlling the Austronesia diaspora in South East Asia (Ollier C.D, 1985). The dispersal area covered a very wide range on different physiographical as well geological setting: consists of shallow epicontinents, small islands, open seas, straits, river's stream, lakes, coasts and swampy lowlands, from the island arc ther spreaded ot to Asian to Australian land even to Australia and Pacific region. Change on physiographical setting of the island has close relation to the change of sea level at almost sequentially happen at around 12.000 yrs. This change is relatively important than change due to tectonic process as it evolve a large area and at bigger magnitude as the sea level was about – 135 m below present level during the maximum glacial period (LGM). Those tectonic changes bring less change on physiographical view as it evolution last in a longer time scale, milenial or even ten milenial scale (Hall, 1997). Change on the thousand years scale of the physiography must be a much bigger time scale than the life time of human being. But we will work on the human occupation and its culture's imprint that could be last in the longer period.

In the west part, Java, Sumatra and Kalimantan, those are the big islands, presently are separated by shallow inner sea basin, named Java Sea and Karimata Strait, extend to South China Sea in the North. This large basin is the epicontinental-sea of the South East Asia Land. Outer sea of Sumatra and Java is deep outer arc basin that faces to the open Indian Ocean. (Fig.1.1-1). Sumatra and Java is the important land to its fertility of the land due to volcanic product, rather than Kalimantan, other big island that tectonicaly is more stable without any recent volcanic activity. Those islands belong to the long river valey which streams may bring any advantage to the human being, had been functioned to move up or downstream as the valley is relatively open then the hilly morphology of dense forest. The more advance river's transportation is using raft, it makes the movement along the river becomes a breakthrough before invention of wheel for their wagon moving in the land.

Geologically and physiographically, those islands are not belong to the west or east part of island arc. Sulawesi island has an important role on the southward migration from Asia through Philippine. To the east, bigger island is Papua which river is relatively long connecting coastland and mountain range. The high mountain seems to be considered to the important morphology that seperates Papua into two different basin. This island had been produced from the northward movement of Australian continent (Hall, 1995) (Fig.2.1-1). Papua is separated from Australian continent by the shallow Sahul Sea. Land conection during LGM allows to the migration south north vice versa. A large mass of thick ice cap covered the mountain during LGM (Allison 1976). Traversing north south of human being was ceased during that period (Hope and Hope, 1976). Melting of ice caps then reopen the path 14.000 yrs BP, as proved by increasing charcoal in the cave close to Hogayaku Lake (Petterson et al., 2002, Hantoro, 2006).

Climatological Setting

Indonesian Island Arc is under the tropical climate which monsoon is one of the climate components. This region has 3 different rainfal zones (BMKG, 2007). Those 3 rainfal types may bring also significant advantage to the movement as the possible way to move by using river valley than traversing dense forest. Asian-Australian monsoon system mainly works in the western part of the island arc (Fig.2.2-1). To the east, seasonal weather is more influenced by the Australian – Pacific system. Daily air and sea surface temperature slightly varies. Monsoon rain mostly is recorded in the whole region, but in North East of Indonesian region does not shows any monsoon rain. Local mechanism as influence of deep Banda Sea could induce this anomalous. Tropical cyclon ceases soon aproach its path close to equator, but the heavy rain is one of the impact to the equatorial zone as well strong wind that induce big wave (Fig 2.2-2).

Unusual regional weather often happens above the scale of variability, such as appearences of “Dipole Mode”. This regional anomaly had been detected during Upper Holocene (Gagan et al. 2004). If it couples with other regional variability, it may induce an extreme climate anomaly. ENSO-La Nina and Indian Ocean Dipole Mode are the regional climate variability, which coupling’s response may induce more global scale weather anomaly (Fig 2.2-3) as the stress environment as well drought to selected area. Coupling with other regional event as Madden Julian Oscilltion, the wet of dry season or inversely dry of wet season appears as deterioration on the climate variability. Strong anomaly of those variability may induce such stress to the water budget as long drought or flood. Recent study using coral and speleothem from Indonesian region reveals that several extreme climatic event appears during long period of Upper Pleistocene (Abram et al., 2007)(Fig 2.2-4). In the millenial scale of change, during maximum glacial, sea level may drop to almost to -135 m below present sea level. Large changes on Sunda Platform from sea to the land environment can be followed by the change on regional climate system such as the change on hydrological balance, albedo, primary production and other meteorological condition (Hantoro, 2001).

Despite negative impact due to climate deterioration, seems that Austronesian learns to take advantage become positive impact. Decreasing SST in eastern Indian Ocean during IOD induce higher sea surface air pressure that is follow by west ward air mass movement to the East Coast Africa. The eastward movement happends during the opposite IOD. It almost lasts until 3 month during, enough long for the simple sailing boat crossing the ocean (Figure 2.2-4 a-b). East ward trade wind during Nino and Nino Modoki from West Pacific and Indonesian Island gives advantage to the east ward moving people to the island in eastern side of Pacific Ocean (Figure 2.2-5 a-b). The return to the west could be supported by west ward trade wind due to the regional anomaly during La Nina.

Geology

Setting on geology of the study area is one of the important factors that may control the physiographic evolution of the area (Fig.2.2-1 and 2.3-1), but also on the producing the factors that give influences to the islands where the Austronesia lived as well as it give the fertility to the land. Volcanic product gives fertility to the land and support good hydrological balance. Moving into this fertile area is necessary carried out to make sure that their needs easily and sufficiently available around them. Geological process produces mineral that essentialy needed for human being as metal industry and fertilizer. Instead as positive support factor, geological setting may be a factor producing stress that pushed the Austronesia changed the habitat, moving to the suitable and comfortable site, escaping from the threats coming from geological hazard.

Geological extreme events had marked this active arc with earthquake (Fig.2.3-2), volcanic eruption and other hazard related to the geological process as landslide, etc. In the historical of volcanic hazards, there are some big volcanic eruption that brings regionally strong impact as the devastation of the environment but also other living matter. Huge Toba eruption is believed induces the cease of south east migration from Asia to the island arc. Strombolian type of Tambora eruption sweeps one sultante's generation around the area, and known as a year without summer in Europe due to the ash dispersion in the atmospher covering the globe. Other more recent calamity on geological hazard was the Krakatau eruption. The repeated explosion generates tsunami that hits coastal zone around Sunda strait. Paroxisma of the eruption is followed by the caldera collapse that generates biggest tsunami and sweeps the living around the strait (Fig. 4.2.1-Ac2). Casualties is estimated close to 30.000 people died. According the coral data, there is relict of other old Krakatau eruption but without any clear tsunami that follows. Wild fire hits villages and plantation in Lampung district due to the pyroclastik falls.

In the heavily tectonized zone, thrusting, folding and faulting of the geological formation weakens the outcrops becomes unstable (Fig. 2.3-1). Heavy weathering and rainfall of is induced by seismic shock produces land slides or rock falls. Coupling of geological and climatological extreme event may increase the degree of the threat.

Environmental condition

The large sea area relatively stable on the climatic setting but could be varies through time on weather condition. Strong anomaly on the weather condition may induce slight change on the tropical land environment. Relatively stable climatic condition in the tropical area could be an advantage to Austronesia manages the natural resources. Evolution and finding on the resource management bring Austronesia to enhanche capacity to optimalize the environment in order giving more food stock by cultivation and domestication and other advantage.

During low stand sea level, the island arc was the large flat land which Sunda Platform was the the northern edge (Fig. 1.1-1). In the south east, Sahul Land was the land bridge that connected Papua to Australia. This large paleo - Sundaland was presumably occupied by tropical forest of low land and wetland. The humidity relatively low (Polhaupessy, 2002 and Dam, 1994) as well its temperature, if it was compared to the present state, so it might give considerable large grassland in those emerge land. Long-drought might induce also forest fire. Large scale of tsunami due to earthquake sometime sweeps the emerge coast of the West Sumatra, South of Java, Lesser Sunda and Banda Sea to the east coastal area face to the rims of plate convergence.

Basic Questions:

Tough this article does not discuss about what and who is the Austronesian, but as it had been stated above, there are basic questions related to origin and where their long sttlement was before they migrate then the reason as well the driving force to the Austronesian leaving from their homeland. It is necessary indeed to understand when Austronesia starts to move.There is still less evidence of both the origin and where the settlement in the island arc was. Regarding the large of the coverage of the Austronesia's occupation, those must come from many possible sites that had not been found and reported. The next question to be arised is related to the more detail reason why did and what did the driving force.

Possible Origin and Settlement in island arc?

Fact that data on Austronesian origin is difficult to obtain, several hypothesis pertaining to the place of origin, the most possible are: Taiwan, Yunnan, SE As China (Yangjiang) SEA and west part of Indonesia, Sunda subcontinent and South Pacific (Jacob, 2006), it seems that discussion of the dispersal brings us to the hot debate too. Based on several archeological finding, Austronesia possibly come from the Asia Land (Fig. 3.1-1) (Belwood, 2006). Where the place Austronesia use to settle relatively in the long time and its dispersal pattern seems to be a chalange to find the data supporting the hypothesis here to be proposed (Hantoro, 2006). It is thought that modern Homo sapiens did not occupy the Pacific region east of Wallace's Line in the Upper Pleistocene (Dijk and Thorne, 2002). So did Austronesian follow their anchestor? The better knowledge on their exploration way, seems that eastern part of the island arc to Pacific region becomes more accessible to be be occupied.

We may start by the assumption on the possible long time occupation of Austronesia in Indonesian Island. This model can be based on several criterias and conditions that minimally must be needed by the Austronesia on the looking for the suitable home land. Considerations of the suitable habitat that is shelded from the hazardous threat and other reason on resources, are:

- Sandy coastal or estuarine, gentle sloping river banks, well protected to the high tide.
- Site close to the evacuation way as rapid escape from and adaptation againts any hazardous threats.
- Good acces to the food stock and water, as well materials for light shelter or building
- Good acces for the visitors come but shelded from the wild animal and other human attcker (fencing, etc).
- Well protected againts extreme weather (typhon, flood, wild stream, etc.)
- Possible cultivation site or area (open river banks, staging house, etc) as well domestication

Possible settlement and occupation setting of Austronesia in Indonesia

Several well preserved archeological sites allow to presume, but are not still enough to conclude that Austronesia used to settle permanently in long time in the whole island arc (Fig.3.1-2). Sheltered place as a cave is the common well preserved archeological site of relatively longtime occupation so far that had been found. Caves in karsts morphology of reef limestone's or volcanic area, are generally found where the Austronesia use to left their historical print as it was kept and well preserved passing through the time. Old reef limestone is geologically found forming hilly karsts morphology, it offers to Austronesia as the best place to find the suitable rooms. It's important to explore the Sunda Epicontinental Sea to find the bigger reef limestone outcrop, where the archeological site possibly can be found. This can allow us to conclude that Austronesia lived some time or just used to pass through that stable low land during the maximum glacial period. Emerged limestone is outcropped in Kai, Aru and Yamdena islands close to Sahul platform. Rock shelters of marine notches are found in the steep front slope of marine terraces.

- *Relative Stable non volcanic island (Kalimantan and Papua)*

Kalimantan is geologically an aseismic cratonic island that performs a mature morphology of V or flat shape river valley and folded mountain ranges of metamorphic, old sediment to intrusive or extrusive volcanic rocks. Wet tropical climate produces thick soils where dense forest contain and keep rich natural resources, this must be sufficient to Austronesia lives as the collectors (pre harvest). There is not any active volcano in West Papua, but this island shows relatively under an active earthquake (Fig. 2.3-1 and 2.3-2).

Stable islands also have reef limestone outcrop, it provide cavernous habitat where Austronesia found sheltered place. Dense forest may not be comfortable for Austronesia to live in a rather bigger group as it was not easy to find enough space to move and stay without any shelter place. Dense forest of big and tall trees reduce the mobility. Swamp and inundated land do not provide good habitat for such settlement, also reduce mobility as well as the risk increases on traversing.

- *Active tectonic islands (Sumatra, Jawa)*

Zone of the active seismic and volcanoes usually performs a rough morphology, build from volcanic product covering folded sedimentary or metamorphic rocks. This zone is well covered by dense tropical forest. Locally, reef limestone offers karstic morphology with many caves. So this zone may provide sheltered and suitable “home”, close by the living resources. Rough morphology in the mountain range prevent Austronesia to catch and domesticate the animal as living stock. Large fluviatil and alluvial down stream sediment’s outcrop offers a fertile field of the dense forest. This zone is not enough suitable to settle as the limestone cave was quite far and dense forest prevented Austronesia move easily. Rough and unstable morphology reduced mobility and probability to catch the prey as it also increase risk of the landslide.

- *Sulawesi (Celebes)*

Geological evolution of this island produces present physiographycal view that reflect different geological outcrops. East arm of this island cosists of metamorphic as well old sedimentary rocks while west arm is part of the volcanic chain connected to the north with recent of Phillipine volcanism. (Fig. 2.1-1, 2.3-1 and 2.3-2). Paralelel to those volcanic islands, group is smaller island of sedimentary rocks. Those two lines of island have important role as the stepping island during people migration from Asia leaving from Taiwan through Philippine to the south enter Indonesian region.

- *Lesser Sunda Island and Molucca.*

This zone typically consists of two different zones. Volcanic zone consists Bali, Lombok Sumbawa, Flores, Alor until Romang in volcanic Banda Arc. Non volcanic outer arc consits of Sumba, Sabu, Rote, Timor to the east until Tanimbar and Kei Island in Banda Arc. Those two lines of island arc are important as stepping island from the main Sunda Land to Sahul Epicontinental Shelf part of Asutralian continent. Cavernous limestone that is close to tropical forest or grass land, is a suitable site for Austronesia’s life. Water is sufficiently available from the creeks, flowing down to the coast. The islands are separated by narrow but deep strait that was relatively easy to be crossed over by Austronesia moving out from Sunda mainland (Walters, 2002). Other important resources are the volcanic rocks material (basalt and chert) for Austronesia to produce their tools.

For the positive value, this zone has supports as habitat for food (fish and other animals) and the less dense forest to be traversed. The threats that may come from the volcanic activity as well seismic shock of the tectonic earthquake. Wild fire appears during long drought in the savana. Unstable volcanic rock is sensible to the landslide or rock fall during wet season or due toseismic shock. Regarding eastward diaspora to the Island in Pacific, island of North Molucca and Papua are the potential starting point. To the south, Sout Esat Malocca's island as well Papua is potential starting point (Fig. 1.1-1, 3.1-1).

- *Sunda and Sahul Land*

This emerged land had been exposed during almost 7,000 years long, at the maximum glacial period. This shallow sea attains the maximum large when the coast extends during the lowest sea level, at almost 130 m below present position. Consider to the large low lying land of the tropical area, this land could has an important role in the human kind history. Arising and evolving human culture as well knowledge could be happend in this area. That why some scientist point out this area as the possible origin (Jacob, 2006) of the people that spreads out around SE Asia.

This land emerges repeatedly during maximum glacial when the sea level drops to the lowest position. The coastline shifts far, extending the large low lying land and coastal zone. Fluvial erosion leave behind deeply incision to the emerged land, forming U shape of river valley, which water's flow transports volcanic materials down to the front slope of the platform to the South China Sea as well to the east to Flores Sea (Fig. 3.2.5-1). Changes of sea level produces repeated erosion during successive low stand sea levels.

Sahul Land in the East connects Papua with Australia during LGM (Fig. 3.1-1). The islands Tanimbar and Kai are the high points where carbonate limestone is outcropped. Geological process and dissolution produces cavernous rock outcrop, an environment shelter rocks for Austronesia used to live. During LGM, the large ice cap that had formed in the mountain in Papua prevented north-south migration. In the south flank of the Jayawijaya Mountain, colder weather induces Austronesia to moves down to the low land then traversing shallow and narrow strait until north of Australia.

Austronesia Diaspora: reason to be discussed

Traversing unknown dense forest land is relatively high risk for the Austronesia, but it is relatively acceptable than traversing open sea. The fact that wandering must be carried out by crossing the rough and open sea by using the simple transportation device, it must be done by an extraordinary people and under an extra ordinary situation. The question that can be proposed here: does Austronesia crosses open sea by its own eagerness or accidently due to extreme event? Where and when does the sailing start? What is appropriate sailing technology used in that wandering? That hard and risky traveling must be decided under the specific circumstances; understanding the weather, navigation and sea condition.

Possible of dispersal

Assuming that Asutronesia enlarge from the migrated group of Asian Land, then occupies island arc, so the diaspora should start the time Austronesia is being under stress that happened in island arc. But it is still possible, consider to the future finding of Austronesia's culture, the Asian people who migrates to island arc can be the proto Austronesia who starts to dispers in the large area as being identified.

- *Reason of dispersal:*

The reasons of Austronesia disperses throughout Indonesian Island Arc were generally can be based on several perspectives. Those can be natural as an external forcing but also anthropogenic as well negative or positive reasons. External forcing to the diaspora could be the stress that brings threat to the security and welfare of the group. The reason that there is no more garanty to protect the life, could be the right reason to be accepted here. Concerning the availability of the reserve on the resources, the island arc's environment is being relatively well inhabitated and belong to the enough bearing capacity. This allows the group to build colonization but it may be not enough favourable for the security reason.

Herewith, the hypothesis on some security reasons related to the threat that must be avoided or security for Austronesia moving and selecting the target occupation as well during movement to toward the target, those are :

- threats from natural hazardous event
- geology: volcanic eruption, seismic shock, land slide and rock fall
- meteo climatology: typhon, flood, severe drought and fire.
- oceanography: high wave season, strong current, high tsunami
- attack or ambush from hostile group and enemy
- save from the wild animal

Despite those threats as driving force to move as lack of security or unconfortable site of the occupation, diaspora or change of the occupation may be caused by:

- the origin of the occupation is getting lessen on the bearing capacity on the land, living stock, water and material for industry (wood, rock, metal, etc)
- collecting and harvesting food stock and other material getting distance
- inadequacy of land for cultivation or for aquaculture, domestication or lack of clean
- water sources.

Other reason of diaspora is supposed to be induced by the internal competition or exiled by the group:

- Internal conflict compels part of separates and leaves out the group
- In exile or escape from the internal conflict to compete or scramble the power or other social position

Other reason of diaspora is the eagerness to explore new habitat as well possibility to expand the teritory, trade connection or finding new material (metal, cloth, weapon, precious goods, etc. Enthusiasm increases when the improvement on new technology and understanding of the environment increase. Those supports the ability and increasing the certainty as well its self confidence to overcome the problem during movement through the land or the sea. On the technological capacity can be notes:

- Availability of the tools to produce more precise product, it means the better material is needed (metal, woods, rocks, tissu, etc.
- Understanding on the environment and ists utilisation to increase exploration capability
- Understanding to the natural process as well weather forcast or astronomy on navigation
- Understanding on the natural resources exploration to increase resilience on food stock
- Understanding on the animal domestication for food stock and transportation (goats, horses, etc.)

Through out the time, dispersal might be easier, more common and frequently done, soon as increasing the ability of the Austronesia in using and developing tools (floating material, simple raft). The better knowledge observing natural dynamic process (weather, wind, current, etc.) increase the the ease of movement. This advantage is helpful on supporting the dispersal passing through the hard field of dense forest, open land, river, lake, straits and open sea. Increasing ability on astronomical navigation and observing the timing of the trade wind allowed a long distance sailing crossing the ocean.

- *Dispersal period:*

As it has been discussed previously that possible timing of diaspora must be in the period soon proto Austronesia borns in its origin land. There are 5 (five) potential locations as the potential origin of Austronesia. Taking account the origin of Austronesia is Asia Land, the timing of diaspora could be around LGM so 15 to 14 ka which climate stress is one reason to decide leaving the unsupportable land. This group leaves and moves to the south traversing forest in SE Asia region until island arc through Sunda Land. Occupation in Sunda Land may start until the sea rise back following termination of LGM. Following the transgression, diaspora from Asia Land until Holocene may carry out by crossing the sea to the closer Philippine then continue to the island arc in the south. Transportation crosing the sea uses simple sailing boat, but it must be enough to carry goods and food stcok supporting long sailing (> 3 weeks) travering open sea despite just couple hours or days crossing strait.

The more precise of the timing the diaspora, it can be assumed by understanding the reasons and how Austronesia migrates. Movement of Austronesia could be done as the response to the hazard, escaped from the frighten disaster, to avoid the enemy or other frightening situation. Volcano eruption in Lesser Sunda Island may push the Austronesia to cross the strait escaping from dangerous area the next save island (Flores to Sumba-Sabu or Timor) leaving the volcanic island. Forest fire during long drought in Kalimantan might be the reason for Austronesia leaves for Sulawesi by crossing Makassar Strait (East and South Kalimantan to South Sulawesi). In fact, recent days, Makassar and Bugis people occupy coastal area of Kalimantan. Flood and storm might push Austronesia away to find temporary place until the flood ceases, but the settlement could be left behind permanently since the flood lasted so frequent. Those the driving force to the diaspora, leave the prints in geological formastion that can be analized recently to reconstruct the past extreme event. The more detail timing can be obtain as well the magnitude and mechanism.

The emerged land bridge due to the lowering sea level induces the more frequent crossing to the next island (Fig.4.1.2-1). Floating or swimming animal (deer, elephant, tiger, etc.) might give inspiration to Austronesia used to cross the narrow strait.

Study on dispersal timing of Austronesia can be based on three approaches: stratigraphic provenance of archeological finds, archeological nature of sites and assemblages and assumption about hominid cultural and behavior patterns (Hutterer, 1985)

- *Dispersal pattern*

Diaspora Austronesia can be an outside moving from Asia to island arc but also an outside moving from Indonesian Archipelago, move out traversing land or land bridge, follows river stream or crossing water (lake, strait, sea) as well sailing across the open sea as the capability on navigation increases. During the low stand sea level, migration must follow the narrow strait to go to the next island. Movement in the large Sunda Land is temporarely done by moving up or downstream traversing the Sunda and Sahul Land. That must be more reasonable then penetrate dense tropical forest or swampy wet land which animal must be the main threat during its travel.

It can be proposed here the pattern of dispersal since the last glacial period (LGM) over the stage 6 (Fig.4.1.3-1). The simple technology and knowledge of proto Austronesia does not allow to cross the sea without risk. Traversing land bridge and crossing narrow strait could happen just by using simple floating device or raft (Kalimantan to Sulawesi, Jawa to Lesser Sunda Island). Floating animal can also move to the Lesser Sunda Island from the Sunda Land. Archeological site in South Sulawesi and fossil of *Stegodon pygmeaus* in Flores and Sumba support the hypotheses.

Low stand sea level of the last glacial maximum must be the period with the more intensive dispersal of Austronesia since their knowledge increased (Fig. 4.1.2-1). Floating material becomes more developed to be used on the crossing the strait and sea. Inside moving could happen during this low stand sea level, traversing Sunda or Sahul Land. Austronesia continues to move to the east from Sunda Land toward Lesser Sunda Island, Maluku or Sulawesi. Moving from Philippine to the South along small volcanic island could be realized by crossing narrow straits and using simple raft. People from those areas are well known as the good sailors. Several archeological sites (with ornament) in the cavernous limestone outcrop had been found in the island next to the strait where Austronesia used to cross (Around Tonasa Limestone). The finding reveals that Sulawesi is one of the favourite site for the human kind, occupied by peoples since 60 ka. The movement continues from East Java and Madura to the Lesser Sunda Island and other far destination. This movement has to use more developed floating device as a raft. Crossing by sailing boat was presumably started during this stage as the wood material is abundant and the tools are getting better. Current and trade wind perhaps helps this moving, so to return back to the previous site, the moving must be more difficult and less frequent. North-South migration from Papua to Australia during glacial time must be taken place by traversing the land bridge of the emerged Sahul Platform. Large ice cap in the mountain (Peterson et al., 2002) must cease the migration during LGM is stuck by the thick ice cap.

The sea returned following the arising sea level since 14.000 BP. This obliges Austronesia to find the way to move in the longer distance by using raft or better sailing boat. Occupation in the Sunda Land was abandoned, Austronesia returned back to the higher land by moving upstream along the river (Fig.4.1.3-2). Approaching interglacial high stand sea level of Holocene period, the diaspora continue but people use better sailing boat to cross the wide and rough sea whilst the land route of migration reopen from Asia passing through the peninsula and principal big island continued to the archipelago (Fig. 4.1.3-3).

Widening the strait and sea during the Upper Holocene made the Austronesia used the sailing as the only way to move from the island to another (Fig.4.1.3-4). Simple raft was abandoned; but sailing boat develops. Understanding on marine navigation increases by using astronomical constalation as well meteorological condition and monsoon pattern. Consideration that may be taken on the traveling, those are:

- Moving through the relatively open land during dry season, use chariot?
- Possible moving down follows the stream during low season to avoid wild stream, use the raft or long boat?
- Several point stop during movement, open land, river banks
- Traversing strait or open water from estuary during low season to avoid strong current and wave. Using raft, long boat, sail? Avoid wild animal?

- Bring commercial for goods barter and enough food stock considering longer traveling.
- More contact with many groups or tribe as to enlarge the commercial or other cultural technological change (weapon, pottery, cloth and tissue, precious good as offers)

- *How does Austronesia dispersed?*

The ways on how does Austronesia disperse can be considered from several perspectives: land origin, timing and to what direction of the moving. The number of the group may determine to how the moving had been carried out.

During low stand sea level of LGM period, it can be presumed that migration is conducted in a small group on traversing the forest inside the big island. The moving followed the river to keep always close to the water and rather open space to move. The movement continued on traversing low land of Sunda or Sahul Land, going to the fertile open grassland and lest dense tropical forest where food and the animal's prey are abundant relatively easy to find.

Ancient people migration to the next island is continued when the strait is enough narrow and shallow, but also enough save from fierce animal's attack (crocodile, shark, etc.). Crossing shallow and narrow strait could be done by using simple floating materials before Austronesia develops the simple raft. Increasing the knowledge of the environment (current, wind, etc) and technology (making simple raft and its sail) increases the distance that Austronesia able to cross the wider strait and sea. Observation to the weather and climate brought the Austronesia to the new knowledge on sailing. Extreme anomaly as Dipole Mode helps the Austronesia to organize long migration. (Fig.2.2-4a & b). Direct sailing from archipelago to East Africa was possible to be done during 3 months, or by stepping the islands or continent (India).

Driving force of dispersal: natural versus anthropogenic internal versus external

It has been discussed; the reason of diaspora of Austronesia is induced by two principal's reason, threats of natural hazard and anthropogenic extreme event that both may caus disaster to the community. Natural process in Indonesia is known under the high intensity of strong magintue extreme event.

Natural factors are discussed below, considered as the negative reason or stresses on the dispersal of Austronesia. There are also condition in those natural factors, can be consider as the advantage on what Austronesia can take advantage as the positive reasons or supports. Extreme natural event produces hazard and disaster that can induce the serious threats. Impact of the disaster makes the Austronesia to decide leaving the habitat. Hence, type of natural hazard is discussed more but not the anthropogenic reason as the internal conflict and other reason related more too anthropological perspective.

- *Natural: extreme condition*

Consider to the natural dynamic process that works in Indonesia Island Arc, there are many accompanying potential extreme events that bring casualties. Experienced to the frighten of the disaster, people tends to escape from the heavily impacted occupation.

a. Geologi: tectonic and volcanic

Impact of disaster and hazard that is induced by tectonic and volcanic event often cover the large area but also give the deep impact. Degree of devastation can change the land features, giving deep fear that make Austronesia become unsecured and uncomfortable to live in that environment and then decide to leave. This type of reason may happen just in the short time, but can give deep influence to the Austronesia to escape from.

a.1. Earthquake & Landslide

Active tectonic convergence of island arc is marked by the high frequency of shallow or deep strong seismic shocks (Fig.2.3-2). This active zone is along the arc starting from Sumatra, Java to Lesser Sunda Island till Banda and Halmahera. Sulawesi is other active seismic zone; it is geologically separated from those zones of the active arc. To the east, Northern Papua is under the influence of plate convergence between Pacific and Australia. Magnitude of the shock varies, depend on the energy release, distance to the seismic center and the lithology type where the energy propagate. The high magnitude shock may induce such in unstable zone, series of geological hazard as land or rock slides, rock fall and others land movement. Those hazards might destroy and buried many important archeological sites. Past earthquake can be recognized from coral data (Hantoro et, al, 1996, Zachariaschen et al, 1999) (Fig 4.2.1-Aa).

Volcanic rocks give the fertile land where Austronesia and animals preferred to settle, but this area is one of the unstable terrains too. Limestone complex where there many caves are found is one of the Austronesia used to occupy. In fact, many archeological sites had been found in the carbonate limestone area, outcropped in the South of Jogyakarta to East Java (Pacitan). Ancient cave and ground occupation around Bandung Basin and in Kalimantan are the settlements which seismicity was relatively less active.

a.2. Volcanic eruption

Except Kalimantan and Papua, the main islands have some active volcanoes that develop along axis of the island. Some of the volcanoes have been actives, each has different on period of the eruption, type and the magnitude of the activity, distance and rock type of the material to be ejected and flows of the viscous lava. Those activities may produce calamity around the eruption center so the degree of the damage the impacted area. The past volcanic activity can be traced back by using coral isotopic data (Fig. 4.2.1.-Ab) (Hantoro et al., 2003).

Volcanic eruption ejected coarse pyroclastic material as pumice to fine ash tuff to the high altitude. Ash tuff can stay longer folows erth rotation to prevent sun rays reach the earth, reduce considerably energy that may lowering the temperature as well the carbon productivity on the earth. Falling pyroclastic tuff and pumice may raise wild fire burns forest around the center of eruption. Falling ejected material falls and covers the ground, it may destroy the environment in quite large area, and reduced considerably the fertility of the forest or savanna for short moment. Product of volcanic activity may destroy and burry many important archeological sites. This way might preserve well the object in long time.

In humid tropical climate, volcanic material produces fertile soil where soon the plant covers the terrain. Water balance is usually positive, so this environment, also become the favorite destination where Austronesia goes to. Ancient occupation sites often had been found in the karstic cavern that is close to the outcrop of volcanic materials/rocks.

a.3. Tsunami

Earthquake and explosion of the marine volcano can induce suddenly change of the large sea bottom morphology that is followed by a sudden the huge sea water mass vertically or laterally moves. This movement of mass huge volume forms high amplitude and big wave length that propagates to the coast. High run up tsunami wave reachs the coast and sweep everything until the water energy come to zero in the high sloping coast. The wave may come repeatedly which height reduce considerably.

Map of tsunami height for Indonesia had been published (Latief 2012)(Fig. 421-Ac1). The west coast of Sumatra including the outer arc Mentawai – Nias - Simeuleu islands and the south coast of Java to Lesser Sunda Island have been being under threat of this tsunami hazard. This tsunami type is coming from the tectonic earthquake. Nias and Mentawai peoples use to live in the mountain since long time as they learn. That is the only way to escape from the threat avoiding disaster in the coastal plain. Tectonic tsunami may sweep also north coast of Papua, north and east arms of Sulawesi and part of Halmahera and Ceram Island. Reef blocks at Porurogat-Mentawai Island were produced by tsunami following 1834 earthquake of 9 magnitude scales. Older blocks reveals that the older tsunami had swept this area too, but it can not ever be predicted when, where and in what magnitude such seismic shock produces tsunami.

Big volcanic tsunami ever known, had happened in Sunda Strait area during the explosion of Krakatau volcano on August, 1883. The paroxysm of the eruption lasted in almost 2 days. Several big explosions had been reported induce thermal expansion that was followed soon by the increasing lateral sea water pressure, generated tsunamigenic wave to all direction of Sunda Strait (Fig.4.2.1-Ac2). Sudden caldera collapse of the biggest explosion may be followed by tsunami. Large hollow space volume that was left by the collapse can be followed by instability of the huge volume of the water that was suddenly transferred to the tsunami wave. Big reef's blocks contain of the massif and branching corals are found laying in the beach and the land, up to 300 m far from the coast line. Those blocks were primarily detached from the reef crest part by the first tsunami wave, then were transported and rolled by the following several tsunami events. Older blocks that are found in the beach around Sunda Strait Area reveal that older volcanic or tectonic tsunami might happen in the past threaten Austronesia to avoid this area (Fig.4.2.1-Ac3).This type of coastal hazard might sweep and destroy many important archeological sites. Though this calamity may happen under the time interval almost 200 yrs return period, but talk among the member of group transfer from the anchestor to the next generation. Once it happened during the 2004 Aceh's tsunami, 3 weeks after, saved person was found floating in the sea.

b. Meteo-oceanographic extrem event:

Weather is the result of the atmospheric process, happens more frequent but influence larger area. Return period of this extreme event may almost annually. The casualty of the impacted area sometime more serious than impact of the tsunamy.

b.1. Extreme climatic deterioration:

This monsoon system is some time disturbed, it looked like due to the influence of the climatic extreme anomaly of the larger, regionally even though globally system. El-Nino and La-Nina climatic events that influence the almost half of the globe can give the impact to this region. Positive coupling of El-Nino with other climatic extreme condition such as Dipole Mode and Maden Julian Oscillation can worsen the weather in this region. Though those worse events last in the short time, it can give serious impact to the environment. In the modern time, the last positive coupling of ENSO and Indian Ocean Dipole Mode leaves the serious impact on the land either in the sea (Webster, et al, 1999, Hantoro et al., 2004) (Fig.2.2-3). Upwelling of deep Indian Ocean brought -5°C cooler water to the surface, cooling the sea along the South coast of Java and West Coast of Sumatra at almost 3 month long. This extreme cooling water harmed the corals (Fig. 4.21.-Ba1). Severe drought induces the large scale of forest fire in Kalimantan and East Coast of Sumatra (Fig.4.2.1-Ba-2). The smoke dispersed to the far distant land and sea, the soot fell down inducing the red algae bloom that killed other marine biota such as large scale coral bleaching that had been being stress before by the extreme cooling along the west coast of Sumatra. Coral growth recovered after several years, left a hiatus or time gap in the banding (Fig.4.2.1-Ba3).

Coral isotopic data of Holocene period from Indian Ocean shows the past extreme surface seawater cooling and several interrupted growths due to serious bleaching. It may indicate series of severe drought and wide spread of forest and grassland fire, ever had last in Kalimantan, Sumatra and possibly Sunda Platform Area during the low stand sea level of LGM (Fig.2.2-4). Isotopic data from coral (Hantoro et al., 1997) and foraminifere in the deep sea sediments also suggest such past extreme climatic event that may change hydrological balance in a large scale.

Other sources of climatic data such as pollen assemblage (Van Campo et al. in Hastenrath, 1994), tree rings, stable isotope from sediments (Duplessy in Hastenrath, 1994), speleothem, etc, suggests several events of the extreme weather anomalies during the Last Quaternary. Those extreme events induce the stress to the large scale's environment in around Indian Ocean (Hastenrath, 1994). Those extremes climatic anomaly events can be considered as natural force of the negative reason to the Austronesia dispersal. By the way, there were several anomalies of natural events that can be considered too as the advantage on the dispersal, supporting Austronesia using those on their moving or finding resources. Clear and dry land made Austronesia easy and save to move. Dispersal to the East Africa from Indonesian Archipelago should be considered as the taking advantage of this extreme weather anomaly. Recent missing boat with 6 passangers from Miangas Island leaving for Nanusa Island to the east, lost in their path for almost 3 month. The 3 save persons was stranded in island close to Palau Island. This is the present phenomene that may reflect to the past during Austronesia lives.

b.2. Flood and Storm/Cyclone

Extreme weather anomaly in tropical area can produce strong wind or storm accompanying heavy rain. This might frighten and made difficult Austronesia as well animals to carry out the activity in the open terrain and water (lake and sea). Fortunately, storm does not work in the equatorial zone; it just sweeps South Pacific (Philippine to Taiwan) and North of Australia (Fig 2.2-2). Hadley and Walker circulation as well Madden Julian Oscillation induce heavy rain in equatorial zone (ITCZ) such heavy convection rain during several months. Fluctuations in rainfall in several places of Asian region have been shown to be associated with variations in ENSO (Godley, 2002). Speleothem record from Maros's caves reveals such anomaly in the past (Scroxton et al. 2015).

High intensity on short time of dense rain can produce wild, strong and rapid water flowing down along the drainage valley. It can sweep everything, destroy rich land to what Austronesia depends on their natural sources. Wet of inundated habitat did not support the wealth of Austronesia life. Flood and inundation covered everything in the low flat land but also the basin of mature river valley in the high land. Flood also increased risk of diseases.

Positive impact of this flood is on producing new fertile sediment layer in the intermittent inundated basin. Flood also brings and introduces new species on flora and fauna such algae, fishes, reptiles, etc.

Large landslide of unconsolidated volcanic material might fill the valley and stop river flow, induced permanent inundation in the basin such as Bandung Paleo Lake (Dam,1994), but this Bandung Basin could be under the substantial increase in precipitation during maximum interglacial or interstadial (stage 5e and 3). Flood might sink the archeological effect, thick clay deposit and other debris flow material had covered but those could preserve the object. Many artifacts had been found in the certain level around Bandung Basin; indicate the level of paleo coastal lake.

b.3. Long & severe drought

Long drought in the island arc was ever known, had been recorded as an extreme variability in several climatic proxy data from several geological formations such had been discussed above. Climatic extreme variability also gives long dry season on monsoon, reducing considerably water balance. Recent study on historical and proxy record reveals that many periodic drought which appeared haphazardly to afflict parts of Borneo and Sumatra, are related to the cyclic shift in climate pattern known as El Nino Southern Oscillation (Potter, 2002). Considerably longer dry season of drier climate with a substantial evaporation surplus was experienced in Bandung Basin that might reduce the lake level (Dam, 1994). Other Holocene pollen record revealed dry land vegetation in the mountain area (Polhaupessy, 2002).

This severe drought might give strong impact to the resources and the environment to what Austronesia had been depend on for their life. The save moving during this severe drought and forest or grassland must be along the wet river banks where water was still enough available. People try to avoid wild fire during the migration but after its colonization as well the animal run after the calamity escape from wild fire and drought. Springs disappear during severe drought, streams reduce to almost dry followed then by escaping animal soon there was no more water, food and shelter in the forest to hide. Austronesia tried to find a new green fertile and fresh habitat where the resources are still enough and easy to obtain.

b.4. Wild Fire

Extreme anomaly on the air temperature changes as its increase during El-Nino period might induce long and severe drought. El Nino 1997 was the good example of this severe drought that produces large dispersion of the fire spots in Indonesia (Fig.4.2-2) (Abram et al., 2003). Several El Nino-Southern Oscillation (ENSO) had been documented since

1887 as strong ENSO which drought were widespread and severe (Taper, 2002), caused fire in Kalimantan and Sumatra (ENSO 1877, 1914, 1982, 1987, 1994 and 1997).

Fire spots increases considerably in the forest, shrub and open grassland during the dry season. Flare expands and become wild, difficult to be controlled since the underneath bituminous sediment starts to burn. This forest burn leaves the ash in the lake sediment that can be identified later as the marker of the past wild fire. This smoke is dispersed by the wind, brings fine organic material to the atmosphere before fall and enrich the sea surface induce blooming algae that kill marine biota (coral and fish) (Fig.4.2-2) (Abrams et.al 2003). Large fire might burn also sensitive archeological site. It can be consider to the fire hazard, the impact coming from extraterrestrial such as meteoric fall. During Quaternary, meteoric shower happened and left the material in the geological formation around Sangiran. Impact of bigger meteor might induce fire in the dry forest.

It had been reported that fire was also used in the method of hunting by burning the field to herd and push the animal to the point where Austronesia caught and then kill for food stock. Other question could be possed to the possibility Austronesian may cause wild fire due to the false acivity in land clearing by burning forest debris.

b.5. Cool climate

Isotopic data from deep sea sediment reveals a slight sea water cooling (2 – 3°C) during maximum glacial period while coral isotopic data gives stronger cooling of the sea surface water by 5°C and lesser humidity. Glacial Maximum was marked by lower greenhouses gasses concentration (CO_2) 180-200 ppmv, compared to the interglacial period (280-300 ppmv) (Raynaud et.al, 2002).

Large ice sheet had covered the mountain in Papua, extended down and the ELA reached until 3,500 m altitude (Hope, 1976). However, maximum glacial period ought be cooler and dryer then present day though there is enigma of the warmer sea in West Pacific Warmpool (Peterson et al., 2002). This dry climate reduces the dense forest, changed to the open shrub or grassland. This cooler weather might compel Austronesia to consume more energy and need warmer cave. Fire needs more wood, but uncontrolled fire might induce burning the forest. More wood consumption then is followed by the forest clearing. The cool climete in the subtropical land my influence to decide strating on moving, searching warmer climate the south closer to equatorial zone.

b.6. Sea level variation (geological time frame)

Relative variations in sea level, in short or long geological time can be consider as the reason why Austronesia diaspora happens. Longer geological time of sea level change can be traced back to the Mesozoic time (Fig.4.2.1-Bf1), the period beyond Austronesia's life, when the mid ocean floor opened forming mid ocean ridges and followed by the earth crustal movement that changed the volume of the basin. The Uppermost Quaternary, during the period of Austronesia, the basin volume did not change so much as tectonic and physiographic features of the earth close to the present state. Change of sea water volume is more controlled by the climatic event than global tectonic process (Hantoro 1992). Those represents several maximum glacial periods. Several slight low sea level period had been registered in those curve represented interstadial sea level period, when the sea was at around – 70 to –40 below present position (Fig.4.2.1-Bf2 and 4.2.1-Bf3)(Hantoro, 1992)(Labeyrie et al., 2002). Those lower level suggested the emerged of the shallow bottom sea, dried up become large terrestrial plain such Sunda and Sahul Land. Lowering of sea level reduce the wide strait, became narrower and shallower, allows Austronesia crossing to the next island searching new settlement.

The repeated physiographical change of the Epicontinental Sea to the Large Lowlying Tropical Land is followed by consequences (Hantoro, 2001):

- Hydroisostatic rebound due to the change of the sea water's load over the continental shelf and in the surrounding areas?
- Change of the hydrological balance and cycle (meteoric, surface and ground water, evapo- transpiration, rainfall, etc.).
- Exchange variations of the terrestrial, marine and atmospheric on carbon and oxygen system.
- Change of total solar energy reflected and absorbed then transferred to biomes stocks in the land. Change of the distribution and total biomes stocks.
- Change of the local or regional climate due to the change of the seasonal regulation on temperature, wind (monsoon system) and global ocean circulation through Indonesian archipelago.
- Variations of the primary production (photosynthesis) of the sea (C/m^2/day) through time
- Variations of the (reef and shallow marine) carbonate production and its distribution.
- Balance of the erosion and sedimentation (placer and mineral trap), variation of weathering and formation of peat and other bituminous deposit.
- South and eastward migration of Eurasian flora and fauna through the island arc searching for conformable climate and rich nutrition.
- Possible occupation of the proto Austronesia and older people.
- Moving upstream to the higher land accompanying sea level rise

Regarding those consequences, one can be believed that there are serious impacts to the living matter. Extinction of species could happen, but there is also new species born in this new land that replaced the lost one. Low lying to undulating landform gives opportunityy to the terrestrial living organism dispersed and colonizing, including Austronesia. It is believed that migration takes place during this low stand sea level, than continues by crossing the straits and sea, the thing that is not difficult for (proto) Austronesia do under its capability.

- *Anthropogenic reason: eagerness vs conflict*

As focus of this paper to discuss more natural driving force as the reason then anthropogenic one, a brief discussion may be proposed to compare to the natural forcing. Anthropogenic forcing to Austronesia leaves the occupation may be related to the internal or external reason.

a. Eagernes or willingness to wander and explore

Natural human kind's behavior that gives advantage to human evolution and better technological mastery is its eagerness to improve knowledge and enhancing experience. This natural behavior must be owned by Austronesia, increasing capability on sailing and navigation then brings to new field as well resources exploration. The good sense on traveling may induce continuation on the movement far from the occupation to look for the better one.

Willingness to leave for the new land could be inspired by the eagerness to find more field for cultivation or hunting ground. The unsufficient food stock due to increasing member of the group persuades Austronesia to leave out to find substitude land and its resources to increase security on the food stock. Become the stronger group if necessary needed may intriguing to enlarge occuption by opening hostility to the other group.

b. Conflict as the driving force to escape

The more complex on the group hierarcy system needs a sharing on responsibility and rights. Breaking the rule and deal may raise an internal conflict that coud be followed by an exile or eventough seriously fighting among the conflicting group. Some time the conflict is related to the stress due to the shortage on the food stock and other needs. The splitting group leave the common occupation seeking a new habitat to continue its life and probably joint to the other group. The scarcity of the resources close to the occupation may depleating the food stock. To ensure the food stock, group may expands teritory by forcing and attacking other group in order to occupy the resources. The weaker group must leave to escape from the hostile domination.

Earth dyanamic and people migration through time

On the map, diaspora of Austronesia occupies a space around equatorial line (30^0E to 110^0E: Madagascar to Eat Pacific), extent to the north until 30^0N (Taiwan, Hawaii) or 30^0 N more to the south (New Zealand). Equatorial zone is the area which dynamic of atmosphere is so complicated and oftenly performs strong anomaly. Though the climate is relatively warm and the temperature more stable, but strong weather anomalous some time brings an extreme event as storm. Center area of Austronesia diaspora around Indonesian Island Arc is the place of the conjuction among continental plates and oceanic crust. This zone belongs to the most active geological process which volcanic rings of fire crosses and meets (Fig.2.1-1). Dynamic on its earth process produces big and high magnituted geological process that brings large scale devastation of calamity.

Subtropical zone is the sensitive area which tropical cyclone often sweeps a wide area brings damage and casualties. Except the long severe cold period, other natural stress in this area could come from the extreme weather event. Storm and cyclone are followd by heavy rain and then strong stream of flood. Extreme event in the sea happens, it is influenced by the natural atmospheric as well earth processes. Time spand of the event starts from the LGM to the almost Recent time date + 500 C yrs.

Many extreme events related to the strong natural dynamic event in the Austronesian dispersal area, may gives negative impact to the lifelyhood, but it gives better experience to improve the adaptive capacity. Experience to be adaptive to the strong threats may increase the knowledge on the observing and maintaining the environment in order to manage better the colonization by increasing its resilience.

Based on the back ground of natural dynamic process that diaspora happends; it can be proposed the different pattern of migration; during the low sea level when the large Sunda and Sahul Land being exist, and high sea level when the large epicontinental land is immerged at present sea level (Fig 5-1 and 5-2).

Understanding and adaptation to disaster

Based on the assumption that Austronesia leaves from the disastrous area, it is necessary to understand what the disaster is. If the timing of the diaspora is around LGM, the cause of migration could be the bad climatic condition that make Proto Austronesia under the stress and decides to leave the home land. The long severe cold season may be unsupportable for people lives under the shrtage of food. Environment becomes unproductive supporting food stock to be collected. The southward movement to find the warmer place can indicate that people seeks for the better and warmer place that promises better environment supporting the life. Some of the people decides to move, but some oh them decide to keep the settlement as there is still few things to support the life. The fact that part of the group splits to leave, this may support the assuption that people is less adaptive to the stress and the rest tries to survive and adaptive to the hard environment. Instead the long severe cold weather, storm and excessive rain may be another strong natural situation. This extreme climate of bad meteorological situation continue which people then become more adaptive and gets more understanding. The better understanding may improve the mastering and able to overcome that situation in the sea until it make possible to leave out by crossing the open sea. This could be the starting point when Austronesia manage an alternative way of migration so continues diaspora. That must be a difficult decision and need long preparation. That could be done until the distance or traversing the land becomes far as the Sunda Land starts to be inundated.

Advantage and disadvantage of natural dynamic process

In the life of Austronesia, during the occupation or moving from one to the other new settlement, it must closely and frequently contact to the hazard due to the extrem condition. As the understanding on the adaptaion againts the negative impact, there could be an enhancment on the ability to take advantage the impact then implements to the daily life. The continuous availability of water along the river banks is being used to support cultivation and develops rice field. Wider open field of low lying land may posses more open grassland to domesticate and breed cuttle. Better understanding on the oceanographical condition of narrow strait and wide open sea as current veolocity and direction trade wind behaviour may increase capability to cross away toward new promising land. Better acces may increase people's interaction as well exchanges on the knowlede on the improving tools and weapon technology.

Diaspora and maritim spirit:

On the map, diaspora of Austronesian covers a large area, which center is almost in Indonesian Island Arc. This region is an maritime island, as just one of third of teritiry consist of the land, the rest is a large sea. During LGM, terrestrial part of the teritory may be larger than present day physiography. During that large Sunda Land exist, its believe that proto Austronesia is being there on the way to move to find better land then disperses to all direction passing through terrestrial route then crossing strait or deep sea to reach new home land.

Perspective approach

The aims of this article is to find new insight to what different approach Austronesia diaspora could be discussed under different purposes. Each discussin proposes different aproach using data so far had been collected. Discussion on the Austronesia diaspora can be noted as:

- Propose the linguistc similarity
- Base on the similarity on the tools, industry (pottery, meterial, painting, etc.)
- Data concerning similarity of the transportation device: wheel, raft and sailing boat
- Similarity of funeral system

The future study of the Austronesia should be carried out under the more interdiciplinary approach. Instead enlarging methodology, more effort must be supported to obtain new physical founding in the unexplored field.

Conclusion and Remarks

This article just offer different perspective in paleoclimate and paleogeography to built hypothesis on when, why, how and at what pattern Austronesian dispersal had happened. To answer those questions, there is a fundamental question that must be explained first, where the origin or at least the longest occupation before Austronesia dispersed. Several archeological sites had been reported, but based on the age and type of the object, there is still far away to give support to the hypothesis that can answer those questions.

Ending the LGM, Sea water rises then covers and immerges the large Sunda and Sahul Paleo Land. Due to that change, the Austronesia must leaves the occupation and the route that is used to to return back keeping contact or to move across the Sunda Land to other site finding the new colonization. Occupations in the immerged land then is inundated. Subject to tbe covered by thick sedimen during highstand sea level. There is no more archeological relict can be found in the immerged Sunda Land. To the scholar who proposed the origin or at least the long Asutronesian occupation in Sunda Land, this situation make a the hypothesis being weaks without any physical evidence. So the period of low stand sea level when the large continent being exist; is the important time slice but also can be the lost period of Austronesian history. In this perspective of study, understanding on paleogeography and paleoclimate is necessary. This to explore the relict to open just small window which we can see the past. Marine and underwater archeology should be an opportunity to find the clues. The Sunda Land Research Program is necessarily conducted; it could cover and must be supported by many scientists from different background: oceanographer, quaternarist, paleobiologist, paleoclimatologist as well archeologist to find the clues on Austronesia’s dispersal and its origin.

Under the insufficient data, conclusion and some notes may be offered to finish in this article, those:

- Possible human colonization (proto Austronesia) occupies large low lying terrestrial Sunda Land before Austronesia starts leaving Asian Land during LGM until rising sea level starting to the Holocene time.
- The majority widespread diaspora of Austronesia is a marine region. Discussion on this matter must be enlarged by improving methode and data related to the oceanographical study, developing paleooceanographic model where, when traveling of Austronesia is done.
- There was not any important change on geological setting that might give considerable change on geographical setting of the Indonesian Island Arc since Quaternary time. Diaspora could be happend starting from LGM toe the Upper Holocene.
- Volcanism and seismicity shock is an important geological event that may give important influence to the Austronesia life. Those can be considered as the factors to Austronesia decides to leave the habitat, escaping from or avoid the hazardous area. High volcanic activity, instead giving stress, it also reduced considerably archeological site as thick volcanic product destroyed and buried it deeply. Landslide due to seismic shock might burry archeological site too.
- Tsunami is an accompanying geological process, tectonic and volcanic event that may induce the diaspora.
- Result on paleoclimatology study of the diaspora area may allow offering hypothesis the reason on Austronesia dispersed. Past extreme climatological anomaly might give the reason on the decision to leave the land.
- Eustatic sea level rise acompanying the period of Austronesia life in the island arc and its diaspora. Lower and shallower strait could support the migration to the next destination. This may be one of the possible ways and may support the hypothesis on the pattern of migration in Indonesian Island Arc. Traversing land along the river valley must be easier and more comfortable then crossing the strait or open sea.
- Longer and wider river valley during low stand sea level could be the route that Austronesia choses during migration traversing then lives in Sunda or Sahul Land than in the mountain. Supportable climate and environment in this land during maximum glacial periods may give the possibility to take hypothesis that Austronesia spends longer time to settle, but still far to conclude that this was the origin of dispersal. There is still lack of good peleo-environment map of Sunda and Sahul Land that can give any support to the hypothesis that the area is the center of diaspora.
- Lack and scarcity data both in land and the immerged land was the weakness to expand and support the hypothesis on the departure of dispersal of Austronesia.

- Paleo-climatology and paleo-geography may give more negative reason or stress that induced migration. It can be considered as positive support too or advantage to Austronesia carries out migration.
- Different approach must be carried out to support the mapping of dispersal pattern. Since the missing of important archeological proofs, mapping on DNA is one of potential method.
- There is not any quantitative paleo proxy data that can be correlated so far to the Austronesia dispersal (pattern, timing and ways). Lack of dating and scarcity on archeological site as the problem that need to be resolved.

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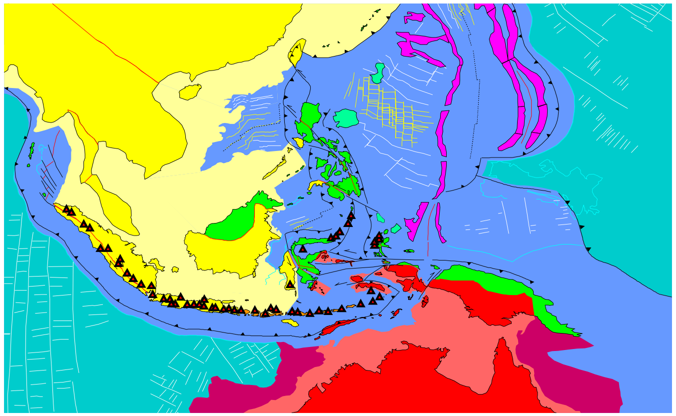


Figure 2.1-1. Geology of Indonesia and SE Asian region. Tectonic setting and distribution of active volcano (modified from Hall, 1997)

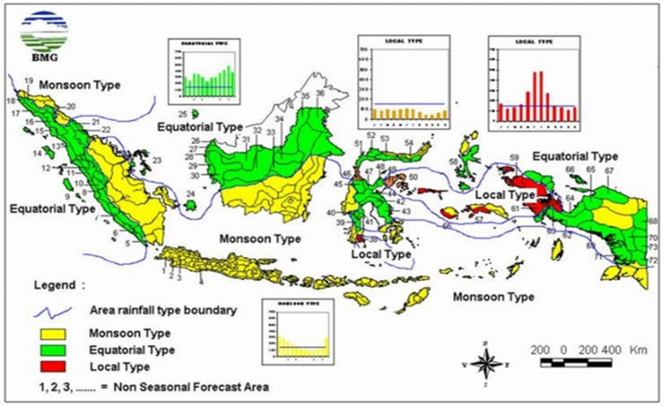


Figure 2.2-1. Map of rain fall type in Indonesia (BMKG, 2007)

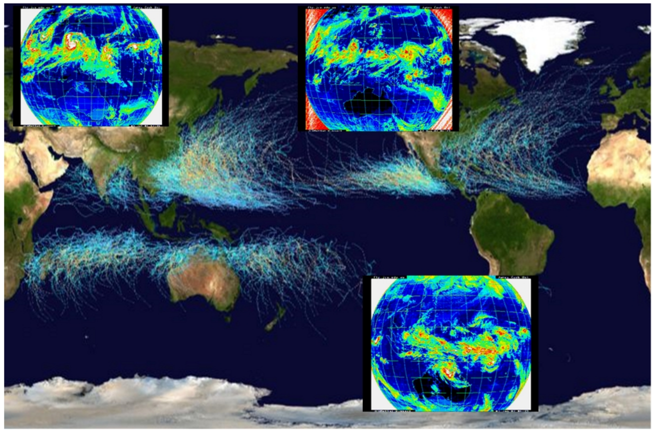


Figure 2.2-2. Map of tropical cyclon in the world.

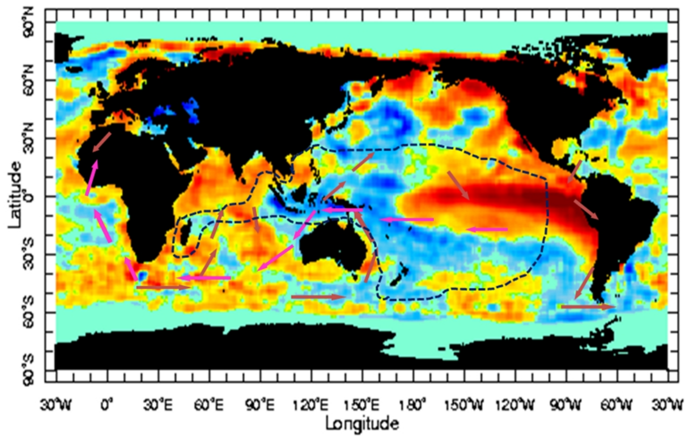


Figure 2.2-3. Map of Nino and global current. East Ward wind brings sailing boat moving from west to East Pacific (17 Sep 1997)

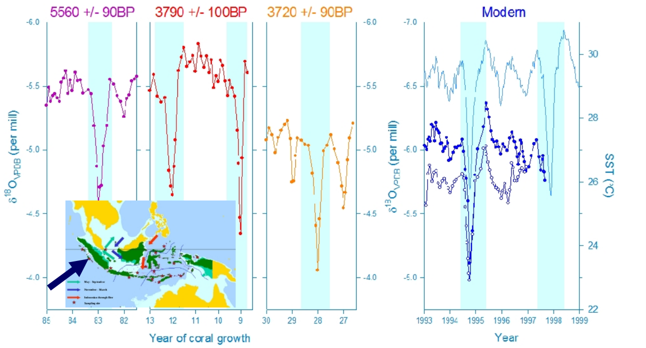


Fig.2.2-4. Holocene fossil coral d^{18}O records from different time slices to the modern records with the similar magnitude but seems to be lighter on average value. It may reveal past extreme events that similar to the present one, gives severe drought that induce negative impact to environment as wild fire.

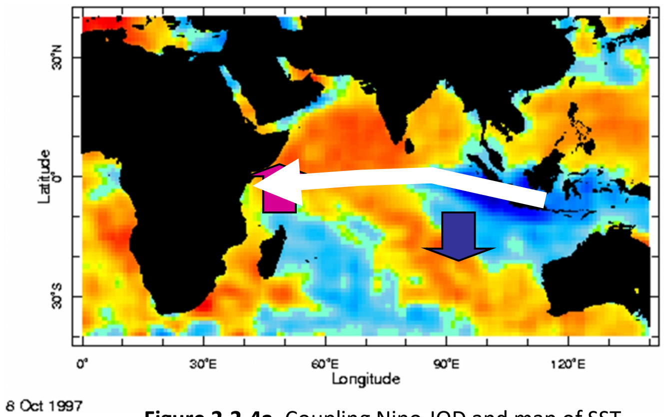


Figure 2.2-4a. Coupling Nino-IOD and map of SST in Indian Ocean. West ward wind brings sailing boat moving from Indonesia to East Africa

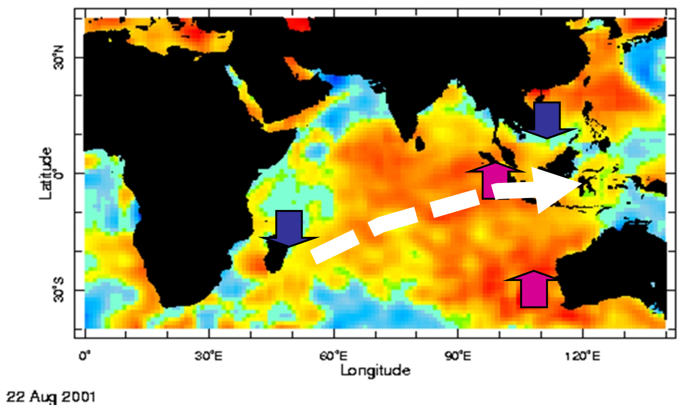


Figure 2.2-4b. Coupling Nina-IOD and map of SST in Indian Ocean. East ward wind brings sailing boat moving from East Africa to Indonesia

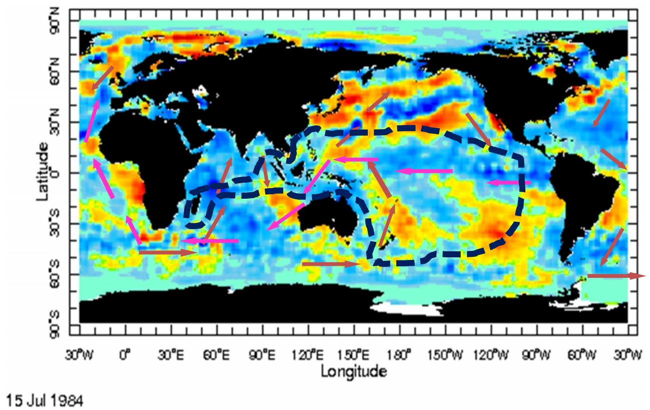


Figure 2.2-5. Map of Like Nina and Global Current. West ward wind brings sailing boat moving from East to West Pacific.

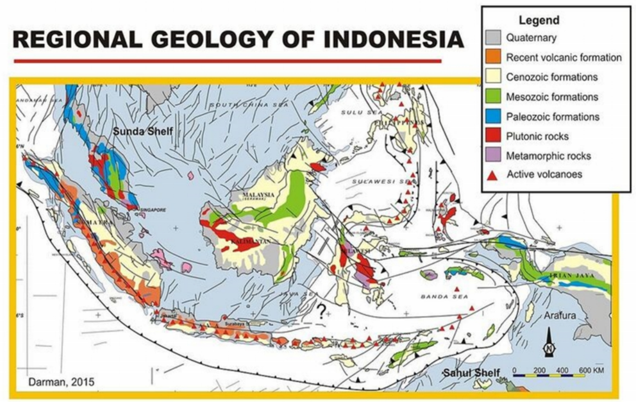


Figure 2.3-1. Geology Map of Indonesia, indicate lithological distribution, structure and active volcano (Darman 2015)

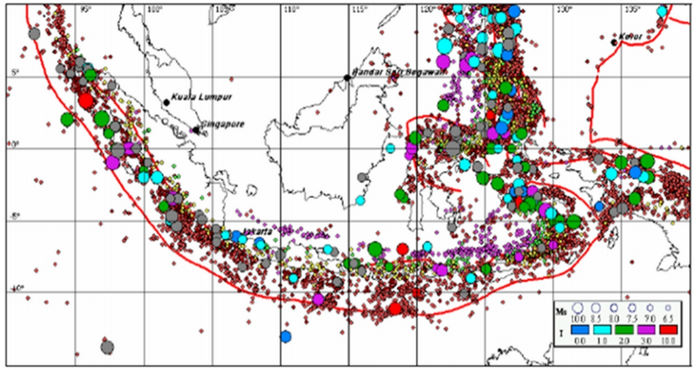


Fig.2.3-2. Location of earthquake (small squares) and tsunamis (coloured circles) in Indonesian archipelagoes and surrounding areas (Latief and Hadi, 2007, in Latief 20012)

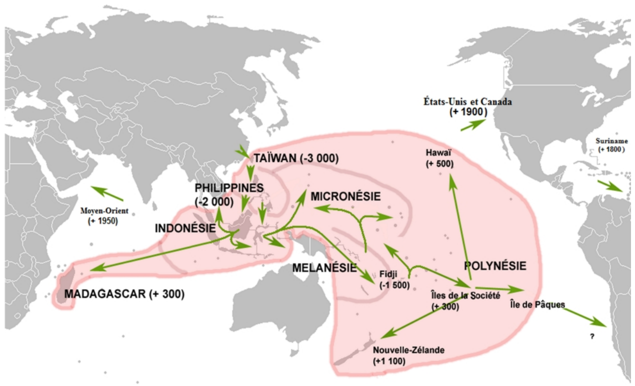


Fig.3.1-1. Temporal diaspora of Austronesian in in Asia-Pacific region (Belwood, 2006)

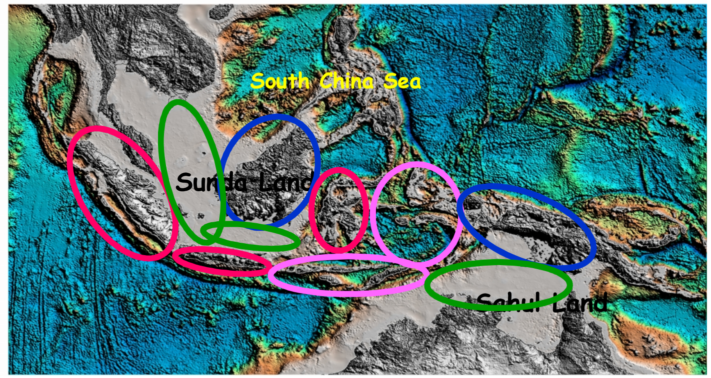


Fig.3.1-1. Possible temporal or long term settlement of Austronesia in several different physiographically land during low or high stand sea level

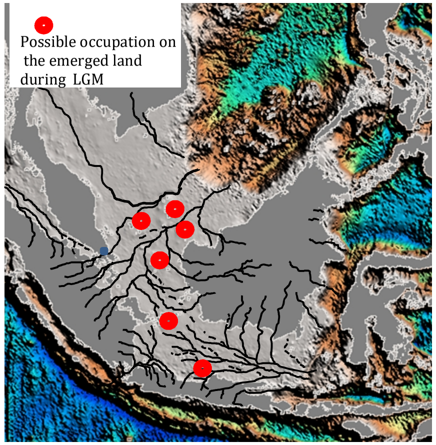


Fig.3.2.5-1. Map of drainage pattern and possible temporal or long term settlement of Austronesian in Sunda Land during LGM

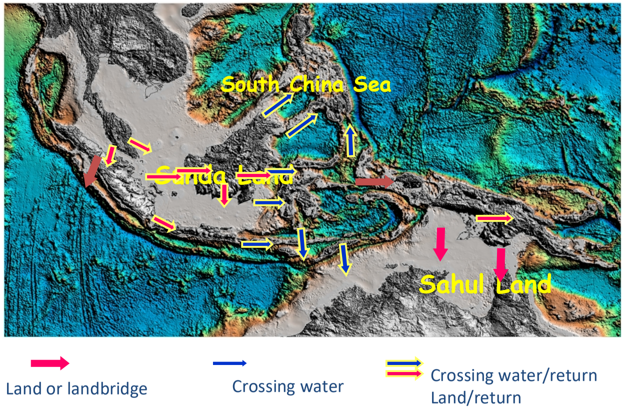


Fig.4.1.2-1. Physiography and possible migration pattern during low stand sea level of the Last Maximum Glacial (stage 2)

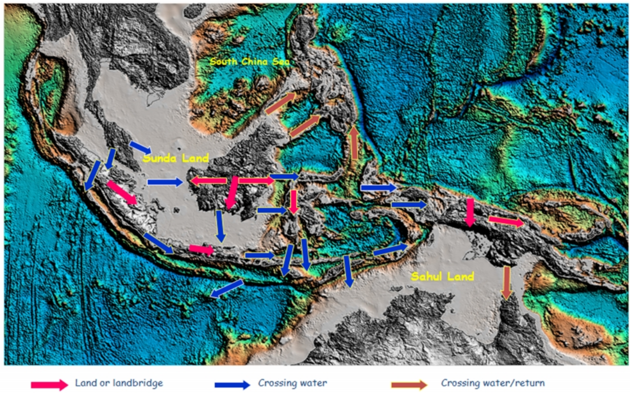


Fig.4.1.3-.2. Physiography and possible migration pattern during **high** stand sea level post Last Maximum Glacial (Middle to Upper Holocene)

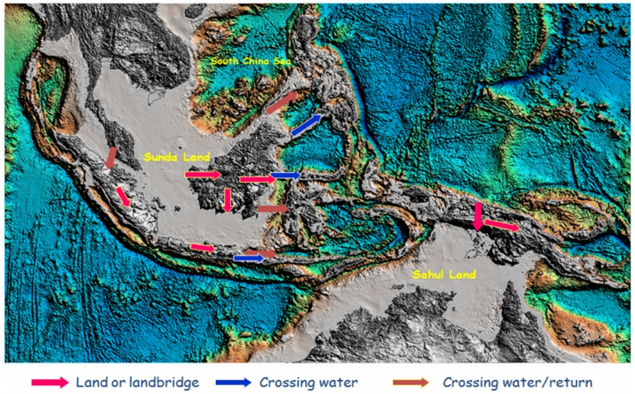
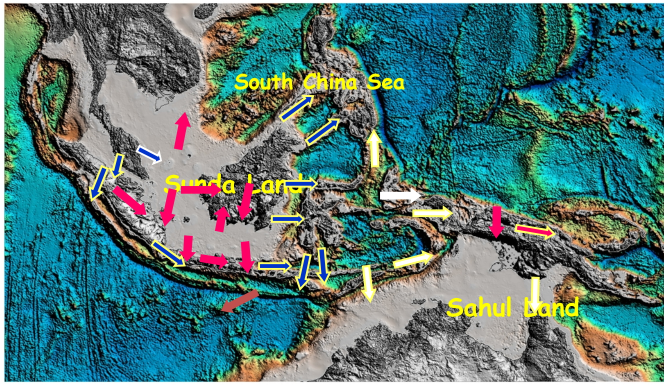


Fig.4.1.3-3. Physiography and possible migration pattern during **high** stand sea level of Last Interglacial (stage 5e) 125 ky.



Land or landbridge Crossing water Crossing water/return

Fig.4.1.3-4. Physiography and possible migration pattern during change from land of low stand to **high** stand sea level post Last Glacial (around 12 k BP)

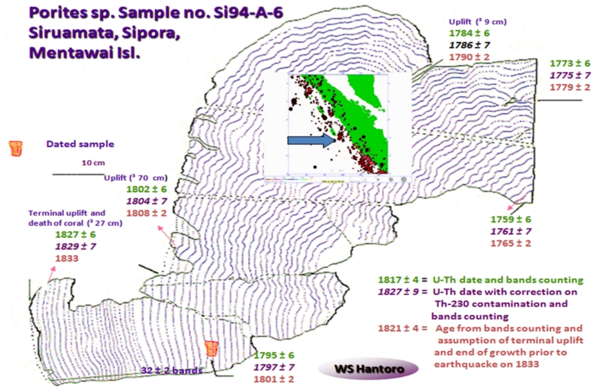


Fig.4.2.1-Aa. Coral Porites sp slabs from Siruamata, Mentawai Island recorded some coseismic uplift.

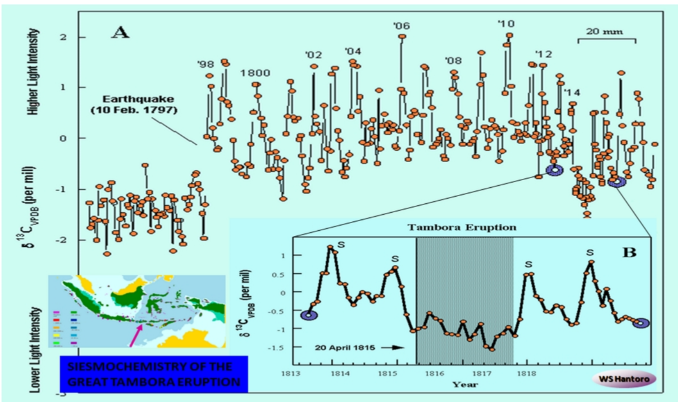


Fig. 4.2.1-Ab. Curve of d^{13}C isotopic record on coral slab (Porites sp) from Siruamata island that recorded the Great Tambora Eruption in Sumbawa on April 20, 1815 (Gagan et al., 1997).

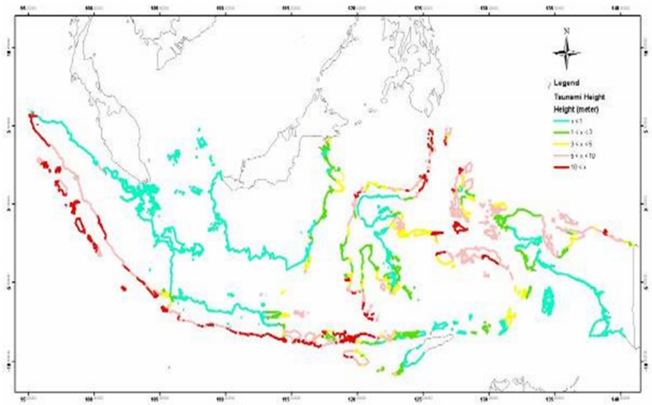


Fig 4.2.1-Ac. Tsunami height along the shoreline base on pre-calculate tsunami database (Latief, 20012)

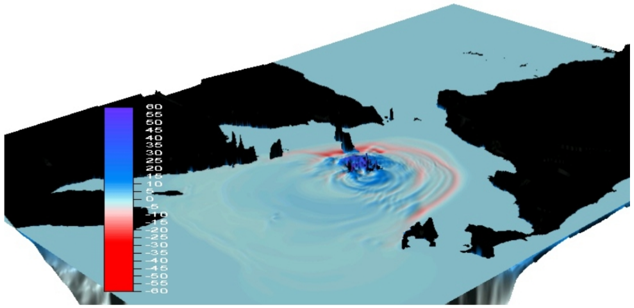


Fig. 4.2.1-Ac2. Schematic diagram of the wave travel time simulation of the volcanic tsunami for t = 20 minute (Aditya, 2003)

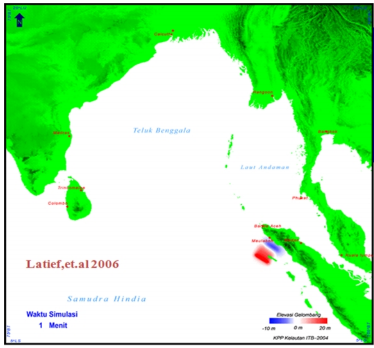
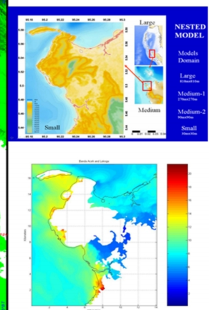


Fig.4.2.1-Ac3. Tsunami animation including rupture propagation for tsunami sourc (Latief et al. 2012)



Tsunami inundation model at Banda Aceh and Loknga

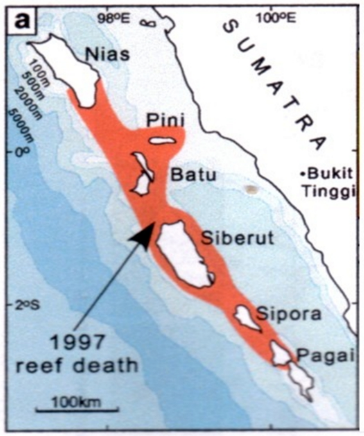


Fig.4.2.
Map of reef death (bleaching) starting from early 1995 due to September 1994 SST cooling. Extreem cooling during 1997 due to Dipole Mode and ENSO coupling and massive algal bloom almost kill all the reef component. Green algae took over the dead surface, preventing the coral's juvenile regenerate and rehabilitate the reef.

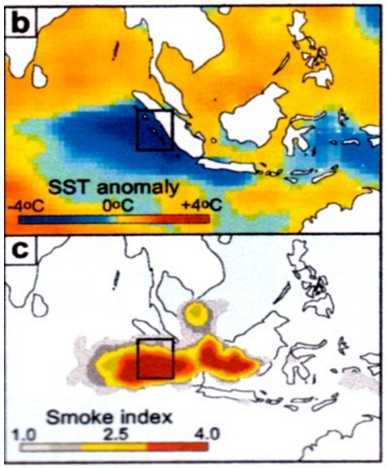


Fig.4.21-Ba2.

SST anomaly map indicate upwelling in Eastern Indian Ocean of the September - October 1997, cooling

to about 3-4° C during almost more than 2 months

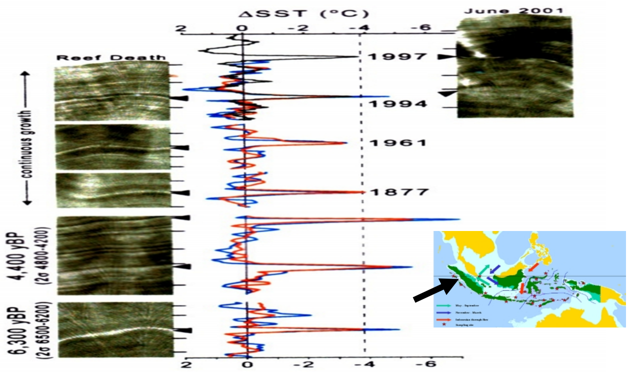


Fig.4.2.1-Ba3. Relict of dead surface of the coral can be identified and being the hyatus of the reef skeleton, missing on isotopic data for almost 5 years before the coral continue its growth.

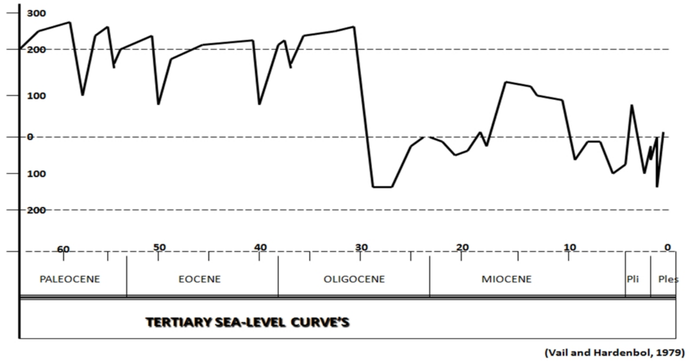


Fig.4.2.1-1Bf. Long term sea level curve since Paleocene

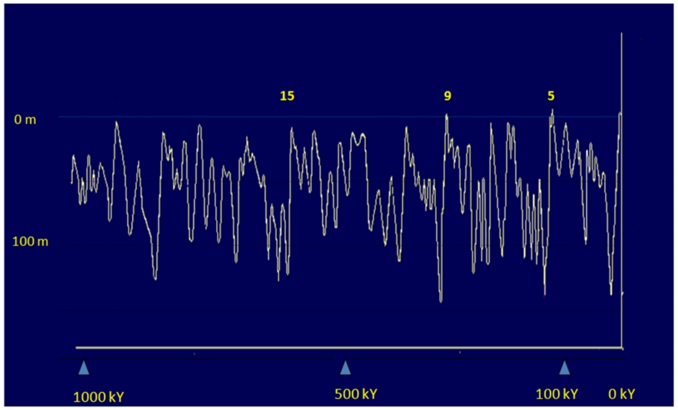


Fig.4.2.1-Bf2. Quaternary sea level curve since 1000 k years based on uplifted coral terraces in Sumba (Hantoro 92)

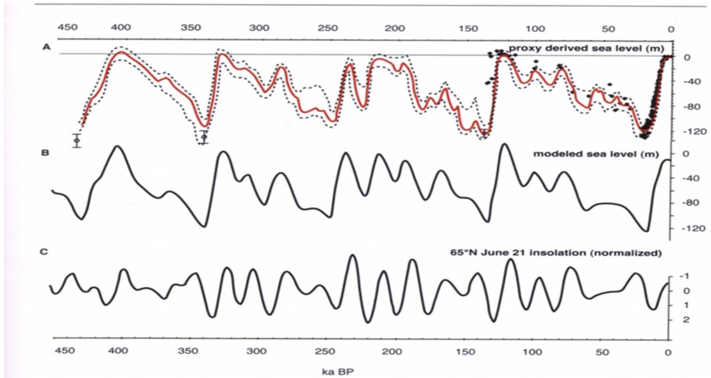


Fig.4.2.1-Bf3. Global sea level changes since 450 ky. Reconstructed based on several data about ice caps, atmospheric and sea water temperature and greenhouse gas variation obtained from several source of proxy data. (Labeyrie et al. In PAGES, 2002)

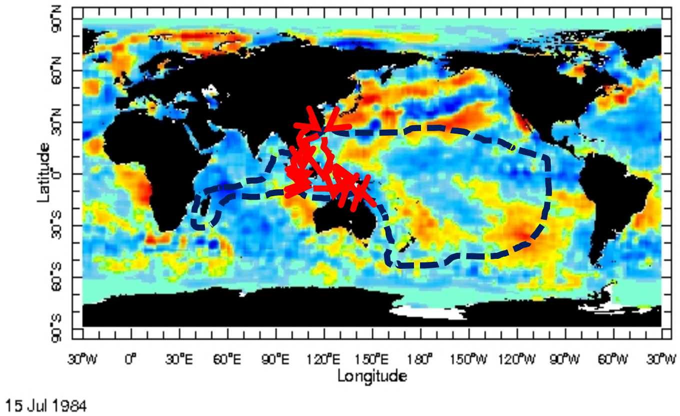


Figure 5-1. Map of (Proto) Austronesia diaspora during low sea level when the epicontinental land is emerged at the termination of LGM (14 ka BP

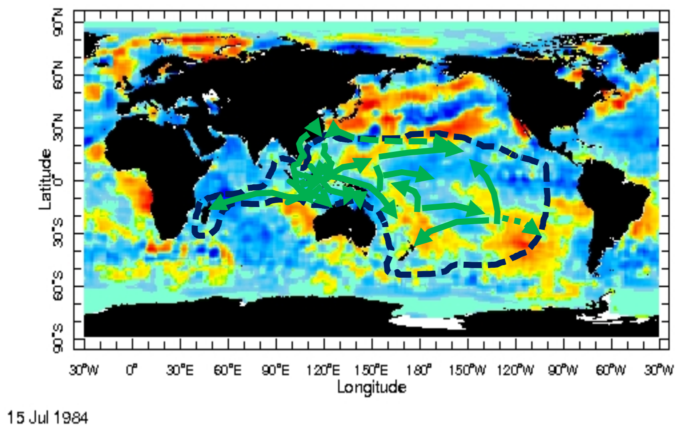


Figure 5-2. Map of Austronesia diaspora during high stand sea level when the epicontinental land is immerged at the starting of Holocene (8 ka BP to present day)

REFRAMING THE ISLAND SOUTHEAST ASIAN NEOLITHIC: LOCAL VS REGIONAL ADAPTATIONS

Peter V. Lape, Fadhila Arifin Aziz, Dian Ekowati, Jenn Huff, Wuri Handoko, Andre Huwae, Michael Lahallo, Simon Latupapua, Adhi Agus Oktaviana, Emily Peterson, Marlon Ririmasse, Karyamantha Surbakti, Joss Whittaker, Lauryl Zenobi

Introduction

Why did Island Southeast Asians adopt a farming economy beginning 4,000 years ago after hunting and foraging wild foods for tens of thousands of years? What was the process of this transition and what environmental factors might have influenced the decisions these people made? We are tackling these questions through a multi-year survey and excavation project on large islands and smaller atolls and islets in the Maluku province of eastern Indonesia, especially Seram, Aru and other nearby islands. Our first survey and excavation targeted Seram, a large island in an archipelago of smaller islands that was most likely a hub for regional interaction. Little is known about its human past, but Seram's proximity to smaller islands with different ecological constraints suggests that it may have provided a jumping-off point for the development of Neolithic technologies. This project will hopefully increase our understanding of eastern Indonesian Neolithic adaptations, and will determine whether the early Neolithic began as a fishing adaptation on small islets, or had earlier progenitors on larger islands. Ultimately, our results should be relevant to questions of Neolithic transitions and human-environment interactions in other tropical insular environments. Survey and exploration of SE Seram Island and nearby atolls conducted in October 2015 has yielded preliminary data on settlement and landscape use across the Neolithic transition and provide a foundation for subsequent research. Future work will expand to include similar projects in Aru and other central and southeast Maluku island systems.

Previous research

Prevailing theories suggest that the first farmers of Island Southeast Asia (ISEA) were migrants from Taiwan, who brought with them a new suite of technologies and languages (Bellwood 2005, Bellwood 2007, Bellwood 2011). Competing theories suggest that just the ideas and technology, rather than actual people, made the journey from Taiwan or from several different 'homelands' (Denham 2009, Spriggs 2011). Most theories look to outside influences (people or technology) to explain these changes.

In the past decade, the fit between these theories and archaeological data has become less comfortable. In some cases, elements of the Neolithic “package” (e.g. domestic animals and plants, pottery, pelagic fishing technology, ground stone or shell tools) do not occur together (Amano et al. 2013, Anderson 2008). Some elements, such as fishing technology, are now known to appear much earlier (Veth et al. 2005, O'Connor et al. 2011), while others, such as rice, appear much later or not at all (Denham 2013, Barker and Richards 2013). Domestic animals such as pigs and rats have turned out to have multiple homelands, and most of these animals found in ISEA do not originate in Taiwan (Lum et al. 2006, Larson et al. 2007). We still know very little about domestic plants, but the evidence available suggests that many ISEA cultigens had ISEA or New Guinea origins rather than Taiwan or mainland Asia (Denham et al. 2004, Denham 2009, Haberle et al. 2012).

Our research on well-stratified open Neolithic sites on Pulau Ay (PA1 and PA12) in the Banda Islands, (100km SW of Seram) suggests that the Neolithic pattern did not appear all at once, as we might expect with a migration scenario. Instead, we interpret the archaeological record there to show a step-by-step process from the first appearance of pottery that takes perhaps 100-200 years to reach “full” Neolithic (Lape et al. in prep, Peterson and Lape in review). A similar pattern has emerged for the Lapita period in the Bismarck Archipelago (Specht et al. 2014). The first century or two of Neolithic habitation was heavily maritime oriented, similar to earlier fishing camp sites on Pulau Ay dating to 7000 BP (e.g. site PA11), though with the novel addition of fine tempered, slipped pottery. Domestic animals (pig, rat, dog, chicken) appear about 100 years later in the sequence, accompanied by a significant change in the pottery technology to coarser wares, and a decrease in fish and shellfish. Although evidence of plant use at these sites has not been well preserved, starch residues on both the early and the later pottery indicate yams, which have many wild progenitors in ISEA and New Guinea. In short, the first pottery users on the Banda Islands appear to have been predominantly fishers rather than farmers.

As Robb notes in his discussion of the European Neolithic, decisions about the adoption of technology or other cultural traits happens on a local level in response to immediate conditions, while large scale trends emerge out of the cumulative effects of these local decisions (Robb 2013). Similarly, the latest archaeological evidence from ISEA demand new explanations that focus on the process of adaptation to each Neolithic element individually and at different times, and consider how these new adaptations might have made sense at a diversity of local scales rather than a single broad regional scale.

Hypotheses and Research Questions

Our new model is as follows: Although people in eastern ISEA had fished since they first arrived 40 or more kya, the adoption of pottery and yam horticulture may have been the key to allow more extensive exploitation of small, dry, remote islands and their highly productive, previously inaccessible reefs. Fresh water transport and storage would have been a problem that settlers to dry islands such as Pulau Ay and the small islets around Seram would have to solve (c.f. Reepmeyer et al. 2014). The earliest fine tempered slipped wares that we found in the early Neolithic layers at Palau Ay are well suited to water storage. Supplementary food sources would have posed another requirement for the permanent occupation of small dry islands. Yam or taro gardens, planted but left untended, would have extended the length of time fishing parties could stay in these islands. Eventually, full time habitation of these small islands became not only possible but perhaps necessary to defend these productive reefs from other groups. Year-round residence would have required alternate protein sources during peak monsoon months when fishing is difficult or impossible. At this point, pigs and other domestic animals were brought in as an alternate protein source and pottery became dominated by coarse-grain tempered cooking vessels rather than fine-grain tempered water storage vessels.

Our project is designed to test this model. On Seram, we will investigate the Neolithic transition in two geographies. There are diverse terrestrial environments that likely enabled lengthy pre-Neolithic forager occupation on Seram proper, including abundant surface fresh water. The fringing reefs are relatively small and subject to degradation from sediment transport, and may have been negatively impacted by increased sedimentation accompanying forest clearance associated with agriculture (c.f. Spriggs 1997). Meanwhile, the reefs, atolls and small islets off the SE coast of Seram – farther from the largest sediment-carrying rivers – would have been extremely attractive to fishers and would have been an ideal testing ground for developing strategies like using fine tempered, slipped pots for water storage. Therefore, we expect this pottery to be present in greater abundances in the dry islands and less abundant or absent on the main Seram coast. On Seram, we expect pre-Neolithic sites will be found in areas with ready access to freshwater whereas Neolithic period occupation requiring water storage will be focused in areas with the most productive, offshore reef systems. We predict that the offshore islets will have a similar occupation record to Pulau Ay, with sporadic pre-Neolithic fishing use, and early Neolithic layers containing fine, slipped pottery but no domestic animals.

As data on past precipitation and sedimentation are important for validating the model proposed here, and the paleoenvironment of Seram is poorly understood, we collaborated with paleoclimate specialist Dr. Julian Sachs from the University of Washington to collect and analyze a rainfall proxy record from mangrove peat sediments from large mangrove swamps adjacent to Airnanang on Seram and on Pulau Ujir in the Aru group. Our project team collected data about exchange and connectedness from pottery and lithic trace element analyses. These two records will be a source of testable hypotheses of possible causal factors in the Neolithic transition. Rainfall would clearly have been an important factor for farmers, especially on small islands that lack permanent surface water supplies such as rivers or lakes. Trade and exchange might have mitigated some of the risk of settling on small islands, effectively expanding the resource base to include a wider variety of ecosystems and allowing small island dwellers to weather unfavorable climate periods.

Results of 2015 Seram Survey

The area of SE Seram was the subject of a reconnaissance survey by Lape in 1998 where several possible open Neolithic sites were identified in the vicinity of Rumadan village. Additionally, a team from the Pusat Penelitian Arkeologi Nasional and Balai Arkeologi Ambon, led by Dr. Truman Simanjuntak, surveyed as far as Waru in early 2012, during which a cave site with possible Neolithic occupation was identified.

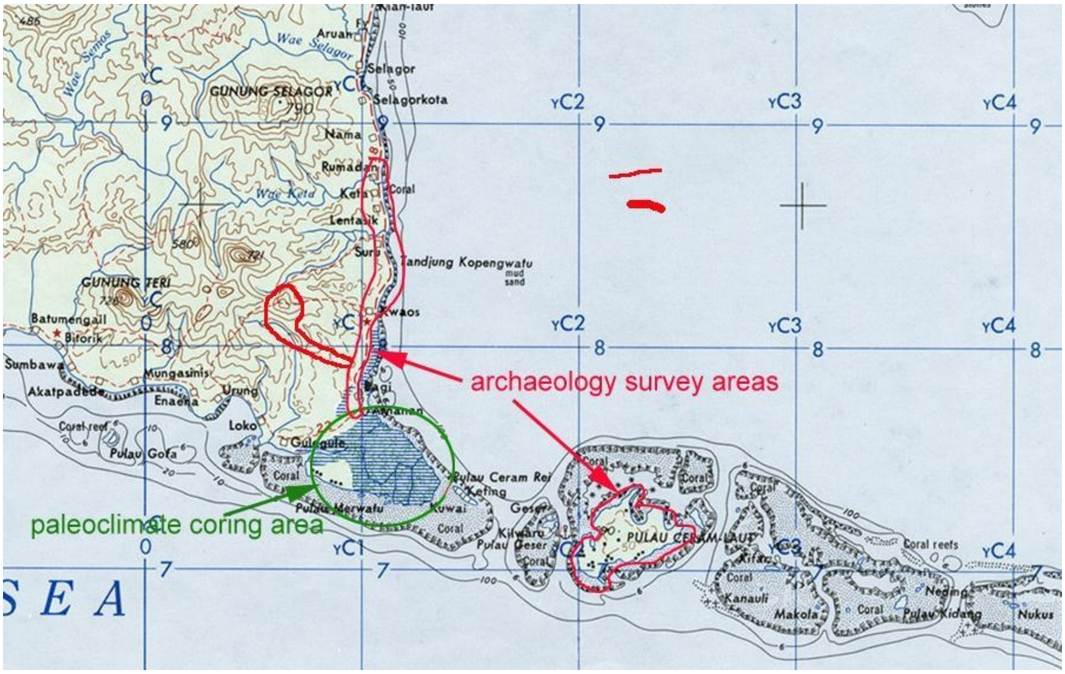


Figure 1. 2016 survey area, East Seram and Seram Laut

Based on this preliminary information, we conducted an initial rapid reconnaissance archaeological survey of coastal Seram Island from Rumadan to Airnanang on the SE tip of Seram, of a cave near Waru, NW of Rumadan, and of the small offshore island of Seram Laut, from October 20-30, 2015 (Figure 1). A subset of the team traveled to Pulau Ujir in early November to sample the mangrove sediments there and also auger at possible sites (Figure 2). The team was comprised of archaeologists from the University of Washington, the Pusat

Penelitian Arkeologi Nasional and the Balai Arkeologi-Ambon (Figure 3). On Seram, we traveled by car to Kian Darat, then transferred to a motorized longboat to our survey sites, setting up a home base in Airnanang (for survey of eastern Seram), then Geser (for survey of Seram Laut). The Pulua Ujir team traveled from Ambon to Dobo by plane, then to Pulau Ujir by motorized longboat.

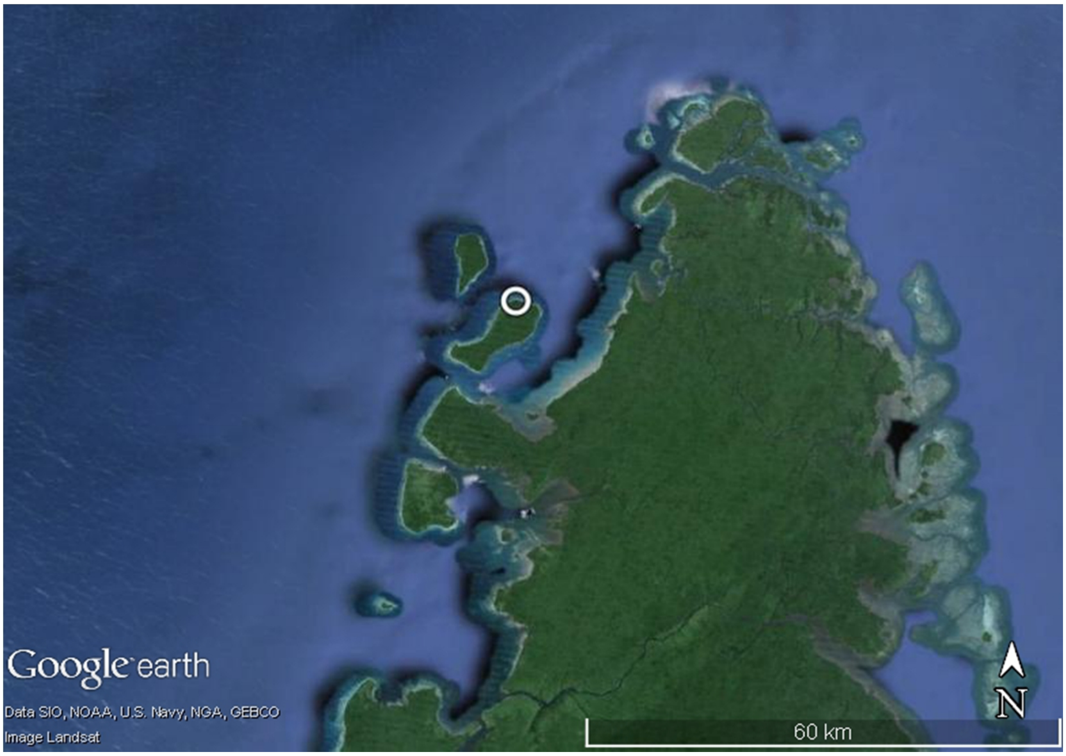


Figure 2. Satellite image of northern Aru showing the mangrove sediment core sample site on Pulau Ujir. Image: Google Earth.

On Seram and Seram Laut, the team followed the coastline and nearby inland areas, looking for surface earthenware pottery, stone tools and house platforms. We interviewed residents of settlements along the way for their knowledge of surface finds, especially farmers, who often encounter pottery during planting and field preparation. The team investigated known caves and rockshelters and walked to areas of karst towers and hills likely to have cave formations. Each team member carried a camera and GPS (or combined instruments) to record tracks, site locations and other identifying information. Sites with excavation potential were tested with augers and/or shovel probes to collect samples for radiocarbon, luminescence and elemental analyses. We identified nine previously unrecorded archaeological sites during this survey, including open sites, rockshelters and rock art sites.

Figure 3. Augering at Liang Watu Tewa, Seram

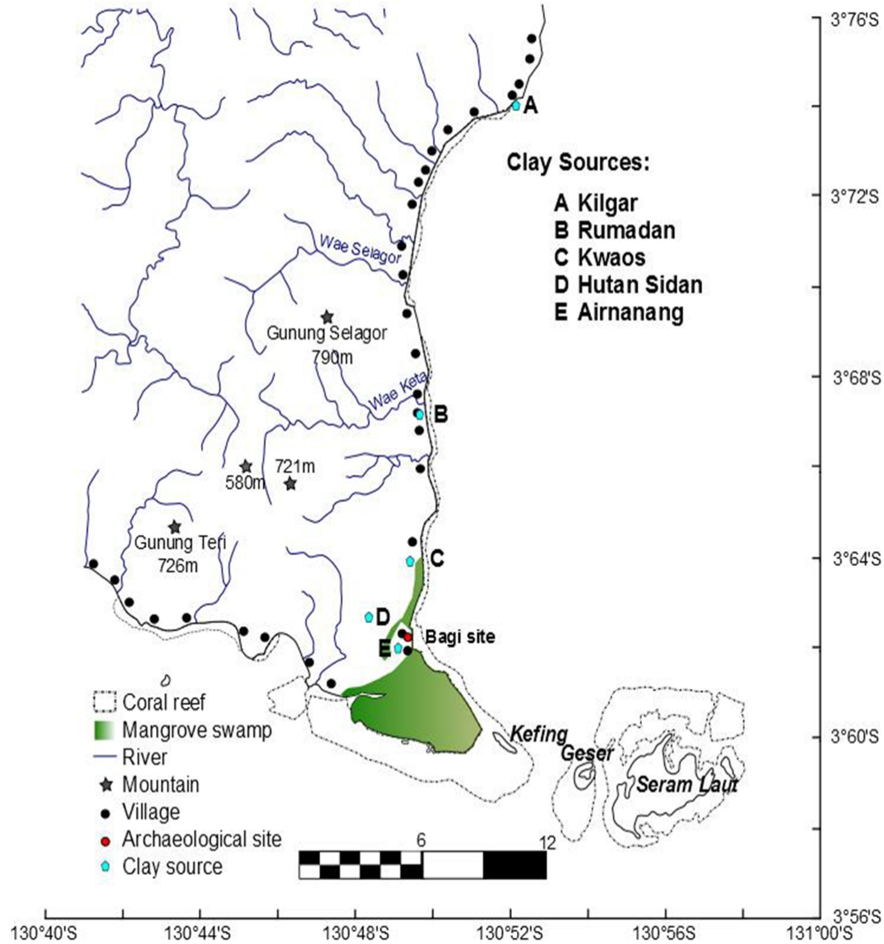


Figure 4. Map of East Seram showing clay sources samples during 2015 field season

We also collected clay and temper source samples from a variety of locales guided by local memories of pottery making. See figure 5 for a map of pottery and clay collection sites.

We collected mangrove sediment cores for paleoclimate analysis, recovering nearly 100 cores up to 1.5 m deep from two mangrove zones in Seram and Ujir. These cores can provide proxy records of rainfall from lipid profiles (c.f. Sachs and Myhrvold 2011, Sachs et al. 2009). See figure 6 for an example of core collection activity on Seram.

Figure 5. Mangrove sediment core collection, Seram

Results of Radiocarbon Dating:

A total of 19 radiocarbon samples from archaeological and paleoenvironmental sites were submitted for AMS dating to Direct AMS (Seattle, Washington, USA). 12 samples were tested from archaeological sites on Seram Island (including two samples from Hatusua cave in NW Seram previously excavated by a team from Balai Arkeologi Ambon), and 3 from sites on Ujir Island. Additionally, 4 mangrove sediment core samples taken for paleoclimate analysis were dated, using bulk organic sediments from the bottoms of the deeper cores, 3 from Seram and 1 from Ujir. Results are summarized in table 1 below.

Table 1. Radiocarbon dates from Seram and Ujir

sample #	location notes	material	Lab ID	d13C	age BP	1s error
Seram Island Archaeological Sites						
ARNGEKS1/2015-1	Bagi SP1 Layer 1 14cmbs Shell Sample 2	conus sp.	D-AMS 013934	-0.3	940	28
ARNGEKS1/2015-3	Bagi SP1 Layer 2 22cmbs	charcoal	D-AMS 013935	-29.4	268	25
ARNGSV/2015-3	Base of Bukit Kiliotek	conus sp.	D-AMS 013927	2.7	1,182	22
ARNGSV/2015-1	Bagi Beach cut 1-23cmbs, associated with lithic (collected)	charcoal	D-AMS 013936	-25.0	modern	
HTS18-2	Hatusua S1B5 spit 3 (x=57, y=70, z=40)	bivalve	D-AMS 013933	-0.8	1,092	24
HTS18-1	Hatusua S1B5 spit 3 (x=18, y=55, z=43)	charcoal	D-AMS 013937	-27.1	489	26
KLBDCR1/2015-2	Liang Kilbidi/Kilbadir Auger1 50-65 cmbs	bivalve	D-AMS 013926	-9.9	3,584	24
KLBDCR1/2015-1	Liang Kilbidi/Kilbadir Auger1 50-65 cmbs	shell	D-AMS 013931	-13.6	3,607	27
LNFG2/2015-1	Liang Fanga2 Surface Collection	bivalve	D-AMS 013929	1.2	4,850	28
LWTW/2015-1	Liang Watu Tewa Surface Collection	bivalve	D-AMS 013930	-1.4	4,086	28
TULK/2015-1	Tulak Surface Collection	bivalve	D-AMS 013928	-5.0	775	24
WTSK/2015-1	Watu Sika	Oyster sp.?	D-AMS 013932	-8.1	15,367	56
Seram Island Mangrove Cores						
ARNGCR1/96-97	Airnanang mangrove cores	sediment	D-AMS 014453	-32	1,001	28
ARNGCR4/146-147A	Airnanang mangrove cores	sediment	D-AMS 014454	-22.3	1,261	27
ARNGCR4/146-147B	Airnanang mangrove cores	sediment	D-AMS 014451	-26.5	1,197	26

sample #	location notes	material	Lab ID	d13C	age BP	1s error
Ujir Island Archaeological Sites						
UJMSFBR3.1	Maisei Fana Auger 5a, 16-42 cmbs	charcoal	D-AMS 014353	-33.3	modern	
UJWOFBR1.1	Woi Fana Auger 6, 62-78 cmbs	charcoal	D-AMS 014354	-42.7	102	28
UJWOFBR1.2	Woi Fana Auger 6, 78-86 cmbs	charcoal	D-AMS 014355	-33.1	138	20
Ujir Island Mangrove Core						
UJSNGCR3/96-97	Ujir mangrove core, Walabuim site	sediment	D-AMS 014452	-37.5	3,586	34

Discussion

While results from our October 2015 survey are preliminary or still incomplete, they are encouraging for additional research. Three of the cave sites in Seram have Neolithic age deposits (or older): Liang Fanga, Liang Watu Tewa and Liang Kilbidi. Three open sites in the vicinity of Airnanang village all date to approximately 1000 BP: Bagi, Bukit Kiliotek and Tulak. Hatusua cave in NE Seram returned dates of 500-1000 BP, but it is likely that this cave site has older deposits in deeper layers.

The Ujir archaeological sites all had fairly recent dates (100 BP to modern). These indicate some disturbance at the sites, as they were found in context with older trade ware fragments. Given the limited testing, it is likely that older deposits are present at Ujir.

We attempted to date an oyster shell from the upper part of a wave cut notch about 1m above the current median high tide, but the date of 15,000 BP suggests we did not collect a relevant sample or that the sample was contaminated (expected date would have been about 5,000 BP).

The dates from the mangrove cores returned encouraging results. The deepest Seram core returned a date of about 1200 BP, and the Ujir core returned an impressive 3500 BP date. These all suggest that we can get paleoclimate information from archaeologically relevant time periods.

Future work

Much of the data we collected during the October 2015 survey are still being processed. Two lab analyses are not yet complete: luminescence dating of pottery samples from several sites to further refine site dates, and LA-ICP-MS analysis of clay and pottery to help reconstruct trade networks. For the latter, a sample of 74 earthenware pottery sherds recovered from the Bagi and Hatusua sites in Seram and the Woi Fana and Maisei Fana,sites in Ujir, Aru were described, prepared, and submitted to the Elemental Analysis Facility at the Field Museum, Chicago for analysis. Laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) will be used to measure the concentrations of major, minor, and trace elements in the clay paste of these sherds. A total of 20 non-archaeological clay briquette samples from Maluku sources in east Seram, Ambon, Aru, Banda Besar, Pulau Ay, and Pulau Hatta were submitted for the same analysis. When results are received we will use statistical methods to identify distinct source groups among the archaeological samples and compare their compositional signatures with those of the clay samples. This analysis will help us understand ceramic production and exchange in Maluku.

Additional analyses of the mangrove sediment cores is pending grant funding, but will include more complete dating to create age models of the cores, followed by lipid profile analyses to reconstruct paleo salinity and rainfall.

We have submitted a proposal to the US National Science Foundation for additional fieldwork and lab analyses. If we are successful, we plan to return to Seram and nearby islands to do extensive excavation and analyses of at least two of the most promising sites identified in this initial survey season, and possibly do additional survey work.

Summary

While still in the preliminary stages, our project to investigate the processes by which people changed to a Neolithic lifestyle in Maluku Indonesia shows promise. We hope that in the next few years, we will have a more complete understanding about why and how these changes happened at a detailed and local level. This local, ground-up understanding should be useful in evaluating large-scale theories about the ISEA Neolithic, which, after all, was a result of countless individual choices made by people 3-4000 years ago.

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SPLITTING UP PROTO-MALAYOPOLYNESIAN: NEW MODELS OF DISPERSALS FROM TAIWAN

Roger Blench

Introduction

The goal of historical linguistics is the reconstruction of proto-forms, i.e. words supposedly spoken when a proto-languages begins to diversify. In the classical model of linguistic palaeontology, the reconstructed forms are matched against historical and archaeological evidence. Thus if 'dog' is claimed as a proto-form, we should expect to find dogs in the archaeological record. This also then allows us to calibrate accurately the splitting-up of proto-families. This appears to make sense; but what if the assumptions we adopt to reconstruct proto-languages contain significant methodological flaws? This paper looks at the example of proto-Malayo-Polynesian (PMP) a well-established subgroup of Austronesian and suggests that the textbook versions are compromised by findings from other disciplines and we must rethink our tools for assessing the status of such hypothetical entities.

The Austronesian dispersal represents one of the great prehistoric expansions of a linguistic phylum. Its inception is usually associated with the Neolithic settlement of Taiwan[1] by 5500 BP followed by extensive movement into Island SE Asia (ISEA) and the Pacific from around 4000 BP onwards. From the point at which the migrants reached the Bismarck Islands and formed the nucleus of the Oceanic language at around 3200 BP its further course is relatively well-charted, as is the association of Oceanic with finely-wrought Lapita pottery (Pawley & Ross 1995; Lynch et al. 2002; Pawley 2008; Sheppard et al. 2015).

According to the current model, all extra-Formosan Austronesian languages belong to a single subgroup, Malayo-Polynesian (Dyen 1963; Ross 2012; Blust 2013) and thus the reconstructions proposed for proto-Malayo-Polynesian (PMP) can theoretically tell us about the lifestyle, social organization, material culture and subsistence strategies of its speakers. Blust (1995) represents an overview of what can be inferred concerning the lifestyle of the early Austronesians based on lexical reconstruction. However, the cultural transformations that occurred in the period between the migrants leaving the southern tip of Taiwan and reaching Near Oceania is less well understood. The internal classification of the Western Malayo-Polynesian languages remains disputed (Blust 2013) and the sequence of archaeological dates is only weakly attested (cf. Spriggs 2011).

[1] The paper uses 'Taiwan' to refer to the island and the modern nation-state and Formosa(n) to refer to the complex of indigenous peoples and languages still present on Taiwan.

Part of the problem arises from assumptions about the pattern of migration. According to the model promoted by Bellwood (2013 and elsewhere) the Austronesian expansion was primarily demographic and driven by agriculture. Hence it was sequential; the early Austronesians reached the Philippines, and moved on, both southwest and southeast, gradually settling Island SE Asia and the Pacific. Blust also implicitly accepts this model as it chimes with the hierarchical internal structure he attributes to Malayo-Polynesian. Nevertheless, this model has been challenged from various quarters, both from archaeology and linguistics. Donohue & Denham (2010) summarise the objections to the models of Austronesian classification, while Spriggs (2011) and Blench (2012) argue that the near-simultaneity of early dates outside Taiwan point to a rapid dispersal in different directions, presumably reflecting access to improved maritime technology. Indeed, the early settlement of the Marianas and Palau, remote and small islands in the Pacific, points strongly to this process.

If there was indeed an 'explosive' dispersal at this early period, then it might be expected to have consequences for both language and synchronic material culture. Four thousand years ago, the Formosan peoples would not yet have crystallised into the groups which exist today with numerous languages and subsistence strategies reflecting the diverse environments of the island. The absence of obvious signs of agriculture at the lowest levels in both the Batanes (Bellwood & Dizon 2014) and the site of O Luan Pi (I and II) on the southern tip of Taiwan (Kuang Ti 2000) argues that some of the early migrants were fisher-foragers rather than farmers (see also Bulbeck 2008). It would also account for the puzzling differences between the agriculture of the Philippines, the first presumed stopping point for these migrants, and Taiwan. Essentially the cereal which constitutes the focus of Formosan peoples is foxtail millet, *Setaria italica*, whereas in Luzon and points south irrigated rice is now dominant. If many of the peoples leaving Taiwan were not sedentary cereal agriculturalists, then they would not reproduce this cultural strategy in the new islands they settled.

This suggests that we have been seduced by the lure of coherence, that the desire for a tidy interpretation has made the early phases of the Austronesian expansion seem more structured than is probable. Resource extraction was revolutionised by new maritime technology, and it would have been seized on by multiple groups, often very varied in character. The boats leaving the southern tip of Taiwan are likely to have had multi-ethnic crews and to have carried a range of ideas to different locations. The seas and currents would have made movement in almost every direction possible, and since the land masses were largely unexplored, new voyages and landfalls were undertaken all across ISEA, sometimes in what may now seem unlikely places. In the light of this, it is no wonder that WMP is hard to classify; it is not the result of sequential diversification, but the fallout from an explosive dispersal. If this is the case, then such a dispersal should also be reflected in the archaeology, as well as the material culture. Dates for early Austronesian presence in ISEA are still relatively sparse, but material culture represents a vast archive which has hardly been exploited. By plotting the distribution of distinctive items, present both among Formosan indigenous peoples and elsewhere, it is possible to get a sense of the routes and destinations characteristic of this early period.

Recent analyses of the skeletal material from the remarkable cemetery at Te Ouma on Efate in Vanuatu has cast a surprising new light on early Austronesian expansion (Valentin et al. 2014, 2016; Spriggs this conference and pers. comm.). In the light of the phenotypic characteristics of the present inhabitants of Vanuatu, it has generally been assumed that they developed a 'mixed' appearance at the earliest phase of the expansion of the Oceanic languages, i.e. presumably somewhere in the Admiralties. People of SE Asian genetic heritage would have arrived on the Admiralties, encountered Austromelanesian populations speaking 'Papuan' languages, mixed genetically and begun the expansion into Remote Oceania, in conjunction with the culture underlying Lapita pottery. However, the osteometrics from Te Ouma indicates this cannot be true. The earliest skeletons all reflect individuals of Polynesian or ISEA phenotype, connecting directly with Taiwan and the populations of Northern Luzon. Only after a couple of generations does the character of the skeletal material reflect more directly the current inhabitants of Vanuatu and New Caledonia. This in turn is associated with the rapid decline of Lapita pottery, suggesting a disruptive culture change, either from the arrival of NAN speakers implying invasive genetic admixture or the arrival of already mixed populations.

If this is so, then it may point to an arrival very rapidly after the migrations out of southern Taiwan. This in turn raises numerous questions, including why migrate such a long distance, what route was taken, what accounts for the disparity of several centuries between the settlement of Luzon and the arrival of speakers in the Admiralties? Why are there no unambiguous precursors of Lapita pottery? On the other hand this would neatly explain one long-standing enigma, the surprising similarities between PMP and Proto-Oceanic. If indeed Oceanic had been the end-product of a complex nesting process in the Austronesian 'tree' then it should surely be more differentiated from PMP than is in fact the case. Related to this is the problem of the SHWNG (South Halmahera-West New Guinea) languages, usually claimed to be a primary split with Oceanic (Blust 2013; Kamholz 2014). SHWNG populations do not generally show mixed phenotypic characters, and certainly do not have Lapita pottery or other cultural features of Oceanic. Where and when could this split have taken place? This paper cannot answer all these questions; the data is too fresh for an interpretation to be fully developed. Nonetheless, it will try and model the early history of PMP to account for it.

The metaphor which can be invoked to characterize the Luzon Strait four thousand years ago is a boiling pot. Numerous different ethnic groups, with differing languages, cultures and objectives, but with access to new types of boat, began to disperse outwards, carrying with the innovative culture and technology. Although the Austronesian world was subject to numerous later episodes of cultural levelling, for example on Java and the Malay peninsula, evidence for this early period can be detected around the periphery, where dominant cultures failed to penetrate.

This paper[2] combines linguistic and material culture data to develop a preliminary model of the early period of dispersal of PMP. Whether PMP can be regarded as a coherent proto-language spoken at a particular time and place remains an open question. While some linguistic roots are very widely attested across the Austronesian world, others have very restricted distributions. It may also be the case that there was substantial back influence to Taiwan, especially from the Philippines. Iron-working, for example, must have been a later introduction from further south, and whatever group was responsible for introducing it would have brought other associated cultural practices and presumably their language. Much of the innovation in the extra-Formosan zone can be attributed to continuing contact with the mainland at this period, although the disappearance of non-Sinitic languages on the Chinese coast makes this difficult to prove from a linguistic point of view. In terms of material culture, it accounts for the high diversity of extra-Formosan repertoire, and why so many widespread PMP lexemes have either only a single or a few scattered Formosan reflexes. One interpretation is that these are not inherited from PAN, but borrowed back into Formosan languages as part of the interaction sphere.

Linguistics

The ethnic chaos in the Luzon Strait is reflected in the linguistic uncertainty concerning Western Malayo-Polynesian. WMP is divided into a number of primary subgroups, which have so far resisted hierarchisation. The discussion will no doubt continue, but PMP divides into the well-characterized Oceanic and the rest, i.e. Western Malayo-Polynesian (WMP) whose internal divisions remain disputed (e.g. Blust 1993; Donohue & Grimes 2008). Figure 1 presents a version of the early splits in PMP, bringing together these various proposals. The composition of the subgroups is as follows:

[2] A very preliminary version of some of these ideas was presented at the National Museum of Prehistory (國立臺灣史前文化博物館) Taitung on the 28th September, 2014. My thanks to the Museum and Tsang Cheng Hwa for supporting my presence, and the audience for discussions. Thanks to Frank Muyard and to Matthew Spriggs for subsequent discussion of the Te Ouma materials.

1. Bashiic languages are Ivatan, Itbayat and Tao [Yami]
2. Includes all languages of the Philippine Archipelago except the Sama-Bajaw (or Samalan) languages spoken by traditionally nomadic 'sea gypsies' of the central and southern Philippines and various parts of Indonesia-Malaysia
3. Includes languages of northern Sarawak in Malaysian Borneo
4. Includes Ngaju Dayak and Ma'anyan of southeast Kalimantan, as well as Malagasy
5. Includes the Malayic languages of insular Southeast Asia, and the Chamic languages of mainland Southeast Asia, and
6. Includes all languages of Sulawesi south of Gorontalic, except the South Sulawesi group (whose best-known members are Buginese and Makasarese).
7. Includes all the languages that fall within Tai-Kadai. This is not accepted or even discussed by many linguists
8. Palau only
9. Chamorro and other languages of the Marianas only
10. Blust (2013) defines an 'Eastern Malayo-Polynesian' branch, which divides into SHWNG and Oceanic proper.

It is remarkable that even the subgroup in the immediate area of the Luzon Straits, Bashiic, cannot easily be fitted into the WMP substructure. The Bashiic [=Batanic] languages consist of a small group of the northernmost PMP languages, spoken on Lanyu island and by the Ivatan and Itbayat in the Luzon Strait. They have been characterised in Ross (2005) but their placing remains problematic. The languages are very close to one another, which confirms the oral traditions on Lanyu that some villages were founded from the Batanes a few centuries ago. However, the Batanes were settled 4000 years ago (Bellwood & Dizon 2014) and Lanyu has also been occupied for a lengthy period (Tsang 2005). It must be that there were former languages on Lanyu which have disappeared or been assimilated, while the Batanes were in relative isolation from other PMP languages for a long period. The Yami in particular have a strikingly idiosyncratic material culture, including large paddled canoes, which do not resemble any others in the Austronesian world. Green Island, further north, was uninhabited at the time of the first European incursions, but has a long archaeological history, and most likely was settled by the same populations as the earliest inhabitants of Lanyu (Mike Carson pers. comm.).

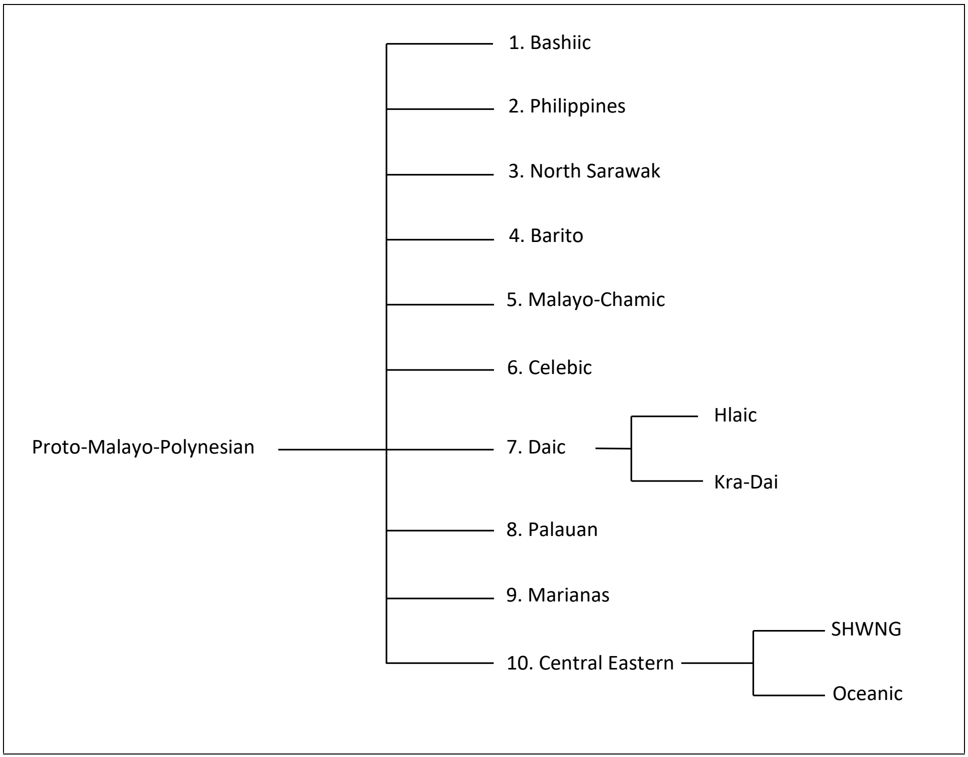


Figure 1. Primary subgroups of Proto-Malayo-Polynesian

Bashiic is not the only isolate apparently dating from this early period. Although the languages of the Barrier Islands, west of Sumatra, have links to languages on the Sumatran mainland (Nothofer 1986), it has not been demonstrated either that these languages are related to one another, or that the cognates with mainland Sumatran languages are other than loans. Nias, Mentawei and Enggano in particular seem to have a wide scatter of 'rogue' vocabulary with either no Austronesian cognates, or parallels in remote branches much further east, in Sulawesi and Oceanic. This is also reflected in their material culture, which reflects Formosan practice (see the sub-chapter "*the leg-xylophone"* for the distribution of the leg-xylophone, for example).

In the Pacific, Chamorro and Palauan are also primary branches of PMP (cf. Reid 2002 for Chamorro), but somewhat surprisingly are the results of parallel eastwards migrations. In the case of the Marianas, the archaeological evidence for the first settlement by at least 3500 BP is strong. There are convincing similarities with the ceramics of the Northern Philippines, which show dentate stamping and lime infill. Carson *et al.* (2013) provide a comprehensive view of the evidence connecting the Northern Philippines with Remote Oceania. Unfortunately much of the other material culture of the Marianas has been displaced by the Cultural Revolution brought about by the early presence of the Spanish and other occupiers.

Early settlement dates for Palau remain somewhat contradictory, with archaeology suggesting a date of around 3000 BP and palaeo-environmental dates, somewhat older at 4500 BP (Clark 2005). Since these earlier dates would put settlement beyond the range of Austronesian migration, they are probably to be discounted. The earliest settlement can be identified with flaked stone tools, rather indistinct brown and some painted pottery, and human burials. The Palauan language has undergone numerous rather exotic sound-changes and morphological shifts, so it has not yet proven possible to identify its nearest relative.

Trees of the WMP languages do not usually include Daic (Tai-Kadai) although a relationship between Austronesian and Daic has long been posited (Benedict 1942). Ostapirat (2005, 2013) has argued for a genetic affiliation between Daic and PAN which is supported with regular sound-correspondences. Norquest (2007:413) points out that the Hlai branch of Daic shares some striking lexical items with proto-Austronesian which do not occur in the other branches. Sagart (2004, 2005) proposed Daic was a branch of PMP and Blench (2013) supported this with further linguistic and cultural data, including dental evulsion, tooth-blackening and multi-tongue jews' harps. It is unresolved as to whether Daic is a sister-language to PAN or to PMP. Sagart (2005) posits 'an early Austronesian language called here 'AAK' (Austronesian Ancestor of Tai-Kadai). This was a daughter language of PAN, and a close relative of PMP: it shared some innovations with PMP, but was more conservative in other respects.'

Daic itself is divided into two major branches, Hlaic and Tai-Kadai, with Hlai spoken on Hainan island and Tai-Kadai spoken inland ain China and in the region further south. It is striking that Austronesian shares a relationship with Hlaic distinct from Austronesian in general, as evidenced in Table 1.

Table 1. PAN-Hlaic relationship

Gloss	Pre-Hl	Proto-Hlai	PAn
slap	*pi:k	*phi:k	*pik
weave	*bən	*p^{h}ən	*bəl+bəl
pinch	*ti:p	*t^{h}i:p	*a-tip (PMP)
seven	*tu:	*t^{h}u:	*pitu
three	*ʈu:ʔ	*tʃ^{h}u:ʔ	*təru
sharp	*ɟə:m	*tɕ^{h}ə:m	*ʈaɟəm
five	*ma:	*hma:	*rima
six	*nɔm	*hnom	*ʔənəm

Source: adapted from Norquest (2007)

An intriguing piece of evidence is provided by the word for 'bird' (Table 2). The PMP form **manuk* appears to be cognate with Tai-Kadai, whereas Hlaic languages have innovated.

Tai-Kadai languages usually delete the prefix of Austronesian forms, but Lakkia preserves the m- prefix inherited from Austronesian.

Table 2. 'Bird' in Austronesian and Daic

Language	Form
PAN	*qayam
PMP	*manuk
Proto-Hlai	*səc
Proto-Tai Kadai	*-nok
Lakkia	mlok

This is likely to mean that there was a primary split in the migrants from the southern tip of Taiwan, with some reaching Hainan and others settling Guangdong and moving inland as pressure from Sinitic peoples intensified.

South and east of Taiwan are a variety of subgroups of PMP, which cover most of the islands now within Indonesia. Some Formosan words, in particular animal names, seem to show strongly split distributions, occurring in the West and Central parts of ISEA and noticeably absent in the Eastern Indonesia. Blust (1995) who carefully notes the distribution of cultural and biological terms, does not draw the conclusion that this is a consequence of the skewed patterns of early voyaging but re-analysis of the data suggests this. §3 presents evidence from a brief sample of animal name and maritime terms which reflect the dispersal of PMP.

Lexical evidence

Sharks and crocodiles

The name of the shark represents an interesting case. PMP has **buqaya* for 'saltwater crocodile' and this has a single Formosan reflex, Puyuma *buaya* 'shark'. Formosan generally has **qisu* for 'shark' which is lost outside Taiwan. Blust (1995) assumes there was once PAN **buqaya* 'crocodile' reflecting a now disappeared species, and that the remaining Puyuma reflex has been transferred to 'shark'. However, in the continuing absence of Taiwanese crocodiles, a simpler solution is that the Puyuma word is simply a borrowing from a nearby PMP language, reflecting intensive contact across the straits.

Pangolins

A curious piece of direct evidence from zoogeography supports a direct link between Taiwan and Borneo. Blust (1995) puzzled over the name for the pangolin;

'Perhaps the best illustration of such a case is **qaRem* "pangolin", reflected in Taiwan and in Borneo (where it applies to another species of the same genus, *Manis javanicus),* but with no evidence that the animal was ever found in any part of the Philippines except Palawan and the adjacent Kalamian and Cuyo Islands, which, like Borneo, rest on the now submerged Sunda Shelf.'

Table 3 presents an abbreviated version of the linguistic evidence for the name of the pangolin[3].

Table 3. Austronesian names for pangolin

Branch	Language	Form	Gloss	Scientific
Formosan	Seediq	ʔaruŋ	pangolin, anteater	*Manis pentadactyla*
	Thao	qalhum	pangolin, scaly anteater	*Manis pentadactyla*
	Amis	ʔalem	anteater with long tongue	*Manis pentadactyla*
Borneo	Kiput	arem	pangolin, anteater	*Manis javanica*
	Katingan	ahem	pangolin, anteater	*Manis javanica*
	Ma'anyan	ayem	pangolin, anteater'	*Manis javanica*

Blust assumes that 'Austronesian speakers moved south rapidly enough to encounter the new species of pangolin before they had lost their recollection of the *Manis pentadactyla*', assuming that the migrants were first resident in the Philippines. This is unnecessary; there is no reason to think the voyages from Taiwan did not reach Borneo directly.

The jellyfish

The Malayo-Chamic languages are spoken in Borneo, on the Vietnamese mainland and have been carried widely across the region in the form of Malay. The proposed PAN term for 'jellyfish' is shown in Table 4, which has a curious distribution, since apart from a single Formosan reflex in Kavalan, the cognates are entirely restricted to Borneo languages. Although it is sometimes tempting to analyse Formosan reflexes as late borrowings, the distance between Borneo and the Kavalan area makes this unlikely.

Table 4. Austronesian names for 'jellyfish'

Subgroup	Language	Form	Gloss
	PAN	*bubuR	jellyfish
Formosan	Kavalan	bubur	jellyfish
Borneo	Miri	bubur	jellyfish
	Bintulu	buvu	jellyfish
	Iban	bubur	jellyfish, sea nettle, swimming bell, *Medusa* spp.
	Bimanese	bubu	jellyfish

[3] Further cognates can be found in the ACD online version

Perhaps also Malay *ubur-ubur* 'bell-shaped jellyfish with a fringe of feelers'. Jellyfish are found throughout the region, so this may be additional support to a direct link between Taiwan and Borneo.

The cowry

The name for the cowry, *Cypraea mauritiana*, demonstrates an interesting pattern. Although reconstructed to PMP on the basis of Northern Philippines cognates, these all refer to a manifestly modern technology, the use of lead balls as sinkers. They are therefore most likely to be recent semantic transfers, not ancient inherited cognates. The nearest form meaning 'cowry' to the presumed homeland of PMP is in Palau. Otherwise, the distribution of the root is confined to Eastern Indonesia and Oceanic (Table 5). Given that cognates are spread widely in Micronesia, it is most likely that Palauan is a loan *from* Oceanic, as is the case with certain other maritime terms.

Table 5. 'Cowry' in Eastern Indonesia and Oceanic

Language	Form	Gloss
PMP/POC	*buliq	cowry shell: *Cypraea mauritiana*
Isneg	bulí	lead; lead sinker of a fishing net
Ilokano	bulí	lead; wharve, whorl; sinker
Palauan	búiʔ	cowry shell: *Cypraea mauritiana*
Ngadha	vuli	large cowry shell used for war necklaces; the necklace itself
Rotinese	fuli	kind of shell; shells or bits of lead used as sinkers for a fishnet
Yamdena	fuli	kind of shellfish
Fordata	vuli	porcelain shell, egg cowry
Yapese	wul	type of shell, large cowry
Nggela	mbuli	generic for all cowries
Lau	buli	white cowry, *Ovula ovulum*, ornament for canoes and men
Sa'a	puli	cowry shell, used as sinkers for nets
Pohnpeian	pwili	cowry, any species of sea shell
Puluwat	pwiil	cowry shell scraper, as for green breadfruit
Woleaian	u-bili	white shell, cowry
Fijian	buli	cowrie shell *Cypraeidae*
Tongan	pule	shellfish, the cowry; be marked with spots or coloured patterns
Niue	pule	cowry shell
Samoan	pule	Molluscs belonging to the genera *Cypraea* (cowries) and *Ovulum*. Cowrie shells are used as sinkers and for making squid lures.
Tuvaluan	pule	shellfish sp. *Pila conica*
Maori	pure	bivalve mollusks: *Notovola novaezelandiae* and other *Pectinidae*

Although this root is attested in Oceanic it is not found in SHWNG which again is suspicious. The data suggests that this term is in fact not PMP at all but was innovated somewhere in Eastern Indonesia and, was carried into the Oceanic area and then back into Micronesia as part of the backscatter which created Yapese. The apparent cognates in the Northern Philippines are then simply borrowings reflecting the introduction of lead sinkers in a much later era.

Typhoons, cyclones and winds

The name for ‘typhoon’, ‘cyclone’, ‘strong wind’ also shows a highly skewed distribution. Typhoons are extremely common on Taiwan, and it is no surprise they are attested in Formosan languages. The earliest settlers of the Marianas must have been familiar with typhoons, as were the seagoing peoples of the Philippines. However, the word was clearly only transmitted along the west coast of the Philippines, as it becomes ‘strong wind’ in the languages of Borneo and is not attested elsewhere and strikingly not in the open seas east of the Philippines (Table 6). The term is completely replaced by the Oceanic term *mana*, ‘storm’, ‘big wind’, which has strong spiritual connotations throughout much of the Pacific. In SHWNG this has the cognate *wana*, spread across the entire branch.

Table 6. Austronesian names for ‘typhoon/big wind’

Branch	Language	Form	Gloss
	PAN	*baRiuS	typhoon
Formosan	Saisiyat	bal^{y}oʃ	typhoon
	Favorlang	bayus	storm
	Amis	faliyos	typhoon; monsoon winds and rain
	Puyuma (Tamalakaw)	vaRiw	typhoon
Micronesia	Chamorro	pakyo	typhoon, storm, tropical cyclone
Philippines	Ilokano	bagió	typhoon
	Tagalog	bagyó	storm
	Bikol	bagyó	typhoon, hurricane, gale, storm, tempest
	Hanunóo	bagyú	strong wind, storm, typhoon
	Aklanon	bágyo(h)	hurricane, storm
	Cebuano	bagyú	typhoon
	Samal	baliw	wind
Borneo	Miri	baruy	wind
	Kelabit	bariw	strong wind, storm wind
	Kenyah	baloy	air, wind
	Kayan	bahuy	strong wind, storm
	Bintulu	bauy	wind

Another intriguing piece of evidence comes from the changing wind directions in Austronesian. A Formosan root which applies to the east wind in Kavalan (in the north of the island) becomes a south wind in Amis. The Amis are the population on the east coast which supposedly represent a back migration from the Philippines. When speakers move southwards into the Philippines, the same lexeme applies to a south or southwest wind. Moving south again into ISEA the wind comes from the west, including the SHWNG speakers. However, in Oceania, this is now a northwest wind. Madagascar reflects the inversion of directionality, as the Austronesian cognate now becomes a north wind.

Table 7. Changing wind directions in Austronesian

Language	Attestation	Gloss
PAN	*SabaRat	wind
Kavalan	sbalat	east wind
Amis	safalat	south wind
PMP	*habaRat	southwest monsoon
Tagalog	habágat	west or southwest wind; monsoon
Bikol	habágat	south wind
Hanunóo	ʔabágat	southwest monsoon; or, indefinitely, any very strong wind; year
Hiligaynon	bagat-nan	south
Aklanon	habágat	south wind
Ngaju Dayak	barat	west; west wind; storm
Malagasy	avaratra	north
Iban	barat	west, western, westerly
Kambera	waratu	west, west wind
Rotinese	fa-k	seawind, west wind
Hawu	wa	west, the island of Sumba
Leti	warta	west, west wind
Selaru	harat	west, westward
SHWNG		
Buli	pāt	west, west wind
Numfor (Biak)	wam-barek	west wind, west monsoon

The changing referent of the name of this wind in Austronesian tells the same story of seaborne populations coming out from Taiwan, initially an east wind becoming south, then southwest, then west, then northwest as they expand out in different directions.

Boats and Maritime Vocabulary

The model depends strongly on the assumption that innovative maritime technology drove the PMP dispersal. There is no evidence that the initial settlers of Taiwan had anything other than bamboo rafts which are still in use today in modified form (Ling 1956; Rolett et al. 2002). However, the peoples leaving Taiwan four thousand years ago had access to more sophisticated watercraft, as they were able to reach the Marianas and return (Hung et al. 2011). The populations in the Luzon Strait today have no such boats; the large seagoing canoes of the Yami of Lanyu Island could reach the Batanes, which is around 150 kilometres, but certainly not survive a 3000 km voyage. Similarly the peoples of the Northern Philippines do not today have large outriggers although these must surely have been constructed in the past.

If indeed the Luzon Strait was a 'boiling pot', this should also be reflected in the terminology for boats (e.g. Pawley & Pawley 1994). The root **[q]abaŋ* applied to 'boat' has a striking distribution (Table 8**Table 8**). Isolated reflexes of **qabaŋ* and **baŋkaʔ* are found in Formosan languages as 'canoe', but the term was subsequently applied to much larger vessels. Based on phonological irregularities, Wolff (2010/2:947) argues the Formosan cognates are secondary introductions from Malayo-Polynesian languages. In proto-Bashiic, this root applied to a large boat of some type, presumably resembling the large surf-boats of the Yami. Blust (1995) links this word to the verb **qabaŋ* 'to float' which gave rise to the more common Austronesian root for canoe and eventually the large outrigger. However, the same root is also widely attested in the languages of mainland SE Asia, both in proto-Tai-Kadai as **baŋ*, and as perhaps a direct loan into Austroasiatic as Monic *kban*.

Table 8. An Austronesian term for 'boat' borrowed into Austroasiatic

Phylum	Branch	Language	Attestation	II	Gloss
Austronesian	PAN		*qabaŋ		boat, canoe
	Formosan	Siraya	avaŋ		canoe
	Formosan	Favorlang	abaŋɯ		boat
	Bashiic	Tao	avaŋ		large boat
	Philippines	Magindanao	kaban		boat
	Philippines	Tagalog		baŋkaʔ	canoe
	Philippines	Sulu	guban		boat
	Ibanic	Iban	boŋ, buuŋ		long, shallow boat,
	Malayic	Moken	kabaŋ		boat
	Malayic	Malay	kəbaŋ		vessel
	Malayic	Sekah	gobaŋ		boat
	Chamic	PC	*bɔɔŋ		coffin
	Barrier	Nias	owo		boat
	Barrier	Sichule	ofo		boat
	Bima-Sumba	Sawu	kowa		boat
	CMP	Komodo		waŋka	boat, canoe
	CMP	Manggarai		waŋka	boat
	CMP	Rembong		waŋka	boat
	PHSWG			*wak[a]	outrigger, canoe
	Oceanic	proto-Oceanic		*waŋka	outrigger, canoe
Daic	Tai-Kadai	proto-Tai-Kadai	*baŋ		boat
Austroasiatic	Aslian	Jahai	kupon		boat
	Bahnaric	Biat	baŋ		coffin

Phylum	Branch	Language	Attestation	II	Gloss
	Aslian	Semai, Temiar	kapal[4]		boat
	Monic	Old Mon	kḅaŋ		ship
	Mangic	Mang	ɓaaŋ		ferry, boat
	Nicobaric		kopòk		boat

Table 8 includes terms for 'coffin' in some languages, since the distribution of boat-coffins throughout the region makes this a likely polysemy. The meaning in both SHWNG and Oceanic is both outrigger and canoe, but not apparently prior to this. Almost certainly, *qabaŋ* underwent metathesis to *baŋka* ~ *waŋka*, either independently in Tagalog, but certainly in Eastern Indonesia where it was applied to large outriggers. As part of the interaction between the Luzon Straits and the SE Asian mainland, the Austronesian term was borrowed into Mon and thence into other Austroasiatic languages. Mangic (isolated in China among Daic languages) could be a direct borrowing from Tai-Kadai rather than inherited from its apparent Austroasiatic relatives. This suggests that when the large sailing boat was introduced, it rapidly spread across the region, and was adopted and adapted by speakers of different language phyla, perhaps reflecting the busy trade in nephrite and other trade goods around the region (Hung et al. 2007). However, once in contact with the mainland the term would be applied to the smaller river boats, without outriggers.

The issue of exactly what technical innovation allowed for the explosive dispersal of PMP speakers has been widely discussed. Some form of outrigger is the most credible hypothesis, but the absence of large seagoing outriggers in the Northern Philippines today makes this difficult to test. The PMP reconstruction **saReman* 'outrigger float' is only supported by reflexes in Eastern Indonesian languages, with no Philippines cognates. Interestingly, Chamorro does have a reflex, *sakman*, but this only applies to a large boat, not an outrigger. PMP **katiR* 'outrigger float' *is* supported by Philippines reflexes and is otherwise attested in Western ISEA. This suggests that outriggers were present in the Luzon Strait at an early period, but that the boat builders set off in two distinct directions, southwards down the west side of the Philippines towards Borneo and directly towards Eastern Indonesia and onwards to the Bismarcks and Vanuatu.

Blust (1995, ACD) suggests that the sail was already present in PAN. However, this is unlikely. The two Formosan potential cognates supporting PAN **layaR* are given in Table 9. Only one, Kavalan, applies to the sail, suggesting that this is either an independent transfer of the word from 'cloth' to sail by analogy, or simply a borrowing.

[4] ? < Malay or Tamil.

Table 9. Evidence for a PAN term for 'sail'

Language	Form	Gloss
PAN	*layaR	sail
Kavalan	RayaR	sail of a raft or boat; cloth around a threshing machine
Paiwan	La-laya	a flag, banner

However, **layaR* is omnipresent in PMP, attested from Nias to Polynesia, surely pointing to a highly visible innovation. As Table 4 for 'jellyfish' reminds us, Kavalan is sometimes the only evidence for PAN forms, which makes borrowing more than a possibility.

Material Culture

Austronesian material culture is wonderfully various and has been enriched by influences from every direction over five millenia. Nonetheless, it is some ways highly conservative, with iconography which is preserved from Luzon to New Zealand (Blench 2012). This section focuses on a few examples of Formosan material culture, which have a patchy distribution in the Austronesian world, pointing to the opportunisitc nature of the early dispersal from the Luzon Straits.

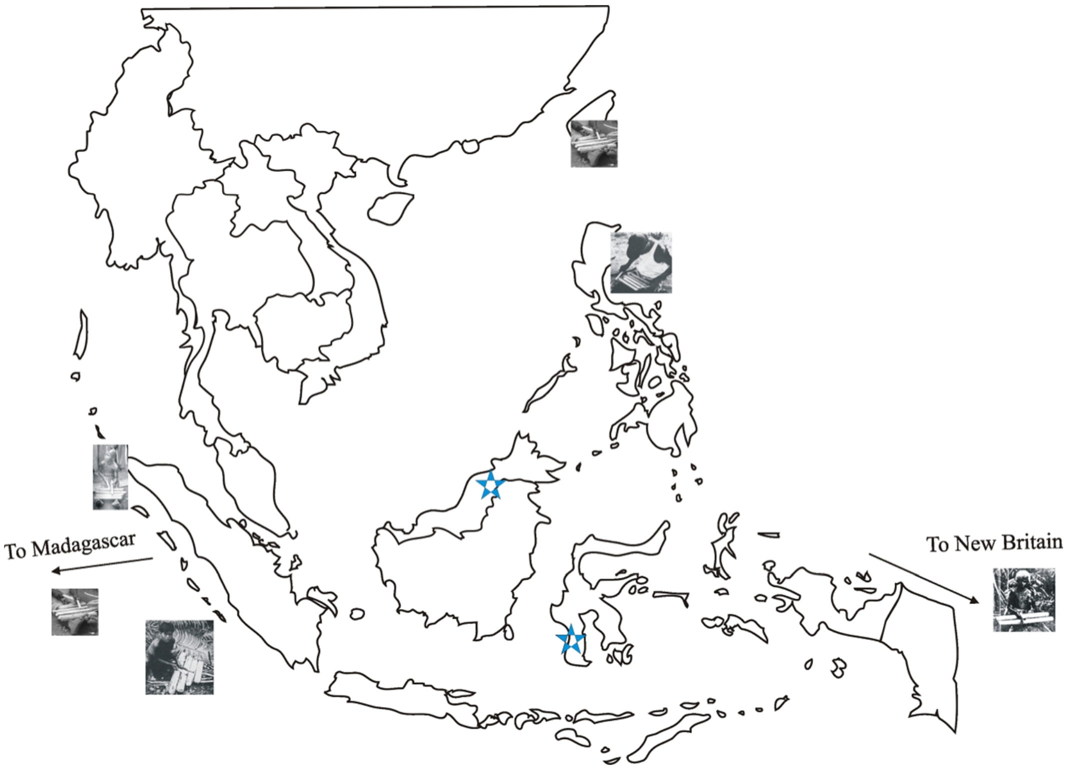

Photo 1. Amis leg-xylophone
Source: Author photo, Shun Ye Museum

The leg-xylophone

One of the simplest forms of the xylophone is the leg-xylophone, where the player simply lays a number of bars across his or her legs and beats them with one or two sticks. The leg-xylophone is found in two regions of the world, Africa and the Austronesian region, occurrences that are probably unconnected. The leg-xylophone is known from the Amis people of Taiwan. A photo on display in the Shun Ye museum in Taipei shows the keys laid transversely across the player's legs (Photo 1). Kunst (1940) mapped the leg-xylophone (he calls it 'thigh-xylophone') in insular SE Asia as far as the information was available to him at the period, recording it in Nias, Mentawei[5], Borneo and south Sulawesi. However, it also occurs in the Northern Philippines. The Itneg people in the Northern Cordillera play a five-key leg-xylophone, *taloŋgatiŋ*, probably forming a pentatonic

[5] Philip Yampolsky points out the Mentawei instrument is not a true leg-xylophone as it has been transferred to bars restring on the ground.

scale (Maceda 1998: 226 and image). Otherwise it is found only at the margins of the primary expansion of PMP, on the barrier islands of Sumatra, in Madagascar and in New Britain, New Ireland, the Duke of York islands, Tami and Morobe province in Eastern Papua New Guinea, although there it is reduced to only two keys (Sachs 1928; Collaer 1965: 102; Fischer 1958: 12; Kunst 1967: 41). Map 1 shows the Indo-Pacific distribution of the leg-xylophone. This suggests that it was carried from Taiwan, but only directly across the Luzon Strait, but otherwise to Oceania, and to western Sumatra. This highly selective distribution is characteristic of the early dispersal period, where individual vessels may have reached remote locations directly.



Map 1. The leg-xylophone in the Austronesian area

The shark rattle

We do not usually look to sharks as typical audiences for musical performance, but in one case this is an opportunity that may have been overlooked. Scattered across the Austronesian world, is a very distinctive sound-producer, shaken underwater in a performance intended to 'call' sharks. The shark rattle is made of a curved rattan with dried fruit-shells attached by cords, as in the example from the coast of North Papua. The record nearest to the Austronesian heartland is in the Sulu archipelago, among the Sama (Maceda

1980). Similar implements are found in New Ireland (Photo 3), in Samoa (Hiroa 1930) and probably across much of Polynesia. No records of anything similar are found in either Eastern of Western ISEA, suggesting that these originated with the seagoing populations of the Philippines and were carried directly to the Oceanic/SWHNG area (Photo 2).

Photo 2. Shark-calling rattle, North Papuan coast. Source: Author photo, Museum Loka Budaya, Abepura

Photo 3. Shark rattle, New Ireland Source: CC

Bamboo bird-scarers

A characteristic item of material culture found in certain parts of the Austronesian world is the split-bamboo bird-scarer. It consists of a bamboo internode with a rectangular hole cut through one half of the tube. The tube is split lengthways so that the two halves rattle against one another when it is shaken, either by the wind or by hand. Several may be mounted in a frame or a single instrument held in the hand. In most places, this instrument is used to scare birds from the fields. Photo 4 shows some examples of these bird-scarers, collected among Formosan peoples. The same use is recorded in Sulawesi (Photo 6) and more surprisingly in Madagascar (Sachs 1938). However, in the Northern Philippines the same instrument is used by Ifugao priests to 'cleanse' houses annually of residual evil spirits (Photo 5). Part of the interest of the split-bamboo bird-scarer is its highly distinctive morphology; such sound-producers are found nowhere else in the world. Since the noise is intended to deter birds from growing millet or rice, it is a characteristic product of a cereal-growing society, evidence that there were some cereal cultivators present among the earliest voyagers in the Luzon Straits.

Photo 4. Formosan bird-scarers.
(Source: Author photo, Shun Ye Museum)

Photo 5. Ifugao priests with bamboo split-rattles. (Source: Maceda Archive)

Photo 6. Sulawesi bird-scarer (Source: Author photo, La Galico Museum)

Shell discs

The Philippines and the Solomons in particular are connected by a tradition of incised circular shell discs. All the peoples of the highlands of northern Luzon make bandoliers from shell discs with incised patterns (Photo 7). The shells are marine shells and therefore must be imported from the coast, which provides a hint to their original context. In Santa Cruz and some other islands in the Solomons, these type of incised shells are used as brow ornaments (Photo 8). The remarkable similarity of these two traditions (and an apparent absence of similar ornaments in the region between them) provides a neat illustration of the early rapid dispersal as far as Oceania.

Photo 7. Ifugao shell discs. (Source: Author collection)

Photo 8. Santa Cruz incised shell ornament. (Source: Author photo, Honiara Museum)

Rattan and coconut fibre armour

The concept of using armour (and helmets) to protect individuals in warfare may seem obvious but is characteristically Eurasian and is unknown in Africa and Melanesia (except in Austronesian-influenced areas). In the Americas, it is only found in the Pacific Northwest. Rattan armour was made in Taiwan (Photo 9) and versions of it are found across much of the Austronesian region, sometimes evolving through the use of different materials and in particular refashioned in metals when these were introduced. The broader concept of this type of armour was known in the Philippines, although by the time of European contact, the fibres had been replaced by metal sheets. Armour extremely similar to the Formosan type is found along the north coast of Papua (Photo 12). The Toraja in Sulawesi used cuirasses which also correspond to the Formosan type, but made of leather (Photo 10). Among the Nias people it was developed into thin metal sheet armour (Photo 11) and in Micronesia fish-skins were used, for example among the Gilbertese.

Photo 9. Rattan armour, Taiwan. (Source: Author photo, Shun Ye Museum)

Photo 10. Toraja leather cuirasse. (Source: CC, Yale University Art Gallery)

Photo 11. Nias metal sheet armour. (Source: CC, Tropenmuseum, Amsterdam)

Photo 12. Rattan armour, North Papua. (Source: Author photo, Museum Loka Budaya, Abepura)

The foot-braced backstrap loom

An intriguing piece of evidence supporting early dispersal to Hainan island comes from a subtype of the loom. The backstrap loom is known over much of the Austronesian world, although it is lost in Oceania. However, the form of the backstrap loom in Taiwan is foot-braced (Photo 13), a rare and inconvenient type of loom which has been displaced elsewhere in the region by various types of frame-loom (Buckley in press). The only other place the foot-braced backstrap loom also survives is on Hainan island, among the Hlai speakers and in a small zone of the Vietnamese-Laos borderland. The most likely interpretation of this distribution is that the foot-braced loom was carried to Hainan and the mainland as part of the earliest PMP dispersal. An innovative frame-loom from the mainland rapidly displaced it everywhere but Hainan, which was inaccessible in the same way as the interior of Taiwan.

Photo 13. Taiwan, foot-braced loom (Source: Author photo, National Museum of Taiwan)

Interpreting New Genetic Data

Four thousand years ago both the island of Taiwan and the Chinese mainland opposite would have been extremely ethnolinguistically diverse, with many more languages present than are spoken today. Most probably those languages could be described in present-day terms as Austronesian. Subsistence strategies would have been comparably varied, ranging from cereal agriculture to specialised fisheries and a foraging lifestyle. At this period, Austromelanesian hunter-gatherers were presumably still present and this may be the source of some of the 'Formosanisms' not attested elsewhere in Austronesian. The only maritime technology would have been bamboo rafts, suitable for crossing protected seas, but dangerous in open oceans subject to cyclones.

In the Luzon Strait, an innovative maritime technology developed which allowed long-distance navigation, and certainly involved the use of outriggers and sails. Seeking natural resources and new fishing grounds, a mix of populations set off in different directions both to explore the open ocean, the islands and to reconnect with the mainland. The technology allowed them to range widely, and rather than settling the Philippines and proceeding sequentially to other locations, they rapidly reached a scatter of different destinations, hence the near-simultaneity of archaeological dates. The multi-ethnic nature of the crews ensured that both different lexical and material culture was dispersed along the routes being newly pioneered. New traffic with the mainland brought innovative cultural practices to the region displacing practices brought from Taiwan, which survived only in peripheral sites.

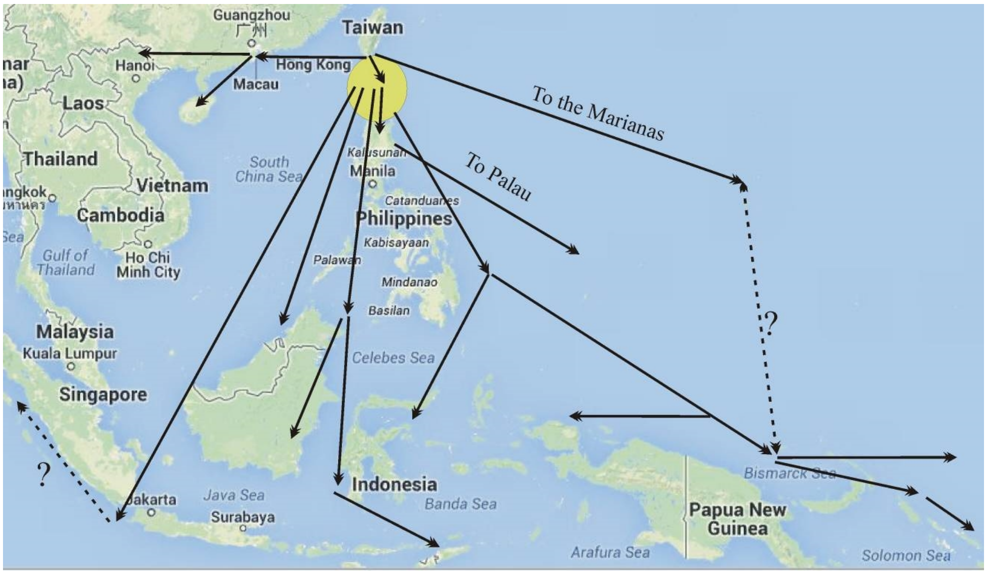
Excavations at the cemetery of Te Ouma in Vanuatu are now producing striking results, in terms of both phenotypic characteristics and genetics (Skoglund et al. 2016; Reepmeyer et al. 2015). Te Ouma dates to the earliest settlement of Vanuatu. Both physical anthropology and genetics suggest that the earliest burials are resemble closely the populations of the Luzon Straits and not the Bismarcks or another intermediate location, such as is suggested by linguistics. It must be assumed that future archaeology will produce similar results in the Admiralties and other islands within both Remote Oceania and in Fiji. The interpretation must be that at least part of the early dispersal from the Luzon Straits included individuals of ISEA phenotype. After the primary migrations to the Batanes, they travelled down the east side of the Philippines and Sulawesi, with one group possibly diverting westwards to Sulawesi, if preliminary reports on dentate-stamped ceramics are confirmed. Somewhere north of New Guinea, one group split from the flotilla of canoes and travelled westward, becoming the ancestors of the SHWNG languages. The main body travelled on towards the Admiralties. Although they must have encountered Austromelanesian populations there, they did not immediately mix with them genetically, but instead sailed on in different directions, reaching the Solomons, Vanuatu, Fiji etc. extremely rapidly. This phenotypic separation may reflect economic divisions; the ISEA component may have been specialised in fishing from offshore atolls, while the Austromelanesians cultivated vegetative crops on the land.

After a couple of generations, these social barriers began to break down, intermarriage began, the impulse which created the Lapita ceramics eroded and mixed phenotype individuals began following the routes pioneered by the initial migrants. They then rapidly breached the genetic isolation of the first settlers, leading to the current pattern. Presumably, however, the migrants had reached Samoa and Rotuman and the ‘second wave’ migrants did not quite reach those places, hence the Polynesians retained the ISEA phenotype. This is not to say there was no mixing, since genetic studies persistently show that Polynesians have some Austromelanesian components, although expressed quite differently from Fijians. Similarly, the ‘aberrant’ languages of South Vanuatu and New Caledonia reflect a distinct phase of the ‘second wave’.

It cannot be underlined too strongly that this re-analysis is at the earliest stage of rethinking the Austronesian expansion, and much more work needs to be undertaken on both material culture distributions and the history of individual lexemes. With these caveats, Map 2 presents an extremely tentative scheme of the routes that may have been established in the early period when PMP was developing.

Two important conclusions inevitably follow from these new findings;

a) The Austronesian settlement of ISEA and the Pacific are not divisible events which can be studied separately and they do not occur in a tidy sequence, but rather reflect a chaotic expansion characterised by rapid movement across vast distances, cross-cutting and turning back
b) The genesis of the typical 'mixed' phenotype of Vanuatu, New Caledonia and Fiji also emerged in a complex process subsequent to the major wave of migration, not at the root of it.



Map 2. The dispersal of early Malayopolynesian

Rethinking the Historical Linguistics of Austronesian

This has important implications for the historical linguistics of Austronesian, but also perhaps more generally for how we reconstruct prehistory more generally. The PMP hypothesis, analogous to PAN and Oceanic, assumes a unitary culture and language in the Luzon Strait, around 4000 years ago. This would appear to be supported by phonological and lexical innovations characterising PMP. However, it has been shown on archaeological grounds that some PMP reconstructions simply cannot be correct (Blench 2012a,b). This is because the reflexes of proto-forms which are supposed to support the reconstructions have been transformed by analogy with the prevailing phonological environment. Unfortunately this may well be true of many more PMP forms which we cannot test archaeologically. On the basis of the typically intercultural nature of sea-voyages, the evidence from both the lexicon and the distribution of material culture supports a more complex picture. The paper suggests that if the patterns of roots in Austronesian are analysed, many PMP roots have a distinct geography, arguing that they reflect the opening up of sea routes by different groups.

Figure 2 represents this contrast graphically. In an ideal version of PMP, reflexes of a proto-form in modern-day languages lead tidily back with regular correspondences and crucially are dispersed in an even fashion geographically. In version 2, PMP is a chain of overlapping lects, representing populations speaking different although related languages, sometimes travelling together, sometimes setting off with a monoglot crew. Different reflexes go back to different early forms, cross-cutting one another and being regularised by analogy. This much harder to analyse and characterise, but closer to the real world we can reconstruct.

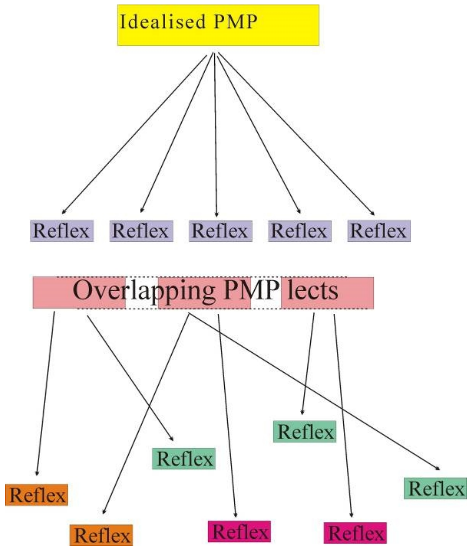


Figure 2. Idealised and Realworld PMP

If so, this leads to the inevitable conclusion that there was never a unified culture in the Luzon Strait, to be identified with a reconstructed PMP language. Rather there was a 'common PMP' a nexus of related lexemes and related lifestyles which reflect a zone of interaction between Taiwan, the Northern Philippines and unknown languages on the Chinese mainland. This 'boiling pot' in the Luzon Straits was the starting point for exploratory voyages carrying 'words and things' in all directions round ISEA, the mainland and Oceania. A flexible, nomadic seagoing culture with no necessary return to a starting point created a series of independent branches of a proto-language, characterised by a variety of contact phenomena. Hence the distribution of material culture with its regional biases, the odd distribution of faunal names noted by Blust and the difficulties in classifying WMP.

These new results also have consequences for our understanding of Oceanic. Oceanic has always been the most well-supported of Austronesian subgroups, with an elaborate series of reconstructions reflecting every aspect of the lexicon (e.g. Ross *et al*. 2008, 2011). Nonetheless, the branches which compose it are more and less well-behaved. Those which show rather irregular or few correspondences with proto-Oceanic forms, including Vanikoro, Utupuan, Reefs/Santa Cruz and some languages of New Britain, are classified as 'aberrant'. Utupuan languages in particular show so few resemblances to proto-Oceanic that to try and account for this by normal erosive processes over 3000 years strains all credibility. However, if we assume that many of these islands were the subject of multiple subsequent waves of migration, in part composed on individuals deriving from non-Austronesian cultures and languages, then the aberrancy becomes far more explicable. But we must then assume complex processes of levelling over millennia which have led us to construct a uniformity in the proposed proto-language and its reflexes which simply do not reflect attested history.

This also points to a more general conclusion, that we have to be wary of placing excessive trust in reconstructed proto-forms. Historical linguists are in many ways idealists, imposing a tidy picture on prehistory in the quest for a science-like approach to reconstruction. However, any informed image of early human societies suggests that it was characterised by mobility and complex mixing thousands of years ago as much as they are today and that this will be reflected in modern-day languages if we know where to look.

A great deal of publicity has recently been given to 'new mathematical methods' for classifying languages and Austronesian has been in the front line. Purportedly innovative Bayesian phylogenies currently in fashion are applied to language history (e.g. Greenhill et al. 2010). Published in hard science journals they are a triumph of style over substance and have typically succeeded by simply not answering the objections of their opponents, an approach associated with the grandly-named Institute for the Science of History in Jena. Their methods produce trees based on a series of binary splits, and by their very nature *cannot* result in the type of model proposed in this paper. This is not an argument for the correctness of this model but *if* such a model of the past is plausible, then these methods exclude it structurally. This would appear contrary to scientific method as usually conceived. Archaeology and genetics are beginning to impose a far more nuanced approach to linguistic stratification than has previously been the case. At every level, Austronesian reconstruction may have to be rethought.

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"EX ORIENTE LUX": RECENT DATA FROM LAPITA CULTURE SITES BEARING ON THE AUSTRONESIAN DIASPORA WITHIN ISLAND SOUTHEAST ASIA

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Introduction

I use the Latin phrase Ex Oriente Lux or "Light from the East" not in its conventional sense of a source for civilization – conventionally from the Middle East spreading into "Barbarian" Europe during the Neolithic or Bronze Age (cf. Childe 1929; 1934) - but in terms of a source of novel insights into Austronesian colonization revealed by recent archaeological research on the Lapita culture in Vanuatu and elsewhere in the South Pacific (Kirch 1997 remains a useful overview of Lapita). These insights concern the chronology and speed of spread of Austronesian-speaking (henceforth AN) groups in the region, aspects of political economy and ideology including details of burial practices, sociolinguistic processes, and also aspects of biology investigated through craniometric and genetic analyses of Ancient DNA (aDNA).

Neolithic Chronologies

Advances are occurring in radiocarbon dating all the time, both technical such as the development of AMS dating of very small samples and new methods of pretreatment of bone and other 'difficult' samples, and theoretical, such as the application of Bayesian analysis to questions of radiocarbon calibration. These mean that we must continually reevaluate the chronologies that are being used in discussing issues such as the dating of Neolithic expansion beyond Taiwan. In the Pacific much useful work has been done in re-evaluating site chronologies by either re-excavating some of the classic sites or by dating archived samples from them. In Island Southeast Asia (henceforth ISEA) one thinks of the major project conducted by Graeme Barker and colleagues at Niah Cave in Sarawak, involving both 'keyhole' excavation of parts of the site and a major program of re-evaluating field records and archived samples from Tom Harrisson's excavations of the 1950s to 1960s (Barker 2013 & forthcoming). Much clarification has been made of the cultural sequence at this key Pleistocene and Holocene site.

As regards the Lapita culture, denoting the eastwards extension of ISEA Neolithic culture into the Pacific, there is currently a major re-evaluation underway of its timing and the rate of its spread Figure 1). For Remote Oceania, that area of the Pacific beyond the parts settled some 50,000 or so years ago and completely uninhabited prior to Lapita, we are at last getting some clarification. It seems that Remote Oceania was not reached until about 3000 BP and then settled out as far as Samoa within 150 years at the most (Burley et al. 2015; Nunn and Petchey 2013; Petchey et al. 2014, 2015; Sheppard et al. 2015).

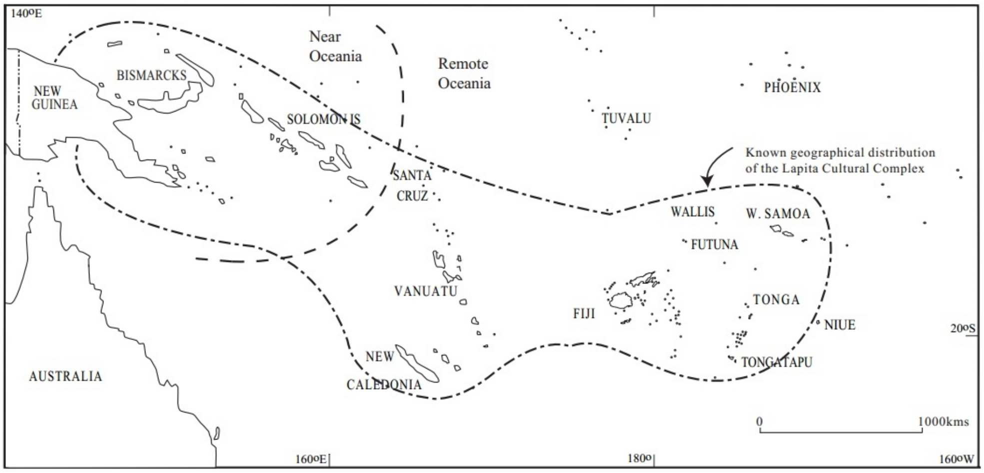

Figure 1. The Lapita Cultural Complex (courtesy of Stuart Bedford)

This new chronology and the comparisons of changes in Lapita pottery styles suggest that previously accepted dates of 3500/3450 BP for initial Lapita settlement in the Bismarck Archipelago to the immediate east of New Guinea (Kirch 2001) must be much too early. Even the more recent semi-consensus of about 3300BP (Summerhayes 2007) seems at least 150 years too early on the basis of the close similarity of early Lapita pottery c. 3000 BP in places such as the Reefs-Santa Cruz and Vanuatu archipelagoes in Remote Oceania and that of the earliest Bismarcks sites (Figures 2 & 3).

Figure 2. A complete Lapita pot from Teouma, Vanuatu, imported from New Caledonia (photograph: Philippe Metois)

Figure 3. Detail of dentate-stamped decoration from Teouma

Unfortunately, we do not yet have reported sites in ISEA that have close parallels in pottery decoration with the early Lapita sites, although a site in northern Sulawesi presented at the recent Lapita conference in Vanuatu in July 2015 would seem to start to fill in this gap (Reepmeyer et al. 2015) and there are other pertinent sites across ISEA (Spriggs 2011). My prediction would be that when such sites are found and dated in ISEA that they will not date much before Lapita in the Bismarcks and will suggest a rapid spread across ISEA by Neolithic groups; something also suggested by the aDNA to be discussed later on in this paper. The dating of the ISEA Neolithic needs a major re-evaluation – yet again (see Spriggs 1989, 2003, 2007 for earlier attempts) - in the light of these new Lapita findings, just as has recently been the case with the dating of the earliest sites – SE Asian-derived – in the Mariana Islands (Petchey et al. 2016).

Neolithic Political Economies

The greater density of Lapita sites in the Western Pacific and the recent investigation of well-dated Lapita cemeteries and burials have meant that attempts can at last be made to develop (arguably) credible models of Lapita political economy (for a recent attempt see Earle and Spriggs 2015). These may well have implications back into ISEA, when looked at comparatively as an example of “macroregional phases of conjuncture” in Helle Vandkilde’s term, ‘hotspot’ periods of rapid cultural change when “foreign impulses are actively and creatively incorporated and identities rapidly and profoundly change” (Vandkilde 2007:16-17). As put earlier by Lotte Hedeager, “during a relatively short period of time a new ritual universe and a new cosmology were established” (2000:51).

As significant, however, as these periods of rapid change are the ‘slow downs’ that inevitably follow, when inter-regional exchange declines and communities become more focused on their own region, their own island (cf. Pawley 1981). The comparison of archaeological sequences of such periods is instructive, as I have tried to point out in a series of recent papers comparing Lapita and its aftermath with, for instance the Neolithic Linearbandkeramik spread in Europe (Spriggs 2016a), wider aspects of the prehistoric sequences of northern Europe (Spriggs 2013), and more general examples of migration and rapid cultural spread (Spriggs 2016b). These various parallels can help to build a truly-comparative world archaeology, based on evolutionary and/or political economy models. This is an archaeology we need to engage with to help us 'think outside the box' of our own regional specialization.

One parallel is in early Neolithic burial practices as exemplified by the Lapita cemetery at Teouma on Efate in Vanuatu (for an overview see Bedford et al. 2010). Teouma revealed complex burial rites involving manipulating skeletons, such as by the removal of heads and other skeletal elements. This suggests extended revisiting of burials. Burial in pottery vessels, paralleling practices in the ISEA Neolithic, also occurred (Valentin et al. 2015). The cemetery was a place where ancestors were encountered directly, as they remained participants in a living cross-generational society (Valentin et al. 2011). In the cemeteries of the succeeding two millennia in Vanuatu, simple inhumation replaced these complicated Lapita rituals. The burial of intact bodies represents a shortening of mortuary activities to a single primary event, representing a changing societal relationship between the living and the dead. Descent rather than group membership was emphasized (compare Thomas [2001] for British Neolithic funerary practices and parallel changes therein). The Late and Post-Lapita concern, we suspect, was to establish land inheritance through descent from particular ancestors (Valentin et al. 2014).

Earle and Spriggs (2015) had difficulty constructing a solid model of Lapita political economy, partly to do with a seeming lack of relevant data contained in the archaeological record, but also precisely because of conceptual difficulties in characterizing such phases of rapid cultural change. Our conclusion was that Lapita political economy could not be based on staple finance, control over agricultural or reef resources, as these were widely available and open to all (see D'Altroy and Earle 1985 for terminology). Although previously Lapita has often been typified as based on a wealth economy of prestige goods exchange (Friedman 1981, 1982; Hayden 1983; Kirch 1991), we could find little convincing evidence of this.

The highly-decorated Lapita pots were rarely exchanged beyond their community of manufacture. Shell ornaments could to some extent have fulfilled this role, but the evidence again is that they were very widely manufactured and the shell species in question were available throughout the Lapita range (Szabo 2010). Perishable goods such as pandanus mats (perhaps the inspiration for the decoration on Lapita pots (Ambrose 2015; Casey 1936), or exotic bird feathers – as are featured in Lapita iconography (Spriggs 2015) and as occasional finds of bones of non-subsistence bird species such as hawks in Lapita sites (Hawkins 2015) – are also possible candidates for prestige goods exchange items. At first glance obsidian might be such a widely-exchanged prestige good (Figure 4), but its treatment once imported into far communities did not suggest that it was considered as such (cf. Sheppard 1993; Summerhayes 2009). Indeed obsidian and the occasionally exchanged pots were considered by us to be by-products of what I have since conceptualized as "prestige practices" (Spriggs 2016c), rather then being prestige objects in themselves.

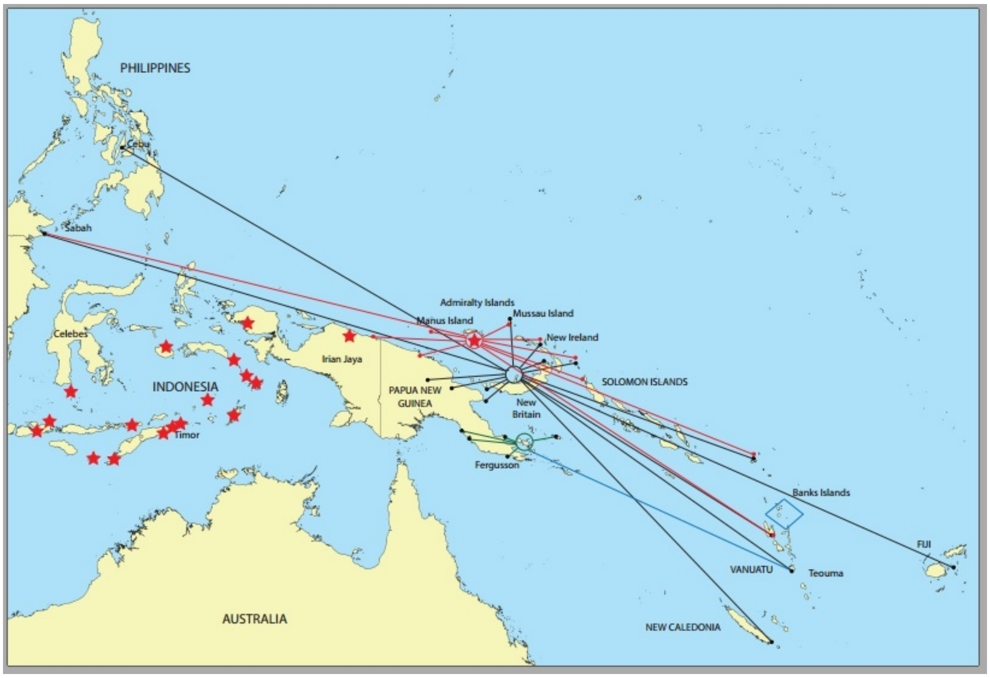

Figure 4. The distribution of Obsidian in the Western Pacific and parts of Island Southeast Asia c.1000BCE (original by Wal Ambrose, redrawn by Richard Potter). Red stars show distribution of Early Metal Age Dongson drums and other metalwork from Ist Century BCE onwards, showing continuing contacts between ISEA and the Western Pacific

Thus the distribution of obsidian would seem to be by-product of the prestige practice of tattooing, given the blood residues found on the rare examples of a formal obsidian tool type, the 'graver' (Kononenko 2012). Other prestige practices might include craft and ritual specialisations such as priest, healer and bone-setter, war or hunting tactician, first farmer, prospector, stone adze maker, first settler, wrapper of dead people, and so on. A chief is engaged of course in a prestige practice, one that needs to be constantly performed and re-stated; but we must remember that the chiefly role in any society is only one among many, and our conceptualization of all powerful chiefs at the top of an apical hierarchy is surely wrong for most societies. We concluded that Lapita represented an open and contested political economy, with few resources able to be monopolized by would-be chiefs (Earle and Spriggs 2015).

In terms of a bottleneck that could have led to the concentration of political and economic power within Lapita groups we were forced to concentrate on the voyaging canoe itself, and the associated prestige practices of boat building, navigation, and provisioning long-distance voyages. Only by owning such a canoe could a would-be chief control to some measure the movement of persons and products. Earle and Spriggs thus concluded that: “distant voyaging created some potential for a small-scale hierarchy within Lapita groups, but local alternatives for status objects and the lack of a property system to mobilize staples would have made such a political economy only weakly channeled to support power relationships” (2015:522).

In Earle and Spriggs’ model putative chiefs were able to monopolise long-distance travel because it was expensive (the ‘costs’ of canoe-building and skilled navigation) and required much ritual as well as technical preparation. Such a monopolization of ownership led to control over the movement of any prestige goods as well as over provision of eligible marriage partners, to the extent that this required recruitment from outside the immediate community. We concluded, however, that for Lapita it is the maintenance of long-distance symbolic relationships that was actually significant for underwriting the political economy rather than the movement of material goods.

If Early Neolithic ISEA cultures were anything like Lapita, and given that Lapita developed from them this would be most likely the case, we need to examine if such a model of open and contested leadership and the importance of prestige practices rather than prestige goods applies. In Lapita our conclusion that pottery was not widely exchanged between islands comes from a combination of petrographic and chemical examination of archaeological collections (Dickinson et al. 2012; Leclerc 2016). Much more remains to be done in this regard in ISEA. Lapita stone adze exchange patterns have also not yet been looked at in any detail.

Obsidian sources are more widespread in ISEA than in the Western Pacific, suggesting less of a bottleneck in this regard in the former region (Reepmeyer et al. 2011; Spriggs et al. 2011). What the obsidian was used for in the Early Neolithic, however, remains to be researched. Finds of Pacific obsidian in ISEA have been made at Bukit Tengkorak in Sabah (from both West New Britain and Manus sources: Chia 2003) and from an open site on Cebu in the Philippines (of West New Britain origin). In this regard too, we should not forget the Jadeitite gouge from the Sentani Lakes area of West Papua that was found in a Lapita site on Emirau in the St Matthias Group of the Bismarck Archipelago (Harlow et al. 2012).

Again, one cannot help but think that the occasional presence of exotic obsidians and other stone artefacts is incidental to some other activity that we cannot examine directly in the archaeological record – continued relations between widely-separated ISEA and Lapita communities perhaps involving prestige practices of a religious and ritual nature, or marriage links. Voyaging also had the potential to confer and legitimise social control through associations with ancestral power and the supernatural, as Mary Helms (1988) has reminded us. It would thus seem that possession and control of voyaging canoes would have been as important in ISEA, given its archipelagic nature, as in the Western Pacific.

Neolithic languages

I have previously raised the issue of how many Neolithics there were in ISEA, by which I mean how many Neolithic expansions contributed to the picture of Neolithic life there (see Spriggs 2012 for instance). Three immediately spring to mind (Figure 5): the AN-speaking expansion out of Taiwan that is the most referred to, a possibly Austro-Asiatic expansion deriving more directly from Mainland Southeast Asia (henceforth MSEA) and particularly affecting Sumatra and parts of Borneo and Java but also seemingly introducing the domestic dog and pig to ISEA more generally, and the spread of crop plants (and what else one wonders?) from a New Guinea source – one of the few independent centres of agriculture in the World. All along we have assumed that these must represent single movements (except perhaps in the case of the spread of New Guinea crops where a more gradual process is envisaged). But single movements are purely an assumption. One can imagine other models of Neolithic spread – either a continuing migration stream over a certain period of time, or even punctuated (i.e. independent) movements at different times from particular source areas such as Taiwan.

Figure 5. Map of major Austronesian Language subgroups and of Papuan languages in the Asia-Pacific region (courtesy of Malcolm Ross)

Historical linguistics is by no means as helpful here as it is usually considered – not least by the linguists themselves. If we look at a map of AN 'subgroups' in our region (Figure 6), it is informative that 9 out of the 10 primary subgroups can be found in Taiwan (Blust 2009). This strongly suggests Taiwan as an origin point. Archaeology backs this up with a long record of Neolithic development prior to settlement beyond that island into the rest of ISEA, lasting at least 1500 years. The tenth subgroup is Malayo-Polynesian, consisting of all of the rest of the AN languages in the world from Madagascar in the west to Hawaii and Easter Island in the east. All of these languages derive from Proto Malayo-Polynesian, but where was that spoken? The answer is that apart from it being in ISEA outside of Taiwan we simply do not know. Linguists have never observed human expansions using Neolithic technologies over vast spreads of space, such as across ISEA or across the Lapita distribution, and so there are no modern parallels they can draw upon to explain or categorise them. But the archaeology may well be able to give them some clues, if they would care to listen.

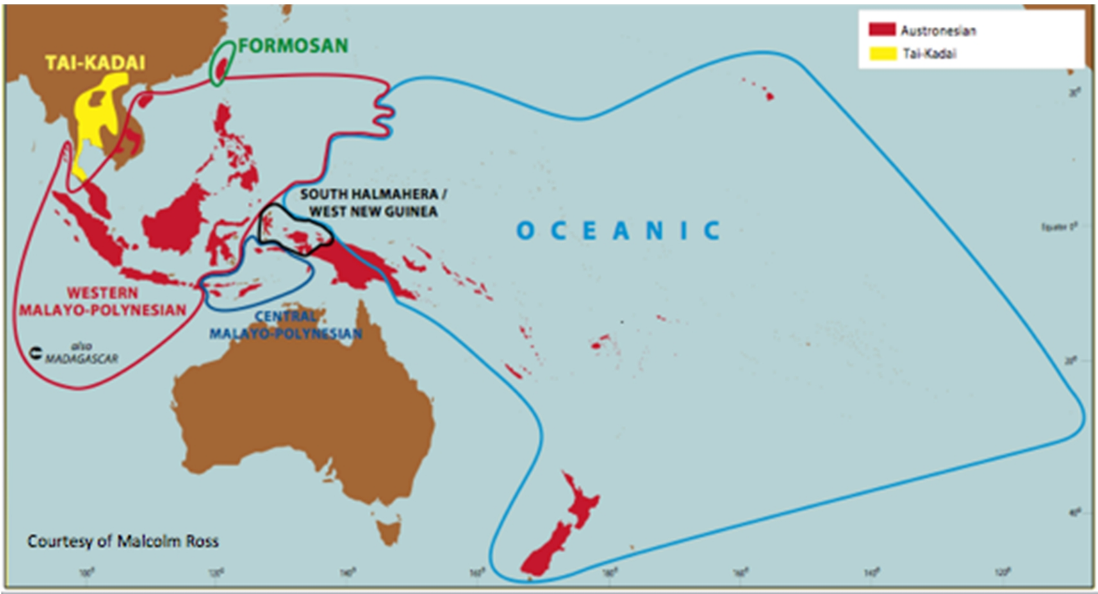

Figure 6. Map of major Austronesian Language subgroups and of Papuan languages in the Asia-Pacific region (courtesy of Malcolm Ross)

The Oceanic AN languages are today found throughout the area where the Lapita culture spread and beyond among successor cultures in Polynesia, for instance, that were in areas settled later. All would agree that they derive from Proto-Oceanic, usually thought to have been spoken in the Bismarck Archipelago (Pawley 2002, 2007). This is very largely based not on any particular linguistic features but on the believed coincidence of the Oceanic homeland being the same as the Lapita homeland in that region. It is then believed that as the Lapita culture spread so did dialects of Oceanic, differentiating as they went. But the Oceanic family tree in fact shows precious little evidence that this was in fact the case. I would assert that Proto-Oceanic was spoken throughout the Lapita realm from the Bismarcks to Samoa with very little differentiation.

This is not a popular view among linguists who assert that a single language community could not have been maintained over such a vast area. But why not? Apparently it is because no linguist has ever observed such a phenomenon in the 'traditional' world, unaffected by modern globalization. The Lapita culture, however, we are now coming to realize spread across its entire range very quickly indeed. It may have formed a single society – Gosden and Pavlides' (1994) 'supercommunity' - of small groups of highly mobile settlers exploiting developments in canoe technology. Individuals could have ranged during their lifetime across the entire Lapita range – found one year in Tonga, some months later in New Caledonia, and the following year in the Arawe Islands off New Britain. Such mobility, unknown in the Pacific again until the 19th century advent of regular sailing and then steamship schedules, is outside of linguistic, ethnohistoric and ethnographic experience, but would help to maintain a single speech community. Once regular voyaging and exchanges ceased, which we know they did for many centuries across the region with the end of Lapita (c. 2700-2500 BP), then the different Oceanic subgroups developed in situ in particular archipelagoes as former ties were broken.

But what of the situation in ISEA? We know that the Western Malayo-Polynesian (WMP) languages do not form a subgroup and also bear witness to major post-settlement language leveling in areas such as the Philippines, so that previous linguistic patterns relating to the early period of Neolithic settlement have been erased (Blust 2009). The implication of this seems lost on archaeologists – it means that the entire WMP area tells us virtually nothing from the linguistic evidence about the early phases of Neolithic AN settlement. It is a historical linguistic 'black hole' for this early period. The Central Malayo-Polynesian (CMP) area is little better in this regard (Blust 1993). Central-Eastern Malayo-Polynesian (C-EMP) is a real subgroup as is Eastern Malayo-Polynesian (EMP), out of which the Oceanic and the South Halmahera-West New Guinea (SHWNG) subgroups developed subsequently (for confirmation of this see Gray et al. 2009, Greenhill et al. 2010).

On this basis and taking note of the parallel situation in the Oceanic area we could postulate that PMP was spoken across much of the area covered today by WMP and by the C-EMP languages to an unknown extent that archaeology in future may be able to sort out . It could represent a very rapid spread out of Taiwan across much of at least of the more eastern side of ISEA – the Philippines, Eastern Borneo, Sulawesi, the Lesser Sundas including Timor, Maluku, and perhaps parts of Java. Related mobile Neolithic groups were the agency of its spread and could have maintained exchange and other social relationships that would have facilitated a period of common PMP development across the region lasting some hundreds of years.

Then a group or groups managed to bypass the large island of New Guinea to continue eastwards, and such regular contact could not be maintained. The AN languages of the region then began to diversify at a faster rate, although this need not imply that all contact between these areas was lost. At some time in the ISEA Neolithic we should therefore expect to see a period when exchange slackens off across the region; that will give us the clue as to when PMP had already diverged into several different subgroups; it may be that we see exchange *within* such subgroup areas continuing at a high rate for a longer period, but any wider, high-density exchange networks across the entire PMP region would have ceased.

It is clear that we do not yet have the density of well-dated Neolithic settlement sites in ISEA to examine these issues, and the cave sites making up much of the record are unlikely to record the patterns of exchange that we are seeking (Spriggs 2011). As I tried to argue in my 2011 paper, we have major sampling problems in examining Neolithic patterns in ISEA. Over the years our theories have been very much underdetermined by the facts. The discourse of ISEA archaeology has sometimes seemed set in stone when its foundations are very much built on sand. It is time to imagine other Neolithics than the ones we have been taught in the past. This becomes particularly clear when we look at advances in genetics, particularly aDNA.

Neolithic genes

In Europe a revolution is underway in our interpretations of prehistory, particularly of the Neolithic and Bronze Age periods because of the application of aDNA analysis, particularly of complete genomes (Haak et al. 2015; Skoglund et al. 2012 are examples). New papers overturning old orthodoxies are coming out almost every month. The general message is very clear: migrations did indeed occur in prehistory, contrary to much recent archaeological theorizing. So it is time to get over this fact, drop tired old processual, adaptationist theories based on the lie that migrations never occurred and start asking new archaeological questions. Recent European highlights include showing that the Linearbandkeramik Neolithic expansion across the north European plains and the Cardial Ware expansion by coastal sailing in the Mediterranean were carried out by the same population (Olalde et al. 2015). We also find that even after several generations of Neolithic farmers in Ireland, as far west as a Neolithic European farmer could have gone, admixture with local pre-existing inhabitants – Mesolithic groups in European terminology – had not proceeded so far as to disguise the origin of these populations from the Middle East - Anatolia in modern Turkey (Cassidy et al. 2016). Little admixture occurred in the first centuries of these agricultural spreads across Europe.

And this is what we find too with recent aDNA analyses of the Lapita populations that spread through the Bismarcks and Solomons and on to Vanuatu and Tonga (Skoglund et al. 2016). The closest living populations in the region today, although not genetically identical given 3000 years of subsequent admixture, are the indigenous Atayal of Taiwan and the Kankanaey of northern Luzon in the Philippines. These early Lapita settlers – termed by Skoglund et al. (2016) as 'First Remote Oceanians" were basically unmixed Asian populations that had seemingly not intermarried or intermixed with populations in Near Oceania when passing through that area. This result was first found, although without the more specific identification we can now make, with the craniometric evidence from Lapita skulls from the Teouma cemetery on Efate in Vanuatu which fitted very much an Asian-Polynesian pattern rather than an Australo-Papuan one (Valentin et al. 2016). One reading of the linguistic evidence in Vanuatu for 'aberrant' languages has come to the same conclusion independently (Blust 2008, building on arguments in Donohue and Denham 2008).

The admixture with Australo-Papuan groups occurred in Vanuatu a few centuries later, albeit probably still within the Lapita period. Such admixture could have occurred later in Fiji, Tonga and Samoa, and needs to be investigated with further sampling of post-Lapita skeletal series. This adxmixture represents a secondary migration stream into Vanuatu and further out into the Pacific that led to intermarriage with the initially Asian Early Lapita groups to form the diversity found in the Pacific today. **All** groups in the Pacific, whether labeled 'Polynesian' or 'Melanesian' are mixtures of these originally very spatially separate populations from Eastern Asia and the Australo-Papuan region; the difference is merely in the proportions of admixture. There is today less Australo-Papuan admixture in Polynesia (although still at least 26% of the genome) and more as one travels back towards the Australo-Papuan source area in the New Guinea/Solomons region and Australia (cf. Wollstein et al. 2010).

The first populations 50,000-plus years ago of both ISEA and MSEA were the Australo-Papuans, and a similar rapid spread of an Asian genotype can be seen in the craniometric analysis of MSEA early Neolithic populations spreading out from what is today South China, again with admixture being delayed with the pre-existing Australo-Melanesian populations (Marc Oxenham, pers. comm.; cf. Matsumura and Oxenham 2014)). We know too that Australo-Papuan populations were present in ISEA during the Late Pleistocene and early Holocene, whereas today this phenotype is only found as dominant among Negrito populations and some Eastern Indonesian groups. Genetically the Negritos represent an early branching off from the Australo-Papuan lineage (Lipson et al. 2014). The suggestion has always been that Neolithic East Asians moved into ISEA and their migrations have produced the pattern seen today.

I do not have the space here to address other genetic evidence relating in particular to the situation in the Eastern Indonesia/East Timor region (Cox et al. 2010; Xu et al. 2012), and the postulated Austro-Asiatic speaking movement from MSEA into Western Indonesia. For the latter there is recent genetic support based on genomic analysis of 56 modern populations suggesting a significant movement from MSEA into Sumatra, Java, Borneo and spreading some way down the Lesser Sunda chain, where however an Australo-Papuan contribution starts to become significant (Lipson et al. 2014, where "Melanesian" stands for what is better termed Australo-Papuan).

What drives Neolithic migrations?

The Remote Oceania Lapita aDNA results have a further implication for ISEA, given that these Early Lapita populations or rather their immediate ancestors must have passed through there as well as through the Bismarck Archipelago region on their way to Vanuatu and Tonga. That implication is that the initial spread through ISEA did not involve any significant admixture with pre-existing Australo-Melanesian populations of the region – such admixture must have occurred only **AFTER** about 3000 BP. So Taiwan-derived Neolithic populations must have been present in ISEA before this date that had not admixed with the people already there, despite having clearly adopted crops of ultimately New Guinea origin during PMP times. There is a problem here if the population we are talking about really arrived in Luzon and spread as far as Timor in the 4000-3800 BP period as has been argued previously (Spriggs 2011). How could they have maintained themselves separately as a population for nearly 1000 years?

The initial response one has is that surely they cannot in fact have kept themselves apart over that period of time and not mixed with the populations already in ISEA. So what is the explanation for the unmixed Asian pattern found in Vanuatu and Tonga in the Lapita aDNA? Two possibilities quickly spring to mind. The first is that, as with the dates for Lapita in the Pacific, a re-evaluation may shorten the period for which an AN-speaking Neolithic culture has been in ISEA. It has to be said, however, that this is a big ask, shaving many hundreds of years off the Neolithic of ISEA to bring settlement down to 3500 BP or later from Taiwan.

The second possibility is that populations continued to migrate from Taiwan throughout the millennium after initial movement into Luzon, either as a migration stream that never ceased, or as a series of separate migration events separated by considerable periods of time. This would allow unmixed populations to move rapidly through an already-Neolithic landscape in ISEA and on into the Pacific – so that the particular population that gave rise to the Lapita settlement of Oceania left Taiwan long **AFTER** initial Neolithic migration into ISEA. They would have to be in ISEA long enough, however, to have adjusted their language to a late dialect of PMP or one of the following stages as the original proto-language began to break up into subgroups. We do not know how long this might have taken, given that the linguists do not seem to have any appropriate modern analogies with which to enlighten us.

I mentioned before that the spread of Lapita across some 4500 km is a process for which there are no obvious recent parallels, and so the linguists have no monopoly of wisdom on how it might have happened and how linguistic change played out. A third possibility is thus that perhaps it really was what it looks like now – that an AN-speaking group was able to maintain itself apart for a thousand years or so in ISEA before spreading out into the Pacific as Lapita.

Whether the separation was for a thousand or only a few hundred years, the obvious archaeological question is how could a group have achieved this. It can only have been through maintaining a very strong ethnic identity, perhaps as a maritime 'chosen people' with a strong religious ideology. In the Neolithic, whether of Europe, MSEA or ISEA, or in the Pacific are we seeing the birth of what might loosely be called 'world religions'? These would be novel and encompassing forms of religious belief, uniting people into believing they had a destiny to fulfill by living a certain way, and settling new lands to maintain that way of life in a rapidly changing world?

A recent comparative study of Austronesian religious beliefs suggests that rather than Abrahamic-like "Moralizing High Gods (MHG)", this religious system may have involved "a broad range of supernatural punishment found throughout ethnic and world religions, including fallible localized ancestral spirits and inanimate processes like karma…referred to here as the broad supernatural punishment (BSP) hypothesis" (Watts et al. 2015:1-2). The results of the analysis suggested that: "the punishing agents that fall under BSP tend to be anthropomorphic beings such as the spirits of deceased ancestors and our results suggest that it is these kinds of supernatural punishers that have facilitated the evolution of political complexity in Austronesia" (Watts et al. 2015:5).

In all cases a point must have been reached, whether demographic, political or social where it became necessary to open up to or even proselytize groups previously considered as 'the other' and to incorporate them. This is what we see in Later Lapita when the crews of the voyaging canoes clearly became filled more and more with people of Australo-Papuan or already admixed groups moving out of the Bismarcks and Solomons into Vanuatu. This led to the genotypic diversity we see in the region today, with the swamping in parts of Remote Oceania of the original Asian phenotype of the Early Lapita settlers (Skoglund et al. 2016). The suggestion of our study was that this secondary migration was primarily of males, intermarrying with resident Asian/Lapita women in Remote Oceania. The idea is not a new one, but the cultural association is a novel aspect – This process happened *during* Lapita in Vanuatu, whereas in the past Pacific archaeologists have been looking for a cultural break *Post*-Lapita to explain it (Valentin et al 2016).

Conclusions

So what light have we obtained from the East? I think there are ten messages for ISEA that should be considered:

1. There is a major need to find and excavate early Neolithic open settlement (as opposed to cave) sites before we can have confidence in any of our models for Neolithic spreads and the nature of Neolithic society. Some of the issues we are starting to be able to discuss in the Lapita realm cannot yet be investigated in a systematic manner in ISEA.
2. We need a major re-evaluation of Neolithic chronologies in ISEA. Did, for instance, the original Taiwan-derived Neolithic spread happen both more rapidly and later than we currently imagine?
3. In trying to reconstruct Neolithic political economies in ISEA, attention must be given to indirect evidence of prestige practices, and not only to supposed prestige goods that may merely be proxies for such practices.
4. In this regard changes in burial practices may be instructive of wider societal changes in ritual, economy and social organization. Detailed recording, direct dating of skeletal samples and study of diet, disease and trauma patterns will allow examination of this.
5. Current linguistic models as applied by archaeologists in ISEA are inadequate to capture the processes and patterns of Neolithic spread in the region; we need to consider a very widespread distribution for Proto-Malayo-Polynesian within ISEA maintained by very mobile populations, as has been postulated for Lapita groups in the Western Pacific in relation to Proto-Oceanic AN.
6. We need to consider whether there was continuous migration out of Taiwan for some time as a migration stream and/or later episodes of significant migration from Taiwan that added to the Neolithic 'mix' in ISEA. This mix was already considerably complicated by a likely Austro-Asiatic settlement from MSEA into western areas and the effects of the introduction of plants - and who knows what else - from the New Guinea region.
7. Potential evidence of such secondary migration from an East Asian source includes the aDNA patterns recovered from Vanuatu and Tongan Lapita skeletons, backed by craniometric analysis, suggesting that these populations derive quite directly from somewhere on or near Taiwan.
8. Another implication of the new Lapita evidence is that admixture with Australo-Papuan groups in ISEA and the New Guinea/Solomons region did not take place during the initial

Neolithic spread; initial Neolithic groups kept themselves apart from these indigenous populations.

9. We need to look for archaeological evidence of what the ideologies could have been that could have maintained this separation – perhaps an ethnicity based on a set of strongly-shared religious and cosmological values that prescribed a certain lifestyle and attitude towards migration.
10. As ISEA archaeologists we need to look outside our own region for parallels with other rapid expansions in history that may provide clues as to the processes involved, and in order to understand seemingly parallel developments across time and space. We will then be able to join a worldwide theoretical discussion on the possibility of an evolutionary comparative archaeology.

This is an exciting time to be involved in studies of the ISEA Neolithic; many of the certainties of the last 40 years are collapsing – as inevitably they should after providing dominant models for archaeological practice for more than a generation. Advances in aDNA mean that the details and timing of broad-scale population movements and interactions can now be assessed, leaving archaeologists to ask what are perhaps now more interesting questions concerning the political economy and identity of expanding groups, and comparing their cultural sequences with similar periods of rapid cultural change elsewhere in the world. Archaeologists too are now better able to critique both linguistic and genetic models, based as both of them have been (pre-aDNA) on information solely from modern distributions of languages and genes with modern analogies that may not at all capture the richness and diversity of the pre-Globalized past.

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THE FORMATION AND DISPERSAL OF EARLY AUSTRONESIAN-SPEAKING POPULATIONS: NEW EVIDENCE FROM TAIWAN, THE PHILIPPINES, AND THE MARIANAS OF WESTERN MICRONESIA

Hsiao-chun Hung

Introduction

Recent multidisciplinary research on the Palaeolithic to Neolithic transition has confirmed several stages of cultural development dated between 20,000 BC and 1500 BC in southern China, Taiwan, and Southeast Asia. The patterns of habitation, settlement, subsistence, and material culture underwent remarkable changes at certain points during this long time sequence, and even whole populations were replaced or massively transformed. This updated synthesis of new research findings will focus the discussion on the archaeological evidence from Taiwan and its neighboring regions, especially from northern Luzon in the Philippines, and the Marianas of western Micronesia.

Palaeolithic Hunter-gatherers in Taiwan

Home erectus: Penghu 1

A recently discovered archaic *Homo* mandible (Penghu 1 澎湖原人) dredged from the bottom of Taiwan Strait suggests the existence of *Homo erectus* (Chang *et al.* 2015) during the late Pleistocene on the land bridge between Mainland China and Taiwan. While some regard the Penghu 1 specimen as belonging to a new species, *Homo tsaichangensis* (McMenamin 2015, Suvad 2015), others have assigned this mandible to archaic *Homo sapiens* (Wu and Tong 2015).

The first modern humans in Taiwan

Since the 1970s, it has been believed that the earliest human remains in Taiwan were those several pieces found by amateur fossil collectors in the Cailiao River bed (菜寮溪) at Zuozhen (左鎮) in southwest Taiwan. The Zuozhen human remains have been identified by Japanese paleontologist Tokio Shikama as *Homo sapiens sapiens*. Fluorine and manganese analyses suggested originally that the bones were about 20,000 to 30,000 years old (Shikama *et al.* 1976), and many Taiwanese archaeologists suggested that they related to the Paleolithic Changbin (長濱) lithic industry of eastern Taiwan. However, recent AMS direct dates on two human bones from Zuozhen stored in the National Museum of Taiwan were only 3000 and 250 years BP (Chiu and Chen 2016). However, Zuozhen has yielded many Pleistocene animal bones from the same area as the human bones, of species including *Stegodon akashiensis*, *Mammuthus armeniacus taiwanicus*, *Rhinoceros hayasakai*, *Stegodon sinensis, Elaphurus formosanus, Muntiacus cf. bohlin, Muntiacus* sp., *Cervus sintikuensis*, *Cervus* sp., *Cervus* sp., *Tomistoma*, *Sus*, *Trionyx*, *Macaca*, *Panthera* and *Bubalus* sp (see Lien 1981), so presumably a possibility still exists of Pleistocene human occupation.

So far, the Changbin chopper-chopping tool industry (Sung 1980) is the most representative Palaeolithic assemblage found in Taiwan, dated as early as 28,000 BC (Tsang *et al.* 2009, 2011, 2016). The major sites are located in the Baxiandong (八仙洞) on the eastern coast of Taiwan. Thousands of pebble and flake tools, and some bone artefacts, have been unearthed from these caves. The Changbin lithic assemblage is similar to Palaeolithic assemblages in southern China and Southeast Asia, so it presumably originated there during Pleistocene periods of low sea-level. Changbin sites are characteristically in caves or rockshelters, with a hunting and gathering subsistence as revealed by animal bones and shells, although palaeobotanical data are not yet available. Scholars such as Chang (1969) and Solheim (1969) compared the Changbin chopper-chopping tool industry with the Hoabinhian of Mainland Southeast Asia, and Bellwood (2007:158) has further pointed to the extension of the Hoabinhian into the larger region that includes southern China and Taiwan.

Although Palaeolithic Changbinian cave deposits are sometimes overlain by middle or late Neolithic cultural layers (Huang & Chen 1990; Tsang *et al.* 2009), nowhere yet has a Changbinian assemblage shown a direct in situ transition into the succeeding early Neolithic. Recently, it is proposed the Palaeolithic Culture in eastern Taiwan can be divided into 2 sub-phases: 1) the earlier *Changbinian Palaeolithic Phase* dated from 30,000 to 15,000 years ago, represented by the majority of Baxiandong in Changbin; and then 2) the later *Pre-ceramic Phase* dated from 6000 to 5000 years ago, represented by Chaoyindong (潮音洞) in Changbin (Tsang 2016), as well as Xiaomadong (小馬洞) in Donghe.

In Taiwan, the only cave with human remains related to the pre-Neolithic Phase is Xiaomadong C5 on the southeastern coast. At this site, a skeleton in a squatting position has been excavated (Figure 1.1), identical in position to other late Palaeolithic skeletons in southern China and Southeast Asia. Two marine shell dates (5770±50 and 5730±50 BP) suggest an age for this burial in the ranges of 6232–5945 and 6181–5916 BP, thus roughly between 4200 and 3900 cal. BC (Huang and Chen 1990).

Figure 1. Human remains from the pre-Neolithic Phase in Taiwan and the Taiwan Strait: 1. A squatting position of human skeleton from Xiaomadong (Huang and Chen 1990); 2. One flexed burial (Liangdao 1) from Daowei I of Liangdao; and 3. another extended burial (Liangdao 2) also from Daowei I (Chen 2013; Chen and Chiu 2013).

Recently, a study on the cranial morphology of this Xiaomadong C5 individual affiliates it with Australo-Papuan populations (ongoing project by Hirofumi Matsumura and the author), as with many Hoabinhian skeletons (e.g. Matsumura 2006), relating it especially to modern Aeta or Agta people (Negritos) in the Philippines (Figure 2). Even until today, there are many legends among Austronesian societies in Taiwan about the former existence of "Little Black People (Negritos)" in the island.

Maritime Hunter-gatherers with Pottery Production in Coastal Taiwan

Between 2011 and 2013, three shell midden sites (Daowei 島尾 I, Daowei II and Baishenggang 百勝港) were excavated on Liangdao Island 亮島, belonging to Taiwan but located directly offshore from the mouth of the Min River in Fujian Province. AMS dating of marine shells and charcoal from Daowei I and Daowei II gave ages for the occupations of 5800–5300 cal. BC and 5600–3000 cal. BC respectively. One flexed burial (Liangdao 1) and another extended burial (Liangdao 2) were excavated in Daowei I, and direct AMS dating of Liangdao 1 placed it at 6380–6204 cal. BC (7380±40 BP), whereas Liangdao 2 was dated to 5512–5374 cal. BC (6490±30 BP) (Chen 2013; Chen and Chiu 2013) (Figures 1.2 and 1.3).

Figure 2. An Aeta (Negrito) family in northern Luzon (Photo by the author in 2003)

These two human skeletons raise interesting questions about the physical and cultural characteristics of early-middle Holocene populations in the Taiwan Strait. The burial practice (flexed without any burial goods) of Liangdao 1 resembles that in contemporary pre-farming sites in southern China and Mainland Southeast Asia (Figures 3 and 4). Recently, through our joint study, Hirofumi Matsumura has confirmed that Liangdao 1 is closely related craniofacially and dentally with Australo-Papuans, while Liangdao 2 is East Asian.

Figure 3. Similar squatting or flexed position of human skeletons from pre-Neolithic phase in Southern China. 1. from Dingshishan (頂螄山), Guangxi; 2.Huiyaotian (灰窯田 田), Guangxi; 3. Gaomiao (高廟), Hunan; 4. Chongtan (沖塘), Guangxi

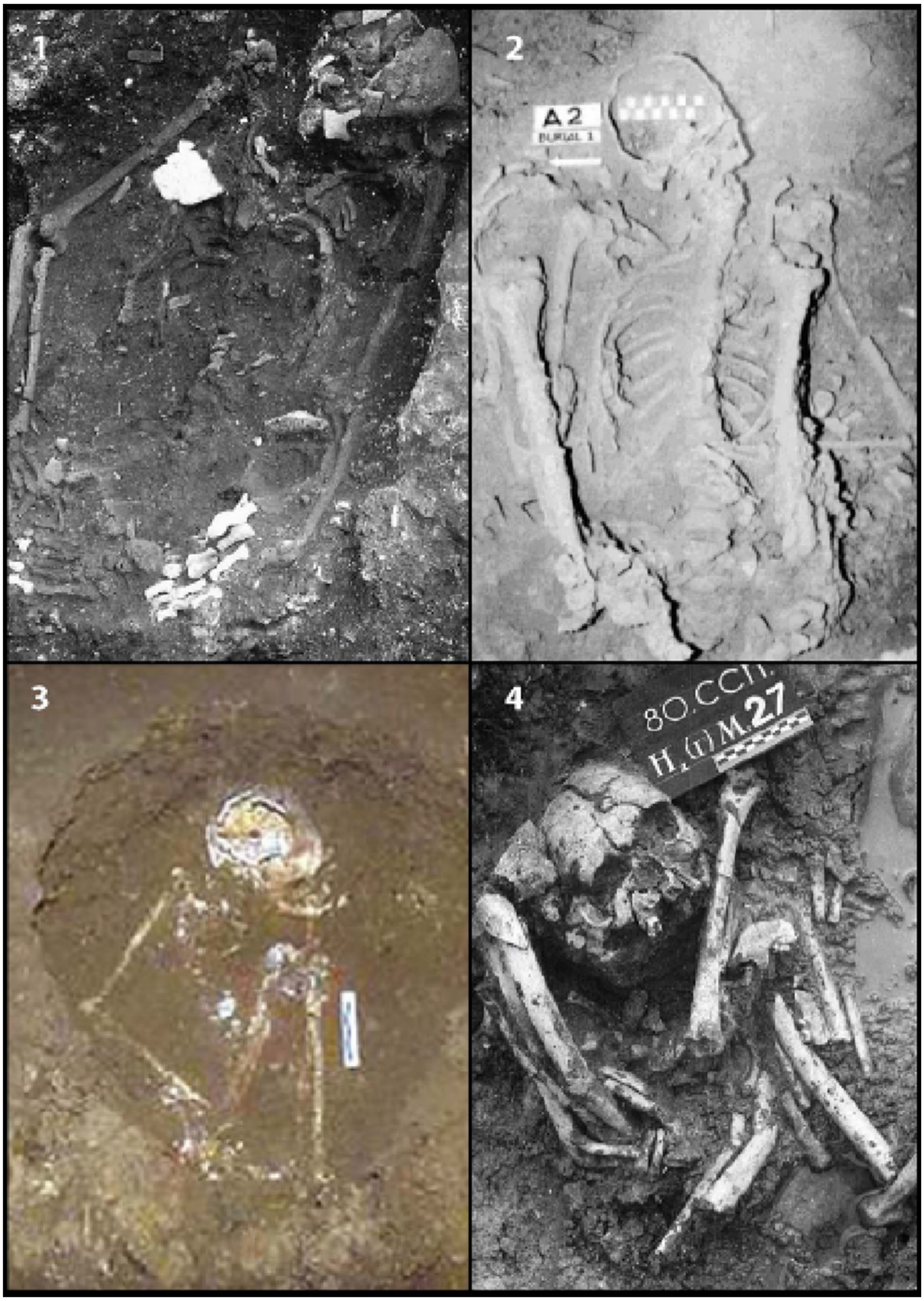

Figure 4. Similar squatting or flexed position of human skeletons from Palaeolithic or pre-Neolithic phase in Southeast Asia. 1. from Hang Cho Cave in Hoa Binh Province, Vietnam (Matsumura *et al.* 2008); 2. Gua Gunung Runtuh in Malaysia (Matsumura & Zuraina 1999); 3. Ban Rai Rock shelter, Thailand (Higham 2013: 30); 4. Con Co Ngua site of Da But Culture, northern Vietnam (Courtesy: Nguyen Kim Dung).

The location of Liangdao Island and its dense archaeological shell deposits all emphasize that subsistence was heavily reliant on marine resources. No clear evidence is yet available for plant foods, except for a presence of acorn starch (*Quercus* sp.) in tooth calculus from the Liangdao 2 burial (Chiu *et al.* 2015). Elsewhere in coastal southern China, archaeological evidence between 5000 and 3000 BC indicates a strong reliance on maritime resources (Zhang and Hung in press) at numerous shell midden and sand dune sites such as Keqiutou (壳丘頭) in Fujian and Xiantouling (咸頭嶺) in Guangdong, both with sand-tempered pottery decorated with stamped and incised motifs. The Xincun (新村) sand dune site in Guangdong (3350–2470 cal. BC) has yielded an excellent record of plant foods. Identified starch grains and phytoliths on the surfaces of grindstones and pounders indicate exploitation of sago (*Caryota* sp.), bananas, lotus roots, Chinese water chestnuts, acorns, fern rhizomes, and seeds of perennial Job's-tears (Yang *et al.* 2013). It is likely that during this time along the coasts of Fujian and Guangdong, as well as on offshore islands, communities of foragers and fishers co-existed with rice and millet-farming groups farther north in the middle and lower Yangtze valley.

On Taiwan Island proper, the so-called Dabenkeng (大坌坑) culture (TPK), dating from possibly as early as 4000 BC and lasting until 2200 BC, represents the Early Neolithic. The TPK was a long-term development through an early TPK dated 4000–2800 BC and a late TPK dated 2800–2200 BC, preceded by pre-TPK Neolithic sites in south-eastern coastal China, including Liangdao, dated 6000–4000 BC (Hung and Carson 2014). In Taiwan, early TPK sites are represented by shell middens or located in sand dunes, and so far no evidence of rice has been found in them. The shell middens are often located on slightly elevated ground originally overlooking coastal swamps, now in-filled with alluvium.

In 2015, the author conducted an archaeological excavation at Changguang (長光) in eastern Taiwan. This excavation produced pottery and stone adzes, but no stone knives (for crop harvesting) or rice remains (neither rice phytolith nor rice grains). It was concluded this site contained no trace of rice cultivation. The sites of Nanguanli (南關里) and Nanguanlidong (南關里東) in the Tainan Science Park (dated to 2800–2200 BC) have produced rice (*Oryza sativa japonica*), foxtail millet (*Setaria italica*) (Tsang *et al.* 2006; Hsieh *et al.* 2011) and broomcorn millet (*Panicum milliaceum*) (see fig 2C of Hsieh, *et al.,* 2011) (Figure 5). But without direct dating of the rice and millet grains from these two sites, their precise age remains uncertain. The nature of the subsistence economy thus remains unclear about the early-middle TPK phase.

Figure 5. The large cemetery at Nanguanlidong, Late TPK phase, mostly in extended position and many with grave goods (after Tsang *et al.* 2006)

Early Farmers in Taiwan: Rice Cultivation and Population Growth

In Taiwan, strong evidence dating to the Middle Neolithic reveals a new assemblage associated with rice farming (sometimes with millet and Job's tear) that appeared in the terminal stage of the TPK, between 2500 and 2300 BC. Site records reveal a significantly increased reliance on rice farming associated with the use of fine cord-marked and red-slipped pottery, some of which appears to relate to contemporary pottery assemblages in coastal southern China, suggesting a degree of cultural interaction. Diagnostic Middle Neolithic artifacts include polished stone knives (presumably for rice or millet harvesting), stone adzes, spindle whorls, nephrite (jade) ornaments, jar burials, and larger settlements and cemeteries with an implied increase in population numbers and densities.

The transition from Early to Middle Neolithic is well documented at Xuntangpu (訊塘埔) in northern Taiwan, which has a sequence dated between 2500 and 1700 BC (Liu *et al.* 2006; Liu 2007) (Figure 6). So far, at least 92 sites of the Xuntanpu Culture are known (Kuo

2016). Stone harvesting knives are very common, and Dalongdong (大龍峒) in Taipei has produced carbonized rice grains (Chu *et al.* 2012). Elsewhere in Taiwan during this phase, carbonized rice grains or impressions in pottery occur at Chikan B (赤崁 B) in the Penghu Islands (Tsang 1992), Kending (墾丁) (Li 1985), Youxianfang (右先方) (Tsang *et al.* 2006) and Sanbaozhunan (三抱竹南) (ca. 2400-2200 BC) (Chiu *et al.* in prep.) in southern Taiwan, and Anhelu (安和路) in central Taiwan (Chu 2015). A recent (as yet unpublished) study of rice phytoliths by Deng Zhen-hua in collaboration with the author has confirmed that domesticated rice remains occur in several Middle Neolithic sites in eastern Taiwan, such as Chaolaiqiao (潮來橋), dating as early as 2200 BC.

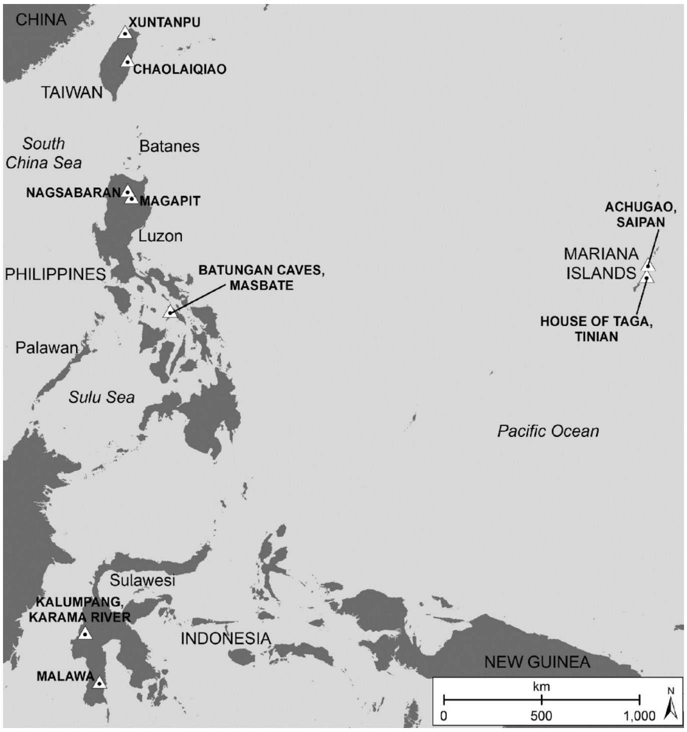

Figure 6. Key sites related with early Austronesian migrations, mentioned in the text.

Also during the Middle Neolithic, visible differences developed between regional assemblages in Taiwan that exceed those in the earlier and more homogeneous TPK, leading to a recognition of five geographically separate facies or cultures. These are Xuntangpu (訊塘埔) in northern Taiwan, Niumatou (牛罵頭) in central-west Taiwan, Niuchouzi (牛稠子) in southern Taiwan, Fushan (富山) in eastern Taiwan, and Hongmaogang (紅毛港) between northern and central-west Taiwan (Liu 2007). More than 300 Middle Neolithic sites have been recorded across the whole of the island (Tsang 1990; Li 2003), more than 7 times the number recorded in the Early Neolithic. This is an impressive statistic linked to population growth and presumably an increasing productivity of rice and millet agriculture. At the same time, offshore fishing and sea voyaging technologies developed considerably, highly significant to explain the success of the contemporaneous Malayo-Polynesian expansion into the Philippines. Thus, at Eluanbi (鵝鑾鼻) and Eluanbi II in southern Taiwan (Li 2002), we find stone net-sinkers, fish-hooks, and bones of very large marine fish such as grouper, and especially large pelagic carnivores such as dolphinfish and marlin. The last two species imply open sea trolling from moving canoes, quite far from shore (Campos and Piper 2009).

Stone raw materials were exchanged widely throughout Taiwan at this time. Olivine basalt from Penghu was used to make adzes and axes. Those preforms were flaked on the island of Qimei (七美) (Tsang and Hung 2001) and transported into southwestern Taiwan for polishing and then distribution. Impressive numbers of stone objects serviced the function for polishing, as discovered from Sanbaozhunan in Tainan (Chiu *et al.* in prep), showing this farming society already had developed craft specialization within their settlements.

Another remarkable development during this stage was the beginning of jade production and trade. Jade was not used often for body ornaments during the TPK phase, but Fengtian (豐田) nephrite from eastern Taiwan was intensively used during the following Middle Neolithic for ornaments such as ear pendants and bracelets, adzes, arrowheads, and other tools. Items of Fengtian nephrite were widely distributed across the whole island, as well as to the Penghu Archipelago and the islands of Ludao (綠島) and Lanyu (蘭嶼) (Hung 2004, 2008). As one of the examples, no less than 235 specimens of comb-like jade items of unknown function were found in one location at Xidunli (西大墩) in west-central Taiwan perhaps for a special ritual purpose (see Chu *et al.* 2011). Such evidence suggests that the Middle Neolithic of Taiwan had developed to a new stage of social complexity.

Southward Expansion into the Philippines

Recent research by Mike Carson (in press) suggests that the eastern coastline of Taiwan has been uplifted by as much as 40 meters since Middle Neolithic occupation began around 2500–2200 BC. Sites along this coastline were originally established on low hills overlooking the ocean, but are now inland. The Middle Neolithic pottery styles and burial practices present in this area can be traced to origins in the western coast of Taiwan with the fine-cord marked pottery of the Middle Neolithic Phase. Deng's research has confirmed the presence of domestic rice in these eastern coast Middle Neolithic sites.

Taiwan and northern Luzon have a similar archaeological history in that both received intrusive Neolithic traditions that eventually replaced indigenous Paleolithic assemblages of pebble and flake tools. In Luzon, the Neolithic is best represented in the Cagayan rift valley, holding the longest river in the Philippines. Since 1971, more than 30 Neolithic and Iron Age shell middens have been found in the lower Cagayan Valley, forming the densest pattern of prehistoric settlement in the Philippines. Some of these sites have yielded red-slipped plain ware pottery derived from Middle Neolithic Taiwan at about 2000 BC, with very similar rim and vessel forms. Other Cagayan artifacts, such as baked-clay pendants, spindle whorls, Taiwan jade objects, and bark cloth beaters also point to origins in Taiwan (Hung 2005, 2008; Thiel 1986-7). So far, the earliest domestic pigs in the Philippines, dated to 2000 BC, have been discovered from Nagsabaran in the Cagayan valley (Piper *et al*. 2009).

Although the Neolithic site of Andarayan in the Cagayan valley has long been associated with an AMS date on a rice husk in red slipped pottery of 3400 ± 125 BP (calibrated to 2050–1400 BC) (Snow *et al.* 1986: 3), there has been a strong tendency amongst archaeologists to doubt that rice farming existed during the Neolithic of the Philippines and Indonesia (e.g., Paz 2005; Denham 2013). However, our excavation at Magapit in 2015 (by Hung and Carson) recovered carbonized rice grains and banana phytoliths, dated directly by radiocarbon at least as early as 1000 BC. More recent excavations in 2016 at Nagsabaran (Figure 7) recovered many more carbonized rice grains from the late Neolithic layer.

Figure 7. The excavation at Nagsabaran, Cagayan, northern Luzon in April 2016 by the author

Besides rice, another significant discovery at Nagsabaran was a clear layer at the base of the site with abundant charcoal and many pieces of low-fired clay. This layer was very likely the result of initial land clearance, and an AMS date for the charcoal was returned as 3760 ± 30 years BP and calibrated as 2287–2125 cal. BC. This result strengthens the conclusion, based on pottery styles and other artifacts, that the Neolithic settlement of the northern Philippines about 4000 years ago came from an eastern Taiwan source and introduced rice cultivation and domesticated pigs.

From Philippines into Remote Oceania: Early Settlement in the Mariana Islands

The Marianas Archipelago consists of more than a dozen islands distributed along 13 to 20 degrees north of the equator, in excess of 2000 km east from the Philippines and northeast from Indonesia. Marianas settlement has been verified at least as early as 1500 BC at sites in three separate islands of Guam, Tinian, and Saipan (Carson 2014, 2016; Carson and Kurashina 2012). For several decades, scholars suspected that the oldest Marianas sites with red-slipped pottery related to a homeland in Island Southeast Asia (Spoehr 1957; Pellett and Spoehr 1961). The Marianas case is especially important as apparently the first place in the world where people migrated across more than 2000 km of deep ocean 3500 years ago (Craib 1999; Hung *et al.* 2011; Rainbird 2004).

The earliest Marianas assemblage includes well made red-slipped pottery with dentate-stamped and lime-infilled designs, plus other artifacts such as stone adzes, shell beads, and fishing hooks (Carson 2014, 2016). A homeland for the first Marianas settlers must have been in a region where the diagnostic decorated pottery had been produced prior to 1500 BC. This date range was prior to the emergence of dentate-stamped Lapita pottery in Melanesia and Polynesia (Summerhayes 2007). Most of the early decorated pottery can be described according to Butler's (1994, 1995) categories of "Achugao Type", best represented at the Achugao Site in Saipan and House of Taga in Tinian.

The oldest known pottery styles similar to the Achugao Type have been found in the Philippines (Figures 8 and 9). This special combination of traits, made by detailed dentate-stamping, circle-stamping, and fine-line incisions in patterns highlighted by white lime-infill, has been found on pottery at several sites in northern Luzon (Hung 2008) and Masbate (Solheim 1968), dated at least as early as 1800–1500 BC. In the Philippines, this decorative style evidently had developed slightly later than the first red-slipped pottery-making as discussed for sites in the Batanes and Luzon.

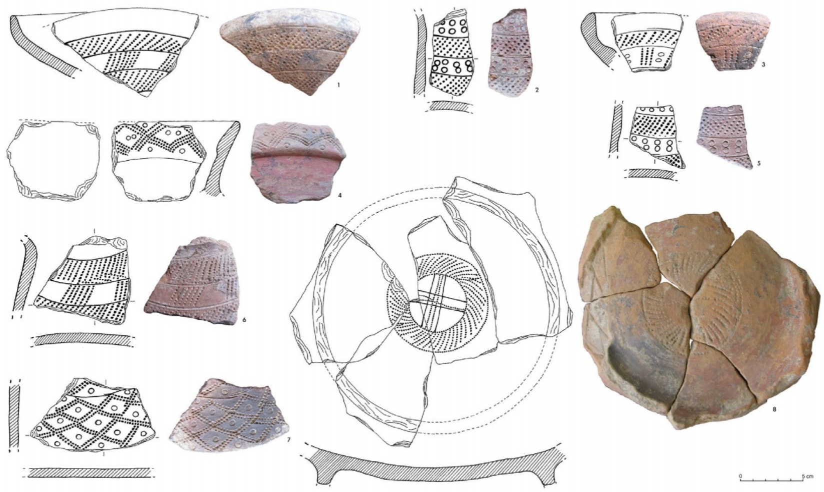

Figure 8. Representative decorated pottery from Nagsabaran, Cagayan Valley of the northern Philippines.

Figure 9. Representative decorated pottery (Achugao Type) from House of Taga in Tinian, Mariana Islands, western Micronesia.

Essential in seeking the origins of the Marianas pottery production, the white lime infilling of the decorated designs can be attributed to people who already were familiar with using slaked lime. Slaked lime is a white powder, made from heating limestone or shell, often used as one ingredient in preparing betelnut quids. Betelnut (from the *Areca catechu* palm tree) is chewed as a quid with slaked lime powder and the leaf of a *Piper betle* shrub, and all three ingredients interact as a narcotic stimulant, which is very popular in the Asia-Pacific region. A biological origin of *Areca catechu* has been suggested in the Philippines, prior to dispersals carried by people throughout Asia and the West Pacific (Zumbroich 2008). So far, the oldest known shell container with residue of slaked lime has been found in Duyong Cave of Palawan in the Philippines, dated by association with a human burial about 2700 BC and a hearth about 3700 BC (Fox 1970:62–65), clearly pre-dating any pottery-making in the Philippines and thus already known locally when pottery traditions began around 2000 BC. Pollen data suggest the betelnut palm tree first appeared in the Marianas within an abrupt horizon of anthropogenic forest-clearing and burning, documented in a swamp-bottom coring record at Susupe in Saipan (Athens and Ward 2001, 2005). The impact horizon is dated at least as early as 1500 BC. In this case, betelnut was imported by the first immigrant settlers in the Marianas, co-occurring with the use of slaked lime in the oldest pottery decorations.

The archaeologically attested Philippines-Marianas connection is consistent with the findings of linguistics and genetics research. The native Chamorro language of the Mariana Islands derived from a Malayo-Polynesian source in Island Southeast Asia, spoken by people who already had separated linguistically from older Formosan Austronesian linguistic origins in Taiwan (Blust 2000; Reid 2002). The Chamorro language detached from its ancestral homeland roots prior to the development of Oceanic-speaking features found elsewhere in Remote Oceania, about the same time as when Malayo-Polynesian languages were diversifying within Island Southeast Asia and forming possible sub-groups in the Philippines and Indonesia (Zobel 2002).

Most certainly, people from Island Southeast Asia were involved in colonizing the Mariana Islands by 1500 BC or potentially even earlier. At least some of these people came from a homeland most probably in the northern to central Philippines, where the distinguished decorated pottery traditions have been verified at an age equal or prior to Marianas settlement. Another potential homeland of the early Marianas is Sulawesi of Indonesia, where a few similar motifs of pottery decoration have been noticed, worth pursuing in future investigation. Besides fishing and nearshore resource collection, other components of earliest Marianas subsistence have not yet been examined in detail, so the roles of different plant foods cannot be assessed at this time.

Conclusion

This paper has first focused on Taiwan, as the linguistic homeland of the Austronesian languages. According to biological observation, two layers of human migration have contributed to the ancestry of modern populations in southern China, Taiwan and Southeast Asia. Australo-Papuans formed the late Palaeolithic hunter-gatherer populations, and then East Asian Neolithic populations spread as food-producers. If we further add archaeo-botanical data from southern China and Taiwan, then three stages of cultural development can be observed, based on different subsistence practices: 1) Palaeolithic hunter-gatherers, some with small scale pottery production; 2) Holocene maritime hunter-gatherers with pottery as represented at sites such as Keqiutou, Xiantouling, and Changguang; and then finally 3) rice farmers as represented by Tanshishan, Xuntanpu and Chaolaiqiao. Overall, the formation of the earliest Austronesian-speaking populations in coastal China and Taiwan is a rather long and complicated process. After rice farming became widely developed in the island, the first outgoing group of Austronesian migrants moved into northern Philippines from the eastern coast of Taiwan about 4000 years ago (Figure 10). In the Philippines, their descendants continued to develop their culture, subsistence, and social complexity in any ways, and then further undertook a long journey into the Mariana Islands of western Micronesia, as well as the great archipelago of Indonesia, and beyond.

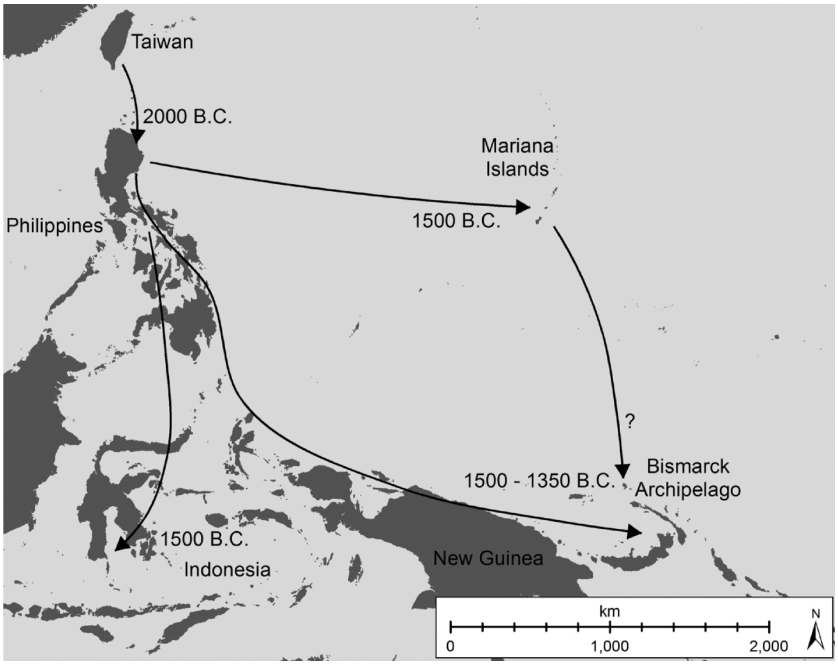

Figure 10. The proposed migration routes of early Austronesian groups "out of Taiwan" discussed in the text. Another important Neolithic route from Mainland Southeast Asia into Indonesia has not yet discussed here.

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AUSTRONESIAN AND AUSTRALIAN ANALOGS IN VIETNAM THROUGH PALEOANTHROPOLOGICAL EVIDENCE

Nguyen Lan Cuong

Introduction: Ancient Human Remains in Son Vi (Paleolithic) and Hoa Binh (Neolithic) Cultures

For long, the fossils of hominids in South East Asia and Australia belonging to the late Pleistocene times such as the Keilor, Cohuna (Autralia), Wadjac I (Indonesia) and Liuchiang (Southern China) skulls have been noted as samples bearing both Australoid and Mongoloid features. (*Weidenreich 1937; Von Koenigswald 1952; Turner 1987; Wu Rukang 1959; 1982; Kahlke 1967*). For example, the fact that the Liuchang Skull has a platform with fang hole situating on a low facial position and a low forehead-cheek index and a low protruding nose are evidences of Mongoloid features. Besides, there are non-Mongoloid features such as high-protruding upper eyebrow arch, rectangular low eye socket, moderate upper-face height and very wide nose.

The Ancient Skull of Mai Da Dieu (86MDDM16) (Son Vi Culture)

Mai Da Dieu in Ha Trung Commune, Ba Thuoc District, Thanh Hoa Province was explored in 1984 and excavated by Vietnam National Institute of Archaeology (VNIA) scientists in 1986, 1988, 1989 and 1991. During the surveying expedition in 1984, one grave was discovered, followed by another 16 graves in 1986 and 8 others during the joint-excavation with Bulgarian archaeologists. All the above graves were of Hoa Binh Culture except for one- the 86 MDDM16 (discovered in the surveying excavation) which belonged to the Son Vi Culture. So far, this has been the only one of Son Vi remains whose skull can be studied.

The 86MDDM16 skull belonged to the remains of a 52-year-old man whose teeth were almost worn out. By skull top (parietal bone) standard, it was egg-shaped and of average skull length (index of 76.32). By skull side standard, it was of the high category (the upright height index from po:36.68). It had high eye socket (with index of 87.67), wide nose socket (with index of 53.15), wide face (with upper face index of 47.9? and whole face index of 82.29?). Our initial suggestion is that this skull belonged to a rather unclassified type, and therefore, the Mongloloid and Australoid features were interwoven (*Nguyen Lan Cuong 2007a*).

Figure 1. The human skeleton (86MDDM16) from Mai da Dieu

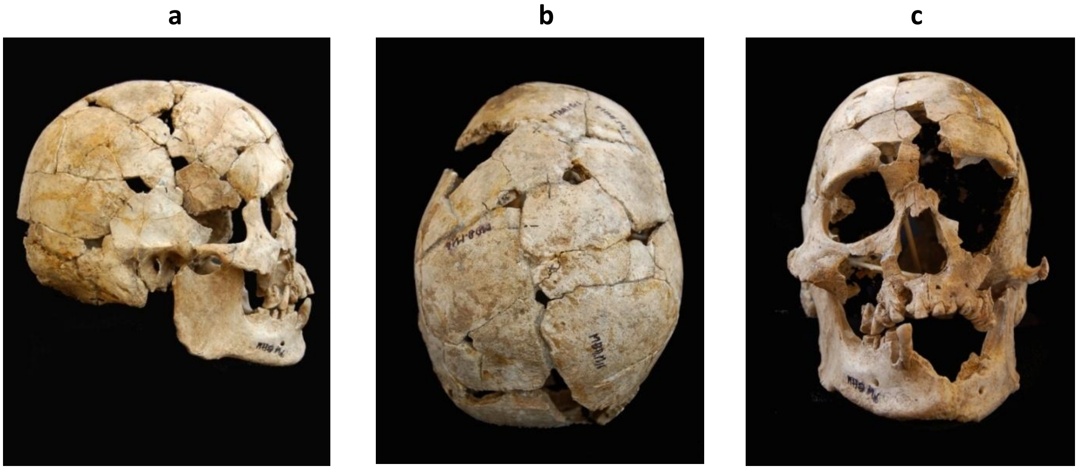


Figure 2. The skull (86MDDM16) from Mai da Dieu – Sonvi Culture
(a- side view. b- vertical view. c- front view)

The Ancient Skull of Mai Da Dieu (86MDDM1) (Hoa Binh Culture)

This grave was at a depth of 0.7 metre and was of an 18-year-old young woman. By top standard, the skull had a pentagonal shape and was very long and high (with an index of 69.91 and upright height index from po: 62.98). Her face was of average type with protruding upper jaw. Glabella was devepoled at level 3. The eye socket was almost square-shaped and high with an index of 86.84. She had average facial width with whole face index of 85 while facial surface was rather wide (with upper face index of 48.33). The nose socket had a heart shape and was very wide (with an index of 62.79)

a **b** **c**

Figure 3. The skull (86MDDM1) from Mai da Dieu – Hoabinh Culture
(a- side view. b- vertical view. c- front view)

Based on these physical features, we suggest that this Mai Da Dieu ancient skull bears both Indonesian and Australoid characteristics *(Nguyen Lan Cuong 1985b; 1986)*

The Ancient Skull of Mai Da Nuoc (84MDNM1) (Hoa Binh Culture)

In April, 1984 during our surveying expeditions in Ba Thuoc District, Thanh Hoa province, sientists of VNIA had found Mai Da Nuoc. A human skeleton was discovered buried lying straight at a depth of 0.8 metre. Near the neck were 3 sea-shells with their bottom filed. The bottom of the grave was lined with macadams and the sides with stone blocks.

a **b** **c**

Figure 4. The skull (84MDNM1) from Mai da Nuoc – – Hoabinh Culture

(a- side view. b- vertical view. c- front view)

The Mai Da Nuoc was a half-fossilized ancient skull which remained almost intact with the absence of only the front part of the occipital bone hole and the stem of the sphernoid bone (butterfly bone). This is the remains of an over 40-year-old man. Restoration of the skull was not simple as it was broken into 50 pieces and those pieces were covered with a layer of solid sediments, which took the skull 6 months to be restored.

By top standard, the skull had a pentagonal shape and belonged to a long type. Along the upright joint was top edge, which was one feature of the Australoid race. It was also considered of great height with upright height index of 76.22. The eye socket was of average low type with an index of 76.19. The nose socket was heart-shaped and of a very wide type (index of 60.42). This man had a wide face with upper face index of 46.27 and whole face index of 82.84. *(Nguyen Lan Cuong 1986-87; 1994)*

Dong Can Ancient Skull (87DCM1)(Hoa Binh Culture)

In 1987, Vietnamese and Bulgarian archeaologists carried out excavations at Dong Can (Can Grotto) site in Doc Lap Commune, Ky Son District, Hoa Binh Province. The deceased may have died lying folded on his side with his back turning to the grotto's entrance. From 149 skull pieces we had assembled a skull coded as 87DCM1. This is the remains of a 70-year-old man. The skull had an oval shape and was of average length of an index of 76.56. It was a low skull with upright height index from porion of 57.29. The man had low eye socket (with an index of 68.48) and very wide nose (with an index of 65.26). His face was averagely protruding with a bit protruding teeth arc and he may have had a wide face with a whole face index of 74.4? *(Cuong 2007a).*

b

a

c

Figure 5. The skull (87DCM1) from Dong Can – – Hoabinh Culture

(a- front view. b- side view. c- vertical view)

Hang Muoi (Muoi Cave) Ancient Skull (63HMM1) (Hoa Binh Culture)

The Hang Muoi (Muoi Cave, also known as Man Cave) is a site in Man Duc Commune, Tan Lac District, Hoa Binh Province. The cave was first excavated by VNIA in 1963 and again in 1964 by Vietnam National History Museum. A skull top was found during the first excavation and was initially studied by Nguyen Duy.

Recently, together with Australian anthropologists, we have conducted a re-measuring and re-study of the Hang Muoi ancient skull. Through fragments of a burnt bone, Australian scientists have estimated its age determined by AMS of 12,020 around ± 40 years BP. By comparison, the 63HMM1 is rather physically similar to the famous Australian skulls found at Mungo Lake, which date back to 40,000 thousand years. The forehead bone (frontal bone) of Hang Muoi 1 Skull is also similar to that of the Tabon Skull in the Philipinnes, which dates back to about 16,500 years B.P. Based on the surgical features proved by Larnach and Macintosh, it can be seen that H.M.1 possessed a wide eye socket edge with a lack of external occipital elevation and an eye socket width of up to 116 mm. The forehead was slanted backward (with curved forehead index of 22.4). These characteristics have led to conclusions that the Hang Muoi Skull shares great resemblance with those of Australian Aborigines (*Bulbeck et al. 2007*).

Figure 6. The skull (63HMM1) from Hang Muoi – Hoabinh Culture
(a- front view. b- vertical view. c- side view)

Hang Cho (Cho Cave) Ancient Skull (04HCHH3M1 (Hoa Binh Culture)

In January, 2004 VNIA and the Museum of Hoa Binh Province in conjunction with anthropologists from Japan, Australia, South Korea and scientists from Faculty of History at the Institute of Social& Humanitarian Sciences, Vietnam National University, Hanoi excavated Hang Cho (Cho Cave) in Vui Hamlet, Cao Ram Commune, Luong Son District, Hoa Binh Province.

The remains were buried folded lying on the person's side. By the skull and lower skull bones structure, we have assumed that the deceased may well have been a 55-60 year-old woman.

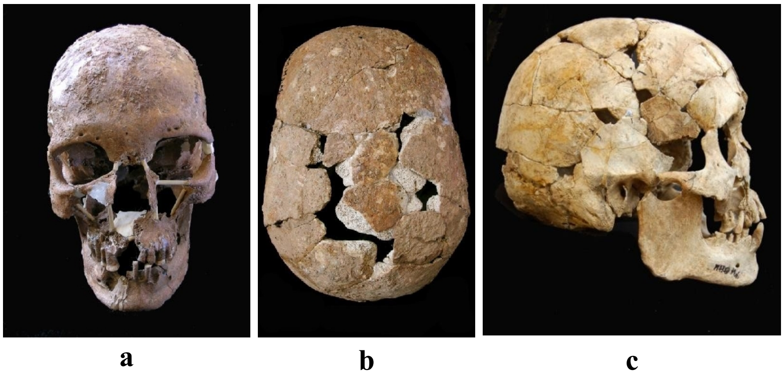


Figure 7. The skull (04HCH3M1) from Hang Cho – – Hoabinh Culture
(a- front view. b- vertical view. c- side view)

By top standard, the skull was egg-shaped and of the long type (with a skull index of 70.83). By side standard, it belonged to the low-average category with upright height index from ba. of 69.79 and upright height index from po of 61.46. The eye socket had a rectangular shape and of the low type with an eye socket of 70.81. The nose ranged from average to wide with a nose index of 50.99 *(Matsumura et al 2006).* This might have been an unclassified female skull which was not as well defined as the Mai Da Nuoc Skull found in Thanh Hoa Province of Vietnam.

Phia Vai Ancient Skull (05PHVL5C2M2)(Hoa Binh Culture)

In early 2005, VNIA and Museum of Tuyen Quang Province carried out the excavations of Phia Vai Cave, Coc Ngan Hamlet, Xuan Tan Commune, Na Hang District- about 150 km., north of Tuyen Quang Province. At the site, 2 graves and one stove were disclosed coded as 05PHVL5C2M2 belonging to Hoa Binh Culture.

The remains were of a 45-50-year-old woman. By skull top standard, the was rather round and of the short type with a skull index of 89.51. By side standard it was rather high (the height-length index being 82.1). The eye socket was round and high (index of 100.3), and the nose socket was very wide of an index of 60?. Two sea snails whose scientific name is *Cyprea Arabica* were found inside the woman's eyes. Her face was of average width with a whole face index of 86.62 (*Nguyen Lan Cuong 2007b,c*).

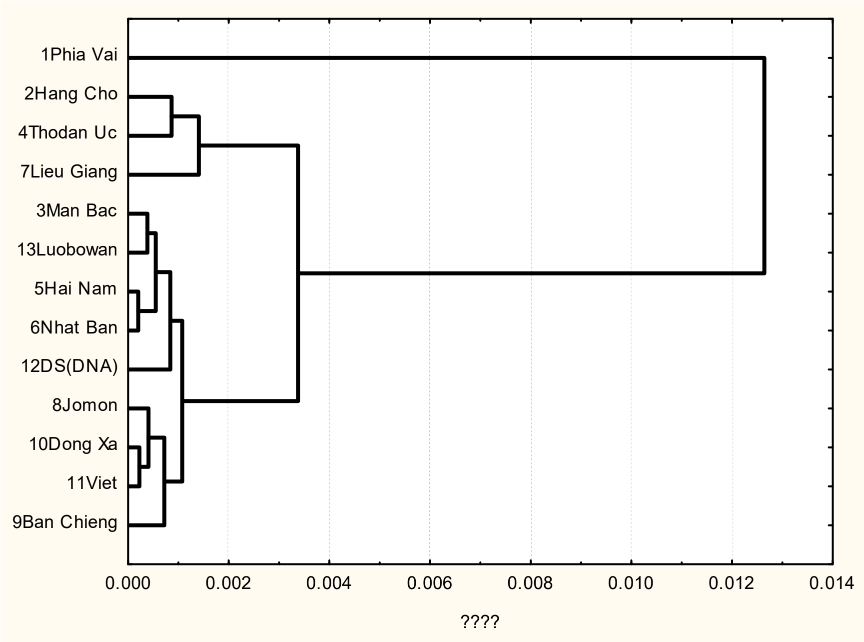


Figure 8. Dendrogram of cluster analysis applied to Q-mode based on the 8 cranial measurements (woman)

a b c

Figure 9. The skull (05PHVL5C2M2) from Phia Vai – Hoabinh Culture
(a- front view. b- vertical view. c- side view)

The Phia Vai woman had the skull size distinctly different from those of other groups, although in the tree diagram it more resembled the ancient Hang Cho (Hoa Binh) Skull, those of Australian Aborigines and the ancient skull of Lieu Giang (China) and quite different from the remaining groups.

Ancient Person of Hang Chim (Bird Cave)(65HCM1)(Hoa Binh Culture)

Hang Chim in Ngoc Lam Hamlet, Dong Tam Commune, Lac Thuy District, Hoa Binh Province was excavated by VNIA in 1965. Within the layers of rather solid brown sediments mixed with snail shells were found a half-fossilized lower jaw bone, a large number of upper teeth and several skull fragments. (*Cuong 2007a*)

Figure 10. The mandibulae (65HCM1) from Hang Chim - Hoabinh Culture (vertical)

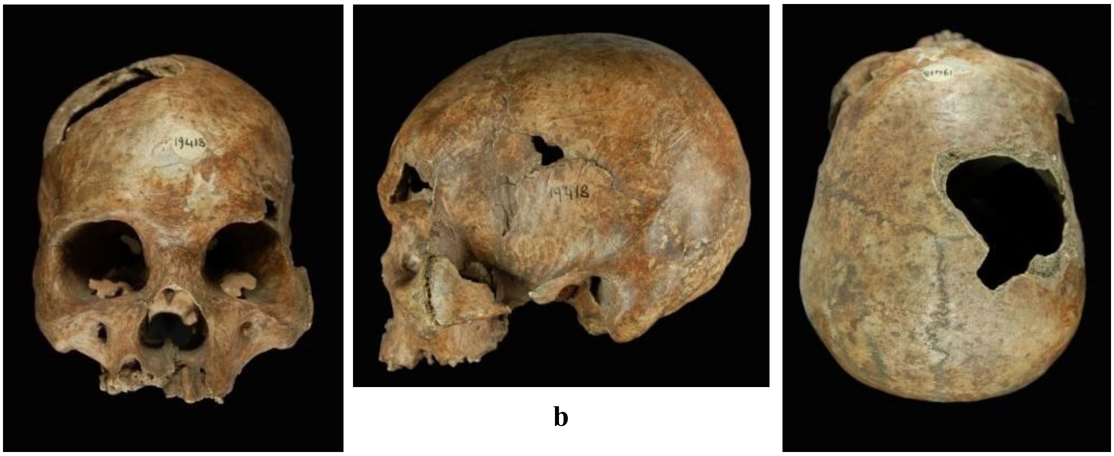
It was suggested that the remains may have belonged to a 9-10 year-old child, sexually unidentified.

The most notable feature was the lower jaw of the Hang Chim ancient person with very large-sized lower cheek-tooth No 1, which served as a basis for us to speculate on type of the person's race. The size of this tooth bears great resemblance to the teeth in Sampoeng and Bodjionegoro in the West Javas studied and published by W.A. Mijsberg in 1931. He suggested that the teeth belonged to the remains of the race of people with large teeth such as the Melanesian and Australian. A comparison in size of big cheek-tooth No1 (M1).

	Hang Chim	Sampoeng	Australien
MD:	13.50	13.10	12.30
BL:	12.80	11.80	11.90

Remains of Ancient People in Bac Son Culture (Neolithic)

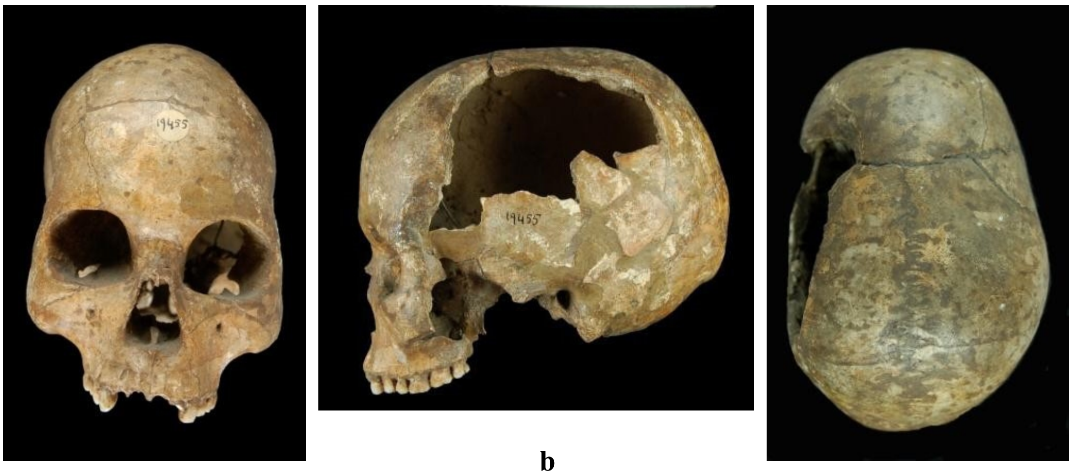
Lang Cuom (Cuom Village) Ancient Skulls (No 19408, 19409, 19455, 19411, 19412 19414 and 14) - Bac Son Culture



b

a c

Figure 11. The Skull (19418) from Lang Cuom – Bacson Culture
(a- front view. b- side view. c- side view)



b
a c

Figure 12. The skull (19455) from Lang Cuom - Bacson Culture
(a- front view. b- side view. c- vertical view)

a b c

Figure 13. The skull (19412) from Lang Cuom - Bacson Culture
(a- front view. b- side view. c- vertical view)

a b

Figure 14. The skull (19413) from Lang Cuom - Bacson Culture)
(a- front view. b- side view)

Hang Cuom Cave is in Binh Gia District, Lang Son Province. This cave was discovered and excavated by M. Colani in 1924. At a depth of 0.6 m. - 2 m. around 80-100 human remains had been found. So far, this has been the site with the largest number of human remains in Bacson Culture in particular (*Mansuy et Colani 1925*) and the second largest number after Con Co Ngua Site (Thanh Hoa Province) in Neolithic Vietnam in general.

In 1925, H. Mansuy and M. Colani publicized 10 skulls namely No 1, 2, 3, 5, 13, 10, 9, 8, 7 and 11. In 1939 E. Saurin publicized another 5: No 14, 15, 17, 16, 18 and remeasured 3 skulls No 3, 9, 11. Actually he publicized these documents in 1938, not in 1939 as quoted by some researchers. In 1938, P.Huard and E.Saurin worked together with Nguyen Xuan Nguyen and Nguyen Van Duc once again re-evaluated the prehistoric skulls in Indochina. Although previous researchers had studied the skulls, they did lack important measuring tools. Therefore, in this research paper, we have made use of the measurements that were used by us during our study of ancient skulls in the Museum of Parisian People.

According to H.Mansuy and M.Colani, the Lang Cuom skulls No 1,2,3 were Proto-Melanesian while skulls no 4,5,6 were Melanesian. Skull No13 was of Indonesian type. No 7 was a mixture of Melanesian and Australoid. Particularly, we suggest that the Lang Cuom skull No14 was a Proto-Melanesian. (*Saurin 1938*)

Dong Thuoc Ancient Skull (No 19424)(Bac Son Culture)

a

b

c

Figure 15. The Skull (19424) from Dong Thuoc – Bacson
(a- front view. b- side view. c- side view)

Dong Thuoc Cave lies on the southern side of Bac Son Limestone Moutain Range. Mansuy discovered and excavated the cave in 1922-1923, publicizing his findings in 1924. The remains were of an adult man. By skull top standard, the skull was egg-shaped and was very long (skull index 66.67). By side standard, there was a curve line flat at the top similar to the Lang Cuom skulls No 17 and 18. This skull was high and narrow. Both H. Mansuy and E.Saurin thought that this belonged to the black Melanesian. So far, the Dong Thuoc Skull has been one of the longest ancient skulls in Vietnam (*Mansuy 1924a*).

Remains of Ancient People in Quynh Van Culture (Neolithic)

Bau Du Ancient Skull (Quynh Van Culture)

Bau Du is a site located on scallop hills in Phu Trung Hamlet, Tam Xuan 1 Commune, Nui Thanh District, Quang Nam Province, Vietnam. The site was discovered in 1981. In 1983, it was excavated for the first time and again for the second time in 2014. The stone artifacts bear strong characteristics of Hoa Binh Cuture traditions, while the burial rituals were similar tho those of Quynh Van-Da But, which featured the grave buried in scallop hills-a type of kitchen waste pile dumping site (Kj**Ö-** kkenm**Ö**dding).

In order to work out the relationship between the Bau Du ancient skulls with others groups of inhabitants, we used mathematical statistics to find the “Q-mode correlation coefficiency distance”. Results have shown that the Bau Du People were very similar to the remains in Hoa Binh Culture.

a b c

Figure 16. The skull (14BDHILVM4)) from Bau Du - Quynhvan Culture
(a- front view. b- side view. c- vertical view)

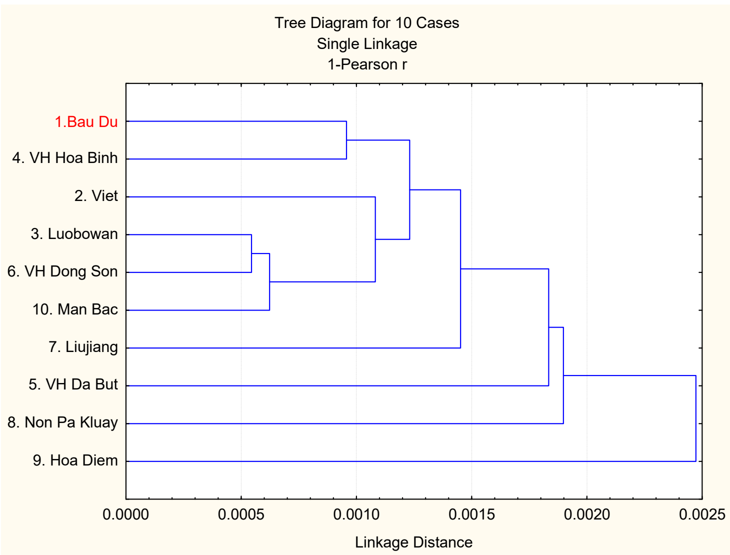


Figure 17. Dendrogram of cluster analysis applied to the Smith’s distance
Based on the 10 cranial measurements

Remains of Ancient People in Bau Tro Culture (Neolithic)

Minh Cam Ancient Skull (No194250)

Minh Cam Cave is located in Quang Binh Province. E. Patte studied and publicizes this ancient skull in 1923 and 1925. According to him, Minh Cam belonged to the Post-Neolithic Age. The remains included a half-fossilized skull with full facial bones except for the two cheekbones. Compared with documents on tooth-growing, we assume that the skull was of a 10-year-old child (*Patte 1925*). By skull top standard, this skull was egg-shaped and of the short type. By side standard, it is of between average and high type (height-length from ba. index: 74.85). The face was straight, not protruding (protruding Flower index: 92.98).

E. Patte listed Minh Cam ancient people as of the Negrito in the Phillipinnes.

a b c

Figure 18. The skull (19425) from Minh Cam - Bautro Culture
(a- front view. b- side view. c- vertical view)

Remains of ancient people in Phung Nguyen Culture (Metal Age)

Man Bac Ancient Skull

Man Bac is a site in Bach Lien Hamlet, Yen Thanh Commune, Yen Mo District, Ninh Binh Province. This archaeological site have been excavated 4 times by a cooperation among scientists from Vietnam, Japan, Australia and the USA. So far 98 skeletons have been found with the best preserved remains in Vietnam.

Among the skeletons in Man Bac, we were particularly interested in Grave No 07(05) MBM29. At first sight, distinctive features of the Australo-Melanesian were noticeable. These included long edges on the eye socket and skull (skull index:73.94), low eye socket (index: 81.24) and an average-wide nose (index: 50.53) (*Matsumura et al. 2006*)

Figure 19. The skull (07(05) MBM29) from Man Bac – Phungnguyen Culture

Remains of ancient people in Sa Huynh Culture (Metal Age)

Hoa Diem Site

The Hoa Diem Site located in Cluster 5, Hoa Diem Hamlet, Cam Thinh Dong Commune, Cam Ranh City, Khanh Hoa Province was discovered by VNIA in 1998.

Through 3 surveying expeditions and 4 excavations of the site (as of 2011), human remains had been found in 61 ancient graves including 55 clay-pot graves and 6 dirt graves. According to H. Matsumur and N.L. Cuong, the inhabitans of Hoa Diem can be classified in to two groups: Group 1 and Group 2. Graphic 20 illustrates results from neighbor-net classification analysis applied in Q-mode correlation coefficiency distance calculated with 16 methods of skull measuring. The tree diagram made up from this analysis is divided into 2 upper layer and 2 lower layer groups including:

1. The East Asian people and many South-East Asian people from late Neolithic to the present day
2. The Australo-Melanesian and similar South-East Asian people of Holocene head type including the inhabitants of Hoa Binh and Neolithic people

Hoa Diem 1 (belonging to the pot-buried type) is categorized in the same group as the Taiwanese Bunun, the inhabitants of Sumatra and the islanders of the Moluccas close to other South-East Asian people including those in Cambodia, Laos, Thailand, the Philippines and South China.

Hoa Diem 2 (buried in large mound) together with the Semang Negrito is placed in the second group with Australo-Melanesian and Hoa Binh peole. (*Cuong and Matsumura 2014).*

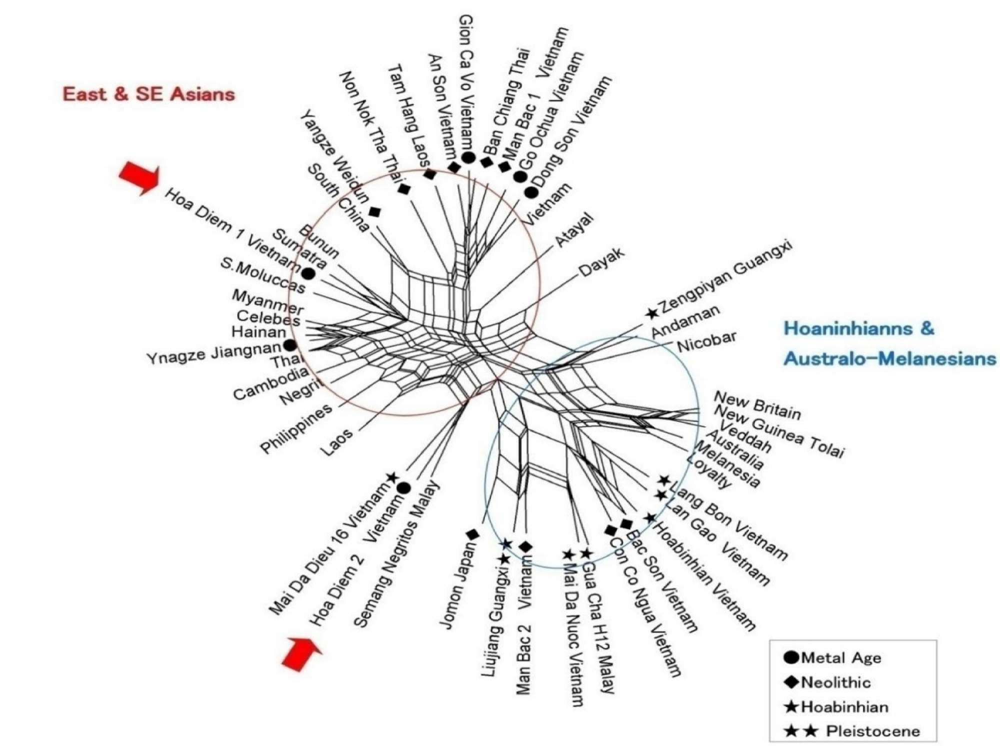


Figure 20. Net split tree generated from Q-mode correlation coefficients based on 16 cranial measurements (Cường and Matsumura 2014)

In this paper we only mention the paleo-antropological findings in Vietnam relating to Austranesia and Australia. There are other archaeological sites with remains found having relations with groups of speakers of Austranesian language not mentioned here such as Lang Gao (Gao Village) in Hoa Binh (skull No17, 19, 20 in Hoa Binh Culture), which is considered of Papua type and Cai Beo, Ang Giua in Hai Phong (Pre-Halong Culture) considered to be of Melanesian type etc.

Conclusion

In 1965, during an excavation of Tham Khuyen Cave, Lang Son Province, Vietnamese researchers found 9 fossilized teeth of Homoerectus hominids and one fang belonging to a giant hominid (Gigantopithecus) along with fossils of many other animals. This has proved that dozens of thousands years ago there were traces of human beings on this land. Later, in numerous other caves such as Hang Hum (Hum Cave) (Yen Bai Province), Tham Om (Nghe An Province), Lang Trang (Trang Village) (Thanh Hoa Province), Ma Uoi (Hoa Binh Province), and Nham Duong (Hai Duong Province), fossilized teeth of the early Homo sapiens and late Homo sapiens were discovered.(*Chinh et al. 1979; Schwartz et al. 1994, 1995; Kahlke 1967; Cuong*

1985a, 1992). Then in Son Vi and Hoa Binh Cultures, several unclearly classified skulls revealed that both Australoid and Mongloloid features coexisted on the same skull. In Neolithic age there appeared remains of speakers of Austranesian language such as the Melanesians, Negritos, Australo-melanesians, Indonesians etc. After thousands of years these people mingled with the native people including the Mongloloid from the North so that the black characteristic was reduced to become the Viet-Muong people of which one group later separated as the Viet (Vietnamese) people.

We have paleoanthropological evidences to prove that the Vietnamese people have our native roots in Vietnam and do not originate from emigrants from elsewhere.

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ROCK ART AS AN INDICATION OF (AUSTRONESIAN) MIGRATION IN ISLAND SOUTHEAST ASIA

Noel Hidalgo Tan

Introduction

In recent years, I have argued that far from being a region that has little, rock art is quite endemic in Southeast Asia, appearing in some shape or form in all the major land masses and countries of Southeast Asia (Tan 2014, see also Tan and Taçon 2012, and Scott and Tan 2016). The number of known painted and engraved rock art sites in Southeast Asia number around 600-700, and where megaliths are included the sites number to over 1,500. Despite this mass of data, rock art offers only limited insight into the past because they are traditionally hard to date, and any attempt to situate them in a chronology tend to be relative to the archaeological context they are found in or similarity to nearby sites. As such, typical rock art site analyses focus on the description of sites and the visual motifs of the rock art.

In this paper I wish to take the sheer number of sites as a starting point for an insight of past movements of people, and to examine distributions of rock art in space, specifically in Island Southeast Asia. I define rock art very broadly as non-utilitarian markings of landscape using natural rock, in the form of paintings or drawings (pictograms), engravings (petroglyphs) and the arrangement of large rocks to modify the landscape (megaliths). By expanding this definition of rock art to beyond anthropogenic additive and extractive processes of rock surfaces, I wish to emphasise the role that rock art plays in place-making (Schaafsma 1985), with the assumption that conceptualisations of space require shared cultural values which in turn suggests that similar modifications of the landscape can be tracked through archaeological methods in time and space.

To this extent rock art is defined, the purpose of this paper is to review the rock art in Island Southeast Asia (ISEA) and examine the three theories of rock art that describe their distribution and relation to the Austronesian migration and spread from Taiwan: the Austronesian Engraving Style, the Austronesian Painting Tradition and the Megalithic Culture. The three theories will be reviewed in the light that much more rock art that is now known in the region; I will argue that the three theories as presently described add little to the discussion of the Austronesian diaspora as they pertain to relatively small geographic ranges and probably also represent separate time frames. Despite this, they have demonstrable value in expanding scopes of similar studies of population movements in Southeast Asia generally.

The range of Austronesian language groups is demonstrably very widespread, from Madagascar to Hawai'I, and for brevity I will limit the discussion of rock art sites to those of Island Southeast Asia, which includes the modern nations of Indonesia, Malaysian Borneo, East Timor and the Philippines. This is a region with significant numbers of rock art, especially in Indonesia where much archaeological research has been done and in which the most rock art sites have been discovered. Rock art sites are among the earliest archaeological sites to be identified in the region (eg, Bland 1837, Allirol et al. 1884, Grabowsky 1888, Röder 1938), including some of the oldest dated in Southeast Asia, as well as others that may have been created in recent memory. The sum of the data indicates that the production of rock art in intrinsically tied to the human experience from deep time until today, where symbols persist across media (eg, Pojoh et al. 2016). I begin the discussion with Borneo, which is shared by three countries, before discussing each country in turn.

Borneo

The island of Borneo is shared between three nation-states: Brunei, which has no known rock art sites; Malaysia, comprising the states of Sabah and Sarawak; and Indonesian Kalimantan. Both Indonesia and Malaysia contain numerous rock art sites representing the main varieties of rock art found in the region. As early as 1888, Grabowsky reported black drawings from Liang Lumba at Mount Mandella. Van Heekeren (1958) noted the presence of megaliths in the form of dolmens (Apo Kajan), rock graves (Long Pura) and sarcophagi (Long Danum) and Kush (1986) noted the existence of a rock engraving site named Long Po in the upper part of the Great Kayan River. Since the 1990s, a French-Indonesian team has made several investigations in the caves of East Kalimantan (see Chazine 2003, Plagnes et al. 2003, Chazine 2005a-d, Chazine and Noury 2006, Chazine 2007, Chazine and Ferrie 2008, Fage 2010, Ricaut et al. 2011), surveying more than a hundred caves. Many of the sites feature painted hands and hand stencils, the latter thought to be indicative as some of the oldest rock art in the region (Tacon et al 2014); rock art from Gua Saleh in particular has produced dates of a minimum 9,900 years (Plagnes et al. 2003).

It is unsurprising that East Malaysia contains a similarly diversity of rock art sites. The best-known pictogram site is that of Gua Kain Hitam in the Niah Caves complex (Harrisson 1959); their association of the boat burials with the ship paintings put the rock art to between 1,000 to 2,000 years old (Pyatt et al 2005). Other pictogram sites from Sarawak include the charcoal drawings at Gua Sireh, and the Bukit Sarang Caves of Lobang Ringen and Lobang Batu Putih (Harrisson and Reavis 1966, Datan 1993, Chia 2003). Two painted sites are known from Sabah: Gua Hagop Bilo and the Madai Caves (Bellwood 1988, Datan 1998, Zuraina 2003). Rock engravings have been noted sporadically in the highlands of Sabah and Sarawak (Harrisson 1973b, Harrisson and Harrisson 1969-1970, Kusch 1986), as well as in coastal contexts (Harrisson and O'Connor 1968, Tacon et al. 2010). Numerous megalithic sites have been surveyed throughout East Malaysia; Harrisson's (1958, 1973a) initial survey of megaliths identifies some 485 sites in Sarawak and 165 sites in Sabah (see also Harrisson and Harrisson 1969-1970). Later surveys include Phelan's (1997) study of megaliths around Kota Kinabalu, Datan's (2010) work on crocodile-shaped mounds in Sarawak; Lloyd-Smith and Datan (2010) on the megaliths of the Kelabit highlands and Azlin et al. (2010) and Ratnah et al. (2010) on the megaliths in Penampang.

Philippines

The Philippines is an important transit point for the movement of Austronesian-speaking peoples from Taiwan to the rest of Island Southeast Asia, however, the prehistoric evidence from rock art is extremely scant. This lack of data may be a function of the amount of data afforded to rock art research, or possibly even a function of geology. The most prominent rock art site is the Angono Petroglyphs in Rizal Province in the island of Luzon which was recently names as a National Cultural Treasure (Santos 1975, Peralta 1985, Faylona and Farol 2011, Bautista 2015). Pictogram sites in the Philippines include the Tau't Batu pictograms (which have been incorrectly described as petroglyphs) in Ugpay Cave (Peralta 1983). The Peñablanca Caves in Cagayan Province which was the subject of a field study conducted by the National Museum of the Philippines in 2012 (Peralta 1997, Mijares 2005, Faylona et al. 2014). Additionally, there are red paintings in the Anda Peninsula of the Bohol province which are currently under study (National Commission for Culture and the Arts 2006, Jenkins 2007). There are no megalithic sites currently known in the Philippines, however, Vanoverbergh (1929) described standing stone arrangements in the Northern Igorot villages of Luzon which are used as gathering spaces, and where found outside of the village, thought to be rest stops for the spirits of the dead on their way to the next world.

East Timor

This modern nation-state is connected to the Indonesian archipelago, and it is thus unsurprising that it contains several rock art sites which must be seen in this wider context. Earlier work in the 1960s by de Almeida (1966) and Glover (1986) marked the discovery of six sites, and the number has doubled in the last decade due to research in the last decade (O'Connor 2003, Aubert et al. 2007, O'Connor and Olivera 2007, O'Connor et al. 2010). The Lena Hara site in particular has yielded dates of great antiquity: uranium-series dating of paints produced dates of between 24,000 and 29,300 years ago, and another layer producing a maximum age of 6,300 years BP (Aubert et al. 2007) while in another part of the cave the dates of petroglyphs date between 12,500 and 10,200 years old (O'Connor et al. 2010). Another site, Hatu Wakik (Hawak) containing negative hand stencils and abstract geometric shapes was dated to between 3,000 and 5,000 BP on the basis of lithic finds (Forestier and Guillard 2013).

Indonesia

Most of the rock art known from Island Southeast Asia is found in Indonesia, and they occur mainly as painted sites and megalithic complexes. We know of megaliths from Sumatra (Van der Hoop 1932, Vonk 1934, Van Heekeren 1958, Schnitger and Tichelman 1989, Caldwell 1997, Bonatz et al 2006), Java (Steinmetz 1898, De Haan 1921, Van Heekeren 1931, 1957 and 1958, Flines 1949) and Sulawesi (Van Heekeren 1958, Handini 2008). Some of these megalithic cultures persist until today, and represent a long-lasting traditional way of life.

Petroglyphs are less frequent, as is the case for the rest of Southeast Asia. Engravings have been found in Sumatra (Indriatusti 2011), the Riau Islands (Caldwell and Hazlewood 1994), in West Java (Djubiantono et al. 2001), southern Sulawesi (Akin Duli 2002), Flores (Verhoeven 1956, Kosasih 1991). The engraved sites in Indonesia are varied and geographically spread out, and it is highly unlikely that there are connections between the petrogylph sites listed currently.

Painted sites make the bulk of rock art sites in Indonesia, although they tend to occur in eastern Indonesia; Java has no known painted sites, and until recently painted sites were unknown in Sumatra until the discovery at Gua Harimau (Simanjutak 2009, Rini 2012). The Gua Harimau site is associated with the Neolithic period, and thus the discovery of painted rock art is very significant in future questions about the Austronesian expansion into western Indonesia.

A higher density of rock art research can be found in eastern Indonesia, in the lesser Sundas, Papua, and Sulawesi (see Marschall and Wäfler 2012, 2013). At the Lesser Sundas bordered by Java, Suawesi and Irian Jaya, rock art has been noted in the Kei islands (Allirol et al. 1884, Van Heekeren 1957, Ballard 1988), Seram Island (Röder 1938, Latinis and Stark 2005), on Flores (Kusch 1986) and in West Timor (O'Connor et al. 2015).

The easternmost provinces of West Papua and Papua contain numerous rock art sites, many of which have been studied in the context of the Austronesian Painting Tradition and Austronesian Engraving Style discussed below. The most prominent rock paintings have been located in the limestone cliffs of the Maccluer Gulf and on several islands, including Ogar and Arguni (see Röder 1938, 1956 and 1959, Souza and Solheim 1984, Kosasih 1991, Arifin and Delanghe 2004), and the Misool Archipelago (Keller 2007, Chazine 2008). At the Kaimana district of West Papua, Djami (2010) has discussed migratory links between southern Papua and Australia, and later (2011a) the potential for these sites for tourism development. Also in Kaimana, Mas'ud (2014) discusses the results of a recent expedition to Gua Karas where black paintings found there are theorised to be some sort of burial markers.

In the Biak region of northern Papua, Maryone (2014) discusses the depiction of the Karwar ancestral spirit in rock art as a belief dates to prehistoric times.

Some of the most significant advances in rock art, not just from Indonesia but for the field in Southeast Asia, have come from Sulawesi. Aubert et al. (2014) published the uranium-series dates from seven cave sites in the Maros karsts of Sulawesi which produced a minimum date of 39,900 years for a painted hand stencil, and at least 35,400 years for a painted babirusa, which place these paintings as among the earliest dated figurative depictions worldwide. The location of these paintings in Sulawesi in such deep time demonstrate that rock art may have been independently created at multiple areas around the globe rather than stemming from Africa or Europe, and also raises the possibility that some rock art in Mainland Southeast Asia could be earlier (Taçon et al. 2014). Sulawesi has long been noted for a number of rock art sites found in southern and southeast Sulawesi (Van Heekeren 1957, Kosasih 1991, O'Connor 2015, Oktaviana et al. 2016, see also Fage 2014).

Defining the Austronesian rock art

As seen from the review above, there are significant amounts of rock art to be found throughout Island Southeast Asia. At times, rock art has been described as being part of an Austronesian style or tradition, as a way to answer questions about the movements of people in Southeast Asia. There are three main theories that describe rock art and their specific distribution in Austronesian space; and to that extent they are thought to describe the traces of movements of people in the past. They also correspond to the three main types of rock art production: the Austronesian Engraving Style (AES), Austronesian Painting Tradition (APT) and the Megalithic Culture.

Austronesian Engraving Style

The Austronesian Engraving Style was articulated by Specht (1979) in his study of 383 rock art sites in the western pacific between the Torres Strait and Tonga. He noted a pattern of curvilinear geometric engravings such as spirals, concentric circles and face-like forms occurring on boulders located close to water sources which occurred in areas where Austronesian languages. Additionally, he noted that while petroglpyh sites clustered in the eastern part of this study area, pictogram sites were found mainly in the western of the Vitiaz Strait, ie. Papua New Guinea, Indonesia and the Torres Strait. Despite the atemporal nature of the study, there was speculation that the AES correlated with the spread of the Lapita culture in the Western Pacific.

Austronesian painting tradition

In a similar vein, Ballard (1992) began examining pictogram rock art sites in the western pacific (from Timor to Bougainville), incorporating sites studied by Specht and adding about 60 more to the corpus. He found a high correlation of painted rock art sites with Austronesian-speaking areas, and a general uniformity of sites: rock art sites were located near the sea or coast, and located on high-up locations that were fairly inaccessible. This cluster of attributes was named the Austronesian Painting Tradition (APT). One key speculation offered by Ballard is that the general homogeneity of the painted rock art suggests that cultural transfer took place relatively quickly and amongst established networks amongst Austronesian-speaking communities in the region, a claim somewhat supported by the appearance of bronze artefacts in the motifs. Here, a tentative and relatively late date of 2,000 BP is offered. Later discussions of the APT have linked the depiction of rock art motifs, human burials and boar burials with funerary rites and beliefs of the afterlife (Ballard et al. 2003, see also Manguin 1986 and Szabo et al. 2008).

Megalithic Culture

Like petroglyphs and pictograms, megaliths are also distributed throughout Island Southeast Asia and it is worth discussing them in the context as rock art, insofar as they are a form of landscape modification. While megaliths have been noted by ethnologists and other researchers all through the late 19th and early 20th century, it was only in the middle of the last century that Heine-Geldern (1945) divided the megalithic culture into two phases: and older megalithic tradition associated with the Neolithic rectangular axe culture (associated with the Austronesian migration), dating to 2500-1500BC and transmitted via Mainland SEA to Sumatra through Peninsular Malaysia. The second phase, dating to the 3rd or 4th century BC, was associated with the Dong Son culture and the bronze-iron age. More recently, an analysis of megaliths by Prasetyo (2006) argues against Heine-Gelden's theory that megaliths are associated with the arrival of Austronesian-speaking people. Instead he argues that the practice of building megaliths was brought to Indonesia via trade networks stemming from India and China. The two vectors for this transfer are from Mainland Southeast Asia to Sumatra and eastwards to Java, South Kalimantan, Java and Papua, and another vector from Philippines to Sabah, North Sulawesi and North Maluku. While the chronology of the megaliths also needs refinement, most dated megalithic sites range between 2-16th century AD (Prasetyo 2006).

The three theories outlined above present a geographical range of certain types of rock art within Island Southeast Asia, but as they stand they are an incomplete picture. Particularly for the AES and the APT, Wilson, Ballard and Specht were mainly focused on the Western Pacific and Eastern Indonesia and new data continue to revise their geographical ranges. One expects that more new discoveries, integration of existing rock art data west of Papua, and clearer definitions of such traditions and styles will reveal that the APT and AES have a larger range than previously thought. Already, O'Connor et al. (2015) have recently alluded to this with the discovery of rock art in west Timor with APT characteristics and has argued for a new heartland of the APT in Eastern Indonesia rather than associated with a migration of Austronesian-speaking peoples out of Taiwan. Additionally, a previous study on the rock art of East Timor, O Connor and Olivera (2007) have pointed out that the painted rock art sites found there, while following the visual motifs and landscape characteristics of the APT, are found predominantly in areas where non-Austronesian languages are spoken.

Petroglyphs in ISEA are far less common than painted sites, and there seems to be little or no linkage between petroglpyh sites in ISEA with that of the AES. O'Connor et al. (2015) have suggested that the AES in the Western Pacific could be linked to Taiwan by way of the Wanshan petroglyphs (see Yang 2006). However, they have also pointed out that the Angono Petrogylphs, are not similar in visual style or landscape which highlights a break, or possibly no connection at all, between the petroglyphs of the Taiwan and the Western Pacific. To add another layer of confusion, petroglyph sites in Borneo are observed with similar motifs as the AES - face designs and concentric spiral patterns - and contemporary accounts attribute their creation to an ancestral deity figure and suggest an age of at least before recorded memory (Harrisson 1973b, Datan 2014).

The distribution and transfer of megaliths in Indonesia is also unclear. Prasetyo's hypothesis that megalithic cultures spread into Indonesia from China and India has little or no evidence in the intervening regions of Thailand, Vietnam and the Philippines, where one would expect to find megaliths if such transfer occurred. Setting aside the megaliths in Malacca and Negri Sembilan in Peninsular Malaysia, the nearest megalithic traditions in Mainland Southeast Asia occur in Northeast Thailand and Laos - the Buddhist sema stone tradition and the Plain of Jars respectively (Colani 1935, Paknam 1981, see also Murphy 2010). The high concentration and diversity of megaliths in Indonesia suggest that it is the probably heartland of the megalithic tradition, which at its furthest jumped the Straits of Malacca and into Peninsular Malaysia where the practice terminated (see Winstedt 1917, Wallace 1920-22, Evans 1921, Sheppard 1936, Sheppard 1962, Chandran 1973). Chandran (1973) in his analysis of the megaliths at Pengkalan Kempas illustrates some contact between Hinduism and Islam, in that at least one megalith were later inscribed with the word 'Allah'. One possibility is that the introduction of megaliths, most likely from Sumatra, coincides with the introduction of Austronesian language speakers into the Malay Peninsula, and to that extent may represent an Austronesian megalithic tradition of a period in time later than the painting and engraving traditions.

Spatially, the three rock art traditions occupy distinct regions that have little overlap (Figure 1). This problematises the question of whether rock art can be a good indicator of the movement of any single group of people into a region, or if it represents a powerful ideology that was shared within a region. In the evolving perspectives on the Austronesian migration, O'Connor (2015) links the idea of rock art as a manifestation of an ideology that accompanied the relatively rapid introduction of the Neolithic material culture into Island Southeast Asia (Spriggs 2011, Blench 2012). There is no evidence to contract this interpretation in the case of the APT, which contains the best-defined set of characteristics: red paintings, located on limestone cliffs, associated with the sea and often containing maritime imagery and associated materials. The APT is linked to funerary rituals (see discussions on the ship of the dead by Manguin 1996, Ballard et al. 2003 and Szabó et al. 2008), and probably signalled the arrival of a group of people who had access to metal objects and pottery due to their portrayal in the rock art, approximately 2,000-4,000 BP.

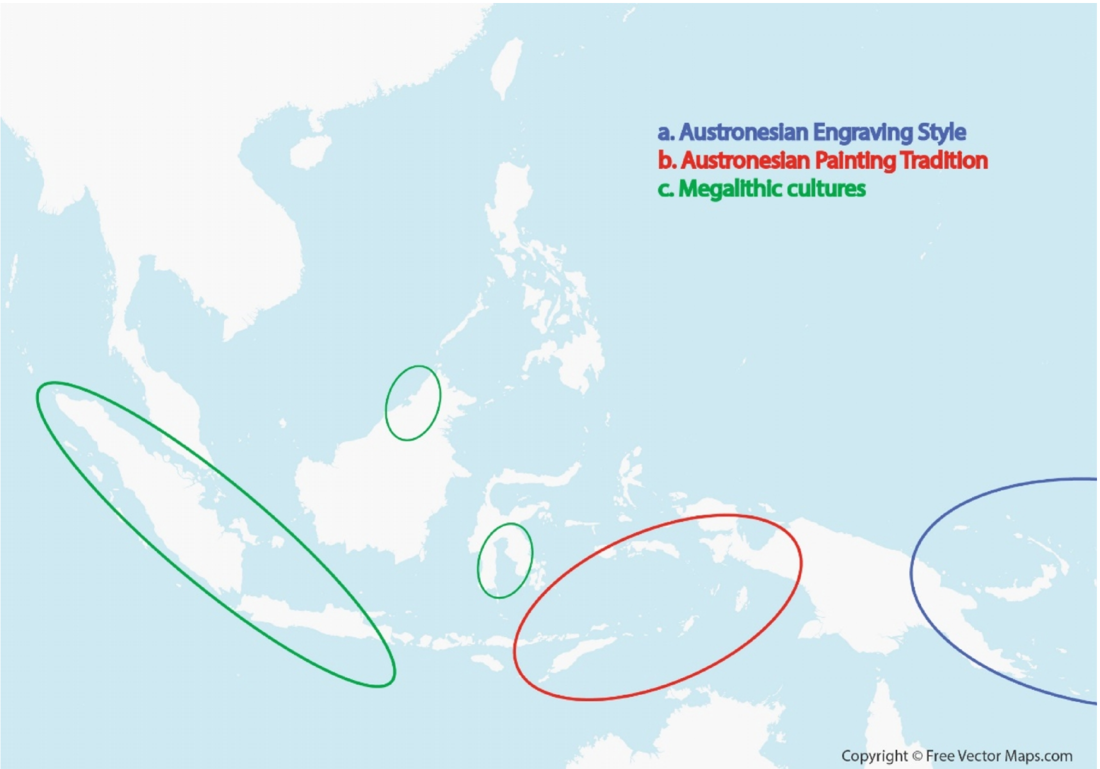

Figure 1. Geographic range of the Austronesian Painting Tradition, Austronesian Engraving Style and Megalithic cultures from known rock art sites. Base map "Map of Southeast Asia with Countries - Outline" by FreeVectorMaps.com

Wilson (2002) has previously pointed out that the lack of temporal context for many rock art sites is a problem, even as the overall symbolic and motif unity in the AES and APT suggests a period of continuous inter-island interaction. More critically, Wilson she suggests that the two broad traditions could have represented to movements of two separate people at different times. If the association for the AES is to be linked with the emergence of the Lapita people, then the dates for this rock art tradition would go no earlier than 3500 BP. The data for the megalithic culture, which is not one but probably many different types of regional styles, date much later from the Bronze age to the 1st millennium CE; their spread in this time period would have been facilitated by the use of established communication networks, not only in coastal areas but also further inland, and also necessarily requires the formation of settled societies in order to marshal the resources necessary to erect them.

Discussion and Conclusion

If rock art is to be useful in the question of tracking specific groups (as a set of accompanying ideological symbols depicted on rock art and other media), three things must occur. First, rock art sites need to be recorded and quantified beyond their visual data, and more like archaeological unit of information, as one would examine a ceramic sherd of a botanical remnant - by extension treating the entire site as an indicator of past human activity. Besides visual motifs and superimpositions, consideration should be placed in recording ethnographic relationships, prominent landscape features.

Secondly, a big data approach to rock art within Southeast Asia, similar to the multivariate approach taken by Wilson (2002) can be utilised to detect patterns in visual motifs, landscape features and where possible, ages of sites. Computation of such data would present patterns in rock art distribution that would further enhance our understanding of how motifs moved and were transmitted across time and space. Indonesia, because of its large and diverse body of rock art sites, is an ideal setting for such a study, as is Thailand in Mainland Southeast Asia for similar reasons.

Finally, effort should be put into dating rock art as far as possible through absolute chronometric methods, or else by explicitly tentative dates derived from associated finds or iconographic identification. Coupled with a geographic analysis, it may be possible to identify possible ages of rock art clusters, which in turn can illuminate movement pathways of people during ancient times.

We have reached a critical mass, or rather a sufficient number, of rock art sites discovered in Southeast Asia to begin making generalised regional groupings. Sensing such patterns in the landscape may offer a new way of looking at the rock art data beyond simple imagery and iconography. The challenge for future researchers is to standardise and quantify a diverse and often incomplete set of data in order to make rock art a more useful set of archaeological data.

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THE CONNECTION AND TRADITION - THE BARK CLOTH MAKING IN HAWAI'I AND TAIWAN

Chi-shan Chang

Introduction

Long before the invention of textile technology, what would the clothes humans wore be made from? In cold regions, animal hide was very suitable, while in many tropical regions, bark was chosen as the raw material for making clothes to cover the human bodies. However, with the evolution of time, they were replaced by textiles in almost all places. The bark cloth is a kind of cloth made from the bark of plants through non-textile technology; it is a kind of cloth that is made through the process of beating and felting using bark as its raw materials. Some scholars have pointed out that the "Ta bu" mentioned in the "Biographies of Usurers" of the *Shiji* is the earliest record of bark cloth. (Tang 1997)

The regions in the world that use bark cloth are widespread, mainly between 30°N and 40°S, including the western part of Africa, Southeast Asia, many islands in the Pacific Ocean, and Central and South Americas. Despite its geographic expansiveness, the main area of distribution centers around the Pacific Rim, including such areas as Indochina (Vietnam, Laos, Thailand), Indonesia, the Malay Peninsula, Oceania, the Central American region, the South American region, Northeast Asia, Taiwan and Central China, Northern China, the eastern coastal regions of China, and Hainan Island (Zheng 2007).

The relationship between bark cloth and Austronesian peoples can be examined in three respects: 1. The ethnic groups that still produce and use bark cloth in Taiwan, Indonesia and the Pacific regions all belong to the Austronesians, and all use paper mulberry as the raw material for production (Chang 2009). 2. All the existing linguistic evidence of bark cloth is found in the languages spoken east of the Wallace Line.[1] Robert A. Blust, a linguist, mentioned that the linguistic term (vocabulary) of bark cloth is only found in the Eastern Austronesian languages, and the regions of the Eastern Austronesia have not developed languages related to weaving (such as weaving, loom and shuttle rod), but instead have shown a distinct bark cloth culture (Chang 1988). 3. Based on the archeological evidence, Peter Bellwood, an Australian archeologist, once pointed out in terms of the significance of the bark cloth culture that tapa beaters are common on islands in southeastern Asia and the

[1] The Wallace Line is a biogeographical boundary. During the Glacial Age, the areas where the Wallace Line passed through were still separated by oceans.

areas of the continental margin, especially in the geographical areas within which the Austronesian peoples inhabit. However, what have been excavated from the sites on the continent are spinning wheels rather than tapa beaters. All these evidence reflects that the bark cloth culture has special meaning for the Austronesian peoples. And in recent studies of the origins and development of the Austronesian peoples, it is generally believed that the bark cloth technology has been a very important cultural characteristic of Austronesian peoples (Bellwood 1979).

The Austronesians in Taiwan which is situated in the region of the continental margin and those on the Hawaiian Islands which span the expansive Pacific Ocean are sharing common cultural traits, bark cloth being an important one of such traits. Also, both places once experienced the disappearance of the production of bark cloth as they undergo modern development. This paper attempts to sort out the historical contexts in which the bark cloth of both places reappeared after extinction to provide references for future comparative studies.

Linking Taiwan and Hawaii

Kapa is the name of the Hawaiian bark cloth. Bark cloth is a kind of cloth made from the bark of plants through non-textile technology; it is a kind of cloth that is made through the process of beating and felting using bark as its raw material. In Hawaii, the raw materials used for making bark cloth also include ***mamaki*** (*Pipturus species*), breadfruits, ***ma'aloa*** (*Neraudia species*), etc. It is not clear as to how ***mamaki*** is used, while the use of breadfruits and ***ma'aloa*** is rarer. In the Hawaiian region, paper mulberry has a more sophisticated taxonomy, like ***wauke*** and ***po'a'aha***, which in today's botanical taxonomy are just grouped under the broad category of paper mulberry (Abbott 1992).

In Hawaii, paper mulberry is called ***wauke*** and is the principal raw material for making Hawaiian ***kapa*** (Brigham 1911). It is believed that paper mulberry was brought to Hawaii by the ancestors of Polynesia and was one of the necessary plants they brought along with during their migration (Abbott 1992, Meilleur et al. 1997). Some scholars pointed out that the natural habitat of paper mulberry is the sub-tropical regions to the east of Asia (Matthews 1996); paper mulberry then reached Remote Oceania from Near Oceania through a narrow path (Matthews 2006).

A study in 2015 that used the chloroplast DNA of paper mulberry as the molecular marker incontestably established the link between the materials of bark cloth in Taiwan and Hawaii. According to the study result of the team, the paper mulberry in Hawaii originated from Taiwan: a unique molecular marker showed that Taiwan is the homeland of all the paper mulberry in the Pacific region. The paper mulberry on the Oceanic islands including Indonesian Sulawesi, Fiji, Tonga, Samoa, Rapa Nui (Easter Island), the Marquesas Islands, etc.

was found to carry the molecular marker from Eastern and Southern Taiwan (Chang et al. 2015), rendering it even more meaningful to investigate the contemporary bark cloth cultures in Taiwan and Hawaii.

The History of Bark Cloth in Taiwan

As bark cloth remains in the archaeological sites is very hard to preserve, if we are to trace the history of bark cloth of a certain place, we can only start with the tools used for making the cloth. Archeologists have discovered at many sites a certain kind of stone tool; the Hong Kong archeologist Tang Chung named it stone beater and believed these stone beaters were the tools for producing bark cloth.[2] How did he prove this? He attempted to investigate this question through archeology, ethnology, and experimentation, by studying the following: (1) the spatial distribution of stone beaters and the ethnological distribution, (2) features of the mechanical structure of the tools used for making bark cloth, (3) the facilities used to strengthen the beating and the handles, (4) the application of the changes in the weight of stone beaters, and (5) the use marks left on the stone beaters. He then deduced the following conclusion: about 7000 years ago, the stone beaters that were used in East Asia were all closely related to the production of bark cloth (Tang 2003).

At present, the areas in which stone beaters have been unearthed are generally below 30°N, including Taiwan, the Philippines, Indonesia, Yunnan Province (China), Guangxi Province (China), Guangdong (China), Hainan (China), Vietnam, etc.; stone beaters have also been unearthed in Central America. Looking at Taiwan's archaeological excavation data, there are at least 40 sites from which bark cloth stone beaters have been unearthed, spanning almost the whole island. This indicates that the bark cloth culture had once enjoyed a boom period in Taiwan (Tang 1999). At present, the oldest bark cloth stone beater unearthed in Taiwan was found at the site of Nanguanli site in the Southern Taiwan Science Park, part of the stone tools used by the Dabenkeng culture 4300~4700 years ago (figure 1).

[2] But some scholars think that existing archaeological materials lack evidence to prove the practical use of this kind of stone tools, and call this tool as "Grooved Stone batten".

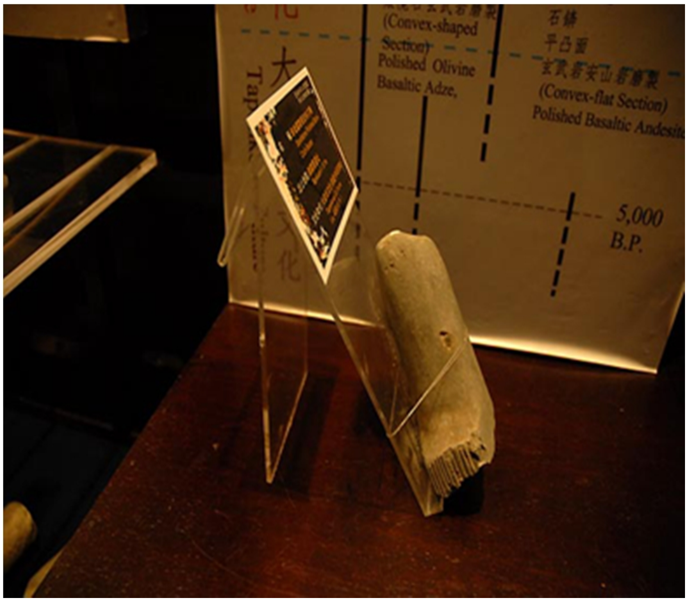

Figure 1. The oldest stone beater unearthed in Taiwan. (Nanguanli site 4300~4700 BC.).

As for the research on Taiwan's bark cloth culture, the first pioneer who initiated the research on Taiwan's bark cloth culture was Tadao Kano while Taiwan was under the Japanese rule. He pointed out that *tapas*, *tapal*, and *tarip* in the vocabulary of the Amis are all intimately related to the bark cloth culture (Tang 1999). In fact, bark cloth today is also called tapa. In addition, studies related to Taiwan's bark cloth in the modern period include a research report titled "The Bark Cloth Culture of Taiwan and the Pacific Rim", by Ling, Man-Li in 1960. She found it plausible to infer from the linguistic materials that there exists an affinity between Taiwan and other Pacific regions (Ling 1960). In 1962, the Institute of Ethnology, Academia Sinica published a book titled "*Material Culture of the Vataan Amis: A Report on the Material Life of a Taiwan Native Tribe"*. The book details the methods the Vataan tribe of the Guangfu Township, Hualien County, used to make bark cloth and the tree species used. For example, in the section on the tools for making bark cloth, the interviewer of the Vataan survey was He Youke (*unak tabong*), then almost 80 the leader of the tribe. He said that he had once seen in his childhood stone knives and hammers used for making bark cloth, and that the researchers had asked him to make two stone knives. In addition, the Institute of Ethnology, Academia Sinica in 1959 commissioned those elderly who had seen bark cloth to make such cloth, but only 4 pieces are in better condition (Ling 1962). From the above two accounts, the making of bark cloth in Taiwan had been in decline by 1959 (maybe earlier), so that the elderly who were commissioned the works could only reproduce the works based on their memories, and that no actual bark cloth or tools for making it could be seen at that time.

The Reappearance of Taiwan's Bark Cloth and Its Present State

Around 1995, the then leader of the Atolan tribe, Shen, Tai-Mu (*Panay*), in Donghe Township, Taitung County, and his predecessor, Pan, Qing-Wen (*Kunui*), together with their wives and a few friends of the same age group, began to deliberate, fumble and experiment with how to make bark cloth according to the faint memories of the elderly. Owing to their unceasing efforts, they succeeded in reproducing bark cloth (figure 2), and also prompting the whole Taiwan east coast to attach importance to this craft. Such efforts have rendered this craft of producing bark cloth to become a channel through which the outside world comes to understand the culture of the Amis (Luo 2011). In Taiwan's modern production of bark cloth, the artist Chen, Shu-Yan, having learnt the production of bark cloth at school and applying it to her creative works, communicated, through the assistance of the museum, with the bark cloth workshops of Atolan. Such exchange has generated new sparks and influence. These processes have more or less helped to shape the current state of the bark cloth reproduction in Taiwan. In the "Fiber Creation Training Class" organized by the National Museum of Prehistory in 2004, the production of bark cloth was one of its programs, which also allowed more people to understand such type of material. At present, many of the bark cloth creators in Taiwan have been inspired by such an influence, or have become more convinced that they themselves like to use bark cloth fiber material in their creations. These people include Chang, Mei-Niang from the Amis in Shoufeng Township, Hualien County and Liu, Jin-Jiao (Bunun people) from the Kamding Tribe in Taitung (Lin 2006; Chen 2008).

Figure 2. The first bark cloth produced in 1995 made by the Atolan old chieftain Panay

The Bark Cloth of Hawaii

In respect of Hawaii, there has not been any record of unearthed stone tools for making bark cloth, thus making it difficult to trace the history of bark cloth in the prehistoric period in Hawaii. In terms of historical records, as early as 1778 when Captain Cook sailed to Hawaii, there were already records of sophisticatedly crafted bark cloth. The bark cloth of Hawaii is called *kapa*, which, analysed in terms of its production process, is based on a different type of technology from that of other Polynesian regions. For example, delicate patterns would be engraved on wooden bark cloth beaters, and such engraved patterns would then be used to produce watermark effects on the finished bark cloth products. Such patterns were different from those of parallel lines found on the beaters of the East and Central Polynesian regions. In the Hawaiian regions, the method of creating different color designs by pressing bamboo-made stamps on the bark cloth was also different. As for the vegetable color dyes, the green and blue dyes of the Hawaiian regions had never appeared in other Polynesian regions, either (Te Rangi Hiroa 1957).

The corresponding author went to the Bishop Museum in Hawaii from March to May, 2011 to examine and study the bark cloth collections of the museum. The following is a concise summary of the observations and comparisons made of the bark cloth of the 18th and 19th century:

In terms of color, Hawaiian bark cloth traditionally was divided into 4 types, red (*'ula'ula*), yellow (*olena*), black (*'ele'ele*), and various deep blue, deep green and deep brown (all called *uliuli*). After Hawaiians came into contact with the Europeans, cloth fibers were sometimes felted into the bark cloth (usually red), which not only enriched its color but also changed its texture (figure 3).

Figure 3. After Contact with Europeans, the Hawaiian bark cloth, not only enriched its color but also changed its texture. (Collection of Bishop Museum)

In the 18th century, the Hawaiian bark cloth was in general thicker with a bold angular design. Linear elements were usually the main theme, with different lines crisscrossing to form squares, triangles, mountain-shapes or slanted lines. These lines were bold and directional. Moreover, stitching was also highly likely one of the features of the Hawaiian bark cloth in the 18th century (figure 4).

In the 19th century, the bark cloth was by comparison thinner and more delicate with watermarks produced by impressing with tools. The patterns on its surface were also different, such as a smaller size of pattern, a combination of very different patterns, and the occasional use of circles. There was less emphasis on the use of linear elements, with lines generally used for separating the spatial arrangement of patterns. It would also be adorned with imprints of bamboo-made small flower stamps (figure 5).

Figure 4. In the 18th century, the Hawaiian bark cloth was decorated with the linear elements. This specimen also can see the stitching feature on it. (Collection of Bishop Museum)

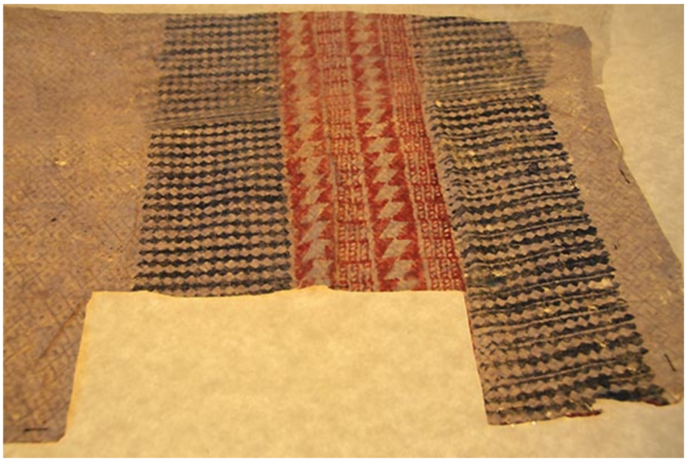

Figure 5. The 19th century Hawaiian bark cloth. This specimen can see the watermark and small stamps printed these features on it. (Collection of Bishop Museum)

When bark cloth became more and more delicate, it became less practical to use the bark cloth. The bark cloth for sleeping was replaced by blankets, while clothes made from bark cloth were replaced by machine-woven clothes. The Hawaiian bark cloth thus became a symbol of class and social authority, and a traditional heritage of Hawaii. Yet after its apogee in the 19th century, the Hawaiian bark cloth gradually languished, even to the point of becoming dormant for a century. It was around the 1970s that this traditional craft was once again "revived" (Kaeppler 1980).

Below are some clues to trace at what point in the 19th century the Hawaiian bark cloth disappeared: when Dr. Adrienne Kaeppler, the incumbent researcher of the Oceanian collections at the Smithsonian Museum, and I examined the bark cloth collections at the National Museum of Prehistory, we discussed when the Hawaiian bark cloth actually disappeared, and she provided a few clues: "during his stay in Hawaii from 1884 to 1886 to research on leprosy, Eduardo Arning, a doctor, took a photograph of a woman making bark cloth in front of a cave; this should be the last image record made in the 19th century of the making of bark cloth". [3] (Kaeppler, Private Correspondence, 2012/10/16)

In addition, there have been records that, within a hundred years of Hawaiians' contact with the Europeans, Hawaii's production of bark cloth became a thing of the past, without a trace to be found[4] (Kaeppler 1975). Another work published in 1992 mentioned that "the flourishing production of bark cloth on the Hawaiian islands gradually declined in about a hundred years after American churches commenced their activities on the islands, as the cotton cloth the churches brought with them for their own use and as goods for trade had replaced the bark cloth there and drove it into disappearance." [5] (Kaeppler, Private Correspondence, 2012/11/04)

Another clue is a passage written by the famous Hawaiian historian, Samuel Kamakau, with the following content:

> ***"All are dead who knew how to make coverings and loincloths and skirts and adornments and all that made the wearers look dignified and proud and distinguished."*** *- Samuel Kamakau, Hawaiian historian, 1870*（Tanahy 2008）

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[3] See Kaeppler, Adrienne L., Markus Schindelbeck and Gisela E. Speidel,. 2008. "Old Hawai`i: An Ethnography of Hawai`i in the 1880s Based on the Research and Collections of Eduard Arning in the Museum Für Völkerkunde." Berlin. This information is based on the private correspondence between the corresponding author and Dr. Kaeppler (2012/10/16).

[4] See Kaeppler, Adrienne L. 1975. "The Fabrics of Hawaii （Bark Cloth）." in *The World's Heritage of Woven Fabrics*, vol. 14, edited by p. b. P. Gilpin. Leigh-on-sea, England: F. Lewis, Publishers, Limited. This information is based on the private correspondence between the corresponding author and Dr. Kaeppler (2012/11/14).

[5] Same as footnote 4. This information is based on the private correspondence between the corresponding author and Dr. Kaeppler (2012/11/14).

Therefore, based on the above information, we estimate that Hawaii's bark cloth became extinct around 1870~1886.

The Reappearance of Hawaii's Bark Cloth and Its Present State

In the first half of the 20th century, the native language and traditional culture of Hawaii were fast disappearing. Not until the 1970s, did a new generation of adventurers begin to try to restore the traditional knowledge in danger of being lost. These adventurers came from some universities; even though it was taught in classroom using textbooks rather than through family members at home, the Hawaiian language was reborn. The reappearance of the Hawaiian language laid down a path, enabling people to acquire through their efforts other traditional wisdom and skills; some major projects with such goals were also established. The traditional navigation method of Polynesia is the origin of Hawaiian culture, so it became the focal point of efforts to restore the cultural knowledge. The construction of seafaring canoes (*Hokulea*) and their maiden voyage in 1975 have affirmed a promising path, allowing people to understand the skills and crafts of early Hawaiians and the things they did; young navigators and sailors experienced for the first time navigating in the Pacific Ocean without using modern equipment (Kam 2006).

Prior to the late 1980s, new adventurers wanted to rebuild traditional canoes, while bringing back a variety of traditional skills and crafts so that they could become part of the daily routine. Besides the technology of canoe building, they investigated the weaving of traditional sails, the cultivated of those Hawaiian plants used for making ropes, tying techniques, and the appropriate manners for expressing traditional rituals. Some people label this period as "The Hawaiian Renaissance" (Kam 2006).

In about the same period, the bark cloth craft was also brought back by some people who went to neighboring regions (like Tonga, Fiji, Samoa, etc.) to learn it anew. Important among these people were Malia Solomon, Pua Van Dorpe, Moana Eisele, etc. (Tanahy 2008). They diligently organized related studies or workshops, and, with the help of the local Bishop Museum, they brought up a new generation of craftsmen. The help of the Museum lay mainly in preserving a collection of spectacular ancient bark cloth for research and comparison; the rich book collections as well as field reports and publications all became the nutrients for the reappearance of bark cloth. These people generally called themselves bark cloth practicers; Maile Andrade, one of the practicers, had also reorganized the bark cloth collections for the Bishop Museum, including such classification tasks as reviewing, photographing, and describing (Gilmore 2009). Until today, though still small in number, the bark cloth craft of the next generation still continues to thrive. The practicers perform such tasks as cultivating paper mulberries, making tools, and dyeing, all by themselves, while persistently educating the next generation about the heritage of traditional culture.

Conclusion

In the history of the changes of the modern world, the indigenous cultures in the world are facing great pressures from all sides, including the introduction of convenient products or foreign religions, changes in political regimes, etc. All these have brought inevitable impact or changes to traditional ways of life and cultures. From the bark cloth examples of Taiwan and Hawaii, these challenges appear the common fate for the tribal peoples in the world, and the members of the Austronesian peoples of both places, sooner or later, have also responded in their own ways to these challenges. And rather surprisingly, the narratives unfolded at the two places look so much alike.

This paper attempts to sort out and recounts the historical contexts in which the bark cloth of both places reappeared to provide reference materials for future comparative studies. The modern bark cloth of both places embodied a “tradition of rebirth”. In the future, when undertaking comparative studies from the perspective of “the bark cloth culture of the Austronesian peoples” or investigating meaning of bark cloth rebirth from the angle of reviving/practicing traditional bark cloth crafts, it is necessary to examine the whole process of development within the relevant cultural context in order to understand the relationship between tradition and culture.

Concerning the significance of the reappearance of bark cloth in Taiwan and Hawaii, the corresponding author would like to quote a passage from a paper by Luo, Su-Mei in 2011:

> “**Although bark cloth experienced a discontinuity in its tradition of production and application, the process of cultural regeneration it has undergone has been endowed with more significance that transcends the object itself, due to its attribute of being a traditional craft. For example, as an important carrier of the cultural heritage, it funcions as a link between creators and learners, and the tradition. This has also attached a significance in cultural regeneration to the arts and crafts of bark cloth that is different from the significance of other non-traditional crafts.**” (Luo 2011)

Also, this paper intends to provide a thinking direction. For example, how should we understand the gradual decline of the traditions of indigenous people against the changes in the broader environment? How should we rebuild indigenous cultures, protect the pluralistic coexistence, traditional as well as special artistic styles of the Austronesian peoples, and to further integrate government departments and educational resources so as to facilitate the preservation of special cultural and artistic assets and their new development? Perhaps, by referring to the contexts of cultural development in different places and comparing their similarities and differences, we might be able to discover useful clues and guidelines as we deliberate.

In the examples of the reappearance of bark cloth in Taiwan and Hawaii, we have discovered that the participation of museums is of utmost importance. Museums can be the seed bank of culture, provide dynamics and strength, and serve as platforms that elicit interest in conservation and revitalization. In museums, actual cultural objects are preserved intact, which provides concrete information for reference; the publication of field reports and papers provides knowledge; and researchers' compilation efforts help trace and investigate the contexts of cultural artifacts. Relevant educational activities can also awaken society to the need for actions and help promote values. It is hoped that in the future, the museums and indigenous people in Taiwan and Hawaii across the expanse of the Pacific Ocean could cooperate to bring about new possibilities, enabling the preservation and the start of new phases of the special ancient cultural and artistic assets of bark cloth.

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BALI IN THE GLOBAL CONTACTS AND THE RISE OF COMPLEX SOCIETY

I Wayan Ardika

Introduction

Recent archaeological discoveries at Sembiran and Pacung in northeastern Bali indicate that contacts between Bali and India, mainland Southeast Asia, and Cina might have had already occurred in the late second century BC. The discoveries of Indian potteries, stone and glass beads, as well as gold foil eye covers at Sembiran, Pacung, and several burial sites such as Gilimanuk, Pangkungliplip, and Margatengah suggest the early contacts between Bali and India. Sembiran and Pacung in Northeastern Bali could be an ancient port or harbour which produced the largest collection of Indian potteries so far in Southeast Asia (Ardika 1991, 2013; Ardika and Bellwood 1991).

Sembiran and Pacung also produced the south Indian coarse dishes, as well as local Indian-style dishes. In Southeast Asia, India style coarse dishes are also known together with Rouletted Ware, from Khao Sam Kaeo and Phu Khao Thong in peninsular Thailand, and Batujaya in north-western Java. To date, the total count of fine Indian sherds from Sembiran and Pacung can be conservatively estimated at over 600, with similar quantity of coarse-facbric sherds of possible Indian manufacture (Calo *et al*. 2015: 383-384, fig. 5j). In addition, Han style paddle-impressed pottery was found at a depth of 3.1 -3.2m at SBN XIX, in association with other wares of possible Mainland Southeast Asian origin (Calo et al. 2015: 385).

Han bronze mirrors recently were discovered at the site of Pangkung Paruk in Northwestern of Bali. The bronze mirrors were found at Pangkung Paruk are believed derived from the first century AD, i.e. during the reigned of king Ma Huan from Xin dynasty (Eastern Han) who ruled from the year 8 to 23 CE (personal communication with Dr. Hung 2009; Westerlaken 2011: 13). The bronze mirrors at Pangkung Paruk, Northwestern Bali were discovered in sarchopagus A and B as burial goods.

A selection of bronze burial goods, and bronze artefacts from SBN XIX layer 8 have been incorporated within the Southeast Asia Lead Isotope Project. All of the Pacung samples, and one of the Sembiran socketed point are made of leaded bronze. The results indicate that lead isotope signatures are consistent with the bulk of broadly contemporaneous (500 BC-AD 200) leaded bronze Southeast Asia Lead Isotope Project database for Cambodia, Thailand and Vietnam. The lead isotope signatures of the points suggest the melting of imported bronze in Bali for local re-casting.

Indian and Chinese artefacts such as potteries, stone and glass beads, gold foil eye covers, as well as bronze mirrors were found as burial goods. These findings suggest that the demand of foreign prestige artefacts might have increased since the appearence of ranked or complex society in Bali between the first century BC and the first century AD. In addition, the discoveries of several fragments of moulds for casting metal objects indicate the increasing of metallurgy in Bali. It is believed that metal artefacts are most valueable for status symbol in the Balinese soceity since the raw materials of metal are absent in the island.

Indian Contact with Bali

Archaeological excavations at Sembiran and Pacung in Northeastern Bali brought a new light at the beginning of contacts between India and Bali. Several Indian Rouletted Wares, Arikamedu type 10, Arikamedu type 18, Arikamedu type 141, and a sherd with Kharosthi or Brahmi script was discovered at Sembiran and Pacung in Northeastern Bali. Sembiran and Pacung in Northeastern Bali produced more than one hundred Indian sherds, the largest Indian Rouletted sherds yet found in Southeast so far (Ardika 1991; Ardika et al. 1997: 194). Sembiran and Pacung which are close to the village of Julah could be the ancient harbour or port site in Northeastern Bali (Ardika 2013). A complete rouletted ware bowl has been found at Kobak Kendal in west Java, though to have been part of the kingdom of Taruma (see fig 1). It should be noted that rouletted ware sherds were also discovered recently at Batujaya, West Java (Manguin 2004: 288-289; Djafar 2010: 97-98, fig. 3.57).

Rouletted ware was manufactured in India and/or Sri Lanka perhaps between 150 BC and AD 200. The earliest rouletted ware probably appeared in Bali and Indonesia in AD 1-200 (Ardika and Bellwood 1991: 229). Some rouletted wares at Sembiran were found in a layer in association with a large black-slipped storage jar tempered with rice husk; this has been dated by AMS radiocarbon to 2660+/-100 BP (Ardika and Bellwood 1991). However, recent excavations at Sembiran and Pacung produced an AMS date obtained from charcoal at 2.9-3.0 m depth at SBN XIX is 142 cal BC-AD 25 (S-ANU 37107). Pacung trench IX, on the other hand, revealed a dense beach cemetry, with more elaborate burial practices, including the use of jar burials and richer burial goods. The sites have produced a cultural sequence starting from the late second century BC for the burials, to the twelfth century AD, a date represented at 2.2 m depth at Sembiran, just below the ash layer. At 95.4% probablity, the bayesian model of eight direct AMS dates from the bones of seven Pacung individuals, and one from charcoal closely associated with burial XIII, confirms that the burials started between 163 cal BC and AD 13 and ended between 51 cal BC and AD 137 (Calo *et al*. 2015: 381).

Figure 1. Rouletted sherds, Arikamedu sherd of type 10, and a complete rouletted ware bowl from Kobak Kendal, West Java

X-ray diffraction (XRD) analysis has been performed on one rouletted sherd from Sembiran IV, four from Anuradhapura, and three from Arikamedu. All have essentially the same mineral: mainly quartz with traces of mica, muscovite, potassium feldspar, and plagioclase feldspar. The XRD result conclusively supports an India origin (Ardika and Bellwood 1991: 224; Ardika 1991; Ardika et al. 1993).

In addition to XRD analysis, nine samples of rouletted wares (two from Anuradhapura, two from Arikamedu, one from Karaikadu [Tamil Nadu], three from Sembiran, and a single sherd from Pacung) have also been subject to neutron activation analysis (NAA) for 20 rare elements. The result indicates that all the rouletted wares are so close in composition with that of a single manufacturing source which is suggested for all the samples listed. The rouletted sherds forms seperate cluster in principal components and average link cluster analysis from sherds of presumed Balinese manufacture (Ardika and Bellwood 1991: 224; Ardika et al. 1993).

Apart from rouletted wares, two sherds of Arikamedu type 10 (fig.1) have also been found at Sembiran. Outside Arikamedu, this type of pottery has also been at the site of Chandraketugarh in West Bengal, and Alangankulam on the Vaigai river in Tamil Nadu (H.P. Ray pers com; Ardika and Bellwood 1991: 224). No information is at present available on its occurrence elsewhere.

A sherd of Arikamedu type 18 was also found at Sembiran (fig.2). The sherd of apparent Arikamedu type 18c was reported from Bukit Tengku Lembu in Northern Malaya (Sieveking 1962: 29; see fig.2a). An inscribed sherd was found in Sembiran VII. The sherd is black-slipped inside and outside and the fabric is coaser than that of the Rouletted ware, Arikamedu type 10 and type 18. Three characters are clearly visible on the inside surface of this sherd (see fig.2). According to Prof. B.N. Mukherjee of Calcutta University the script is Kharosthi, and his preliminary reading is *te sra vi* (Ardika 1991: 53, fig. 4.4; see fig. 2b). He (Mukherjee 1989 a,b; 1990a,b) believes that a group of people who used the Kharoshthi script extended their interests from Northwest India to West Bengal, where they became very actives as traders from about the last quarter of the 1st century AD to about the beginning of the 5th century AD. These traders probably conducted maritime commerce with Southeast Asia and reputedly had accessed to a supply of central Asian horses (Mukherjee 1990a:2).

Figure 2. A sherd of Arikamedu type 18, an inscribed sherd of Kharosthi or Brahmi script, and gold beads from Sembiran

Beads of glass and stone have been found in several Indonesian sites. Glass beads were discovered in several Indonesian sites including Sembiran, Gilimanuk (Bali), Plawangan (central Java), Leang Bua (Flores), and Pasemah (South Sumatra). Five glass beads from Sembiran have been analysed by Kishor Basa at the Instituteof Archaeology in London. One of them can be categorised as mixed-alkali glass, and four are potash glass. Basa (1991) believes that the Sembiran beads are similar to south Indian samples in terms of raw materials and were probably manufactured at Arikamedu.

Roman glass has been newly identified in Sembiran (SBN) XIX through chemical data, indicating indirect contact with the Roman world via India, and new compositional data from gold and carnelian artefacts suggest a route from the north Indian subcontinent to Indonesia, via mainland Southeast Asia. A red bead with grey striation is made of Roman soda natron glass. Moreover, two drawn beads with gold foil analysed as comparative samples from a cluster of 40 found in a sarcophagus at the site of Pangkung Paruk, to the west of Sembiran, were also made of soda natron glass. These finds constitute the first evidence of Roman materials in a prehistoric context in Island Southeast Asia (Calo *et el*. 2015: 384, 389, fig.8d and 8e).

Indo-Roman commerce had generated a rising demand for exotic and prestigious items of consumption and adornment in the urban civilization of the Mediterranean Basin - that “splendid and trifling’ trade in spices, perfumes, precious stones and pearls, silks and muslin, tortoiseshell, ivory, and rhinoceros horns, dyes and ungents, ghee, lac and so on (Bellina and Glover 2004: 70). The demand for exotic products in the west, one need only look at the spice trade and particularly at the trade in cloves, the unopened flower buds of eastern Indonesia. Cloves were already known in China in the third century BC, and were described by Pliny in Rome in the first century AD. At the production end, the trade in cloves, nutmeg and mace transformed Moluccan society from scattered kin-based communities of hunter-gatherers and shifting cultivations to stratified coastal trading states and petty empires.

Carnelian and gold beads were also discovered in Sembiran. Several prehistoric sites in Bali including Sembiran, Gilimanuk, Nongan, Margatengah, Pujungan, and Ambiarsari produced carnelian beads. Carnelian beads are generally believed to have been imported from India, although some may have been made in Southeast Asia since carnelian scrap occurs in some sites including Kuala Selinsing in West Malaysia.

Gold foil eye covers have been found in several burial and sarcophagus sites in Bali. These sites including Gilimanuk (burial site), Pangkungliplip, and Margatengah (sarcophagus sites). These artifacts were also found at Oton on Panay island in the Philippines and at Santubong in Sarawak (O'Connor and Harrisson 1971: 72-73). These gold foil eye covers are similar to artifacts reported from graves at Adichanallur on Tamil Nadu coast (O'Connor and Harrisson 1971; Ray 1989: 51).

It is interesting to note is the result of analysis of ancient mitochondrial DNA from the human tooth of Pacung III in Northeastern Bali. The tooth sample is generally associated with haplogroup A which is clearly clustered closest to Indian sequences followed by most Nepalese and Tibetan sequences (i.e., 16240 G. 16261 T) (Lansing et al. 2004: 288-90). AMS radiocarbon analysis of the tooth indicates its age as 2050+/-40 BP) (conventional radiocarbon age 2110 +/- 40 BP) (Lansing *et al*. 2004: 288). In addition, preliminary results of Y-Chromosome data were taken from a sample of 551 modern Balinese men indicate significant prehistoric contacts between India and Bali (Karafet et al. 2005).

Early Contacts between Bali, Mainland Southeast Asia and China

New chemical composition data for glass beads and bracelets excavated in 2012 from a burial context and directly above it at Sembiran and Pacung indicate strong links to Vietnam and, to a lesser extent, elsewhere in Mainland Southeast Asia, India and the Roman world. Some 119 out of a total of 759 samples from Sembiran (SBN) XIX, and 33 out of a total of 361 from Pacung (PCN) IX, plus comparative samples from broadly contemporaneous sites in northern Bali have been analysed using Laser Ablation Inductively Coupled Plasma Mass Spectrometry in the Institut des Recherches sur les Archeomateriaux of the Centre National de la Recherche Scientific (CNRS), Orlean, France.

Eighty per cent or more of the analysed samples from both Sembiran and Pacung were potash glass, compositionally similar to the low-lime potash glass (mKA) which is most strongly associated with Dong son sites, and the moderate-lime, moderate-alumina potash glass (mKCA) associated with Sa Hyunh and Dong Nai sites in Vietnam. Potash (potassium oxide) silica glass of at least three types was most common in Mainland Southeast Asia from the fourth to the second century BC, although with the occurrence of North Indian highalumina, high-uranium soda glass at Khao Sam Kaeo and Ban Don Ta Phet (Calo *et al*. 2015: 388, fig 9).

Two volcanic tuff moulds were discovered at Sembiran, one is for a Pejeng drum found in 1989, and the other one is for a socketed axe found in 2012. Both were found in the same layer. The first stone mould was carved with geometric motives typical of the decoration on Pejeng type bronze drums (Ardika 1991; Ardika and Bellwood 1991). Similar stone mould is still kept at the Pura Puseh temple at the village of Manuaba, Gianyar (figure 3).

The second stone mould was excavated in SBN XIX layer 8, which coressponds to the layer where Ardika found the first mould in SBN VII. The conical mould was analysed using portable XRF, and its surface give significant reading for copper, tin and lead, exceeding those detected in the associated soil. The conical shape suggests that it would have been used in the lost-wax casting of socketed bronze axe of Soejono type Vb (Calo et al. 2015: 389-390, fig. 10).

The selection of bronze burial goods, and bronze artefacts SBN XIX layer 8 have been incorporated within the Southeast Asia Lead Isotope Project. All of the Pacung samples, and one of the Sembiran socketed point are made of leaded bronze. The results indicate that lead isotope signatures are consistent with the bulk of broadly contemporaneous (500 BC- AD 200) leaded bronze Southeast Asia Lead Isotope Project database for Cambodia, Thailand and Vietnam. The lead isotope signatures of the points suggest the melting of imported bronze in Bali for local re-casting.

Figure 3. A fragment of mould from Sembiran, and fragments of a mould kept at Manuaba village, Gianyar regency

Archaeological discovery at Pangkung Paruk, in Northwestern Bali produced evidence of the earliest contacts between Bali and China. Two bronze mirrors were found as burial goods in the sarcophagus A and B on the site of Pangkung Paruk, Seririt District, Buleleng Regency during recent excavations by the Balai Arkeologi Denpasar. The bronze mirrors probably originated from Xin dynasty (Eastern Han) under King Wang Mang, who ruled from the year 8 to 23 CE (personal communication with Dr. Hung 2009; Westerlaken 2011: 13).

Figure 4. A Completed and broken bronze mirrors from Pangkung Paruk, Seririt, Buleleng (Northwest Bali)

It is interesting to note that new evidence of Han-style pottery was found in SBN XIX during the excavation program in 2012. This pottery was found at a depth of 3.1-3.2m, in association with other wares of possible Mainland Southeast Asian origin (Calo 2015: 385, fig. 6a).

Stratified or Ranked Society in Bali

Indian artifacts such as gold foil eye covers, glass and stone beads have also been discovered as burial goods at the sarcophagus burials in Bali. These artifacts are believed to be manufactured in India, and these might have been utilized as status symbol by the local elites in Bali.

Figure 5. Showing different types of burials: sarcophagus, bronze drum (centre), and without container

Social stratification or ranking in the Balinese society was manifested in the burial systems during the beginning of Indian contact with Bali. Some individuals were buried in the sarcophagi, jars or even in the bronze drum. However, other individuals were buried directly in the ground without containers (Ardika 1987). Social diffrentiation was refleted in the diffrent types of burial systems (see figure 5). Hegemony and hedonism might have been practiced in the Balinese society during the beginning of contact between India and Bali. Imported goods such as Indian artifacts show higher status for the owner than the local ones. Only the elits of the Balinese people might have had accessed to obtain such valueable artifacts.

The Balinese society at the beginning of Indian contact has already practiced metallurgy and produced artifacts such as bronze drums and axes with unique forms. The raw material of metals including copper and tin are not available in Bali. Therefore, these materials could have been obtained from other islands or regions in Southeast Asia. In other words, Bali has involved in long distance trade during the late second century BC.

The local elites of the Balinese society could be very active at the beginning of Indian contact with Bali. The local elites of the Balinese society search for imported products for their status symbol, even ideology beyond them.

The distribution of sarcophagus burials and inscriptions of early Hinduism and Buddhism in Bali between the 8th and 9th century AD are overlapped (Ardika 1987: 45; fig. 4.1). This phenomenon suggests that the development of social complexity in Bali was a continuous process. The local elits of pre-Hinduism and Buddhism adopted and adapted Hindu and Buddhism ideologies for their status symbols.

Contacts between India and Bali might have also involved Buddhism and Brahmanical priests. The epigraphic sources dated from the 8th to 11th century also indicate close relationship between Bali and India. Bali also produced hundreds of clay stupas which have been found at Pejeng and Blahbatuh villages, Gianyar regency, and Kalibukbuk in Buleleng regency, in the northern coast of Bali. The stupas contain certain tiny seals, in pairs, covered up with lumps of clay. The seals are stamped with a well known recitation of faith, so called *ye-te* formula. Similar clay seals and stupas were also discovered near Borobudur in Central Java (Kempers, 1991: 95-96). The texts on seals are in Siddhamatrka script. On the basis of palaeography, the date of the seal is estimated from 800 to 1000 AD (Griffiths, 2014: 183; fig. 12). Two pieces of gold foils, a silver foil bearing a few *aksaras*, and a terracotta tablet bearing *ye dhar*ma formula were discovered during the preparation for reconstruction of Pura Pagulingan, at Tampak Siring, Gianyar regency. The foundations of Pura Pagulingan showed an octagonal groundplan.

Figure 6. Clay stupas, dhyani Buddha and seals *ye dharma* stored at Museum Bali

The appearance of *dharanis* and *mantras* in Bali suggests that the island is an integral part of the ancient Buddhist world. Griffiths (2014: 186) argues that the text used in this part of Buddhist world must have been quite similar to the texts that were used in other Buddhist countries.

It is interesting to note that the Balinese inscriptions dated from the late 10th up to 11th century mentioned several places names in India such as Waranasi, Nalanda, and Amarawati. These places names were associated with court of justice, high functionary, the residence of Buddhist priests, and the name of a shrine or a sacred place.

The inscription of Sembiran B dated from Saka 873 or AD 951 states III.2. ...*da dikara di panglapuan di waranasi tuha dara* (Goris, 1954: 72-73; Ardika and Beratha, 1996: 106). It is translated as follows: the honorable *Dhikara* (functionary) of court of justice at Waranasi is Tuha Neko.

The term Nalanda was first mentioned in the inscription of Serai AII, dated from Saka Baranasi/Waranasi is Tuha Dara. The inscription of Gobleg, Pura Desa II dated from Saka 905 or AD 983 mentioned Iib.2. ..*da senapati waranasi tuha neko*,...(Goris, 1954: 79; Ardika and Beratha, 1996: 123). Translation: the high functionary or army commander (*Senapati*) at the year of 915 or AD 993. The inscripstion stated as follows: Va. 5. ..*mpungku di nalenda dang upadhyaya dhanawan* or the Buddhist priest at Nalenda (Nalanda) was Dang Upadhyaya (*honorefi*c teacher) Dhanawan (Goris, 1954: 83; Ardika and Beratha, 1996: 135-136). It is interesting to note that Tuha Gato was mentioned as *Senapati* at Waranasi in this inscription. On the basis of the inscription of Gobleg, Pura Desa II dated from AD 983 and the inscription of Serai AII, dated from AD 993 that Tuha Neko was replaced by Tuha Gato as *Senapati* (army-commander or high functionary) at Waranasi.

The inscription of Bwahan A dated from Saka 916 or AD 994 noted that the Buddhist priest at Nalanda was Dang Upadhyaya Dhanawan and the Buddhist priest at Waranasi was Dang Acaryya Sucandra (Goris, 1954: 86; Ardika and Beratha, 1998: 35). This inscription indicates that Nalanda and Waranasi were residence of Buddhist priests. Futher more, the inscription also mentioned Brahmanical priests (*kasaiwan*) as well as Buddhist priests (*kasoghatan*) were members of court functionaries.

The inscription of Tengkulak A dated from Saka 945 or AD 1023 mentioned the hermitage (*katyagan*) at Pakerisan river called Amarawati (Ginarsa, 1961: 4-8 ; Ardika and Beratha, 1998: 86). The Balinese inscriptions indicate that the Indian places names such as Waranasi, Nalanda, and Amarawati were transfered the to the local place in Bali. These places are associated with the centre of Buddhism in India. Amarawati was the Buddhist influence site in the lower Krishna valley under the Mauryas (Ray, 1994: 140). However, it is still not clear whether the Balinese might have visited to the Buddhist centres such as Waranasi, Nalanda, and Amarawati and other places in India or they knew the places cognitively? New data from India or Bali are needed for further studies.

Figure 7. Stupa Pagulingan and Gunung Kawi rock arts

Archaeological evidence that was discovered at Sembiran and Pacung indicate revolutionary process involving different types of cultural interaction that led, to the formation of Indic-based state in Bali by the first millennium AD.

Conclusions

Global contacts with India, mainland Southeast Asia, and China have stimulated the appearance of complex society in Bali. Imported artefacts such pottries, glass and stone beads, gold foil eye covers, metal objects were utilized as status symbols by elits of the Balinese society. In addition, contacts between Bali and mainland Southeast Asia also trigerred the existence of early metallurgy in the island.

The second waves of contact between Bali and India might have occurred around 800 AD. The existence of clay stupas which contain *dharanis* and *mantras* in Bali suggests that the island is an integral part of the ancient Buddhist world. It is believed that the text used in this part of Buddhist world must have been quite similar to the texts that were used in other Buddhist countries.

At the late 9th century AD, Indic-based state appeared in Bali. It is interesting to note that several Indian places' name such as Waranasi, Nalanda, and Amarawati were transformed to local places in Bali. The phenomena suggest the intens of contacts between India and Bali occurred in the 9th century.

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REGIONAL HIGHLIGHTS

UPDATED VIEWS ON THE AUSTRONESIAN STUDIES IN INDONESIA

Truman Simanjuntak, Adhi Agus Oktaviana, and Retno Handini

Introduction: Austronesian Studies

Austronesia is a big phenomenon in the history of mankind and civilization. Why? First, because this language family is inherited from a population to a very vast area, which covers more than half the globe, from Madagascar in the west to Easter Islands in the east and from Taiwan-Micronesia in the north to New Zealand in the south. It is the most widespread language diaspora before Western Colonization reached various places in the world. Secondly, it is the largest language family based on the number of languages (1000-1200 languages, depending on the criteria used to distinguish languages and dialects) that it covers (Bellwood et al. 1995). Thirdly, aside from their languages, the physical appearances of the speakers and cultures also highly varied. These three conditions make Austronesia a wide and interesting field of study for many parties.

Initially Austronesian Studies were more focused on language/linguistics, then developed and include the speakers, cultures, and even the environments, with related disciplines of science. It was Wilhelm Scmidt (1899), a linguist and pastor from Germany, who suggested the term Austronesia to name a language family that was spoken by the inhabitants in Indonesia and the Pacific region. He used Austronesia to replace the term Malayo-Polinesia, which was invented by the previous scholar from the Netherland, Hendrik Kern (1889), who was also a linguist. According to Kern Austronesia language was originated from Continental Asia, probably from Champa, Cochin-China, Cambodia, and the surrounding coastal areas (See Blust, 1984-1985).

Kern's assumption was supported by a number of archaeologists who related it to the dispersal of rectangular adzes (Callenfels, 1926; Heine Geldern, 1932, 1948; Duff, 1972). Furthermore, other opinions were proposed from various points of view, which evoke never ending debates until nowadays. They believe that it was originated from Taiwan (Blust, 1976, 1984-85; Chang, 1964; Bellwood 1984, 1996, 1998); the Sunda Plate that was sunk at the end of the last Ice Age (Oppenheimer & Richards, 2001); the Southern Philippines-Northeast Indonesia region (Solheim, 1964); and other places (see Anceaux, 1965). Among those opinions, Taiwan as the homeland is supported by archaeological and linguistic data, but there is still a possibility that there are other places of origin (Simanjuntak, in press).

The long debates about the origin of Austronesian speakers in international level has hardly any impact in the development of Austronesian studies in Indonesia, which is a contradictive condition in spite of the fact that this region is very important and has a very significant role in the efforts of understanding Austronesia. Even within the scientific world the term Austronesia is rarely mentioned. Archaeologists tend to focus more on the culture (Neolithic) and not relating it to the bearers, which are the Austronesian-speaking people. This condition has caused the term Austronesia is barely mentioned in scientific discourses, particularly in community life. Thus far the name Austronesia is more frequently known from publications written by researchers from outside Indonesia. In the universities the discourses on Austronesia are barely known until recently. Nowadays many students are interested in learning more about Austronesia, not only in the field of archaeology but also linguistics and anthropology.

The beginning of the third millennium was a moment of resurrection of Austronesian studies. The change began when a group of researchers from different fields of science, who were encouraged by Prof. Sangkot Marzuki (now the Director of Akademi Ilmu Pengetahuan Indonesia/the Indonesian Academy of Sciences), carried out a number of activities in relation to Austronesian studies. The milestone was a scientific oration titled "Indonesia dan Revolusi Genom: Menelusuri Sejarah Manusia Indonesia dan Masa Depan Bangsa" (Indonesia and Genome Revolution: Retracing the History of Indonesian Human and the National Future) by Prof. Marzuki on the commemoration of the 34th anniversary of Lembaga Ilmu Pengetahuan Indonesia (the Indonesian Institute of Sciences) in 2001. The next important event was Kongres Ilmu Pengetahuan Nasional or KIPNas VIII (the National Congress of Science VIII) in 2003, where "Asal-usul penutur Austronesia" (The Origin of the Austronesian Speakers), once again by the encouragement from lagi-lagi atas dorongan Prof. Marzuki, became one of the (only) seven main topics of discussion. From thereafter, Austronesian-related activities continue with support from Lembaga Ilmu Pengetahuan Indonesia, one of which was the first International Symposium on Austronesia in Solo (2005), which was ended by a declaration to establish the "International Center for Prehistoric and Austronesian Studies (ICPAS)" that was planned to be coordinated by Lembaga Ilmu Pengetahuan Indonesia and under the UNESCO.

There were some obstacles in the process of the establishment of ICPAS as an international research institution, but they did not diminish the determination to promote Austronesian studies. Workshops, scientific discussions, publications, and researches were conducted so that Austronesia gains more attention from the communities. In fact, the stagnating establishment process of ICPAS has persuaded the establishment of a private institution, the Center for Prehistory and Austronesian Studies (CPAS) in 2010. This institution, with its limitedness, carries out discussions, researches, and publications on Austronesia, including giving talks and presenting papers in seminars in Indoneia and abroad in cooperation with various partners.

Now the National Research Centre of Archaeology and the Center for Prehistory and Austronesian Study still conduct researches with Austronesian topics. In its development, the Archipelago is divided into seven units of research geography, which are: Sumatra, Jawa, Kalimantan, Sulawesi, Nusa Tenggara, Maluku (the Moluccas), and Papua. In the National Research Centre of Archaeology, Austronesian study is one of the seven themes of the national policy of archaeological development. In its implementation, researches are intensified on the sites that have been investigated a long time ago, such as Kalumpang and Punung, as well as new sites like Gua Harimau (Harimau Cave). Along with excavations, explorations are also carried out at various areas to retrace the dispersal of early Austronesian speakers, including the development of continuing traditions (Simanjuntak, 2016). Thus far the efforts have yielded significant results, which enrich our knowledge about Austronesia.

4000 years of Austronesians in Indonesia

In the perspective of time, the life of the Austronesian-speaking people in Indonesia can be traced back to the last 4000 years. Although the available radiometric datings are not that old, they do not rule out the possibility that they date back to 4000 BP (Simanjuntak, 2011). Since its emergence the Austronesian occupation can be devided into four main cultural periods.

Prehistoric Austronesia: covers the arrival of early Austronesian-speaking people in the archipelago up to ca. 2000 BP. The cultural characteristic of this period is Neolithic, with innovations that brought changes of lifestyle and behavior in various aspects of life.

Protohistoric Austronesia: covers a period of around 2000 BP – 4th/5th AD, which was characterized by more complex community life in line with advancement in sea navigation and regional-global trade. The cultural characteristic of this period is urn burial (besides open burial), which was a continuation of Neolithic tradition; metal objects influenced by the Dongson Culture; and megalithic that was also an influence of foreign culture.

Historic Austronesia: covers a literate period until now. Based on a number of events that have caused significant changes, this period is further divided into the sub-period of Hindu-Buddhist influence (4th/5th–9th/12th CAD), Islam period (11th/12th–16th CAD), Colonial period (16th CAD–the mid of 20th CAD), and Independence period. The last sub-period, which occurs from mid 20th CAD until now, is characterized by the beginning of the process of the establishment of national culture, which is a combination of traditions from indigenous cultures and modern cultures.

The above time frame clearly shows that Austronesia is directly related to our origin and our indigenous culture. However, please note that early Austronesian speakers are not the only ancestor of Indonesian people, who have lived in the Archipelago since the prehistoric period. Evidences show that there had been some migrations before the Austronesian migrations and they developed in space and time. One of them was a migration – possibly from Continental Southeast Asia – to Sumatra, Kalimantan, and Java through Malaysia. The migration, which is assumed to reach Indonesia in ca. 4500-4000 BP, was also done by the bearers of Neolithic culture who spoke Austroasiatic language (Simanjuntak, in press). Long before that, in ca. 60.000 BP, anatomically modern human came to Indonesia and proliferated and produced the Archipelago population at the end of the Ice Age, which was known as the Australomelanesid race. That population was the predecessor of the recent ethnic groups in East Indonesia (Simanjuntak, 2015).

Islands Occupation

Until nowadays archaeological and linguistic data tend to support the Out of Taiwan model, with Sulawesai as the first settlement after the migrants arrived in the Philippines. Data on datings also reveal that the Neolithic sites in Sulawesi are generally the oldest in the Indonesian Archipelago and gradually the sites are increasingly older towards the Philippines and Taiwan in the north. The dates are in accordance with the opinions which state that the Austronesian-speaking people in ca. 5000-4500 BP were migrated from Taiwan to the Philippines and created Proto-Malayo-Polynesia language. They brought agriculture, red-slipped pottery, and great sea navigation skill. The migration continued to Sulawesi and probably also Kalimantan.

Up to now the oldest Neolithic habitation sites in Sulawesi are the ones along the Karama River in Kalumpang, West Sulawesi (Simanjuntak, 2008; Anggraeni, *et al*, 2014). One of them is Minanga Sipakko, which habitation layer is characterized by red-slipped pottery, bone tools, rectangular stone adzes, and animal remains. Its oldest date is ca. 3800 BP (cal. 3834-3572 BP). Based on the unfinished excavation there and its location in the interior area, there is a possibility that the habitation date can be older, probably up to ca. 4000 BP. Other oldest dates, just slightly younger than Minanga Sipakko, are from Leang Tuwo Mane'e (ca. 3600 BP) with typical red-slipped pottery finds (Tanudirjo, 2001); Malawa Site in South Sulawesi with a date of 3580 ± 130 BP (P3G, 2006), which finds include red-slipped potery, Stone adzes, and animal remains (Simanjuntak, 2008); and the cave sites of Maros with pottery dated from ca. 3500 BP (Bulbeck, 1996-1997).

From Sulawesi the Austronesian speakers dispersed to the surrounding islands and with time they inhabited most large islands in the Indonesian Archipelago. The dispersal to Kalimantan is shown by among others the site of Liang Jon from 1672 ± 21 BP - 1524 ± 22 BP (Plutniak, et al, 2014) and Bukit Tengkorak Site at Sampurna, Sabah, Malaysia (Chia, 2003) from ca. 3000 BP. They are characterized by red-slipped and plain pottery, stone adzes, obsidian objects, human burials, etc. Other Neolithic sites in the Malaysian side, like Gua

Sireh (Sireh Cave) and Gua Niah (Niah Cave) that have old dates (>4000 BP) yielded pottery with cord-marked and other stamped decorations with no red-slipped ones, seem to have no relationto the Out of Taiwan but other migration route. It is worth noticing that on this island there are other Neolithic sites such as seperti Nanga Balang (2550±100 BP), Liang Kawung (3030±180 BP: Chazine, 1995) that are still difficult to be identified because they do not bear pottery with cord-marked and red slip decorations. There are also sites with red-slipped pottery finds, for instance Liang Abu and Liang Jon with cord-marked decoration (Plutniak, et al, 2014).

The eastward diaspora reached the islands of Maluku (the Molucca Islands) in around 3500-3000 BP, as shown by the finds at Uattamdi Cave on Kayoa Island, which are red-slipped pottery in association with pig bones (*Sus celebensis* and *Sus scrofa*) from ca. 3300 BP (Bellwood, 1998), and Pulau Ay (Ay Island) in forms of red-slipped pottery, mollusks' shells, and *Sus scrofa* bones dated from ca. 3150 BP (Lape, 2000). From Maluku the migrants moved to the Pacific area, and they brought with them a pottery culture that was gradually transformed into a pottery culture with local characteristics, which is known as the Lapita pottery culture.

The southward diaspora entered the area of Nusa Tenggara. Among the early habitations there was Lie Siri in East Timur, which bears decorated pottery dated from ca. 3500 BP. Another site, Uai Bobo 1, yields pottery in association with pig bones (*Sus celebencis* and *Sus scrofa*) (Glover, 1986). On Lembata Island a habitation site is found at Lewoleba, which dated from 2990±160 BP (Grn-14308), with finds that include human burials as well as plain and decorated pottery. The most recent finds are uncovered at the site of Pain Haka, East Flores (ca. 2700-2500 BP), in forms of burial jars and open burials in association with mollusks' shells and fish bones, ornaments and bracelets made of shells, rectangular adzes, net sinkers, moluska dan sisa ikan, earthenware objects (pots, cups, and flasks), and animal bones that were served as habitation remains and funeral gifts (Simanjuntak *et al*., 2012).

The dispersal to Java is indicated by the finds from Kendeng Lembu Site, which are red-slipped pottery and rectangular adzes from 1332±35 BP – 543±34 BP (Noerwidi, 2009). Recently during an excavation at Tanjungsari, Karawang, West Java, were found red-slipped pottery in the upper layer while the lower layer, which dates back to 4716±260-1723±95 BP (Tim Penelitian Medalsari, 2016) yielded plain and decorated pottery. This site becomes important to be further investigated due to the presence of red-slipped pottery in the upper layer and pottery with cord-marked decoration in the lower layer. Such is also the case in Sumatra with typical red-slipped pottery finds at Lolo Gedang, Kerinci, from 1060 ± 120 BP – 810 ± 120 BP (Azis 2009), Gua Harimau (Simanjuntak, 2016), and Loyang Mendale (Wiradnyana & Taufikurrahman, 2011). Their presence in the upper part of the habitation layers confirms our assumption about Austronesian colonization in later period, aroud the Palaeometalic period.

It is quite interesting that those sites generally have younger dates, which is the Palaeometalic period. On the other hand, like in Kalimantan, Java and Sumatra there are Neolithic sites that yield pottery with cord-marked decoration, which is a marker of Neolithic Culture that came to Indonesia from Continental Southeast Asia and dates back to older period. We will discuss about this later on. The coming of the Austronesian-speaking people has caused cultural change in the Archipelago due to the cultural items that they brought, which had not been known to the populations they encountered in the new places. There are at least ten cultural items that have developed since their arrival, namely: First, Austronesian language. It is assumed that proto-Austronesia language had been created when the migrants from Southern China stayed in Taiwan. It was this language which then developed into Western Malayo-Polynesian language, which dispersed in the Philippines up to the western part of Indonesia and Madagascar. Its dispersal in the southeastern and southern parts of Indonesia has created a language called Central Malayo-Polynesian, while eastward dispersal up to the Pacific created Eastern Malayo-Polinesian language.

Secondly, great water navigation. The diaspora of the early Austronesian speakers, which covered vast archipelagoes, including the Indonesian Archipelago, is an evidence of their great navigation skill in water navigation. Certainly it was not merely limited to their ability to make water transportation vessels like rafts and boats, but also managerial skill that enabled them to reach the many islands. They must have had good spirit, courage, and strong motivation to find new places to stay by crossing the ocean near and far; knowledge on astronomy and weather; as well as the ability to adapt to new environments. Direct evidences about their great knowledge and skill in water navigation are not easy to find because the vessels were made using perishable material and did not leave physical traces. However, the facts regarding their wide and far dispersal are indications about those things. Based on ethnographic data, in which traditional fishermen and sailors in Indonesia still use outrigger boats, we can assume that possibly it was such kind of boats which were used in the interinsular process of diaspora.

The third is sedentary lifestyle. Sedentary lifestyle has brought multiplier effect to various things. It is still unclear whether it was sedentary life that had encouraged domestication or the other way around. But they undoubtedly they influence each other. Sedentary life provides an opportunity to domesticate plants and animal; on the other hand, domestication requires sedentary life. Discoveries of artifact and ecofact assemblages at many Neolithic sites such as traces of tool manufactures (stone chips) in association with adzes, pottery, ornaments/jewelry from different materials, traces of burning activities, animal remains, as well as nuts and grains at Neolithic sites confirm that there had been permanent habitations with various activities in them. There is a possibility that people initially lived in caves or rockshelters, but in areas where the environment did not provide sufficient resources they then lived at open spaces on lowlands or hill slopes near clean water source.

The Austronesian speakers did not stay forever in caves or rockshelters. As their needs increased, and in line with advancement in thoughts and technology, they moved to open spaces and built basic stilt houses (Simanjuntak, 2002). Their communal lifestyle was later developed into small hamlets with domestication activities as well as stone tool and ornament manufactures with burnishing technique. The site of Passo is an interesting example of a habitation on open space. Evidences of open space habitation can be found among others at Passo in North Sulawesi, Purbalingga in Central Java, Karangnungal in Tasikmalaya (West Java), and Kendeng Lembu in Jember (East Java) (Soejono, 1984; Heekeren, 1972; Noerwidi, 2009). In Purbalingga, for instance, there were more than 20 groups of ateliers/workshops within the district of Bobotsari and its surroundings. Many more ateliers, up to several hundreds, were found at Punung and its surroundings (Heekeren, 1972). From the vastness of these industrial centres we can imagine that the products were not merely fulfill the needs of the local communities but also outside communities.

The fourth and the fifth are animal and plant domestications. Sedentary activities in caves or hamlets gives more time than nomadic ones, so people are persuaded to domesticate animals and plants. Or the other way around, the increasing needs encourage domestications so that people have to live sedentarily. By planting certain kinds of plants and raising certain animals, they will have enough food supply to ensure their life sustainability. Food supply also enables trade interactions, which create economic life within the community or hamlet. Domesticated products also fulfill other functions in their daily life, like offerings, and dogs to guard their homes and help them during hunting.

The most common domesticated animals are pigs, chicken, dogs, and probably later also water buffaloes. Significant evidences from some cave sites in East Timor (now Timor Leste) include pig bones (*Sus scrofa* and *Sus celebensis*) in association with fragments of pottery which date back from ca. 2500-2000 SM (Glover 1977). Finds from several other caves in Timor Leste are remains of dogs, water buffaloes, and goats that were assumed to be from after 1000 SM. *Sus scrofa* and *Sus celebencis* seemed to have been domesticated in the Moluccas since around 3300 years ago, as indicated by the remains found Uattamdi Cave, together with red-slipped pottery (Bellwood 2000). Other finds consist of bones of *Sus scrofa* in Harimau Cave from ca. 3300 BP (Simanjuntak et al, 2016).

Evidences of plant domestication are more difficult to find because of their highly perishable nature, but plants like foxtail barley (*jawawut*) and other cereal types as well as tubers are assumed to have been cultivated to satisfy their needs. Thus far the evidence was reported from Sireh Cave in Sarawak, Malaysia in form of rice grain on pottery, but the old dating (ca. 4300 BP) (Datan & Bellwood, 1993) suggested a relation to a migration from Southeast Asia. At the site of Minanga Sipakko, Kalumpang (West Sulawesi) rice was also found on pytolith from ca. 3500 BP (Anggraeni, 2013), while at Punung the date is even older, which is 5000-7500 BP, (Chacornac-Rault, 2004). More recent finds are from Sembiran, Bali in form of rice husks from 2660±60 BP or cal. 910 (818)-790 BC. Other data are domesticated chestnut (*inocarpus*) and foxtail barley, which date back to after 1000 BC in Timor Leste (Glover 1977) as well as rice at Ulu Leang in South Sulawesi from around 1500 BP (Glover 1985).

The sixth is pottery making, which are very universal among the Neolithic cultures all over the world. This type of activity makes use the availability of materials (clay, etc.) in the surrounding environment. Pottery is essential in people's daily life, among others to store water or certain things, to cook food, and so forth. Red-slipped pottery is very typical in early habitation period, as shown at the sites in Taiwan, the Philippines, Indonesia (particularly East Indonesia), up to the Pacific (Spriggs, 1989). Besides red-slipped pottery, there are also plain and decorated potteries. The decorations were made using impressed, incised, gouged, applied, and cutting techniques. At Minanga Sipakko, red-slipped potteries are found in the lowest habitation layer and gradually diminished and replaced by plain and decorated potteries, and low-fired ones in the upper layer (Simanjuntak, 2008). The types vary a lot, from small ones like bowls, plates, to big ones like urns and pots, while the manufacturing technology developed from hand-shaped, paddle and anvil, to slow potter's wheel.

The seventh is adze manufacture. Aside from red-slipped potteries, stone adzes are also the marker of early Austronesian speakers' culture. There are various types of adzes such as shoulder adzes, stepped adzes, violin adzes, and even elongated rounded axes that have long been considered as the typical marker of East Indonesian Neolithic culture. It is interesting to note that such types are also found in the northern region, which covers the Philippines and Taiwan, and even Japan. Therefore, the adzes and red-slipped potteries are artifactual data which support the Out of Taiwan model of migration. The adzes or axes are made of different types of rocks according to the availability in the local surroundings. Their functions also vary, among others to cut down trees during forest clearing, to make boats, and to hunt.

The eighth is bark-cloth manufacture to make clothes. Bark-clothes have never been found during excavations because they are easily decayed, but bark-cloth beaters were found in some prehistoric sites. Ethnographic data also support the assumption that they are one of the distinct characteristics of the Austronesian-speaking people's culture. The dispersal of bark-cloth beaters is also in accordance with the diaspora of the Austronesian-speaking people, which covers a wide area from Taiwan, the Philippines, Indonesia, up to the Pacific

(Cameron, 2008). In Indonesia bark-cloth beaters were found in Sulawesi, Kalimantan, and Nusa Tenggara (Simanjuntak, 2013). A number of “batu Ike”, the name for bark-cloth beaters in Sulawesi, were found at a number of Neolithic and Palaeometalic sites (Simanjuntak *et al*. 2008), which show that bark-cloth manufacture on this island is a continuing tradition. Even nowadays certain families in Besoa and Bada valleys still make bark clothes, although only based on order.

The ninth is familiarity with art and ornaments/jewelries. One of the types of artworks that had been developed during the lifespan of early Austronesian speakers is pictures/paintings on rock surfaces of caves or hill/mountain slopes. Probably this type of art is a further development of the rock arts that had been practiced by previous communities in the Archipelago (*Australomelanesoid* communities) or even by their predecessors, the anatomically modern human groups (Aubert et al, 2014), which is presumed to arrive in the Indonesian Archipelago in around the second half of the Upper Pleistocene (Simanjuntak et al, 2015). The rock paintings that are characterized by boat motifs in black colours found along the southern coast of Papua and some other places were probably made by the Austronesian speakers. The ones found at Harimau Cave, which until now the only cavesite in Sumatra with rock paintings, were probably also made by the bearers of Neolithic-Palaeometalic cultures that lived in caves in about 3500-1000 BP (Simanjuntak, 2015). Furthermore, the Austronesian speakers had made ornaments from various materials. Among them, the impressive ones are stone bracelets like those found at the Neolithic sites of Purbalingga (Simanjuntak, 1986), Punung, and Tasikmalaya (Heekeren, 1972). The existence of stone bracelet workshops mixed with stone adze ateliers within the area is thought to occur since 3500 years BP. Other ornaments were made of animal teeth bored at the base parts or of stone by shaping, polishing, and boring the raw materials to be made into jewelries.

The tenth is the practice of religious beliefs. It seems as though the early Austronesian speakers had practiced belief in life after death, as shown by the discoveries of burials, both in urns or without burial containers and with or without funeral gifts. The custom is based on a belief that good treatment to deceased people will bring blessings to the living, be it in health, fertility, etc. Certain objects were given as funeral gifts to the deceased for provision in his or her journey to the other world. Ground haematite sprinkled on a corpse during burial is thought to symbolize new life (reborn) for the deceased. Neolithic burials are found among others at Pain Haka Site in East Flores, Harimau Cave in South Sumatra (Simanjuntak, 2016), and Plawangan in Central Java. Such burial system was increasingly developed during the proto-historic period, which is characterized by practices of different types of burial system.

Proto-Historic Austronesia

The Proto-historic period is presumed to begin in around early centuries AD and ended when Hindu influence entered the Archipelago up to the establishment of the first Indianized kingdoms in about $4^{th}/5^{th}$ centuries AD. Just like the Prehistoric Austronesian period, the beginning and end of this period are different in the various parts of the archipelago, so that it is impossible to determine a general beginning for the entire area. Therefore, the oldest date is used as the milestone of the beginning of this period, because it is the earliest evidence of change in people's lifestyle and culture of within the Indonesian Archipelago. This period is characterized by thrive of water navigation and regional-global trade that include the Indonesian Archipelago, as well as the earliest presence of foreign writings about its people and culture (Simanjuntak and Widianto (eds.), 2012).

The ability of the Austronesian speakers to adapt in the archipelago has caused advancements on one hand and population growth on the other hand; so the regional-global development created complexity in the life of the communities that were ready to interact and adapt with outside influence. Social stratification were formed with several social groups under traditional leaders, such as groups that deal with religious beliefs, artisans, farmers, traders, sailors, etc. The community life's complexity at that time is shown by three cultural markers, namely: (1) Jar burials as a continuation of Neolithic culture; (2) Metal objects, which were influenced by the Dongson Culture; and (3) Megalithic structures that represent further development of the conception of belief in life after death.

Jar burials are widely found all over the the archipelago, usually on coastal areas. Some of the sites are Anyer in West Java, Plawangan in Central Java, Gilimanuk in Bali, Gunung Piring in Lombok, Melolo and Lambanapu in Sumba, Lewoleba in Lembata, and Takalar in South Sulawesi (Heekeren, 1972; Soejono, 1972, 1995; Nitihaminoto, *et al*. 1978; Bintarti, 1994; 2000). Radiometric datings on materials from Pain Haka, Flores and Plawangan, Central Java reveal that jar burial was first practiced at the end of the Neolithic period, which is around the first millennium BC and reached its peak during the Paleometalic period around early century AD. Among the prominent jar burial site on the transition phase between the prehistoric and the historic periods are Gilimanuk, Bali, with coastal lifestyle and necropolis (Soejono, 2008), and Lolo Gedang in Kerinci. The discovery of typical Dongson Culture metal objects, Arikamedu pottery from India, as well as beads and other types of ornaments/jewelry from Mediterranea at a number of sites are evidences of interactions and trade activities with the outside world. Experts assume that international occurred in forms of barter of exotic objects from abroad with commodities from the Indonesian Archipelago. Jar burial traditions were continued up to the historic period, as shown at the site of Renah Kemumu, Jambi, from ca. 1100 BP (Bonatz, 2009). Other traditions were found in Lahat, South Sumatra and Padang Sepan, Bengkulu.

The coming of Megalithic Culture, which was represented by the constructions of worship facilities or symbols using big rocks, has enriched the belief conceptions that had been previously practiced. We know menhirs, dolmens, statues of human and animal figures, terraced structures, stone mortars, and stone burial containers. Furthermore, there are also stone seats, stone structures, pit-marked stones, cylindrical stones, etc. Regarding stone containers, their shapes are very diverse with strong local distinctiveness. There are stone cists at Kubur Kalang Site in Kendeng Utara (North Kendeng) mountains; stone vats in Southeast Sulawesi, Sumbawa (West Nusa Tenggara), and Samosir (North Sumatra); sarcophagi in Bali and Samosir; and *pandhusa* in Bondowoso (East Java).

It seems like the ancestor worship culture was suitable for the pattern of thought of the communities in the Indonesian Archipelago, so that it was able to disperse widely. In fact, its certain items are still being practiced among certain communities until now. Dating and contextual data reveal that this culture was introduced to the archipelago in about the first centuries AD and flourished during the historic period. As an illustration, the datings on the megalithic objects at Pajer Bulan 2 and Tebat Gunung in Pasemah are from 1120±260 BP and 770±160 BP (Prasetyo, 2009); those at Dawuhan and Doplang in Jember are from 1230±100 BP and 580±100 BP; while the ones at Entovera in Besoa Valley are from 2460±120 BP (cal. 831 BC-232 BC) and 2890±120 BP (cal. 1387-831 BC) (Yuniawati, 2009). A megalithic site characterized by waruga (a type of stone vat) at Woloan, Tomohon (North Sulawesi) has a date of memiliki between 1540 ± 140 BP and 1180 ± 80 BP and the objects were still being used until 19th century AD during the Dutch colonization period. (Yuniawati, 2006).

The above-mentioned dating show clear evidences of the continuation in Megalithic development since its emergence in Proto-historic period up to the Historic period. Its continous development sequence is a correction of an old opinion that Megalithic came to the archipelago in two waves (Heine Geldern, 1945). The first wave, namely the Old Megalithic, was brought to the Indonesian Archipelago by the bearers of Neolithic rectangular adze culture in between 2500 and 1500 BC; while the second wave, which was The Young Megalithic, was assumed to come in several phases in later period together with the Dongson Culture. However, the above-mentioned dating evidences and other datings show that Megalithic Culture was not come during the Neolithic phase but during the Proto-historic period and continues up to the Historic period.

Jar burials, metal objects, and Megalithic Culture, which characterize the proto-historic life, reflect the condition of life that has been a complex one with social stratification and interaction with the outside world, as well as the existence of artisans or stone sculptors who generate creativity in the making of Megalithic structures. Aside from it, there was a very important value shown in the construction of Megalithic structures, namely togetherness or co-operation of the communities at that period. Certainly the accomplishment of constructing such objects was also due to leadership among the communities of that period. It was the life complexity that have made the communities in the Indonesian Archipelago ready to accept Hindu influence, which came in around 4th/5th century AD, and even developed it by including elements of their indigenous cultures.

Conclusion: The Prospects of Developing Austronesian Studies.

Nowadays the Austronesian studies in Indonesia have progressed a lot. There are many discoveries that enhance our knowledge about life within the last 4000 years of habitation period. Talking about Austronesia is talking about one of Indonesian ancestors, as well as the speakers that cover a vast archipelagic area. In this context, the Austronesian studies deal with plenty of interests, among others for the sake of knowledge advancement, particularly about the life of the ancestors of Austronesian-speaking people from their first emergence until now. In other words, it can provide an understanding about the common ancestors and root of culture that can strengthen the brotherhood solidarity among the Austronesian-speaking groups in recent time.

On the other hand, within the context of Indonesia, Austronesian studies are critical to know the processes of emergence, diaspora, and development until it formed recent ethnicities that are now unite under the political entity of Indonesia as a nation. Revealing and actualizing the values like diversity, maritime, co-operation, togetherness, courage, tenacity, adaptability to the environment and interactions with outside influence becomes very important as the basis of our national civilization in recent time and as an inspiration to lead a better life in the future.

However, eventhough the studies have achieved some progress, there are still plenty of unsolved problems due to limitedness. First, the Austronesian-related researches are not integrated, so that the results are partial and not synthesized. Such condition makes us realize the importance of collaborations among institutions to carry out joint researches, which involve various related disciplines. Secondly, the scopes of researches are unequal to the extent of the forms, spaces, and times of Austronesian studies, so that a number of aspects have not been investigated. Interactions with the environment and other populations, migration, ethnogenesis process, and domestication are among the aspects that have not been much investigated. This condition is influenced by limited human resources and funds, so that a number of sites that are widely dispersed all around the archipelago are still untouched. Even the highly potential sites have not been thoroughly investigated.

To anticipate such obstacles, the government’s attention is needed to develop Austronesian studies by encouraging the young generation to study Austronesian-related subjects as well as increasing funds to develop researches. On the other hand, there is a need of researches with solid concepts which are carried out continuously, and institutional collaborations (local and international) which involve related disciplines of science. With various attempts mentioned above, as well as serious intention and sincerety, the Austronesian studies in Indonesia in the future will increasingly progress. The results will significantly contribute to the advancement of knowledge and science, and will inspire the development of Austronesian studies in global scale, while revealing and actualizing their values of humanity and cultures are very important as the basis of our life as a nation.

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REASSESSING THE NEOLITHIC-METAL AGE TRANSITION IN BATANGAS, PHILIPPINES: A DISTINCT SOUTHERN LUZON POTTERY TRADITION

Grace Barretto-Tesoro

Introduction

My doctoral research in Calatagan, Batangas, southern Luzon, which focused on ceramics has provided me a glimpse of how people in the area lived in terms of their social organisation, mortuary practices, and cosmology during the 15th century AD (Barretto-Tesoro 2008) (Figure 1). I interpreted that the social organisation of the inhabitants of Calatagan was governed by reciprocity between and among members of the community including supernatural beings. Thus, my research was able to weave the interaction of ritual practices with routine activities such as trade and pottery production. Ceramics exhibiting solar and bird motif designs have been found associated with high status members of the community. To date, a particular earthenware vessel with a diagnostic form and design has only been documented in sites dating to the 10th and 15th centuries AD located in southern Luzon, in an area known as the Tagalog region (Vitales 2013) (Figure 2). These designs were interpreted to be part of the Austronesian cosmology (Salazar 2004). I want to examine the earliest use of the solar and bird motifs, in southern Luzon, that I have interpreted to symbolise high status that is related to cosmology. I am also now proposing that earthenware vessels with solar motifs can be linked to the cultural group occupying southern Luzon (Figure 3). It is only through searching for older sites such as those belonging to the Neolithic and/or Metal Age sites that I may be able to determine the earliest appearance of the solar and bird motifs as symbols.

In this preliminary study, I will examine artefacts belonging to sites older than 15th century AD that were collected by Beyer in Batangas in the early part of the 20th century. I will also include other Batangas sites that were later excavated. I want to seek the forerunners of earthenware vessels from Calatagan. In understanding the nature of Neolithic in Batangas, it will answer whether the earthenware vessels have Austronesian origins or a distinctly southern Luzon tradition.

Current research on the Neolithic in the Philippines can be anchored on two frameworks. First is the dominant Austronesian Migration Theory proposed by Bellwood (Bellwood 1995, 1997, 2013; Bellwood and Dizon 2005) and the second which deconstructs the Austronesian paradigm (Paz 2013). Bellwood proposes that the Austronesian speakers who populated Island Southeast Asia today originated from Taiwan 6000 years ago, hence the similarities in culture, language, and genetic affiliation. Generally, from an archaeological standpoint, this group of speakers are characterised by a set of artefacts and ecofacts such as cord-marked and red-slipped pottery, jade ornaments, rice agriculture, implements related to agriculture, and domesticated pigs and dogs. The second framework challenges the Austronesian package. The Ille site in northern Palawan with radiocarbon dates from secure contexts contains artefacts that do not agree with Bellwood’s characterisation of an Austronesian Neolithic society. This research on early sites in Batangas aims to contribute to this debate.

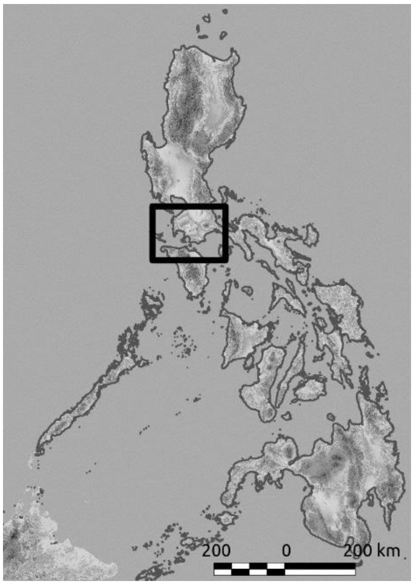

Figure 1a. Map of the Philippines showing the location of Batangas

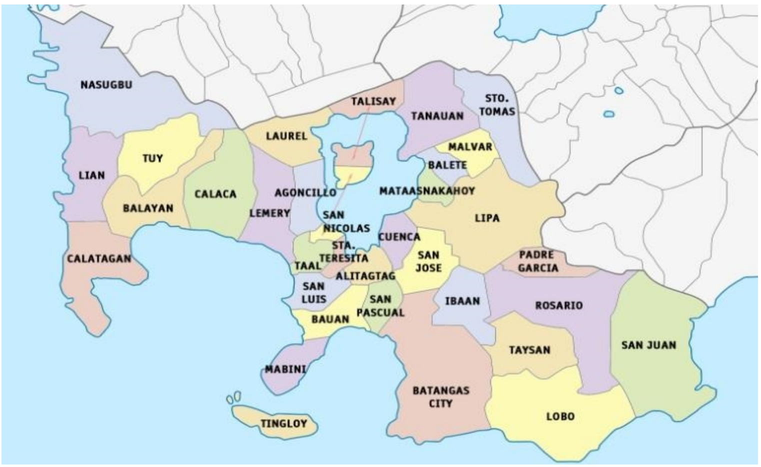

Figure 1b. Map of Batangas showing key municipalities mentioned in the text (Batangas map from Google maps)

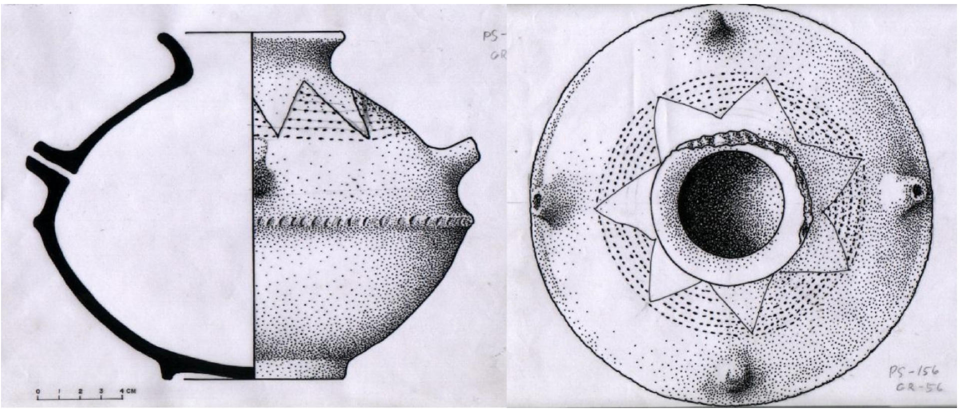

Figure 2. A carinated and lugged earthenware vessel from Calatagan decorated with a solar motif showing profile and top view.

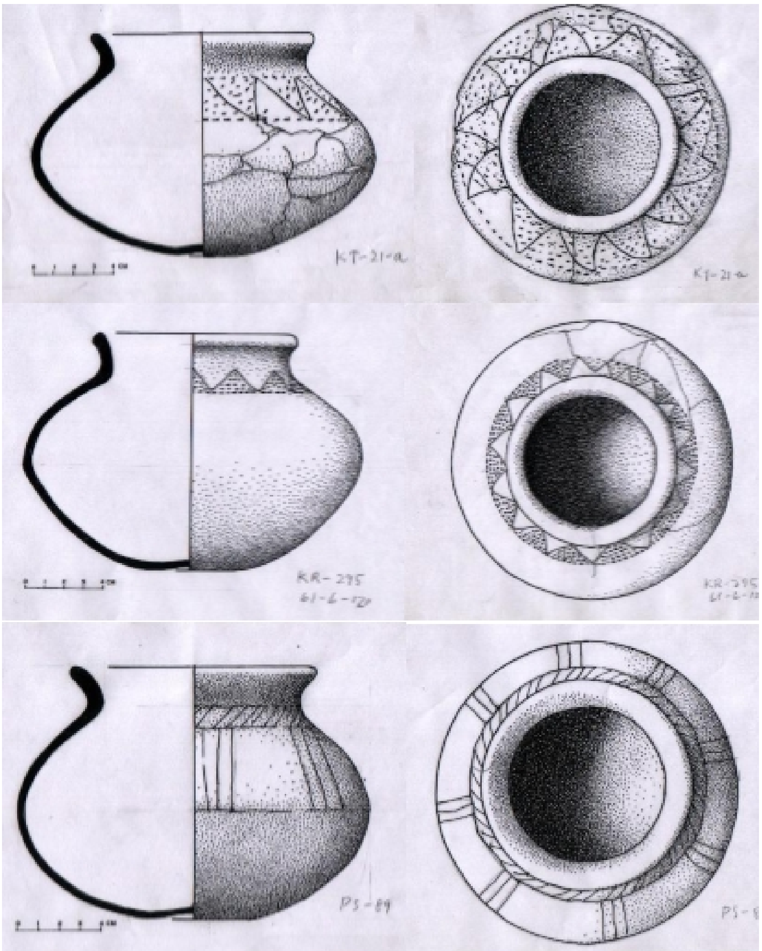

Figure 3. Other samples of earthenware vessels from Calatagan designed with solar motifs showing profiles and top views

Previous works in Batangas

Beyer (1947) conducted the earliest surveys in Batangas that lasted from 1932 to 1941. He recorded neolithic materials from the towns of Lipa, Lemery, Cuenca, Alitagtag, Bauan, and Taal that include flaked obsidian implements, nephrite adzes, chisels, gouges, groovers, awls, stone axes and hammers, and jade ornaments. Many areas such as Nasugbu, Lian, and Calatagan contained 15th century materials such as Chinese porcelain. He also collected Palaeolithic choppers in Taal. Regretfully, these palaeolithic and neolithic materials have no proper archaeological contexts (Dizon *et al.* 2006).

By the mid-1940s, Janse (1941, 1944-1945, 1947) had excavated a cemetery in Calatagan containing foreign ceramics from the 15th century. This was followed up by Fox's (Barretto-Tesoro 2008; Fox 1959) large scale excavations of several cemeteries also in Calatagan in 1958 and 1961. The Calatagan sites were dated to the 15th century based on the foreign ceramics found in the burials. The famous Calatagan Pot, an earthenware vessel with inscriptions on its shoulder, was recovered in the 1960s (Dizon 2003; Borrinaga 2009; Guillermo n.d.; Guillermo and Paluga 2008-2009). Due to the high quantity of Chinese, Vietnamese, and Thai ceramics, and atypical pottery found in Calatagan researchers focused their attention on foreign trade and pottery production that earlier Palaeolithic and Neolithic sites were overlooked (Fox 1959; Main and Fox 1982). In addition, Fox became involved in state-sponsored excavations in Sta. Ana, Manila and Tabon Caves, Palawan (Barretto-Tesoro 2013) that he was not able to return to Calatagan after 1960s.

The next large scale excavation was in Lemery in the 1960s where deposits range from Palaeolithic to the Protohistoric Periods (10th-16th centuries AD) were recorded (Locsin *et al.* 2008). Significant were the lithic assemblage and the pottery associated with the burials.

The ensuing research in Batangas was initiated after more than 30 years by the National Museum of the Philippines with the specific goal of looking for settlement sites associated with the Calatagan burials (Bautista 1994a, 1994b, 1995; Ronquillo and Ogawa 1996). In their explorations (De La Torre 1994a, 1994b, 1994c, 1994d, 1995, 1996a, 1996b, 1997; Orogo 1994a, 1994b, 1995) the most significant site was the Ulilang Bundok site which predates the 15th century burials of Calatagan. Located along the eastern coast of the peninsula, just across from the sites excavated by Fox, the Ulilang Bundok is a secondary jar burial site dated to 2780-2860 BP (De La Torre 2008). The Ulilang Bundok site proves human presence at around 2800 years ago. However, the connection between Ulilang Bundok and the 15th century burials have not yet been established. Questions such as the relationship of the shift from secondary jar burial tradition of the Ulilang Bundok to primary open pit graves in the western coast hopefully can be resolved after documenting more sites earlier than 15th century AD.

In the 1990s, the Spanish galleon San Diego, was discovered and excavated off the coast of Nasugbu (Desroches *et al.* 1996; Dizon 1993; Dizon and Orillaneda 2007). In 2006, the most recent recovery of Metal Age deposits came from San Nicolas in which Dizon (Dizon *et al.* 2006) recorded the presence of Neolithic materials. In the last decade, research in Batangas focused on excavating church ruins in San Juan, San Nicolas, Sta Teresita, and Talisay (Dizon *et al.* 2005; Paz 2003a; UP-ASP 2012; Vitales *et al.* 2011). These forays into historical sites had unknowingly created a research gap in the earlier archaeological history of Batangas that hopefully will be initially addressed here.

Previous pottery studies in the Philippines relied on this artefact as evidence of migration (Bellwood 1997; Solheim 1964a, 1964b), trade (Junker 1999), political alliance (Bacus 2003), boundary maintenance (Longacre and Skibo 1994), social organisation (Longacre and Skibo 1994), identity (Barretto-Tesoro 2008), and cosmology (Barretto-Tesoro 2008; Salazar 2004). My study on the bird and sun motifs on ceramics dating to the 15th century was an initial undertaking on understanding past cosmology from an archaeological perspective (Barretto-Tesoro 2008), though the model I used was introduced by Salazar (2004) using ethnographic materials. Subsequent studies on cosmology had been carried out using other artefacts such as shells and landscape (Paz 2012; Vitales 2009). I want to extend my study on the bird and sun motifs much deeper in time.

Significance of the study

Since the 1960s, after Fox's (1959) excavation in Calatagan, a large portion of Batangas province had been looted for intact porcelain and earthenware vessels to meet the demands of the illicit trade in antiquities (Barretto-Tesoro 2013). The Calatagan sites are 15th century AD burials that contained whole Chinese, Vietnamese, and Thai ceramic wares. Due to unsystematic excavations, many of the atypical earthenware vessels coming from the Batangas-Laguna area have no archaeological contexts (Valdes 2002, 2003). The existence of these earthenware vessels that have been estimated to be 2000 years old suggest that parts of Batangas were settled at this time. However, apart from the early preliminary studies by Beyer (1947) in the early 1900s, the excavations in Lemery (Locsin *et al.*2008), and Ulilang Bundok (De La Torre 2008), no recent organised research has been done on the pre-10th century sites in Batangas. In the last decade, studies in Batangas have concentrated on old church ruins hoping that a prespanish occupation may be discovered. To date, only a couple of church sites yielded possible prespanish sites (Dizon *et al.* 2005, 2006; Vitales *et al.* 2011). The most recent archaeological research in Batangas revealed that the old town of San Juan was a resettlement site in the 1890s during the late Spanish colonial occupation and earlier sites were located further south of the town (Barretto-Tesoro 2015; Barretto-Tesoro *et al.*

2009a, 2009b; UP-ASP 2010, 2011, 2012). Examining Neolithic and Metal period sites in Batangas will help determine the origins of the Calatagan earthenware vessels.

Theoretical framework

For this project proposal, I will be using Salazar's theory on cosmology. Salazar (2004, 2005) states that the bird, sun, and reptile motifs prevalent in Philippine cultures were fundamental Austronesian symbols brought by Austronesian speakers when they migrated from Taiwan to the rest of Southeast Asia following Bellwood's Austronesian Migration Model. Salazar posits that these symbols became associated with high status individuals based on ethnographic studies. My study on the 15th century burials from Calatagan in Batangas demonstrates the strong link between high status burials with the said symbols. In this preliminary research, I will look for older sites and using Salazar's model, I want to investigate the earliest use of these symbols in the Batangas region.

Beyer's Neolithic discoveries in Batangas

Beyer's (1947, 1948a) systematic survey in Batangas included the municipalities of Cuenca, Alitagtag, Taal, San Luis, Bauan. Additional materials were collected in San Jose, Lipa, and outside the systematic area such as Tanauan, Lemery, Ibaan, and Calatagan. Beyer was able to collect more than 250,000 pieces of artefacts from his 1932-1941 Batangas survey. Outside the systematic area he collected shouldered axes, obsidian flakes and cores, stone axes, pitted stone hammers, adzes, nephrite adze, mall quartz disc similar to those found in the systematic area.

He classified the finds based on their forms and assigned them to the Palaeolithic, Mesolithic, and Neolithic periods. He further subdivided the Neolithic into Early, Middle and Late Neolithic. Most of the materials he collected belonged to the Late Neolithic that was divided into four phases, discussed below. I will focus on the Late Neolithic of Batangas.

The Palaeolithic remains include choppers or handaxes and cleavers. Some neoliths could have been reworked palaeoliths. Although Beyer categorised some objects such as mesoliths such as obsidian semimicroliths of obsidian and fine-grained basalts, the term 'mesolith' did not gain a following. The European term was deemed not applicable to a Southeast Asian context (Paz 2003b).

In 1933, Beyer published the results of the Batangas Archaeological Survey (Table 1). There are eight volumes of the Catalogue and Accession Book but I was only able to access Volumes IV to VII. At the start or end of each volume, Beyer summarised all the finds beginning Volume 1. Even if, Volume VIII was not available for this paper, the high quantities of lithics as shown in Table 1 indicate the widespread production and use of these tools. We can infer that a large Neolithic population settled in the areas Beyer surveyed.

Table 1. Summary of number of obsidian and ground/polished lithics from Beyer's Batangas Archaeological Survey from 1932 to 1941 (Beyer 1933)

Lot no	Obsidian specimens (ganta[1])	Ground or polished neoliths or fragments[2] (pieces)
1 to 23	310.75	5376
24	14.75	279
25	6.75	141
26	12.00	225
27	12.50	363
28	8.50	327
29	16.00	467
30	19.36	616
31	16.60	519
32	11.25	306
33	14.25	393
34	13.60	683
35	17.50	583
36	12.50	416
37	15.25	689
38	10.38	510
39	10.33	527
40	13.25	406
41	10.25	423
42	11.25	282
43	20.00	625
44	9.00	275
45	6.25	140
46	6.17	264
47	9.20	253
Total	95.70	15,088

Beyer proposed that axes, adzes, and chisels from early Neolithic sites in Batangas were reused during the Late Neolithic. Traces found include repolishing and regrounding of older forms. Beyer found it difficult to identify original forms, thus, he classified them as Late Neoliths. Despite of the similarity of forms, the materials used differed. Early neoliths were usually made from andesite or schist materials and Late neoliths were made from harder and a wider variety of stones. The Early Neolithic materials recovered in Batangas were like those

[1] One ganta is roughly equivalent to three liters

[2] Complete description of the lithics including jade artefacts are found in Beyer 1933.

found in the Rizal-Bulakan area. Shouldered and ridged adzes constitute the Middle Neolithic remains.

As mentioned above, Beyer fine-tuned the Late Neolithic by classifying the artefacts into four phases. He labelled the First Neolithic Phase as the 'Early Nephrite Culture' dated to 1500 BC or 3500 BP. The objects were made from ancient jade or nephrite such as adzes of various sizes, grooving chisels, gouges, groovers, awls, and small woodworking tools. The adzes from the First Neolithic Phase were all polished 'plain-backed, no shouldering, stepping, or tanging off the butt, except for spearheads, which were tanged or had shouldered butts' (Beyer 1947: 248). Other objects include barkcloth beaters, hammers, and mullers made from quartz pebbles or from reworked adzes.

During the Second Neolithic Phase, tools made from nephrite were lower in quantities compared to grey and black stones from 1000 BC to 800 BC or 3000 to 2800 BP. Transitional types emerged during this phase. Other changes included shaved butts, increasing number of spearheads, stone barkcloth beaters more common, and greater variety of small woodworking tools. Nephrite tools became rare but other tools such as stepped adzes and chisels became more common during the Third Neolithic Phase, which dates to 800 to 500 BC or 2800 to 2500 BP. Despite of nephrite tools becoming infrequent, there was an increase of nephrite jewellery (Figure 4). From 500 to 250 BC or 2500 to 2250 BP, the Fourth Neolithic Phase saw the rise of fully stepped adzes made from very hard stones that were produced by 'sawing, some with perforated butts' (Beyer 1947: 248). There was no more evidence of nephrite tools but nephrite jewellery were still in use such as beads and earrings. Other nephrite objects include amulets and other items difficult to classify. Barkcloth beaters had sawn grooves. Stone saws and drill points were made from schist. All tools from this phase were polished. Beyer referred to this phase as the Hole-boring and sawing period because of the technique used in tool production. He also referred to it as the 'Jade cult' due to the nephrite ornaments.

Beyer believes that that fully stepped adze was developed in Batangas since no fully stepped adzes were found on Mainland Southeast Asia (Beyer 1948a). Those from Dongson, Luang Prabang, and Hongkong were 'close approximations' (Beyer 1947: 249). Beyer (1947: 249) attributed the decreasing use of nephrite as raw material for tools during the Late Neolithic Phase to 'importation and a gradually diminishing supply'. As early as the 1940s, Beyer hypothesised that green nephrite was sourced outside the Philippines which were later confirmed to have been from Taiwan in later studies (Bellwood *et al.* 2011; Hung *et al.*2006, 2007). Raw material was imported but the products were made in Batangas as evidence of the different stages of production were recorded (Beyer 1948a).

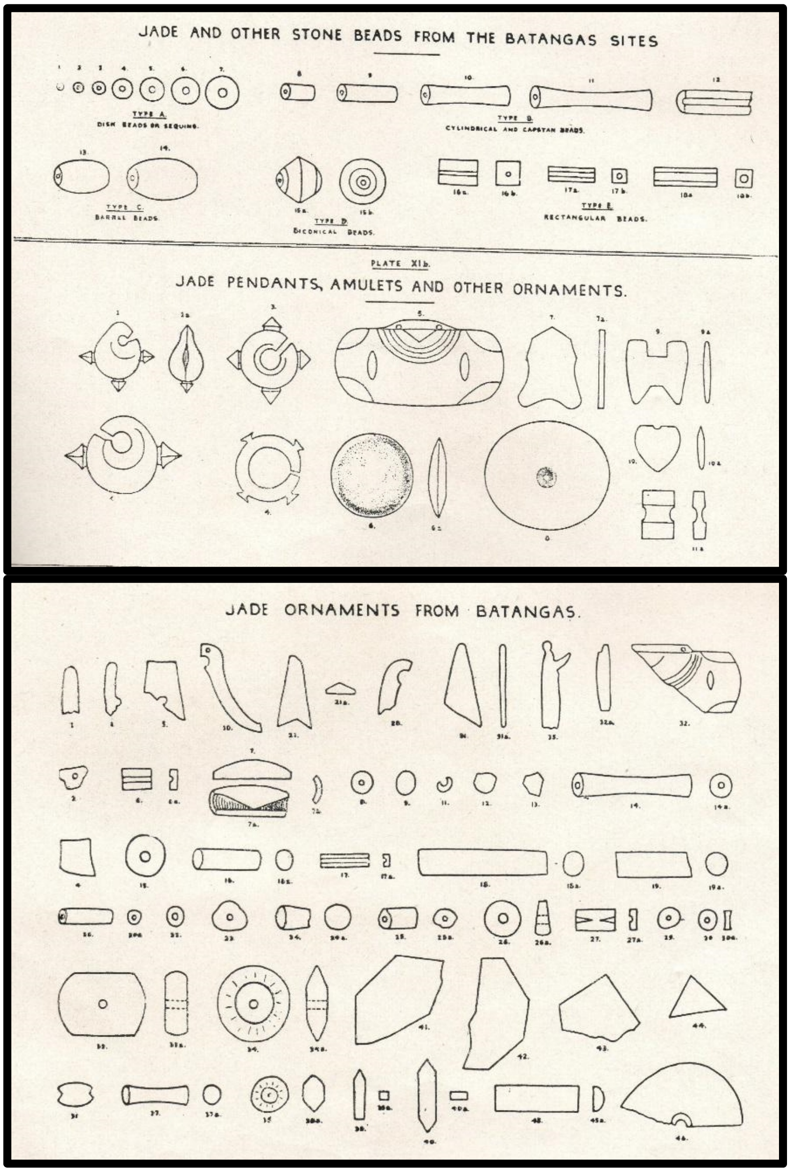

Figure 4. Illustrations of jade ornaments recovered by Beyer during the Batangas Archaeological Survey from 1932 to 1941 (Beyer 1948: top, Figure 27; bottom, Figure 28)

What is interesting in Beyer's analysis was that the Neolithic finds in Batangas were not associated with any kind of pottery. In Indo-China, South China, Formosa, and Japan, shouldered adzes were associated with cord-marked pottery (Beyer 1948a, 1948b). In Batangas, there were very few shouldered adzes and no 'good evidence of cord-marked pottery' (Beyer 1948a: 42) or mat-marked pottery. However, there existed a coarse-grained pottery exhibiting incised decorations, found in some areas associated with the nephrite ornaments during the Late Neolithic Phase. Metal objects and pre-16th century porcelain were also found in these sites so it is difficult to ascertain the context of these coarse-grained pottery. Judging by the materials found during the Late Neolithic in Batangas, Beyer proposed that the Neolithic cultures originated from Indo-China or South China. He specifically mentioned Yangshao culture in north-central China where elements from that culture particularly sawing and drilling techniques resemble closely those from Batangas during the Fourth Phase of the Late Neolithic (Beyer 1948b). These elements include rectangular adzes, stone-saw technique, hole-boring and perforating techniques, spearheads made from schist, feldspar, nephrite, and hard grey stones, bone and shell implements, stone and shell bracelets and rings, flat and cylindrical stone and shell beads, and stone barkcloth beaters. (Beyer 1948b). Yangshao cultural elements were present in Batangas except pottery (Beyer 1948b). Based on Beyer's assessment, the Late Neolithic population 'disappeared around 2000 BP' perhaps due to Taal Volcano's eruptions, suggesting that whatever population followed were not descendants of the Late Neolithic population (Beyer 1948b).

The 1960s Lemery excavation

My main concerns with the Beyer collection from Batangas is first, the finds have no proper stratigraphic contexts. Although, Beyer, painstakingly recorded the locations of the sites and the names of the collectors (Beyer 1933), there were no description of the individual finds based on their deposition. Associated objects were mentioned but the lack of site reports makes it difficult to provide conclusive statements. And second, since it was mostly agents who collected the finds, a selective collection could have taken place where there was preference for stone tools, spearheads, and nephrite objects and ornaments, overlooking pottery. Since the main reason for this paper is to look for the possible ancestors of the Calatagan pots, and no pots with good contexts were recovered by Beyer during his survey, I had to look for other early sites in Batangas with pottery from good stratigraphic contexts.

Lemery was excavated from 1969 to 1970. The excavations revealed eight cultural layers spanning 21 geological layers, including the current surface at that time (Locsin et al. 2008). I will only include descriptions here of Cultural Layers I to V because they correspond to the time periods in question. Cultural Layers VI to VIII are from 1100 AD to 1800 AD, when porcelain appeared.

Cultural Layer I is pre-8000 BC (Pre-10,000 BP) and characterised by core tools, scrapers, chopping tools, flake tools and hand axe. Cultural Layer II dating to 8000 BC to 4000 BC (10,000 BP to 6000 BP) had different types of stone tools compared to the previous cultural layer that include non-geometric microliths made from obsidian, basalt, quartz, andesite, and cryptocrystalline material; obsidian flakes, worked bones, hammerstones, anvils, small animal bones, and ochre concentrations. In 1850 BC (3850 BP), evidence of earthenware vessels first appeared in what has been labelled as Cultural Layer III. These plain sherds appeared close to the burials that belonged to later cultural phases. The sherds in Cultural Layer III are different from those associated with burials found in Cultural Layer IV. In Cultural Layer IV dating to the 1450 BC to 190 AD (3450 BP to 2190 BP), the excavators recorded reduced adzes - made from basalt, nephrite, and quartz, associated with burials, and earthenware sherds and pottery rims with altered, curved/linear fields, and punctuated geometric fields (Figure 5).

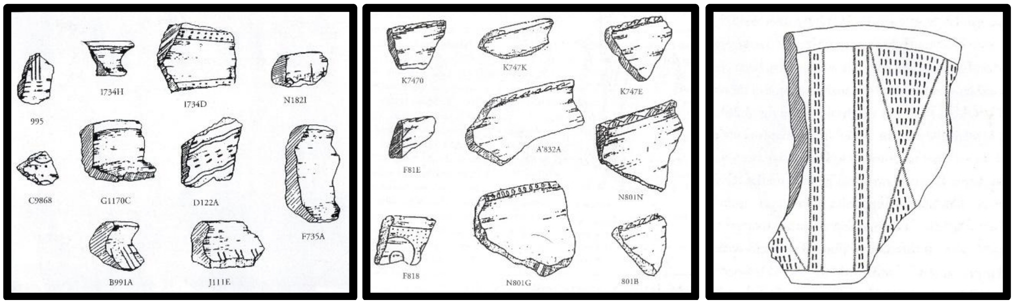

Figure 5. Earthenware sherds from Lemery's Cultural Layer IV
(Locsin *et al:* 2008: left, Figure 3.21, middle, Figure 3.22, right, Figure 3.23)

Twenty primary burials and eight secondary jar or urn burials were recorded in Cultural Layer V which dates to 190 AD to 240 AD (1810 BP to 1760 BP). Out of the 20 primary burials, four are male. Other remains were aged based on the bone fragments. There were three juveniles and one child. Collagen samples from extended burials were radiocarbon dated to AD 190 and AD 240. Further examination of the bones inside the urns indicates that non-adults were most probably interred in them. Due to the sizes of urns, it was unlikely that they were used as primary adult burial jars. The jars either contained secondary burials or infants. These two types of burials were judged contemporaneous based on the similarity of the mortuary goods such as earthenware vessels, beads, stone fragments, and metal implements. Some urn burials contained earthenware vessels. Some of the extended burials had red-ochre on the bones. It appears that the jar burials were buried on top or cut into the extended burials. Interpretations put forward by the excavators include that the jar burial was a new culture, or belong to the same culture. Both tradition belong to the same culture but urns were buried at a 'lesser depth' (Locsin *et al.* 2008:67). It was also thought that the secondary burials contained the bones of those in the extended burials or not 'necessarily related' (Locsin *et al.* 2008:67). According to Locsin *et al.*, the presence of these burials was 'reflecting a multiplicity of ideological notions shared within the burial subsystem of Iron Age Lemery' (Locsion *et al.* 2008:84). The concept of lateral differentiation within categories rather than between categories was interesting. Locsin hypothesised that there was some degree of ranking based on personal characteristics and not age, sex, or trade.

What was interesting in the Lemery excavations which reached a maximum depth of almost six metres was it did not yield any jade ornaments as those collected and described by Beyer earlier in other Batangas sites. Yet, a light green nephrite adze was recovered associated with a burial from Cultural Layer IV. I will get back to this point below.

The Lemery pots

As I am interested in the ancestor of pots with solar motifs found in Calatagan, let us look at the three pottery assemblages from Lemery. The first assemblage are the plain sherds from Cultural Layer III. Sherds from Cultural Layer IV have short incised lines on the neck and body that are either parallel or perpendicular to the mouth rim. Incised diagonal lines and lenticular notches are found on some mouth rims. The third assemblage belong to Cultural Layer V and associated with the burials. These pots were formed by paddle-and-anvil technique. Pottery parts such as neck, ring foot, and ring stand were formed separately then joined together. Seventeen forms have been recorded for the pottery assemblage in Cultural Layer V, which includes spheroidal, angled, ovaloid, pouring vessels, shallow dishes or bowls, and one basin (Figure 6). Other forms have lugs and/or ring stands. Designs on these pots include incised horizontal, vertical, and wavy lines, zigzag lines, carving, moulding, interlocking curvilinear S scrolls, hatched incisions (Figures 7-8). These designs can be combined to form geometric bands around the neck or body. Cultural Layer IV pottery assemblage has been interpreted by Locsin et al. (2008) as different from Cultural Layer V burial pottery assemblage, though some design elements were shared.

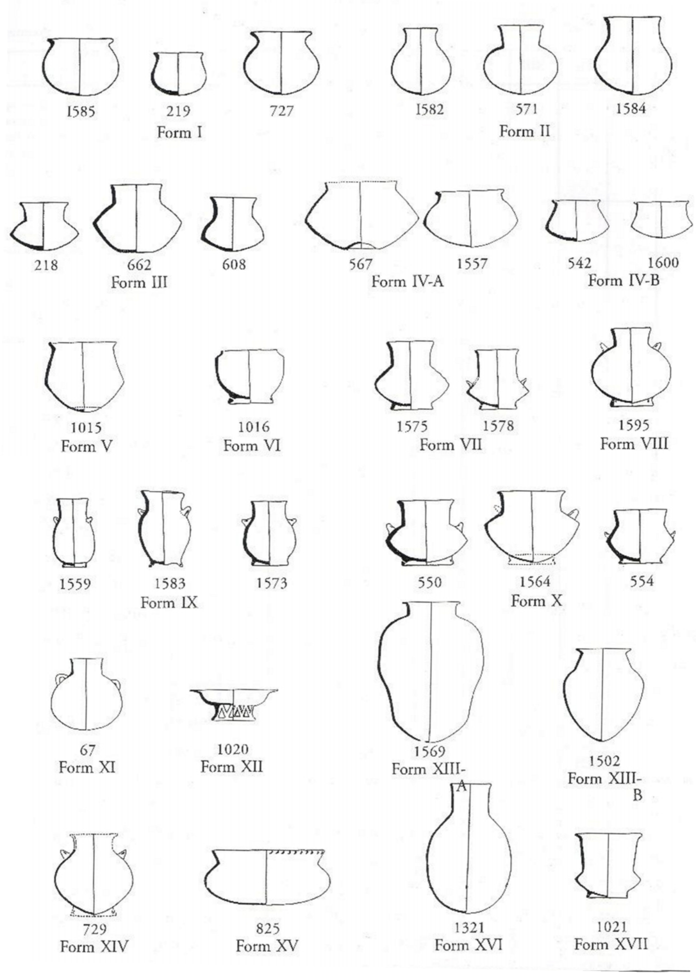

Figure 6. Pottery forms from Lemery's Cultural Layer V
(Locsin *et al.* 2008: Figure 3.33)

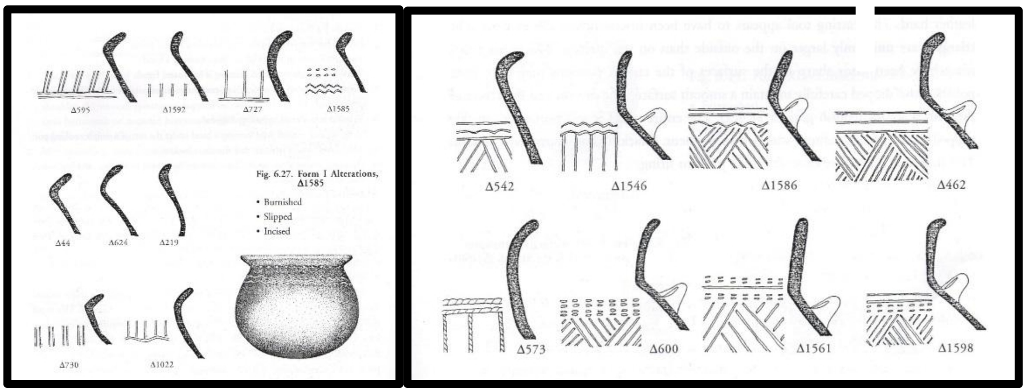

Figure 7. Design motifs on pottery belonging to Lemery's Cultural Layer V
(Locsin *et al.* 2008: left,Figure 6.28, right, Figure 6.38)

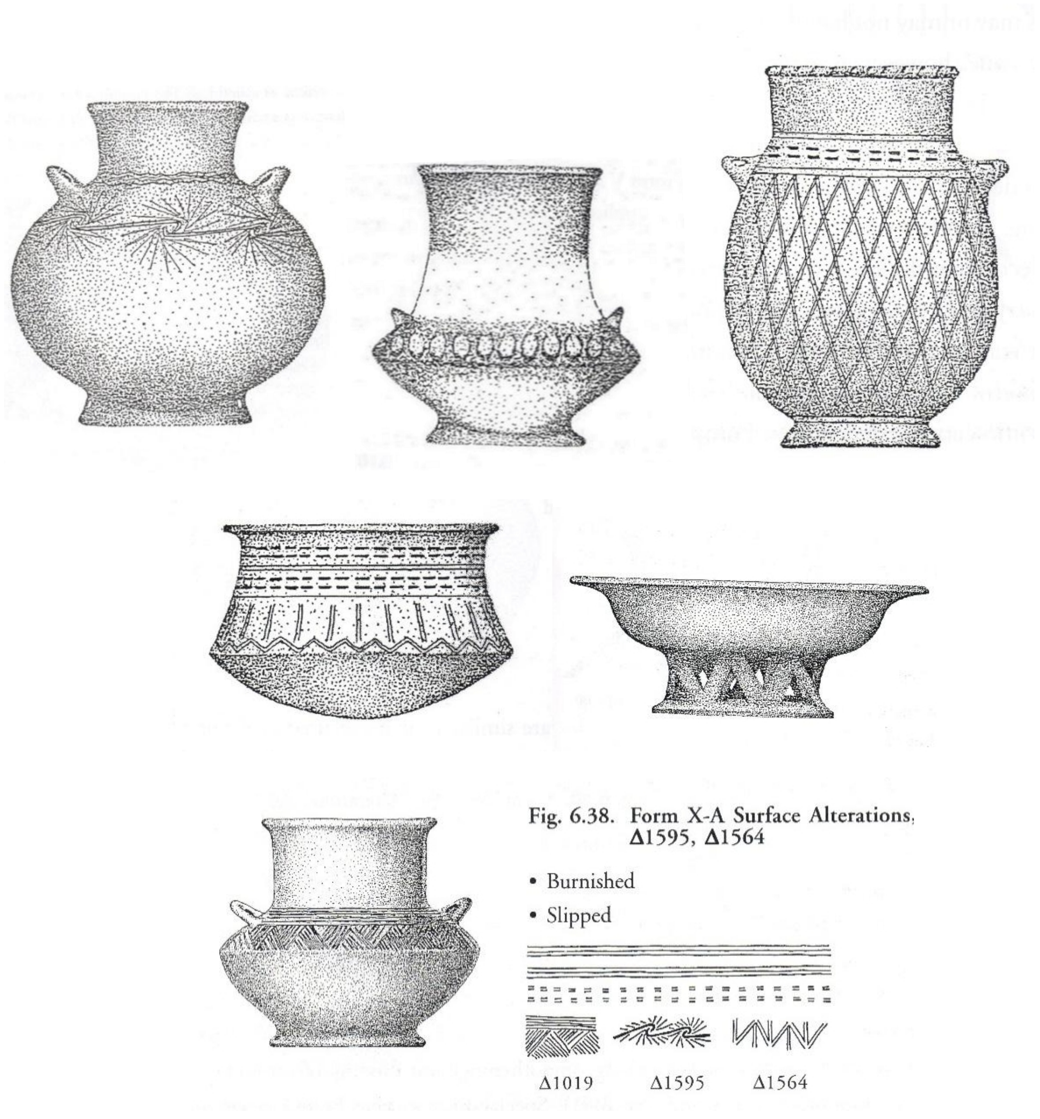

Figure 8. Samples of pottery forms and their decorations from Lemery's Cultural Layer V (Locsin *et al.* 2008: top, left to right: Figures 6.15, 6.35, 6.37; middle, left to right: Figures 6.32, 6.41; bottom, Figure 6.38)

What interests me is the interlocking curvilinear S scrolls that Locsin *et al.* (2008: 218-219) described as 'two single curvilinear scrolls in opposite directions (Figure 8, top left and bottom). Figure 8, bottom pot is carinated and lugged and designs found on this form vary including the sunburst motif (see designs on the right side of this pot). The upper scroll runs to the right, as suggested by incised lines emanating from the scroll and which are deliberately bent back as in encountering friction in its left-to-right movement. The lower scroll runs to the left, as indicated by the incised lines emanating from the scroll which is drawn as leaning backwards from friction in the right-to-left movement of the lower scroll. The overall effect of countermovements is dynamic.' This type of design can also be referred to as 'sunburst'. A sunburst design is defined as beams or rays radiating from a central disk such as the one found in Lemery wherein the point where the interlocking curvilinear S scroll meet serves as the central disk, and the incised lines as the beams (Figure 8, top left and bottom). This is one variation of the sunburst design.

For Calatagan pots with solar motifs, the mouth serves as the central disk from which incised lines emanate to form the rays (Figures 2-3). These ray designs can be straight incised lines or lines that formed triangles where the base of the triangle, whether it is a positive or negative, is parallel to the mouth rim. This can be considered a second variation of the sunburst design. The solar whorl is another type of solar motif, which is circular and spiral found on shells from Ille site in Palawan (Paz 2012; Vitales 2009). To date, it is the second variation of the sunburst design that is commonly seen on earthenware vessels from Calatagan. This observation is also shared by National Museum of the Philippines research, Timothy James Vitales (personal communication, 2 September 2016). There is one pot from Lemery which could be related to the sunburst variation found in Calatagan. It has incised lines parallel to the mouth and underneath are diagonal lines forming the beams. Locsin *et al.* (2008: 215) referred to this as 'basket weave pattern' (Figure 8, bottom). The two variations of the sunburst are present in the Lemery burial pottery assemblage from Cultural Layer V. In the Lemery assemblage, both variations of the sunburst designs are found on lugged vessels, while in Calatagan, only the second variation of the sunburst are found and on vessels with or without lugs. The iconic earthenware vessel that could represent southern Luzon has the second variation of the sunburst design on an angled and lugged body similar to its probable ancestor in Lemery (Figure 2).

The Batangas neolithic and its connections with the Austronesians

Sufficient evidence has been found in Batangas to support the presence of materials associated with the neolithic. To understand if the pottery belonging to Cultural Layers II and IV in Lemery has Austronesian origins, it is necessary to investigate the nature of the Neolithic in Batangas. To look at the Austronesian connections of Batangas, I will briefly mention[3] two areas in the Philippines interpreted to have strong Austronesian presence. These sites are in Batanes islands (Bellwood and Dizon 2013; Hung *et al.* 2006) located north of the Philippines and in Nagsabaran, Cagayan Valley in northeastern Luzon (Amano *et al.* 2013; Bellwood *et al.* 2011; Carson *et al.* 2013; Hung *et al.* 2011; Oxenham *et al.* 2016; Piper *et al.* 2009). The Peñablanca caves also in Cagayan Valley also show Austronesian presence based on items exchanged by farmers with foragers (Mijares 2006, 2007).

[3] Fuller discussion on these sites can be found in the cited references.

Based on the Batanes reports (Bellwood and Dizon 2013), some islands were peopled by 4000 BP which was interpreted as the earliest settlement there. No earlier evidence of a palaeolithic culture has been documented in Batanes. The crucial artefacts recovered in Batanes that point to an Austronesian origin are the pottery and nephrite ornaments. The pots forms and designs were closely related to those found in Taiwan and Nagsabaran. Raw material for the green nephrite ornaments such as the *lingling-o* that is found across Southeast Asia and other Philippines sites such as those in northern Luzon, southern Luzon, Masbate, and Palawan, were sourced from Taiwan suggesting a long-distance trade at this time (Hung and Iizuka 2013). Artefact forms and faunal data demonstrate a strong association and cultural continuity with Taiwan from 4000 B.P. to the present, hence, the current Ivatan population in Batanes are most likely to be descendants of the Neolithic migrants from Taiwan. Batanes appeared to be the stepping stone from Taiwan to northeastern Luzon as no Neolithic sites have been found in Ilocos as of this writing (Bellwood *et al.* 2008).

Nagsabaran is one of the Neolithic shell midden sites along the Cagayan River. Excavations revealed the presence of red-slipped pottery, stone adzes, grindstones, flakes, clay spindle whorls, clay earrings, schist beads, and jade objects (Oxenham *et al.* 2016) dating to 2000 to 1800 BC. Decorative motifs on pottery found in Nagsabaran resemble those found in the Mariana Islands that date to 1500 to 1400 BC (Carson *et al.* 2013; Hung *et al.* 2011) which led Carson *et al.* (2013) and Hung *et al.* (2011) to suggest that the eastern route from northeastern Luzon could be the migration path of the Austronesians to the Pacific islands. Shared motifs on pottery include red-slipped circle, punctate-stamped pottery, incised lines, paddle-impressed markings, filled triangles, lozenge patterns, and chevrons. In addition, the source of a jade bracelet fragment recovered in Nagsabaran was also from Fengtien in Taiwan (Hung *et al.* 2007).

In this paper, I will use pottery and jade ornaments as source of data to argue for an Austronesian connection in Batangas. As mentioned above, despite the time depth in Lemery, no jade ornaments were recovered, the only jade found was a light green nephrite adze which dates to after 1450 BC to 190 AD. However, in Beyer's collection jade ornaments are plenty. Studies have shown that Batangas green nephrite were likewise sourced in Taiwan (Bellwood *et al.* 2011; Hung *et al.* 2006). Due to unsecure contexts, we cannot clearly state if the presence of Taiwan jade in Batangas was because of Austronesians trading with local populations or an Austronesian population migrating to Batangas. Hung *et al.* (2007) mentioned that jade ornaments could have been brought by 'itinerant jade craftsmen'. Regardless, if we follow Hung *et al.* (2007), Austronesians have reached Batangas at 1500 BC.

Regarding pottery, a visual comparison of the motifs found in Batanes and Nagsabaran indicate close links with pottery in Taiwan associated with Austronesians

(Bellwood *et al.* 2013; Carson *et al.* 2013; Hung 2005). Pottery forms were also similar between those found in Nagsabaran and Taiwan (Hung 2005). Beyer said no pottery were found together with the Late Neolithic materials, of which I have reservations due to the collection manner described above. Let us now see if these Austronesian motifs on earthenware vessels were present in Lemery.

The earliest sherds in Lemery dating to 1850 BC were plain (Cultural Layer III). After 1450 BC and prior to 190 AD (Cultural Layer IV), decorated sherds, which I refer to as the second pottery assemblage in Lemery, were associated with adzes made from various materials including green nephrite. These sherds bear motifs similar to Nagsabaran pottery (Carson *et al.* 2013) such as incised rectilinear lines, pin-impressed tips, cord-impressed lines, and lenticular notches but the patterns differ. These did not evolve into the intricate designs found in Nagsabaran.

The motifs Carson *et al.* (2013) noted to be shared between Nagsabaran and Mariana Islands are incised rectilinear lines – vertical, horizontal, descending right, ascending right – are common in the third pottery assemblage of the Lemery pots which date to 190 AD to 240 AD (Cultural Layer V). The half circles, whether open upwards or downwards, circle-stamps, incomplete circles, impressed circular tips, punctate-stamped multiple circular tips, and dentate stamped multiple rectangular tips are absent in Lemery. Similar combinations of these motifs to form linear bands and filled zones are found in Nagsabaran and Mariana Islands. Although the incised rectilinear lines, regardless of orientation, and the multiple rectangular tips are present on the Lemery repertoire (second and third pottery assemblages), the linear bands and filled zones are not in any way similar to Nagsabaran pottery. These design patterns are not also present on the 15th century decorated Calatagan pots, even if motifs such as incised rectilinear lines and pin-impressed circular tips are present.

Based on the data presented, it appears that Austronesians reached Batangas as supported by the jade ornaments which were perhaps brought as finished products (Hung *et al.* 2007), whether they just traded or settled is still uncertain. The second pottery assemblage may be linked with the Austronesians. In Lemery Cultural Layer V, the pottery does not appear to have descended from the pottery in Cultural Layer IV. Perhaps the people who made and used the pottery in Cultural Layer V were a different population.

Discussion

In interpreting what is happening in the neolithic of Batangas, I will borrow from Kalström's (2007) non-linear approach to cultural heritage management in Laos. According to her 'history is linear with a start and an end, and now and then along that linear development there are some focal points which we select and protect as cultural heritage' (Kalström 2007:6). She added that 'there are many more stories about the past and to be told, and that this idea of linear development from simple to complex and from primitive to civilized also has to be challenged if we want to include the varied histories of the various peoples in the country' (Kalström 2007:6). As archaeologists, we are interested in origins, developments, and ends (Kalström 2007) and in this case the spread of the Austronesian from a defined homeland at a specific time period to its current range. However, for Kalström (2007: 14), 'a narrative can neither start nor end definitely; all narratives always start in the middle, and the so-called end is a temporary cut in a never-ending sequence of facts. We chose when and where the narrative starts and ends, but perhaps the most important matter is to be aware that when we create a history, we actively chose that temporary cut which we call the origins of. This is evident in the circular sent by the Organising Committee of the International Symposium on the Austronesian Diaspora in Bali, Indonesia in 2016 (http://austronesiasymposium.org/circular). The varied topics which include: (1) the diaspora itself within regional, state, and global perspectives; (2) the origin of diaspora, (3) the development of habitation and culture in space and time; (4) the technology that supports the diaspora; (5) diaspora background; (6) environmental conditions that support the diaspora; (7) environmental adaptation process; (8) interaction of the Austronesians with the outside world; (9) the ethnogenesis; (10) continuing traditions; (11) Austronesian-speaking people and the variety of their physical appearance; (12) languages; and (13) the actualization of cultural values' clearly demonstrate that archaeologists can choose any part of the Austronesian narrative to begin and to end.

Anderson (2005) questions the dates from Batanes used by others (Bellwood and Dizon 2013) to argue for an Austronesian expansion from Taiwan. "In the meantime, it can be proposed that the least problematic estimate of initial occupation in the Batanes Islands is represented currently by the oldest charcoal dates from Sunget and Naidi, 840 to 760 BC (ANU–11693) and 835 to 760 BC (ANU–11695) respectively. Broadly, this suggests initial colonization near the beginning of the 1st millennium BC. That conclusion would collapse the Sunget and Naidi phases into one period, about 800 BC to 0 AD". Dates in northern Luzon are earlier than Batanes which suggests an alternative path to the 'stepping stone' route from Taiwan into the Philippines. If there is an alternative path, then the Austronesian migration, is therefore, not linear.

In the narrative I offer to interpret what happened in Batangas, I chose Lemery, at the moment, as the starting point of the elements found in Batangas culture, particularly the sunburst design on pots. I cannot say where exactly they come from or how they reached Batangas but definitely there are connections to the Mainland Asia (Barretto-Tesoro 2008). In terms of geography, the closest neolithic site to Batangas with good stratigraphic contexts is the most studied Ille site (Paz 2012). The materials found in Ille that corresponds to the conventional neolithic period do not fit the current dominant Austronesian model proposed by Bellwood (Paz 2012, 2013). There is no end to the narrative as the elements found in Ille and Batangas continue to persist today in the form of the solar motifs (Barretto-Tesoro 2008; Barretto-Tesoro *et al.* 2009a).

There is no strong evidence at the moment to state that Austronesians colonized the Batangas area, but, there are cultural elements recorded that indicate involvement with a maritime trade network where jade from Taiwan reached Batangas (Hung *et al.* 2007). I feel that Solheim's concept of the Nusantao and the Nusantao Maritime Trading and Communication Network (NMTCN) is a more appropriate model to view cultural elements that are widely shared in the region (Solheim 2006). Solheim primarily used design elements on pottery which he termed as Sa Huynh-Kalanay as evidence for long-distance and extensive maritime contacts. Elements brought by traders and migrants mixed with those of the home culture that are also influenced by individual choices that could result to different suites of cultural traits, hence, there could be different homelands for different cultural elements. In my mind, the diagram below which shows the non-linear connectivity on the net is an apt model for Island Southeast Asia which is governed by maritime connections of various shades, degrees, and scales (Figure 9). Similarities of cultural traits were probably caused by constant interactions. Locales of interactions became centres of some cultural traits which eventually spread. In the past, there could be many centres of different traits and centres where specific traits mixed or combined. Batangas has Austronesian elements but not necessarily from the direction as suggested by Bellwood.

Throughout the years, Solheim (2006) modified his definition of the Nusantao and does not have a linguistic connotation. They are the 'natives of Southeast Asia, and their descendants, with a maritime oriented culture from their beginnings, these beginnings probably in southeastern Island Southeast Asia around 5000 BC, or possibly earlier' (Solheim 2006: 60). They could have spoken an Austronesian and/or non-Austronesian language. The varieties of Nusantao Solheim (2006) described and presented had different maritime orientations and mixed subsistence which include part-time maritime people practicing agriculture. Each Nusantao variety had their own maritime network which intertwined and overlapped with other Nusantao (or even non-Nusantao) variety networks which could be represented graphically in Figure 9. Cultural interactions could have caused an explosion of artefact types and designs that are similar but not exactly the same. Hence, pottery designs in Lemery's Cultural Layers IV and V could have been a result of this overlapping networks.

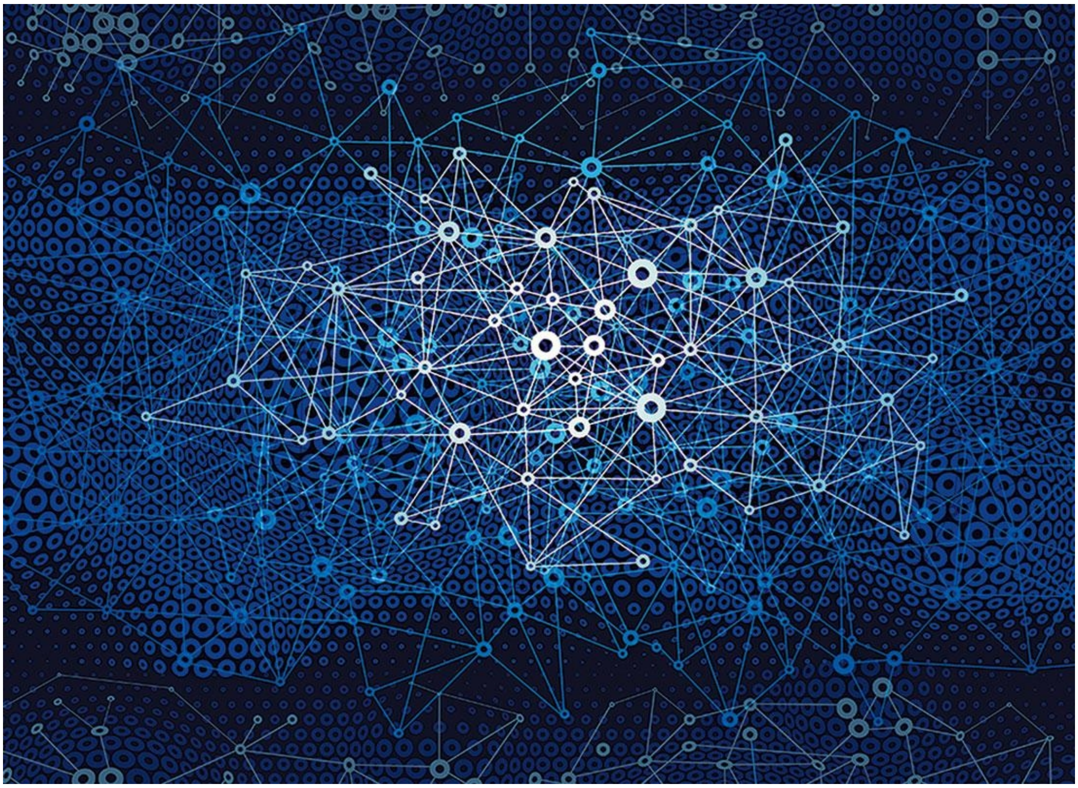

Figure 9. A diagram borrowed from http://www.techspot.com/news/59248-cornerplay-clicktivism-social-media-trolling.html to show a model of the possibility of different homelands for different cultural traits in Island Southeast Asia.

Philippine sites with established connections with Taiwan include Batanes (Bellwood and Dizon 2013), Nagsabaran (Hung 2005) and other Cagayan Valley sites (Hung 2005). Yet, south of these sites, there is a gap until you reach Novaliches and Batangas in southern Luzon which contained neolithic materials, not necessarily associated with Austronesians. South of Batangas is the Ille Rockshelter Site with materials dating to the Neolithic but do not conform to the Austronesian package (Paz 2012, 2013). If we follow the Bellwood (1997) Out of Taiwan model linear movement, Austronesians must have passed through central and southern Philippines to have reached the Indonesian archipelago where sites with Austronesian connections have been identified. Interestingly, Solheim (2006) also noted the gap between Cagayan Valley and Borneo and Sulawesi. Similar cultural traits between Mainland Southeast Asia and Island Southeast Asia and within Island Southeast Asia could have only occurred with a consistent non-linear maritime trade and communication. Disregarding the lack of archaeological research in central Luzon, Solheim's NMTCN would be the best explanation for the presence of cultural materials dating to what has been claimed as the Philippine

Neolithic and Metal Periods[4] in Batangas. Central and southern Luzon are not part of the four lobes of Nusantao expansion as 'variants of the Sa Huynh-Kalanay pottery' (Solheim 2006:185) were not present in these areas at the time of Solheim's investigations. Pottery from Lemery, presented above, and those from Ille, though some motifs are shared with Sa Huynh-Kalanay, they do not belong to the Sa Huynh-Kalanay pottery tradition (Balbaligo 2010; Locsin *et al.*2008). However, Balbaligo asserts that Sa Huynh-Kalanay is not a useful term. Similar to Balbaligo's (2010) claim that Ille pottery was a product of a localised pottery production that resulted from the introduction of new ideas, Locsin *et al.* (2008) argues that pottery in Lemery could had also been produced the same way. A discrete (Locsin *et al.* 2008) and distinct southern Luzon tradition. In addition, Locsin *et al.* (2008:57) presented data that points to 'possible local developments of potting technology' as noncord-marked pottery tradition in the Philippines from northern Luzon is 'contemporaneous with the earliest of the cord-marked Yangshao potteries and antedating the later Lungshan ang Lungshanoid traditions'. Beyer (1948b) suggested that the Neolithic of Batangas, except for the pottery, were similar to the Yangshao culture. The NMTCN is dependent on pottery designs, since the pottery designs on Lemery and Ille do not fall under Solheim's Sa Huynh-Kalanay, a modified NMTCN should be applied to understanding the cultural elements in Batangas.

The presence of pottery sherds associated with non-geometric microliths in Cultural Layer III in Lemery is interpreted by Locsin *et al.* (2008) as a combination of local pottery tradition and the introduction of potteries to the area. I will quote from Locsin *et al.* (2008: 84) regarding the pottery from Lemery:

> The formal character of the Iron Age Lemery burial site evidences a well-established southern Tagalog tradition of earthenware jar burials in the third century A.D. Further, the relationship of the burial jars to primary and secondary burials and the forms of burials suggest the integration of all these into an intricate burial complex reflecting a multiplicity of ideological notions shared within the burial subsystem of Iron Age Lemery.

To further support the non-linear movement of peoples in this part of Southeast Asia let us look at two other artefacts that were traded during the pre-neolithic period. Obsidian found in Ilin, Mindoro, and Ille, Palawan indicate that they were from the same geological source (Neri *et al.* 2015; Pawlik *et al*. 2015). They could have also engaged in obsidian trade with each other. Seeing the geographical proximity of Batangas, Mindoro, and Northern Palawan, the obsidian collected in Batangas by Beyer could have been acquired via this trade network. But no study supports this at the moment. However, obsidian from one site in Batangas was sourced from Nagcarlan, Laguna, located in southern Luzon (Neri and De La

[4] Some Filipino archaeologists used Iron Age (see Locsin *et al.* 2008).

Torre 2007). The second object that I will present to support non-linear movement is the distribution of shell adze technology which probably originated from Melanesia and spread to the west to Mindoro during the Middle Holocene. A shell adze from Ilin Island dates to 7550 to 7250 cal BP which indicates that interisland trade between Melanesia and the Philippines began thousands of years earlier than what Bellwood suggested and that movement was not necessarily from the Philippines to the Pacific islands (Pawlik *et al*. 2015). These two examples suggest that there was a pre-neolithic trade that could have involved Batangas populations (Figure 10). And this existing pre-neolithic trade network could have been later joined or utilised by the Austronesians coming from Taiwan. These trade networks could have been early variants of the NMTCN responsible for the shared pottery motifs across Southeast Asia, which locally evolved that manifest the local culture, such as the design patterns on pottery from Batangas, which I support to be distinctly southern Luzon tradition beginning in Lemery at 190 AD to Calatagan during the 15th century AD.

I would like to add that the use of ochre/hematite in burials found in Cultural Layer V in Lemery among some of the extended burials was most likely a pre-Austronesian practice. The use of ochre in Lemery was first observed in Cultural Layer II, where ochre concentrations were found associated with animal bones which predates Austronesian contact. In Ille (Paz 2012), the use of hematite to cover artefacts and human bones was dated to before 4000 years ago. This suggests to me that the using ochre and/or hematite in burials was pre-Austronesian. Ochre can be used along with the obsidian to argue for a pre-Austronesian and pre-neolithic population in Batangas that most probably interacted with Austronesian traders and/or migrants which could explain the presence of some Austronesian elements in Southern Luzon. The use of ochre in burials was not observed in Nagsabaran, except for burial NAG 2000 B2, where the authors described an 'iron deposit was noted on the left humerus' of this adult male (Oxenham *et al.* 2016: 322). This, however, was not elaborated on. But in Arku Cave in Peñablanca, approximately 62.6 kms southeast of Nagsabaran, red ochre covered adult human bones and human skulls dating to 2200 BC to 50 BC. Pieces of red ochre were also found inside one earthenware vessel containing human bones. No ochre was reported on the jar burials found in Batanes (Bellwood and Dizon 2013).

Outside the Philippines, red ochre has been found on flexed burials in Hoabinhian sites in northern Vietnam and Gua Cha in Peninsular Malaysia; and with secondary burials, dating to around 6000 BP in what used to be called Guak Kepah sites also in Peninsular Malaysia (Bellwood 1997). Also in Gua Cha, red ochre stains were found on river pebbles associated with flake debitage dated to after 10,000 BP (Bellwood 1997) similar to Lemery's Cultural Layer II in terms of associated materials and time period. In Sumatra, red ochre was found associated with grindstones. There is clear evidence from Niah, Sarawak (Harrisson 1975) that red ochre predates Austronesians when it was found associated with a seated burial that dates to 13,640 ± 130 BP. It appears that red ochre continued to be used much later in the same sites, when a red-dyed adult skull associated with a child burial in a coffin, which dates to 3080 ± 40 BP was recovered (Harrisson 1975). Red ochre was found in other sites in Borneo associated with hammerstones, and anvils or grindstones before 7000 years ago in Agop Sarapad (Bellwood 1997). In Sulawesi, red ochre is associated with obsidian flakes, and bone points from 6500 BC (Bellwood 1997), again predating the Austronesians and similar in context with Cultural Layer II in Lemery. In Golo, in Northern Moluccas, red ochre was found covering an extended human burial before 3000 years ago (Bellwood 1997). In Gua Lawa, in Eastern Java, traces of red ochre were found on spherical rubbing stones in preceramic layers. The earliest burials in Khok Phanom Di, which dates to 2000 BC to 1500 BC, were clustered extended burials that were dusted with red ochre (Bellwood 1997; Higham 2002). What is interesting about Khok Phanom Di is that these non-Austronesian hunters and gatherers produced pottery and were in contact with inland rice farmers, applied red ochre on their dead. Based on the above, it appears that the use of red ochre was a pre-Austronesian practice which continued after the arrival of Austronesians and this is evident in Lemery.

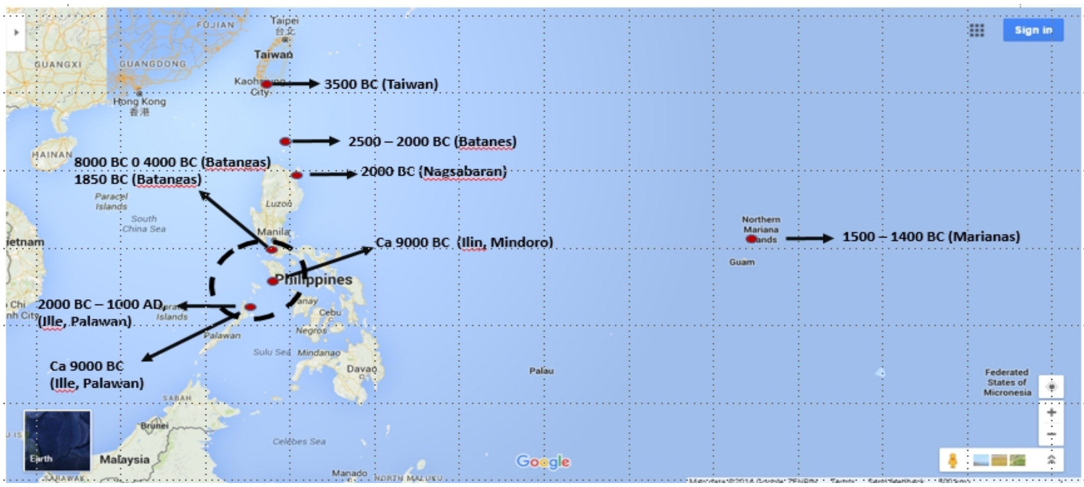

Figure 10. Map of the Philippines showing the Batanes, Nagsabaran, and Mariana Islands sites with artefacts associated with Austronesians. Pre-neolithic exchange and/or interaction which continued to the later periods represented by the black broken lines could have taken place among the people of Ille, Ilin, and Batangas based on obsidian artefacts and red ochre concentrations found on bones.

Conclusion

This paper has examined the Neolithic sites recorded by Beyer from 1932 to 1941. He demonstrated that a Palaeolithic population inhabited parts of Batangas. The Neolithic population could have descended from these Palaeolithic populations and mixed with Austronesian traders as evidenced by nephrite ornaments and adzes that were sourced from Taiwan. Comparing the Batangas materials to materials from sites interpreted to have Austronesian elements demonstrate that some pottery motifs were shared but patterns were unlike the pottery in Nagsabaran and Mariana Islands that shared very similar linear bands and filled zones. It appears that the pottery in Batangas was a local development that shared some similar motifs with pots considered evidence of Austronesians. An alternative explanation of how the Austronesians reached Batangas is perhaps the Austronesians brought the jade objects to Batangas most probably via a maritime trade network that have existed since the pre-neolithic rather than a north-south movement of the Austronesians coming from Taiwan through Batanes and south to Luzon. This pre-neolithic population in Batangas had access to obsidian and used ochre which were also found in other sites in Southeast Asia that continued during the neolithic. There could have been an existing neolithic population in Batangas that networked with Austronesians.

We must examine Beyer's claim that no pots were found in Neolithic sites in Batangas. Even if the Lemery materials have good stratigraphic contexts which shows when earthenware vessels first appeared, perhaps there are Batangas sites that did not have any pottery. Thus, the notion of multiple Neolithic cultures in Island Southeast Asia should be addressed and I will echo Paz's (2013) point that the Neolithic should be redefined. Second, the use of Iron Age to refer to the cultural period that follows the Neolithic should also be reassessed. In the case of Lemery, in the Early Iron Age, which is Cultural Layer IV, stone adzes were associated with burials, and only three metal implements were found associated with 29 burials in the Middle Iron Age, which is Cultural Layer V. The lack of metal objects in these cultural layers should make us rethink of what and how labels should be used.

I would like to end this paper highlighting the non-linear approach by saying that the Austronesian diaspora continues today. Rita Gabiola[5] is a Badjao Moslem, with a Spanish name, who resides in Quezon Province, in southern Luzon, and speaks Tagalog. Rita's history is a testament to the high mobility and flexibility of Austronesians that their original spread across Southeast Asia cannot and should not be defined by a linear explanation.

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[5] She was spotted begging in Quezon Province in May 2016. Her photo became viral because the photographer and netizens likened her to a supermodel (http://www.actslifestyle.com/look-a-badjao-beauty-that-launched-a-thousand-likes/)

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INDICATION OF EARLY PLANT DOMESTICATION IN JAVA BASED ON THE PALINOLOGY RESEARCH

Anjarwati Sri Sajekti

Introduction

The term crop cultivation means an effort made by human toward vegetation to fulfill their needs of food. Agricultural activity (crop cultivation) is one of the activities of the earliest known human civilization that has totally changed the form of culture. Many experts generally agree that agriculture was first developed about 12,000 years ago in the Middle East region, which covers the area of the Tigris and Euphrates river valleys and stretches to the west to the area of Syria and Jordan now. Some of the first evidences ever found show the presence of grain crops (cereals, especially wheat; dates; and legumes).

Domestication was the key process that enabled many societies to move from a hunter-gather lifestyle to a more settled one. The early phase was probably a combination of gathering productive wild foods and selecting the best ones to improve qualities for replanting and breeding animals for human utility. Based on the current archaeological evidence, primitive maize cultivation in southern Mexico, Central America has existed since 7000 years ago. The remnants of ancient corn cob were founded in Naquitz cave, Oaxaca Valley, with the age 6250 years old; while the oldest intact cobs were found in caves near Tehuacan, Pueblam, Mexico and aged around 3450 BC. The Olmec and Maya play a role as the early cultivators since 10,000 years ago in Central America. Cultivated corn is regarded as a direct descendant of grass similar to corn called *teosinte* (*Zea mays ssp. Parviglumis*). In the process of domestication that took place about 7000 years, corn is the only species that cannot survive in the wild nature (Gepts 2004, 6).

Corn plants are annuals which have a life cycle of only 80 -150 days, the average age of three to four months, so they appertain to short day plants. Flowering happens when it gets enough sunlight intakes. As a member of monocots, corn has fiber roots that can reach a depth of 8 m, although mostly in the range of 2 m. Maize plants have male and female flowers that separated in one plant (*monoecious*), the male flowers are located at the top of the plant with yellow pollen and unique aroma, while the female flowers that are arranged inside the cob and grow between the midrib of leaves and stems are often known as corn hair. Corn pollination occurs when pollen from the male flowers fall and stick to the cob hair (female flowers); generally cross-pollination occurred (cross pollinated crop). Pollination usually happened from other plants' pollen, pollination within one plant is very rare (Purwono and Hartono 2006). Corn does not require special conditions to grow as the plant is able to grow in all soil types. Although numerous races of maize are able to grow and adapt to low temperature and the highlands, maize is included into the lowland plantations with warm temperatures and full of sunlight. Maize is also able to grow on various types of soil as long as adequate water is available. Corn fields should not have puddles so it is important to make trenches as the water drainage. According to Suprapto (1986), some climate factors that are important in the growth of corn are the number and distribution of sunshine, rainfall, temperature, humidity and wind. Corn plants must be grown in areas without sun obstructions with an optimum temperature of 23-27° C and equal water distribution.

Problems

The earliest maize domestication is known from Mexico (Piperno et al. 2009), and this is about 9000 calBP. It was transported to the rest of the world after the first or second Columbus voyages. A case has been made for pre- Columbian maize in China before this (Uchibayashi 2005) but the route to introduction is unclear. *Zea mays* was domesticated from *Z. Mays spp*. *Parviglumis* and today these differ greatly. Maize is very important crop in China and now outstrips rice production. In the 1940s the majority was used as food for humans but now the vast majority is used to feed pigs, chickens and cows plus some industrial uses, and while farmed areas and production rates have increased China is a net importer of maize (Dodson and Dong 2016).

While the presence of corn in Southeast Asia, especially in Indonesian archipelago, is believed be to since the arrival of the Portuguese around the 16th century CE, some studies reveal interesting facts to review about the existence of corn in this archipelago. Some research data indicate the presence of corn in Indonesian archipelago in general and in Java in particular, which raise the following questions:

1. Are there any indications of quite clear climatic change, especially in Java?
2. Could it be that corn has been cultivated in Southeast Asia in the past, considering this land has tropical climates with full sunlight?

Study Material and Methods

This research explores the preservation of the pollen during the Holocene Period using the sample from the Dieng Plateau area in Central Java. The purpose of this research is to understand the climatic changes based on the vegetation record from this highland. Dieng Plateau has the highest varieties of vegetations from the altitude of around 2000-2500 m (Pudjoarianto and Cushing 2001). This study took the sample from the swampy sediment of Telaga Cebong with a depth of around 600 cm. Swamp sedimentations is important sample from the preservation point of view, because the sediments have been deposited regularly and without any disturbance by the water flow. The stratigraphy will thus be consistent and continuous, and provides the best sample for this study. The result of this study shows the changes of the palaeo-environment on the Dieng Plateau area during the Holocene Period.

Study Area

Telaga Cebong (Cebong Lake) is a swamp site that is located on S 07° 14.223' – E 109° 55.142' at an altitude of 2123 meters. The sampling was performed by vibrating the west part of the swamp and brings out a raft of vegetation and a thick sediment layer under the water. The sediments are mainly clay and recovers 2.4 m of sediment between 5.94 m and 3.50 m. They are brown colored compact argillaceous, which are beige at base layer and mushy black at the top. The 4.50 m layer has tephra which shows an eruption of the volcanic. The sediments were influenced by Mount Merapi eruption, one of the most active volcanoes in world, about 70 km southeast from Dieng. Van Bemmelen wrote the history of the eruption of the Mount Merapi in 944 BCE, which destroyed Dieng temple complex (Bemmelen 1949). The thickness of the tephra continues until 4.62 m although not so concentrated as before and then shows up again on 4.16-3.50 m alternated by mill metric gravel and lentil. The sediment on the top or surface was full with organic material (peat) and has dark color. This site is one of the three sites where samples have being taken for the environment study of Dieng Plateau.

Material Study

Samples were collected using vibrating core method. One of the characteristics of the majority of the sites is represented by a raft of thick vegetation on the circumference of the lakes, floating on water, and making it perilous to take away. The coring of the lakes most effectively conducted using the Hiller method. This is a chamber sampler (Fries and Hafsten 1965) fitted with an auger head, allowing it to be twisted as it penetrates the sediment. This method provides considerable capacity for penetrating even the fairly stiff or fibrous materials. The sample was obtained by twisting in opposite direction when the inner rotating flanged chamber opens and scours a sample from the next sediment.

Six of the samples used for the palynological analysis represent the indication of different materials on the sediment: CBG 2-(1)/594 - 593 cm; CBG 2-(2)/ 550 – 549 cm; CBG 2-(3)/ 500 – 499 cm; CBG 2-(4) / 472 – 471 cm; CBG 2-(5) /416 – 415 cm; and CB 2-(6) / 380 – 379 cm. The analysis was conducted in the palynological laboratory of the Institute de Recherche pour le Développement site de Bondy (IRD) in France under the supervision of Anne-Marie Sémah. This study is very important to analyze the pollen record on the stratigraphy of Telaga Cebong Site.

Methods

a) Cutting the core

The sediment was cut into 1 cm sample, packed on the aluminum foil and kept inside a plastic bag. The cutting process must use sterilized tools to avoid contaminations between the samples or from the outside environment. The total amount of samples is 245 pieces, but for this research we only use six (6) samples for Palynology analysis and four (4) samples for the dating with different depths to present all of the stratifications on this site. This process was done by the author and Acep Andra'i (technician from the Archaeological Research Office of Bandung). Before the chemical reaction there is pre-preparation step to measure the sediment on humid condition and on dry condition and also to measure the H2O in the sediment.

b**) Chemical Preparation in Laboratory:**

The chemical treatment was conducted in laboratory to prevent any external contamination. The methods of the preparation are depending on the mineralogical composition on the sediments. The sample extractions were done in the pollen laboratory of the Institute de Recherche pour le Développementsite de Bondy (IRD) in France with Anne-Marie Sémah. Before chemical reaction, the dried samples were refined into powder to have perfect reaction with the chemicals. The laboratory work is divided into three steps:

- Hydrofluoric acid (HF 50-70 %) treatment:
  This treatment is to dissolve the siliceous material from the sediment, and to avoid pollen being obscured when mounted. The samples are left in the HF for at least 24 hours. The next step is transferring the residue into a plastic tube and centrifuged at 3000 turns/minute for 10 minutes.
- Hot Hydrochlorhydric acid (HCL) treatment:
  There is an abundance of calcium carbonate in the sediment that needs tube clean using the Hydrochloric acid. This sample then transferred to a hot plate, centrifuged at 3000 turns/minute for 10 minutes and neutralized with H2O which followed by HCL 50 %. This treatment also neutralizes the material sediment from the HF treatment.
- Hot Potassium hydroxide digestion (KOH 10 %):
  This treatment is to remove organic materials. The procedure of this treatment is by placing the sample in boiling tube and adds KOH 10 % and put in a boiling water bath on the hot plate. This digestion process besides to break up the matrix, is also to dissolves humid material and producing a dark brown solution. The next step is put the samples on the centrifuged at 3000 turns/minute for 20 minutes and neutralized with

H2O. After the residue is clean from the chemicals, the tube is put face down on a tissue on top of the table, to make it dry.

a) Interpretation

The relationships among climate, vegetation, and fire regimes expressed in the palaeo-ecological record, combined with model simulations of past, present, and potential future environmental changes, can help us understand how fire regimes may change. The presence of fire was related to human occupation and this evidence is an important agent of vegetation disturbance in the rain forest and ecosystem change in the past. Intensive Slash and burn method will progressively fire-adapted ecosystems (Caldararo, 2002). Fire regimes depend not only on the climatic background and biological factors, but also the cultural background of how people managed ecosystem and fire (Pyne, Andrews, and Laven 1996). Fire in the world depends on the ecosystems, at least in regard to biomass production, tree cover or species composition (Bond and Keeley 2005). That biomass burning effected to the vegetation structure and disturbance-adapted ecosystems (Wooler et al. 2012). In the paleo-ecological record, different configurations of climate, hydrology, vegetation, and fire provide an important tool for delineating the magnitude of possible future responses of fire regimes to climate and vegetation changes, and to help identifying those variables (Whitlock, Shafer, and Marlon 2003).

Radiocarbon Dating Results

The dating was based on the Carbon C-14 using AMS (Acceleration Mass Spectroscopy) method, which was submitted to the Beta Analytic Radiocarbon Dating Laboratory. Radiocarbon dates were calibrated by the laboratory using INCAL 04 calibration method (Stuiver, Reimer, and Brauziunas 1998). Telaga Cebong site has dates approximately around:

Table 1. Results of radiocarbon dating on Telaga Cebong samples.

No.	SAMPLE	DEPTH (cm)	DATING	
			Yrs BP	BCE/CE
1	Sample (1)	349-350	1440 +/-40	cal CE 550-660
2	Sample (2)	477-478	2480 +/-40	cal BCE 780-410
3	Sample (3)	570-571	2540 +/-40	cal BCE 800-720
4	Sample (4)	592-593	3350 +/-40	cal BCE 1740-1520

If we correlate the results of Carbon dating from Telaga Cebong site and from Telaga Balekambang site (Pudjoarianto and Cushing 2001), which have a distance of around 2.49 km, there is data continuity. The dating of those sites have shown some different indications on the presence of the tephra[6] on Telaga Balekambang which shown at the date 1020 +/-50 yrs BP, whereas in Telaga Cebong Site the date is 2480 +/- 40 yrs BP. These data give additional information that there was another eruption even though we do not know yet from which volcano. Dieng is surrounded by volcanoes although they are no longer active. According to Van Bemmelen, Merapi volcano was erupted around 944 BP (Bemmelen 1949; Pudjoarianto and Cushing 2001). Merapi volcano is the most active volcano in the world, located 67 km southeast of Telaga Cebong Site.

Result and Disccusion

Each sample has its own characteristic on the variation of the taxa and on residue correlated with material on the sediment. The pollinic diagram of Telaga Cebong Site is dominated by seven taxons: *Arecaceae*, *Asteracecae*, *Poaceae*, *Myricaceae, Engelhardia sp*. (Fam. *Juglandaceae*), *Urticaceae*, and *monolete spore*. The vegetation from the taxon *Asteraceae* has the flexibility to adapt in every environment, including the ubiquity plant group. The presence of *Asteraceae* is an indicator of abandoned place after human activity. The taxon of *Poaceae* gives information that the climatic condition was dryer, which also explain there was human culture in form of cultivation activity. Some of the pollen fossils are very easy to recognize based on the morphology, such as *Podocarpus imbricatus*, which have three balloons; *Engelhardia sp*. which has three pores and the exine is thin. These pollens grains are from high latitude forest around 1500-2500 m. *Myricaceae* has three pores, *exine psilate* and thick, contour sub-triangular, convex, pores prominent; *Asteraceae* is also very easy to recognize as it has a characteristic on the *exine echinate*, circular or triangular, mostly is tricolpate and some fenestrate and have various sizes (20-100 µm). However, there is also some pollen that is very difficult to determine because of a lot of variation in pollen flora of Java. Moreover, sometimes we found big variation on the ecology inside the same family. This analysis also found undetermined pollens, which have similar characteristics with the ones of the family but have different size and characters. The accumulation of the fossil pollen can help to reconstruct the paleo-environment around that site.

The pollinic diagram shows that pollens from the tree taxons have similar frequency compared to the herbaceous pollen on level 1 (CB 2- (1)/594-593 cm). The percentage of AP = NAP > Spore, means that Arboreal Pollen (AP) and Non-Arboreal pollen (NAP) were almost similar and the spore is very low, dominated by Asteraceae and *Aristotella sp.* (Fam. *Elaeocarpaceae*). The *Asteraceae* gives an indication of open environment. *Asteraceae* is the

[6] Tephra is air-fall material produced by a volcanic eruption regardless of composition or fragment size. Tephra is typically rhyolitic in composition, as most explosive volcanoes are the product of the more viscous felsic or high silica magmas. Ash is small tephra (Encyclopedia:www.wikipedia.com)

second largest herb families of flowering plant which very common in open and dry environment. *Castanopsis* and *Arecaceae* also exist on this layer, as the characteristic of climate vegetation, which established for given climatic conditions in the absence of anthropic action after a long time. The dating of this layer at 3350 +/- 40 yrs BP has a correlation age of the pollen record on the lowland at Rawa Pening, Ambarawa, Central Java, which shows the same evidence of open forest trees during 4000 BP. Open forest characterized of drier climate condition, as a result of longer dry season (Sémah 2004). Ambarawa is located around 56.13 km in the east part of Telaga Cebong.

The pollen stratigraphy of Telaga Cebong indicates that human strongly affected the environment as shown on the big percentage of the taxon of *Poaceae* on level 2 (CB 2-(2)/550-549 cm). Based on the observation in this layer the attendance of forestry taxon has at least been partly compared to the herbaceous AP<NAP>Spore. There is a big decrease of taxon of *Elaeocarpaceae* and *Asteraceae*, which indicates that the forest was removed to create new open area. The deforestation is mostly caused by human activity as proven by the presence of charcoal. If we observe the connection of the sediment it was interesting because it contains numerous pollens, a lot of organic material and charcoal (see: annex 4). This evidence has important value equaled with the high percentage of *Poaceae* and *Cyperaceae* that explain there was a human activity in form of cultivation. There is also a high percentage of *Haloragaceae*, which lives in mud puddle. The presence of *Poaceae* characterized of warmer and humid condition, which is an indication of minor climatic change after long drier condition. The concentration of charcoal in this level is an evident of fire, aligned with the numerous pollen fossils that give information of human activity that caused the fire. However, there is another possibility that the fire was caused by natural affair as the result of the monsoon. The dating of this level was close to 2540 +/- 40 yrs BP. During this period there is an indication of drier condition in lowland area correlated with the data of Ambarawa which located on 460 m elevation (Sémah, AM., 1992). We assume that highland was warmer and more humid compared to the lowland condition. The sediment analysis also showed an indication of high percentage of H20 compared to the other sediment. If we make a correlation with other data of human occupation in Java, it has a similar age with Gunung Sewu Site in the southern part of Java. We know that the occupation in Gunung Sewu, especially at Song Tritis site, corresponds with the typical features of the Mongoloid around 2500 year ago (Simanjuntak et al. 2004). However, this assumption is still preliminary and needs further research to have a good indication of human occupation.

The level 3 (CB 2-(3)/500-499 cm) has shown that the herbaceous increasing on the taxons *Ericaceae* and *Vitex sp.* (*Verbenaceae*) and small decrease on the taxons of *Poaceae*. On the other hand the increase of taxon arboreal pollen such as *Castanopsis* (Fam. Fagaceae), *Engelhardia* (Fam. Juglandaceae), *Myricaceae* and *Arecaceae* equal to the almost disappearance of *Asteraceae*. This phenomenon gives information of the increase of moisture in this area, the condition where fern also more develop and supported by small presence of the taxon *Podocarpus imbricatus*, which characterizes coniferous forest and more temperate climate. We observed that the percentage of the pollen in this level is AP=NAP<Spore.

The next level is level 3 (CB 2-(4)/472-471 cm), which is almost similar with the previous level. There is an increase of the taxon *Urticaceae* and *Myrsinaceae*, whereas other taxons have constant frequencies. The percentage of Arboreal Pollen is bigger than the herbaceous but fern is more developed (NAP<AP<Spore). The ecology of this area is more mountainous and ever wet, where the taxons of big trees are more developed. The most interesting of this level is that it contains heavy ash that equals with the decreasing *Poaceae* pollen. It seems that this area was abandoned from human activity. This layer is correlated with the age (approximately 2480 yrs BP +/- 40 CAL BC 780 – 410), which have explosion phenomenon from an unknown volcano, could be the local explosion or explosion of other volcano surrounding the area. This evidence can also be found in Ambarawa which contains of argillaceous plastic that impact the environment destruction.

The sample on the level 5 (C-2(5)/416-415 cm) shows a small decrease of arboreal pollen and the disappearance of Arecaceae. Non arboreal pollens were increased especially *Poaceae*, *Vaccinium sp.* (Fam. *Ericaceae*) and *Dacropyllum sp.* (Fam. *Epacrydaceae*). The presences of Poaceae gives information about human cultivation based on the ecology of the *Poaceae* that develop on warm areas. The environment has no big alteration on the frequencies of taxons but the presence of human cultivation has shown that the climate was warmer. The Presence of *Vaccinium sp.,* as the pioneer after the volcanic activity, leads to the assumption that there was mixed forest cover this site.

The last level is level 6 (CB-2(6)/380-379 cm,) which is dominated by Myricaceae and an increasing of taxon *Engelhardia sp.* (Fam. *Juglandaceae*). Myricaceae was the pioneer of ligneous in the grassland, supported by small presence of Casuarinas which is resistant to fire. Those vegetation characterized the pioneer on bare soil of the ash and sand in the upland position and colder condition.

Big quantities of charcoal on the level 2 (CB2-(2)/550-549 cm) correlates with the high quantity of pollen record (see: annex 6) suggest human activities on the pre-agricultural (such as burning of semi-arid vegetation) for extension of land use which caused deforestation. Monsoon affected the long drier season and the collapse condition on the lowland made human could not conduct cultivation activity, thus forced to move to another place. The presence of Poaceae in the highland is one indication of deforestation to produce human subsistence. Human activity was one of the major factors to the environment change besides the natural events (such as fire caused by long drier season and volcanic explosion).

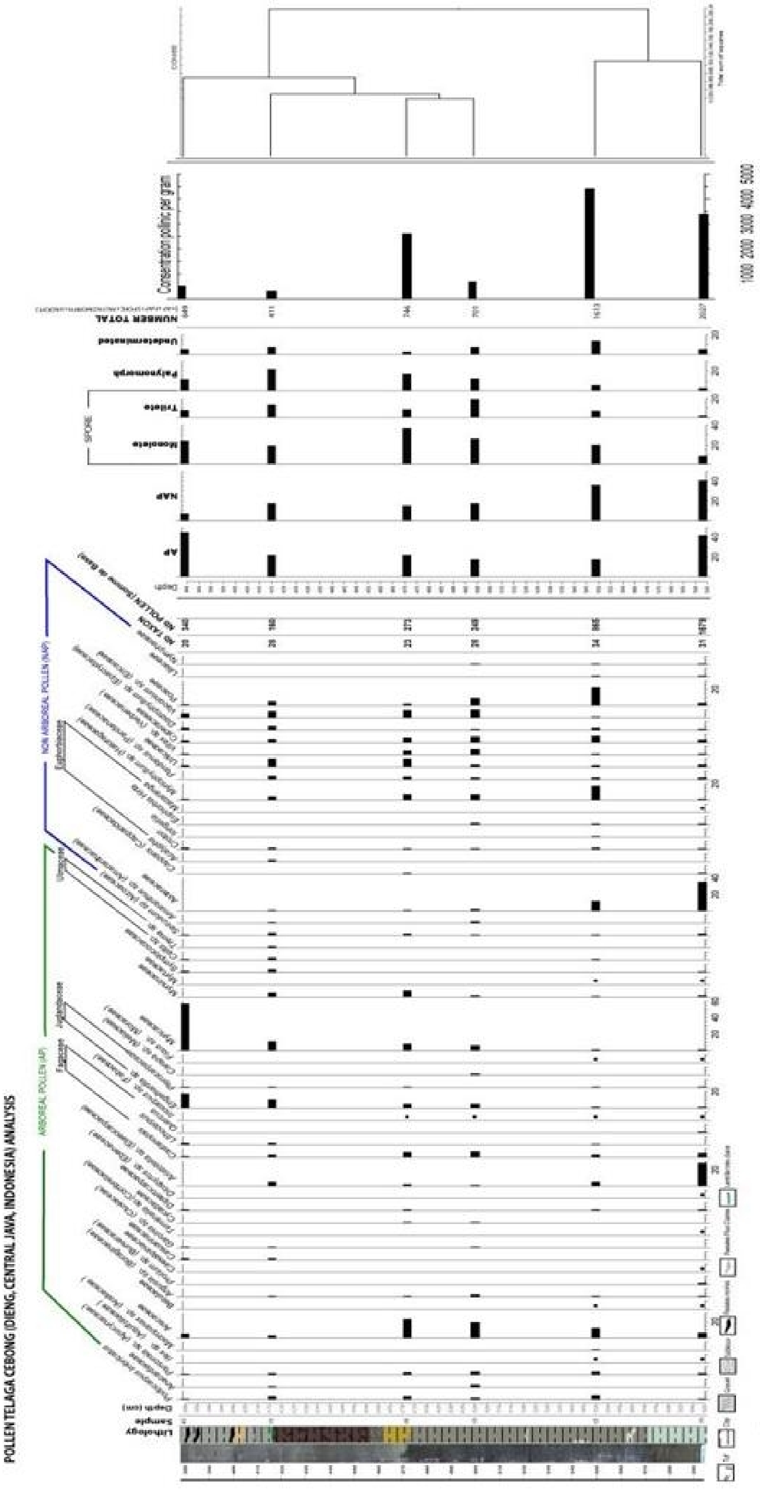

Figure 1. Pollen diagram from Telaga Cebong, Central Java

Supporting Data

The Palynological studies on Java Island have been done by researches since 1980. In Central Java, A.M. Sémah (Sémah 1982; Sémah 2004) has studied Late Pliocene and Early Pleistocene deposits of several early hominid sites. She highlighted a pattern of local environment context of the early hominid fossils in Sangiran Dome. During Late Pliocene and Lower Pleistocene, the pollinic record suggests an environment swampier with the mangrove forest and followed after by drier environment during the Middle Pleistocene. Polhaupessy has worked on various cores from Java. Middle Pleistocene Trinil and Upper Pliocene Bumiayu produced mainly pollen of local origin (Polhaupessy 1980). Later in in 1981 Polhaupessy published an undated pollen record from Batujaya in the lowlands of West Java (Polhaupessy 1981). Polhaupessy also published the results from few cores obtained from the ancient Lake Bandung (1980). One of these cores, Rancaekek, dates back to c. 11,000 BP. Polhaupessy made an interesting reconstruction of the ancient lake. Local pollen and spores prevail here, too, and not much information about the upland vegetation could be obtained. The new cores from Bandung Lake, covering c. 50,000 years, were investigated by van der Kaars in Amsterdam (Kaars and Dam 1995). His initial analysis points to a high proportion of regional pollen in the pollen spectra, as well as marked fluctuations in the pollen curves (Inge-Lise Maria Stuijts, 1993).

In 1992 A.M. Sémah discloses a fluctuation evidence of the climate variation during 16.000 - 4000 BP. The fluctuation of the climate from cool and dry environment to humid and warmer period was occurred around 12.000 BP in Rawa Pening, Central Java, Indonesia. During 4000 BP there is an evidence of the volcanic activity. The environment condition more open forest as an impact from the longer the dry season. Secondary forest was developing as the result of the drier climate condition, and percentage of arboreal pollen and Non Arboreal pollen was decreased. This drier condition continues until 2800 BP, which shown of the open forest trees and the sediment contains more clayey. The anthropic origin clearing the land and the beginning of the cultivation culture occur around 1500 BP as shown by the pollinic diagrams with the increasing of the Poaceae. On this level trees almost disappear, which indicates of longer dry season (Sémah 2004).

Chacornac-Rault in 2004 researched the pollen of the Gunung Sewu from The Holocene Period. She mainly used pollen analysis to reconstruct the arboreal and herbaceous vegetation found around the sites and thus deduces the climatic parameters. In addition to the pollen analysis, two other analyses were carried out: charcoal analysis, which highlights fire stage, and phytolith analysis, which precise Poaceae ecology, the presence of plants that are economically important (such as rice, banana, etc). A phytoliths analysis is also useful to analyze sediments with low pollen content which makes the palynological research possible to give a better understanding of human impacted on their environment. The phytoliths support the analysis by adding certain information which could not be obtained by the pollen studies alone (Chacornac-Rault 2005).

From the new data from Liyangan Site, there are indications of agricultural cultivation in Java that developed since 8^{th} - 9^{th} CE with the findings of foodstuff remnants on this site. Liyangan site is located on the slopes of Mount Sindoro in Temanggung regency, Central Java. There are several findings on this site, i.e. the remains of traditional Javanese settlements; village fences; home appliances; and also food stuffs such as grains of rice (*Oryza sativa*) and corn were found in burnt conditions. Corn were found still located inside the rice container made of bronze correlated with a rice ladle in burnt conditions, but the conditions are still intact complete with its cornhusks and ears of corn. This site has been investigated by the Archaeological Research Office of Yogyakarta. The data are very useful to investigate the history of agricultural cultivation and technology or land cultivation in Java Island in the past, considering Java Island has very fertile soil condition at that time so it could be developed for cultivation. It is possible that the existence of the corn seed is the result of inter-state relationship that happened at that time. The cultural life (Hindu-Buddhist) itself came from another country and some artifacts like metal objects and ceramics are assessed to be imported from China and other places in mainland Asia. With the discovery of these latest findings, it allows other disciplines of science to conduct more detailed research. Liyangan site is an ancient shelter or settlement site with very important archaeological remains, because it leaves the evidence of subsistence in the form of cultivation products of that era.

Conclusion

From the discussion above, it is clear that climatic and environmental drastic changes had ever happened in Indonesia archipelago generally and Java particularly. The impact of the Last Glacial affected the global climate change, as evidenced by the lower temperature and great aridity in many regions (Adam 1997). Based on this research, the minor climatic and environment change was present on Dieng Plateau during 3350 – 1440 BP. The sediment from Telaga Cebong site have shown that it is older than Telaga Balekambang samples of Pudjoarianto research (2001), which is the continuation of the Telaga Cebong's site and has a comprehensive image to the environmental changes. Primary level on this study began with open landscape that presents a high value on *Asteraceae* and less variability on the vegetation which of the areal abundance for long time and growth to be an open landscape during the drier condition and colder climate. Other evidence is the abundant amount of *Poaceae* and increasing frequencies on the pollen record that gives information of the high variability vegetation as the result rapidly spread of the cultivation on the warmer climate. The vegetation found in this site acts as evidence of cultivation activities during the warmer period in Java. The next level which presents of the volcano activity proves to contain ash and pyroclastic element on the sediment. Indeed the presence of the ash around 12 cm thick had shown a possibility of unknown volcano explosion, which might came from either Slamet, Sumbing, Sindoro, or Merapi, which are the volcanoes surrounding the Dieng Plateau. Biomass burning and the resulting fire regimes are major drivers of vegetation changes and the ecosystem dynamics. The presence of charcoal and ash suggest a fire activity although there is unbalance frequencies between the charcoal and the ash based on the stratigraphical record. This phenomenon arise a question regarding human activities that causes the fire, although there is also a possibility that nature was the one behind the fire presence at this site.

On the last level, vegetation was dominated by tree taxons: *Myricaceae*, *Castanopsis* (Fam. *Fagaceae*), *Engelhardia* (Fam. *Juglandaceae*), and *Arecaceae*, which indicate a more humid condition. *Myricaceae* is the characteristic of pioneer ligneous grassland on the bare soil, which contains ash and sand. This vegetation develops in the upland position and colder climate condition as shown by the typical taxons from high altitude which suggests high humidity and cool temperature that created the sub-mountain forest. Big quantities of the charcoal on the level 2 (CB2-(2)/550-549 cm), which correlates with the high quantities of pollen record, suggest human activities on the pre-agricultural (such as burning of semi arid vegetation) for extension of land use which cause to the deforestation. Monsoon affected the long drier season as the collapse condition on the lowland makes the human could not conduct cultivation activity, and thus forced them to move to another place. The presence of Poaceae in the highland is one indication of deforestation to produce human subsistence. Human activity was one of the major factors to the environment change besides the natural events (such as fire caused by the long drier season and the volcanic explosion). Between the big quantities of Poaceae pollen there is some *Zea mays* pollen grains that give a probability that there were pre-agricultural activities. In fact that Liyangan site is nearby the Dieng Plateau site, so there is a correlation between them. The cultivation tradition may be the same although in different periods. However, those domestication activities still need further research to get a good interpretation to explain the first domestication in Java.

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AUSTRONESIAN DISPERSAL TO MALAYSIAN BORNEO

Stephen Chia

Introduction

Archaeological research and discoveries in Malaysian Borneo since the late 1950s have provided ample evidence for the arrivals and existence of prehistoric human societies and cultures dated from the Palaeolithic to the Neolithic, Metal and early historical periods. The archaeological evidence is found mostly in cave or rockshelter sites, and occasionally open-air sites. Hunter-gatherer societies arrived and occupied Malaysian Borneo during the Palaeolithic period as indicated by evidence found in the Niah Caves (Harrisson 1958; Zuraina 1982; Barker et al. 2002) and Gua Sirih (Datan 1993) in Sarawak as well as the sites of Tingkayu, Madai, Hagop Bilo, Tomanggong, Balambangan, Gua Samang Buat and Mansuli in Sabah (Harrisson T & B 1971; Bellwood 1988; Mokhtar 1997; Jaffrie 2000; 2013). These early sites yielded mostly stone tools, faunal remains and sometimes human remains. At the West Mouth, Niah Caves, the earliest human skull in Malaysia was discovered and radiocarbon dated to around 40,000 BP (Harrisson 1959; Barker et al. 2002). Some scholars have affliated this skull to the early inhabitants of Australia and mainland East Asia (Brothwell 1960; Wu Xinzhi 1992). More intact and complete flexed burials were also found in West Mouth, dated to the late Palaeolithic, perhaps as early as 20,000 years ago (Harrisson 1967; Brooks et al. 1979). Another site with Palaeolithic human remains dated about 16,000 BP is located on Balambangan Island, Kudat, Sabah (Zuraina et al. 1998; Jaffrie 2000).

The focus of this paper, however, is on the next period of human arrivals in Malaysian Borneo, traditionally known as the Neolithic period. This period is believed to occur around 3000-4000 BP based on the discoveries of technologically new artifacts such as earthenware pottery, polished stone adzes, stone bark beaters as well as shell or stone ornaments and food remains. Burial practice during this period is characterized by extended human burial as opposed to the flexed burial during the Palaeolithic period. Neolithic deposits are usually found on the top layers of cave and rock shelter sites representing mostly burials, habitation or camp sites. Scholars have long sought to find the people and societies responsible for the Neolithic cultures in Malaysian Borneo and the Austronesian language speakers is believed to the main carrier of this culture to Malaysian Borneo and elsewhere in Island Southeast Asia and the Pacific.

Evidence for Austronesian Arrivals and Existence in Malaysian Borneo

A majority of the archaeological evidence dated to the Neolithic period, in my opinion, can be seen as small-scale migrations of Austronesian language speakers to Malaysian Borneo, especially in Sabah but not Sarawak. The archaeological evidence also suggested that the Austronesian migrations to Malaysian Borneo, probably happened on a larger scale, after the Neolithic or during the later historical periods, as indicated by numerous sites with other cultural materials such as metal artifacts, megaliths and log coffins in Malaysian Borneo, some of these traditions or cultures still exist until recent times. In addition, there is currently very little direct or indirect evidence for rice farming in Malaysian Borneo, suggesting that Austronesian migrations to Malaysian Borneo were not driven by the search for new land to do rice farming but perhaps to explore new territories to carry out trade and technology exchange.

In Sabah, archaeological sites which can be connected to early Austronesian migrations include mostly sites from eastern Sabah such as Bukit Tengkorak, Melanta Tutup, Bukit Kamiri, Agop Atas, Agop Sarapad, Hagop Bilo, Pusu Samang Tas and Pusu Lumut. The earliest evidence of Austronesian arrivals, thus far, is on the Semporna Peninsula in eastern Sabah, dated as early as 3,300 - 3,000 BP and represented by the coastal sites of Bukit Tengkorak (Bellwood 1988; Chia 1997, 2001, 2003, 2005, 2016), Bukit Kamiri and Melanta Tutup (Chia 2006, 2008, 2009; Chia et al. 2005; Chia & Matsumura 2007; Eng & Chia 2010). The archaeological finds at these sites are typical of most Austronesian sites in Island Southeast Asia. Further away from the coastal areas of eastern Sabah, there are also sites linked to the Austronesians such as the limestone cave sites of Agop Atas, Agop Sarapad, Hagop Bilo, Pusu Samang Tas which produced mainly paddle impressed pottery and some red-slipped pottery as well (Harrisson T & B 1969-70; Bellwood 1988). Apart from the red-slipped pottery, the Sabah pottery assemblage has a variety of impressed and incised designs which are very similar to those found in other Austronesian sites in Island Southeast Asia (Bellwood 1988; Chia 2003, 2005, 2006). Palaeoantropological studies and comparisions of human remains recovered from Semporna and other sites in Southeast Asia also suggested widespread migrations of ancient populations during the Neolithic and Metal Age (Chia et al. 2005; Chia & Matsumura 2007; Chia 2007).

In Sarawak, there is little evidence for the early arrivals of the Austronesians thus far because many of the early sites with pottery such as Gua Sirih, Niah Caves, Lobang Makuta and Lobang Angin do not have red-slipped pottery, the hallmark of the Austronesian language speaker's culture. The pottery found in these sites is mostly plain and paddle impressed and sometimes incised. In addition, the earliest pottery in Malaysian Borneo from Gua Sirih, Serian dated 4500 BP pre-dates the arrival of the Austronesians to this region by 500 years or more (Datan 1993). The Gua Sirih pottery is plain and paddle impressed designs.

Another site in Sarawak without the red-slipped pottery but has paddle-impressed pottery is Lobang Makuta in Ulu Kakus dated 2100-2700 BP (Chia & Datan 2003). Likewise the Niah Neolithic pottery re-dated c. 3500 to c. 2200 BP (Lloyd-Smith 2009; et al. 2013) is predominantly plain and paddle impressed with some incised designs (Solheim et al. 1959; Harrisson 1970; Zuraina 1982). However, the dating and association of the Niah pottery and burials are still problematic and questionable because the burials at West Mouth, crudely dug by the Harrissons in the late 1950s-1960s, were mixed and interred at different time periods. Some of the younger graves were probably dug into or buried between the older ones and hence there is a high probability that the soil (and charcoal) from the deeper and older layers could have been used to cover graves interred at a later period. Given these problems and issues, I believe that the recent assignment of the flexed burial at West Mouth to the early Neolithic by Lloyd-Smith et al. (2013) is inaccurate and inconsistent with the usual practice of Neolithic (extended) and Palaeolithic (flexed) burials generally found in Malaysia and throughout Southeast Asia. Other sites in Niah that have shown signs of site disturbances include Gan Kira and Gua Kain Hitam where the radiocarbon dates are inverted (Szabo et al. 2013). My excavations of a burial site at Gua Kain Hitam in 2008 have also produced inverted radiocarbon dates, suggesting that the shallow burials were probably filled with soil (and charcoal) from the deeper and older layers. As such, I suspect that the rare three-colour-ware and double-spouted vessels from Niah and Lobang Angin in Mulu do not belong to the Neolithic pottery assemblage but are probably exotic trade items brought in from elsewhere (probably at a later period by the Austronesians via Palawan Island or southern Vietnam) and used at the Niah burials. In fact, some of the Niah pottery, in particular the burial jars paralleled the funerary jars dated to the Metal Age at Tabon caves and other sites in Palawan, southern Philippines as well as some sites in southern Vietnam.

Some Issues and Questions on Austronesian Dispersal to Malaysian Borneo

The complexity of the history of migrations of ancient populations and cultures to Malaysian Borneo and the limited archaeological evidence have resulted in long standing debates on the origin, dating, dispersal and the carrier of these cultures. There are still many unresolved issues and questions to be answered before we can have a better understanding on the Austronesian dispersal to Malaysian Borneo and elsewhere. On the basis of the current data, however, it appears that early small-scale Austronesian migrations and dispersals did occurred at the eastern coast of Sabah by around 3300 BP via the southern Philippines or Sulawesi Island but did not reach Sarawak. The data also suggested that Austronesian migrations to the west coast of Sabah and to the northern region of Sarawak probably occurred after 2000 BP or later.

In Sabah, the earliest arrivals of Austronesians occurred on the east coast as suggested by archaeological evidence dated as early as 3300 BP in the Semporna region (Bukit Tengkorak, Melanta Tutup and Bukit Kamiri) and continued until the Metal to the historical periods. The archaeological evidence from these coastal sites also revealed that the early Austronesians were maritime-oriented, fisher-foragers societies and that long-distance trade or exchange was already in existence on the east coast of Sabah as indicated by the occurrences of the Lapita pottery found at the Semporna sites. Sourcing studies of the obsidian flakes excavated from Bukit Tengkorak provided further findings and evidence for the movements of people and trade items westwards, over a distance of 3,500 km, from Melanesia to eastern Sabah around 3000 BP (Chia 2003a; Tykot & Chia 1997; Bellwood & Koon 1989). On the west coast of Sabah, however, there is currently no archaeological evidence to suggest that the Austronesians arrived there by 3000 BP but there are, however, some indications from a few undated sites such as Pulau Burong and Sepirak Island that the Austronesians could have arrived on the west coast at a later period, probably during the Metal or early historical periods.

In Sarawak, the absence of the red-slipped pottery seems to indicate that Austronesian migrations and dispersals did not reach Sarawak during the early Neolithic period. Practically all the early pottery from the inland Neolithic cave sites of Sarawak such as Gua Sirih, Niah Caves, Lobang Angin and Lobang Makuta are either plain or paddle impressed. Moreover, if the earliest pottery date for Gua Sirih is accurate, it pre-dates the suggested age bracket of 4000-3000 BP for early Austronesian dispersal to the Malaysian Borneo-southern Philippines-Sulawesi region. The question arises as to who are the people who brought the early pottery and technology to Gua Sirih and Sarawak? Could it be the Austroasiatic people? or perhaps another earlier wave of Austronesian migration without the red-slipped pottery? I am inclined to the idea that it is the Austroasiatic people who arrived first in Sarawak, most probably from southern Vietnam as indicated by the abundance of paddle impressed pottery with basket marked, cord-marked and other designs in the Sarawak sites which paralleled those found in southern Vietnam during the Neolithic and Hoabinhian periods, in particular the basket and cord marked pottery. Moreover, the Austronesians only migrated to southern Vietnam at a later date, about 4000 BP, as indicated by the red-slipped pottery excavated at An Son site in Long An Province (Masanari & Nguyen Kin Dung 2002).

The idea of a long-distance, open seafaring from south Vietnam to Sarawak is not too far-fetched if you consider the case of the Austronesian migration, over 2000km, from northern Luzon to the Mariana Islands 3500 BP (Hung et al. 2011). Another possible route to Sarawak is perhaps via the coasts of Vietnam, Thailand, Peninsular Malaysia but this route seems unlikely because there are thus far no contemporaneous sites in Peninsular Malaysia with pottery that are reliably dated as early as that of Gua Sirih. The first Neolithic migration from mainland Southeast Asia to Sarawak at around 4500 BP (before the Austronesian dispersal out of Taiwan) is also consistent with the findings of a recent and comprehensive study by Soares et al. (2016). Using a combination of mitochondrial DNA, Y-chromosome and genome-wide data, this study shows that a common ancestry for Taiwan/ISEA populations was established before the Neolithic and there were two minor late Holocene migrations, probably representing Neolithic input from both Mainland SEA and South China via Taiwan. The latter is believed to be responsible for the Austronesian language dispersal on small-scale migration and language shift rather than large-scale expansion of rice farmers.

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SEA, STONES AND STORIES: THE MARITIME TRADITION IN SOUTHEAST MOLUCCAS ISLANDS

Marlon Ririmasse

Introduction: The Sea as Common Heritage

The sea is a sphere with its own dynamic. As with land, the sea has been seen as a space that continually explored, studied and exploited by humans (Rainbird 2007; Helms 1988). Hence, people activity and mobility in the ocean is not random, but has been understood as the accumulation of action that been practiced in structured manner. In these perspectives, the sea can be seen as a cultural space, a place that was created by humans through a process of learning and adaptation.

The sea is also selectively chosen, to be inhabited and attached to the economical, political and ideological values as was implemented to the land. Various historical resources have pointed on how the sea becomes a vehicle to show the hegemony of certain nations. The global colonization by European nations was initiated through the understanding and exploration of the sea. The dynamic process of contact, interactions, conflicts and trade at the sea in the past has shaped the cultural history of particular regions. The Mediterranean Sea that surrounded by the boundaries of three major continents for example, has served as the interaction sphere that historically affected the world history. So with the South China Sea and its extension which over centuries becomes a major economic route in Eastern Asia. The region of Southeast Asia has the Java Sea, Flores Sea, and Sulawesi Sea to the Banda Sea that forming a trade route system as the extension of the dynamic region of Mallaca Strait. It was this complex record of maritime role accumulation through centuries which makes the sea deserves to be called as the common heritage.

In other words, it is possible to understand through this perspective that historical and cultural meaning has been repeatedly attached to the sea. This diverse significance is an implication of different forms of experienced gained in the interaction with sea and individual, community and nation. Typical response on these specific experiences can be observed through the cultural manifestation of this idea in the tangible as well as intangible expression with the sea as a theme. In this broad variation of representation, the sea has become the universal reference for the rise and development of maritime culture as one of the key aspect in human history.

The Sea and Maritime Identities in Southeast Asia

The insular Southeast Asia is known as a region with the complex profile of maritime culture (Lapian 1996, 2009; Ballard et al. 2003; Manguin 1986). This cultural historical profile cannot be separated from its geographical characteristic which has been formed by the vast sea region and the complex of islands groups; the long and complicated regional shoreline; as well as the strategic geographical position and the dynamic coastal strip area. The combination of these three factor has become the foundation that established relation between the community (at the coastal and insular area) with the sea in the region. For many communities in Southeast Asia, the sea is the source for living and a sphere that connected them with the world. Here, the sea is not seen as an obstacle, but has manifested as the vehicle that led people in this region to interact with the wider world. This natural relationship to the sea was then culturally transformed into the maritime tradition materially and non-materially.

It was reasonable when the insular of Southeast Asia become the place to live for several traditional communities that chose the sea as their identities. Some of these people is represented by The Butonese which is known as the long-distance maritime traders (Ballard et.al, 2003). A role that later also controled by the Bugis after the first half of the second millenium. The trace of the Bugis traders even can be found in the Northern Coast of Australia as represented in the Aboriginal rock art in the Groote Eylant. Some other traditional communities is even step further by choosing to live upon the sea. This typical group chooses to live as the sea nomads using the boat as a place to live. Their presence are represented by Orang Laut (Sea Tribe) who lived on the east coast of Sumatra in the region nearby Riau-Lingga; as well as the Bajo who spread along the coast and islands of Southern Philipines, Kalimantan, Sulawesi to Flores and Maluku (Ballard et al. 2003).

Without having to live as the sea nomads, various coastal communities in Southeast Asia have provided a respectable position for the sea in their cultural construction. This phenomenom can be observed in the complex profile of maritime oriented tradition that attached the philosophical value of the sea in the cosmological construction and traditional ritual. One of the most typical forms of this practice is *Larung* (floating) which is the tradition to give offering to the ruler of the nature on the coast or the sea. The forms of the offerings are usually very diverse ranging from fruits, flowers, food to the animal head. Although diverse in practice, this ritual has a common meaning: to have blessing and safety when fishing with abundant result. The form of this tradition is reflected through the rituals in various regions of Indonesia, in particular those discovered along the coastal region of Java. *The Labuhan Alit Parangkusumo* in Yogyakarta as the tradition to send the offering for the ruler of the South Sea. Fishermen communities in Pamekasan Madura is also practice a ritual known as *Rokatasek* of Petik Laut as the tradition to send offering in the middle of the sea. It also can be found in the community of Makassar Island in Bau-Bau, Southeastern Sulawesi which has a ritual tradition known as *Tuturangiana* as form of send offering during the shortage period of fish.

It is generally observed that the forms of these traditional ritual practices have their philosophical values as represented by the presence of myths and traditional beliefs that related to the sea nearby. Labuhan Alit Parangkusumo for example cannot be separated from the construction of local history and traditional beliefs of people in Yogyakarta on the Queen of the South Sea. It is similar to the people of Lombok, which has the ritual tradition of Bau Nyale that attached to the story of Princess Mandalika who turned into the sea worm. These expressions of oral traditions and maritime oriented mythologies often associated with the belief on local identity and origin of communities where the ancestor usually believed came from the other part of the sea. People in the Islands of Southeast Maluku for example has famous myth of Atuf that explain the arrival of the first ancestor who are believed to come from the west (McKinnon 1991)

In the practical context, this sea-based cultural construction is represented by the konwledge and traditional coastal economy technology that includes the fishing tradition and other forms of marine resources exploitation approaches. This specific aspect is also represented by the sailing technology and knowledge as reflected in the traditional navigation techniques and various approaches in the boat construction technology in every communities. The Bugis for example is famous for their traditional construction of long-distance ship. Similar to the outrigger canoes, either single or double, that widely used in the islands of Maluku.

The boat is indeed is one of the distinctive markers in the maritime culture of Southeast Asia Archipelago. Here, the role of the boat is not only attached to the practical function but has been widely represented with the symbolic meaning in the culture of the region. In this context, the boat became the key aspect in the various ritual practice that relate to the major transition of life such as birth, initiation, marriage and death. For the latter form of ritual, the concept of the death boat has been widely adopted as the cultural icon in the culture of Southeast Asia. Here, the boat is seen as the symbolic vehicle to escort the dead to the world of spirit over the horizon. The boat as a symbol is also represented in the traditional architecture as well as the reference for the concept of traditional cosmology and local spatial pattern in the traditional communities of Southeast Asia islands.

In particular the archaeological studies is also recorded this maritime orientation with the major role of the sea as reflected in the material culture. The discovery of the remains of boat in Punjulharjo, Central Java, is the part of the evidence on the dynamics of sea voyaging and its technology in the past as has been found as well in Vietnam (Nugroho 2009:15-27; Bellwood et al. 2006). The economical aspects are represented in the orientation of the marine-based subsistence as reflected by the famous findings of shell midden in Sumatera and the and fisihing equipments such as fishhook of the neolithic period in the site of Uattamdi, North Maluku and Uai Bobo in East Timor (Belwood 2000: 334-337). The rock art sites in the Southeast Asia islands are also represented the image of boat in various forms (Ballard et al. 2003; Ririmasse, 2007). Similarly in this case of the use of symbolic boat is also found in the megalithic tradition as reflected in the form of Kalamba. Ancient burial practice in Indonesia is indeed widely adopted the boat of the dead in various forms across the islands (Sukendar 2002: 166-205; Ballard et al. 2003). The material culture of bronze-iron age of the insular is also represented the image of the boat as attached on the famous Dong-Son drum (Ballard et al. 2003; Kempers 1988).

This wide use of maritime theme in the culture of Southeast Asia islands to some extent is a reflection of the cultural historical orientation that based on the sea as the reference. The variety and the depth on the use of this particular theme are different from one period to another as well as one region to another. The Southeast Moluccas Islands, for example, as a region at the corner of Insular Southeast Asia, is also served an area that naturally and culturally formed by its insular geographical character. Here, the sea has been adopted as the geographical adhesive that developed as the key aspect in culture history of the area.

The Maritime Culture of Southeast Moluccas Islands: Materialization of Identity

The Southeast Maluku is a group of islands that stretches over 1,000 km between Timor to Papua (Le Bar 1976, Ririmasse 2010). Administratively the region is the part of Maluku Province and currently consist of four regencies and one city government which are the city of Tual, the Southeast Maluku regency; The Regency of Aru Islands; The West Southeast Maluku regency; and The Southwest Maluku regency. Two main seas became the natural boundaries and zone of interaction as represented by the famous Banda Sea and The Arafura. In the larger geographical context, both of the sea can be seen as the part of seascape that connected to the Seram Sea, Maluku Sea to the Halmahera to the North that unify the Maluku as the eastern border of the Wallacea Zone.

The Banda Sea is known as one of the deepest sea in Southeast Asia. It also have a key role as a zone of interaction that connects the islands in the Central Maluku to Southeast group that created a source region for the exotic commodities in the past such as nutmeg and pearl, while the Arufura is also strategic as the natural border between Southeast Moluccas as one of outermost area of Wallacea with the neighboring region of Papua and Australia. Arafura Sea is also important for the role as the interaction zone for the exotic commodities trade like the bird of paradise and pearl that came from Aru archipelago. It is in between these two major sea the insular of Southeast Maluku streches.

The cultural studies once devided the Southeast Moluccas Islands in two parts. The first one is the chain of islands consist of the 'more accessible' group such as Aru, Kei and Tanimbar. The second is western group of islands that include the Babar Islands, Leti-Moa-Lakor until Wetar and Kisar nearby Timor (de Jonge and van Dijk 1995). Historically the eastern group is more connected to the outside world since these regions supply the exotic commodities need by the regional market. While Aru have pearls and bird of paradise, Tanimbar and Kei have the wood and weaving, jewelry, boat and slave. In contrast, contact and interaction in the western islands were more limited. The historical records about this region during the colonial period are mostly represented by the trade between Kisar and nearby islands such as Timor and Alor (Kempers 1988; de Jonge and van Dijk 1995).

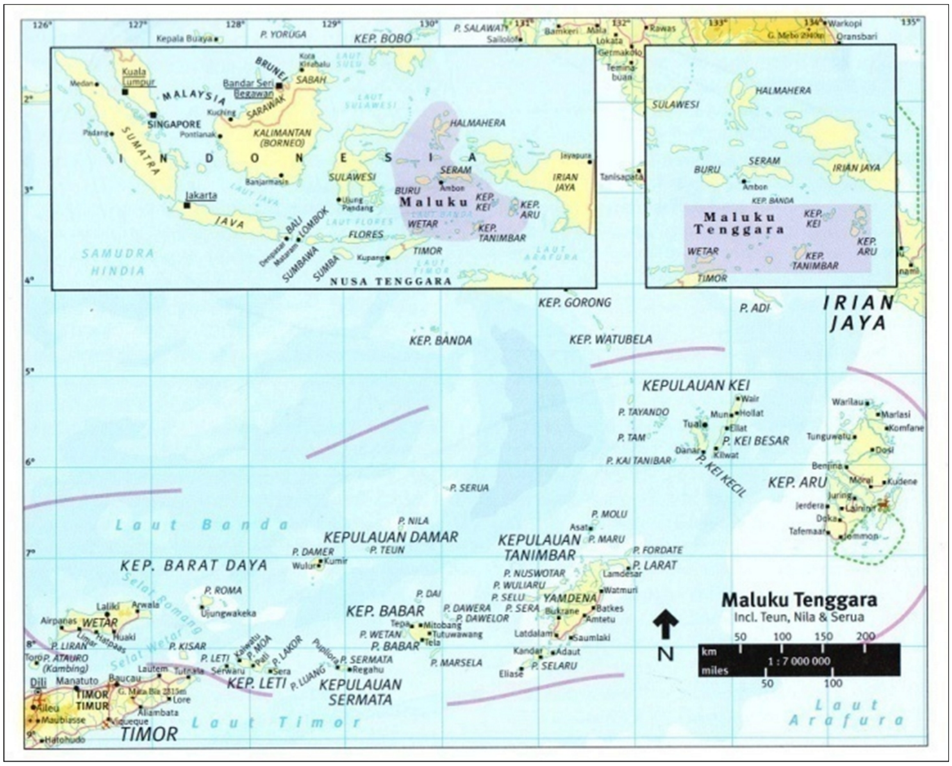

Figure 1. Map of Southeast Moluccas Islands

Unlike the other part of Southeast Asia, the maritime sea nomad such as Bajo does not existed in the Southeast Moluccas islands. The existence of maritime communities in the region in the past is represented by the coastal communities with the strong maritime tradition as reflected in the forms of material culture and intangible representation. The intangible aspect related to the maritime tradition is represented in the local and traditional knowledge on the sea and sea voyaging; as well as the ideological aspect that includes local philosophy on maritime theme. The spectrum of this ideological aspect are included traditional cosmology, symbols, local beliefs and oral history as represented in the local myths and stories that related to the issues of identity and the first ancestor. Material aspects of the maritime culture are represented in seafaring technology in relation to the traditional boat making and its related material devices. This is included the material representation on the maritime ideological aspect such as traditional architecture, traditional spatial arrangements, monuments and large variety of symbolic artifacts.

Local and traditional knowledge on sea and sea voyaging are represented on traditional knowledge on season, weather and traditional navigation system. Historical data has often presented the traditional sailing route of Central Maluku-Banda and Kei which shows that these particular knowledge has developed in the past for the long distance inter islands voyaging. The people from Kei are indeed famous for this long distance sea voyaging, zince they were also very well known for boat-building capabilities. Their products were sold to Banda, Seram and small islands nearby. These local knowledge is also covered the traditional fishing system as well as other marine resources, which include capabilities to identify the resource areas in the islands (de Jonge and van Dijk 1995; Fox 2000; Ririmasse 2010).

In term of intangible aspects, ideological sphere is the space where the maritime theme is widely use that mostly represented by the using of boat as a cultural symbol in the Southeast Moluccas. This phenomenom can be observed in aplication of cosmological concept at the most basic level. The traditional knowledge of people in Dawera and Dawelor can be an example. As they view a person as the most fundamental cosmic unit in the universe. Human is seen as a mix of physical aspect known as Mormosol and spiritual aspect known as Dmeir. Mormosol is represented by the body and are temporary; while Dmeir is represented by the spirit, soul and character and therefore is unique and eternal. The use of boat as a symbol in this individual level is visible through the local traditional philosophy that symbolizes the Mormosol as the boat and the Dmeir as the Helmsman. Life as a journey begins only when these two aspects can be fused totally in the individual.

Similar philosophy then extended and applied in the family level that also considered as a symbolic boat. The traditional value of people in Babar symbolize woman as a boat who is waiting for a man as a helmsman. The unification between man and woman is a requirement for the symbolic voyage at the family level. The use of this concept became more complex at the community level. The village and its people are seen as a symbolic boat with families and clans attached with their own social role linked to the specific role of every boat crew. The head of the village for example has the function as a captain and similar condition apply for other roles in the village custom structure. The community in general symbolize as the passenger that should always be acknowledged by the elders. In this context, the boat is the symbol that inspires the social governance in the village.

The intangible aspect on the sea and its value are also represented by the presence of local narration, oral histories and myths on the origin of the community. Since for the most of traditional communities in Southeast Moluccas has seen the sea as the source of identity. The sea is the place where the first ancestor came as well as the space to gain the social status. Through the sea voyaging one's courage is tested to acquire wealth and fame after returning from faraway places. One of the famous myths in the region is the story on Atuf who was personified as the ancestor that origin from the west and came with his slaves to bravely spear the sun into pieces. The achievement of Atuf in this myth is seen as the essence of a man in the family that has to have the journey to hunt and cruise to get a well established position socially. Hence in this context, the sea is understood as the universe that has to be explored to gain the social reputation in the traditional societies.

As represented in the intangible sphere, the local knowledge and maritime ideology are then implemented into the physical realm as represented in the material culture that reflected this values (de Marrais 1996). The traditional boat is one of the main manifestations of the maritime culture in the region. Most of the ethno-historical records mentioned on the people of Kei as the famous boat builder in the region. Their boats were sold to the Banda Islands and Seram as well as nearby islands such as Tanimbar and Aru (de Jonge and van Dijk 1995; Ririmasse 2010). In the later period, people in Tanimbar and Aru developed their own skills on boat buildings. Traditionally people in Kei have four types of boat. Each type is difference in type and function. The first one is known as Habotetear or 'big boat' and is used for long distance voyage and trade. The second one is Habo bot which is the development of the traditional Habotetear. This type is also have a large size and normally use for the long distance voyage and trade as well. The third one is Belang. This type is also known and used almost in the whole region of the Maluku insular. The function of Belang is use for as the war fleet, ceremony or contest. The last one is Lebleb which is local words for the canoe type. This type is normally use for daily used of fishing and other personal needs. Recently, the traditional boat building is almost dissappear in Kei. Historical records mentioned that until the late nineteenth century and early twentieth century people in Kei usually build the large size boat with the complex ornaments. Some boats could reach the length of 30 meters (de Jonge and van Dijk 1995).

The traditional boat building process in Southeast Moluccas islands in essence is also a asymbolic process. The birth of a boat is seen similar to the birth of a child, a process that requires symbolic elements that reflected both men and women. These aspects are manifested in the parts of the boat and symbolically has role that related to both men and women. The unification of these elements is required for a boat to succeed in every voyage.

Therefore in some places in the Southeast Moluccas, the boat building ritual involved both men and women in the process.

The concept is also applied during the sea voyaging that attached with the symbolic elements. In the Southeast Maluku during the past, the long distance sea voyage only performed by men. The journey usually began with the ritual to attach the bow plank to the boat. This plank is usually full with decorative figures of masculine symbols that represented the 'hot' character and power of men to conduct the journey. This element is also represented the presence of the ancestor to protect the journey on the sea. Since the sea was believed as the origin of the ancestor, their presence is believed will bring good fortune. Women on the other hand, have their own duty on the land, by continually sending prayer and maintain the 'fire' on to keep the journey safe.

As applied in the traditional boats, this complex maritime philosophy is also applied in the traditional architecture in the region. Until the early twentieth century, the traditional houses in the region have a roof ridge that both end shaped like the bow an stern of the boat. The spatial arrangement in the house is also arranged refer to the part of a boat. The head of the family for example, occupy a room that reflected his role as the captain of this boat-house. The bow plank, which is always attached to the boat during the journey, usually will be placed at the altar of the house when the boat is not sailing. The use of boat symbolism extends on the village level, where the spatial arrangement of the traditional settlement will be arranged according to this concept. Since the traditional village is seen as a boat, the orientation of the settlement will be laid from east to west according to the sun. The placement of the gate of the village will be referred on this model. The plan of the house arrangement will be set according to the points of compass that used as a guide in the journey. Since each clan has their own social role as the crew in the boat, the placement of the houses in this traditional arrangement will refer to this concept.

Another symbolic manifestation on the maritime tradition in Southeast Maluku is manifested in the form of traditional boat-shaped monuments like the one found on the Tanimbar Island. Locally known as Natar, this stone boat monument has the central role in the traditional cosmology of the community. The stone boat is the symbolic representation of the ancestor; the symbol of community unity; as well as reflected the traditional social structure that relate to role of boat crew. The monument is the center for the traditional ritual and also functioned as the place for the elders to meet and discuss the issues of the village. This symbolic role of the monument is equipped with the object orientation that face the sea as the symbol of the origin of the first ancestor; at the same time, the complex decorative motif which relate to the maritime elements is also attached (Intan 2004; Ririmasse 2005, 2010).

The Maritime Theme for Archaeology in Maluku

The short overview above has showed the wide scope of the maritime theme in the cultural profile of the Southeast Moluccas Islands. Ethnographical and ethno-historical data reflected the traditional concept and local knowledge on the maritime issues applied both in the intangible and tangible aspects. In particular for the implementation in the material culture is very rich and varied from one place to another. Each archipelago, island and communities develop their own concept based on the way this people see the world. The question then remain is what is the specific aspects that could be the domain of research for archaeology to contribute in the issue of the Southeast Maluku islands?

Until recently there is no findings related to maritime issues that have been reveal in the archaeological context. Several preliminary researches has recorded the material expression which are related to the maritime theme. This result might be used as the entry point for further study of this particular issue in the future. The first one is the rock art painting that have been identified with another motif in the coastal site of Dudumahan in Kei Islands (Ballard 1988; Sudarmika 2000; Ririmasse 2005, 2007a, 2007b, 2007c, 2010). In this site, at least three motif of boat has been presented with more than three hundred other motifs on the limestone panel. Although there is no direct dating so far for these painting, Ballard (2003) argues that it appeared at the same period with the spread and the arrival of the Austronesian speaking people around 2,000 BP. His early studies hypotize the similarity of the style with the motif of rock art sites in Arguni and Ilekere-kere in Timor Leste. Further research on these painting might still required. In particular to compare the image with traditional motifs used in different medium. As mentioned by Ballard (1988) that several motifs are so similar to the motifs depicted on the boat in Kei during the sea voyage.

Figure 2. Boat Motif of the Rock Art in Dudumahan Site, Kei Islands

The second, recent studies in the Tanimbar Islands have reveal new sites with the stone boat monuments. Earlier, historical and ethnohistorical sources only mentioned on two stone boat monuments in the region. As have been identified in Sangliat Dol and Arui Bab. Recently, three new sites with these monuments have been recorded in the island of Yamdena Tanimbar. Although the conditions is only left in ruins, the shape and structure of these object still can be identified. These three new monuments were recorded in Lorulun site, Atubul Site, and Wermatang. As have been applied in two previous sites, these new monuments are also the part of the traditional settlement arrangement in Tanimbar. Since this kind of site is sacred by the local, excavation and sampling cannot be conducted to get the chronological data of these sites. Hopefully in the near future it can be obtained followed the better understanding of the community on the archaeological studies.

Figure 3. Stone Boat Monument in the Tanimbar Islands

The third is related to the implementation of the concept in the traditional settlement layout. As we know, that most of the recent settlement in the region is the product of colonial policy to relocate villages from the hills and the difficult to access location to the coastal area and more accessible places in the late 19th century and early 20th century. Therefore, currently only very few villages which still have the original location and have the remains related to character of the traditional settlements, including the remains that related to the application of the maritime theme. Several villages to be mentioned are the Tanimbar Kei in Kei Islands and Lolutuara in Lakor. The old village of Tanimbar Kei is located on the hill that difficult to be accessed. Although the new village has been built nearby the coastal area, half of the community is still live in the old village. Here the traditional houses were arranged according to the layout of boat symbolism. While in the Lolotuara village of Lakor, the concept is visible in the surrounding wall of the village with the structure of prow-like shape at the corner. Further studies on these traditional settlements in the region is still needed. Beside to create the regional comparison between area, obtained the chronological data is also needed to have the chronological framework of the sites in the regional context.

Of course a broad space for further studies on this issue is still available. In particular, considering very few archaeological studies has been conducted in the region. On the other hand, the geographical position of the islands in future research has key issues in relation to the nearby region. Both ethno-historical dan ethnographical data can be the foothold to initiate research on the intra and inter island connectivity with the neighboring region, including the sea itself as the zone of interaction, trade and conflict after first millenium ad.

Preliminary Conclusion

This brief article is an introduction to observe the role of the sea in the cultural history of people in Southeast Moluccas islands. The wide use of the maritime theme is the reflection on the local perspective of the sea in their daily life. Here, the sea is not seen as a barrier but has been accepted as the bridge with the world. Sea became the natural vehicle that transformed the life of the people in this region.

As the other area in the Southeast Asia region, the way people attached meaning to the sea have been applied in the form of tangible and intangible. The non-material aspect can be found in the traditional knowledge on the sea and sea voyaging to the cosmology, local beliefs, oral histories, myths and symbols. These broad sphere of the intangible then transformed into the material culture such as traditional boat, local architecture, traditional monuments, to the spatial arrangement of traditional settlements. There is no maritime culture related objects has been found in the archaeological context yet. Preliminary studies have identified the use of the boat as a symbol in the context of rock art, traditional monuments and the spatial arrangements in settlement sites. The wide scope of the maritime theme can be an entry point for further studies in the near future. Particularly on the role of the sea of Southeast Moluccas in the past as the zone of contact, interaction, trade to conflicts.

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SWINGING-LIKE MOVEMENT: PATTERN OF ANCIENT MIGRATION IN EASTERN PART OF INDONESIA

Toetik Koesbardiati, Rusyad Adi Suriyanto, Delta Bayu Murti, and Achmad Yudianto

Introduction

The history of residential in Indonesia has long been a concern of researchers. Based on dental aspect, Turner (in Ballinger et al. 1992) states that there are two population groups that migrated out of China about 20,000-30,000 years ago. The groups are sinodont and sundadont. Sinodont moved to the north. Meanwhile, sundadont moved to the south heading to Southeast Asia and Indonesia. Sundadont moved further to Melanesia, Micronesia and Polynesia. Based on morphological aspect, Jacob (1967) and Glinka (1978, 1981) state that the migration in Indonesia was from the west and north of Indonesia. In his thesis, Jacob (1967) states that Indonesia was inhabited by at least two races namely Australomelanesoid and Mongoloid. Australomelanesoid first inhabited Southeast Asia, including Indonesia. Mongoloid were immigrants who migrated to Indonesia through the west and north. Jacob's rationale is the study of morphological features of the remains of modern human skeleton which among others were found in Flores and Sumba. This postulation is reinforced by Glinka (1978, 1981) who conducted research on morphological characteristics of facial somatometry of several populations in Indonesia archipelago. The results of the research indicated that Indonesia had at least three racial elements, namely Protomalayid, Deuteromalayid, and Dayakid. Dayakid is a variant of Deuteromalayid whose characters are different from Deuteromalayid's. Dayakid grow rapidly in Kalimantan. Protomalayid is the population that first inhabited the entire region of Indonesia and Southeast Asia, while Deuteromalayid is immigrant (Mongoloid) who came in waves and shoved the natives.

The results of the studies conducted by Jacob (1967) and Glinka (1978, 1981) are reinforced by Belwood (2000) who states that the Indo-Malayan islands, including Indonesia, were inhabited by populations with Australomelanesoid and Mongoloid racial elements. Australomelanesoid is allegedly to be the first to inhabit and dominate the western region of Indonesia to the east, becoming the strong influence of Melanesia (Papua). Then, in waves, Mongoloid migrated from the west and north of Indonesia. The influence of this migration is clearly seen moving to the south and east of Indonesia. It is evident from the diverse morphological features of Australomelanesoid with the influence of Mongoloid. The features ofAustralomelanesoid were increasingly dominant in the eastern part of Indonesia. The Austromelanesoid features are strongly evident to the east. If the Mongoloid migrated to Indonesia and shoved the natives to the eastern Indonesia, at least there has been a mix of morphology in eastern Indonesia. In other words, there are Australomelanesoid and Mongoloid features in eastern Indonesia, with sundadont's dental features.

The diversity in eastern Indonesia is not only the interest of research in anthropology, archeology, and language, but also genetics. Ballinger et al. (1992) examined the human mtDNA of 153 independent samples encompassing seven Asian Populations using PCR, restriction endonuclease analysis and oligonucleotide hybridization. The results indicated that all populations in Southeast Asia came from the same source, namely the southern Mongoloid. Southern Mongoloid is alleged to have replaced or assimilated by the previous inhabitants namely Australomelanesoid. More specific research was conducted by Karafet et al. (2005). Karafet et al. examined the genetic variation of the population in Bali, Indonesia based on Y-chromosomes to see the relative contributions of Austronesia farmers and pre-Neolithic hunter gatherers to the paternal gene pool of current population in Bali as well as to test the hypothesis of recent paternal gene flow from the Indian Subcontinent. Phylogeographic analysis results showed that all three major Y-chromosomes haplogroups migrated to Bali with the arrival of Austronesia speakers. Further, Karafet et al. stated that STR diversity patterns associated with these haplogroups are complex. This is likely to be due to the multiple waves of Austronesian expansion to Indonesia by different routes. Karafet et al. found that the paternal gene pool of current Bali's population was influenced by the Pre-Neolitic component and migration from India from a younger age.

Recently, Tumonggor et al. (2013) reported the results of their research on mtDNA and associated Y-chromosomes diversity in Indonesia. Tumonggor et al. managed to reconstruct 50,000 years of population movement based on mitochondria lineages. It indicates the very earliest settlement in islands in Southeast Asia to Neolithic population dispersals. This study also indicates the influence of the population of China, India, Arab and Europe. In the migration taking place in the past, women moved further and more widespread. It indicates that the pattern of genetic diversity is influenced by the matri- or ambilocality marriage pattern of Austronesian communities at that time. However, the marriage pattern evolved toward current patrilocal. In other words, genetic diversity in Indonesia is influenced by the region's complex immigration, transitory migrants and population that have endure in situ since the region's first settlement.

The findings of prehistoric remains are spread over several sites in the eastern Indonesian ranging from Semawang, Gilimanuk in Bali, Liang Bua, Liang Toge in Flores, Lewoleba in Lembata and Melolo in Sumba. The purpose of this paper is to describe the pattern of ancient migration in the eastern part of Indonesia based on data of antiquity, epigenetics, facial morphology, dental modification and genetics compiled from the results of study conducted by the authors.

Figure 1. Islands in Eastern Indonesia.

Material and Method

The material of this study is the remains of human skeleton with neolithic until iron age antiquity found in Bali, Flores, and Sumba, namely the population of Gilimanuk, Semawang, Melolo, Gunung Piring, Ntodo Leseh, Liang Bua, Liang Toge and Lewoleba.

Table 1. Variation of samples in Nusa Tenggara

No.	Cranial Sample	Antiquity	Racial Affinity	Dental Modification	Dental Colorization
1	Gilimanuk	Paleometalic	Mongoloid	Yes	No
2	Semawang	Paleometalic	Mongoloid	Yes	Yes
3	Gunung Piring	Paleometalic	Mongoloid / Australomelanesoid	Yes	No
3	Ntodo Leseh	Paleometalic	Mongoloid / Australomelanesoid	No	No
4	Liang Bua	Neolithic	Australomelanesoid / Mongoloid	Yes	Yes
5	Liang Toge	Neolithic	Australomelanesoid	Yes	Yes
6	Melolo	Early paleometalic	Australomelanesoid / Mongoloid	Yes	Yes
7	Lewoleba	Neolithic	Australomelanesoid / Mongoloid	Yes	Yes

Antiquity data were collected from the literature (see Table 1), i.e. antiquity data of each specimen examined. Morphological data were collected through anthropometric method which includes the following variables: frontal breadth (fmt-fmt), bimaxillary breadth (zm-zm), biyzgomatic breadth (ZY-ZY) and the height of face (n-pr). The measurement method was based on Martin method (Brauer, in Martin & Knussmann, 1988). Based on the single measurements, facial index and upper facial malaris index were then calculated. Metrical data of Liang Bua, Liang Toge and Lewoleba populations were then compared with the one of the population of China, Indonesia in general and Australomelanesoid. ANOVA test with a significance level of 99.00% was conducted to see the differences among samples. In addition, Scheffe test was performed to determine the affiliation between samples.

In addition to morphological data, epigenetic data measured by Hauser & de Stefano (1989), Buikstra & Ubelaker (1994), and Indriati (2001) were also collected. The measured variables include the number of palatine foramen, the size of palatine foramen, the shape of palatine foramen, the degree of expression of torus palatinus, the continuity of torus palatinus, the degree of expression of torus maxillae, the degree of expression of os japonicum, the level of completeness of tuberculum marginale, tuberculum force projection, the degree of expression of infraorbital suture, the number of infraorbital foramen, the degree of infraorbital foramen, the number of zygomaticofasiale foramen and the size of the zygomaticofasiale foramen.

Genetic data were derived from mtDNA of human skeletal remains found in Gilimanuk, Semawang, Liang Bua, Liang Toge, Melolo and Lewoleba. Haplotype variation among the populations examined was then compared to see the similarities among the populations.

Cultural activity was measured by the practice of dental modification determined by macroscopic observation. Observation results were then grouped and categorized by adopting the method of grouping by Romero (in Koesbardiati, 2015).

Results and Discussion

Morphology

Facial morphology was measured based on the variables of frontal breadth (fmt-fmt (M38)), bimaxillary breadth (zm-zm (M22)), bizygomatic breadth (zy-zy (M-20)) and the height of face (n-pr (M18)). The measurements of these variables were used to calculate the facial index and the upper facial malaris index. The calculation results showed that the average size of the frontal breadth (fmt-fmt) of the samples of Nusa Tenggara was the widest. When compared with the samples of China and Australomelanesia, based on Scheffe test, the samples of Nusa Tenggara were closer to the samples of Australomelanesia. Variables of upper facial index, bizygion breadth (zy-zy) and the height of face (n-pr) showed no significant differences among the samples of Nusa Tenggara, China and Australomelanesia. On the other hand, the measurement results of bimaxillary breadth (zm-zm) showed that the average size of the samples of Nusa Tenggara tended to be closer to the samples of China. In general, the samples of Nusa Tenggara can be categorized as having a strong affiliation with the samples of Australomelanesia. However, regarding the facial width, the samples of Nusa Tenggara had a closeness with the samples of Mongoloid. If the similarities and differences of these variables are translated as mongolidization process, the samples of Lewoleba are the samples with the least similarity to the samples of Mongoloid. In other words, Lewoeleba received the least influence from Mongoloid. Lewoleba is located at the east of Nusa Tenggara. It is clear that the influence of mongolidization moved to the east of Indonesia, but not too strong to reach the eastern part of Flores Island.

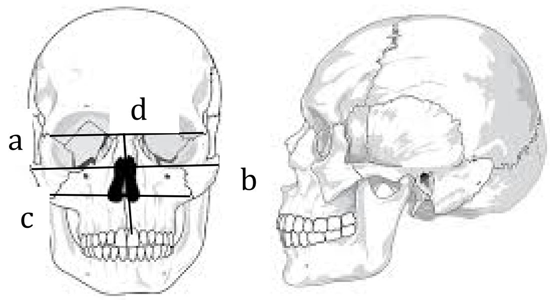

Figure 2. anthropometric measurements (Suriyanto and Koesbardiati, 2006)
a: fmt-fmt (M38) c zm-zm (M22)
b: zy-zy (M20) d: n-pr (M18)

Epigenetic character

Some epigenetic characteristics show more real existence in one sex. Racial factors reinforce this distinction. Functional factors or extrinsic factors such as biotic, abiotic and culture are factors that greatly affect the bone structure which in turn forms the epigenetic characteristics.

Embryologically, the skull is controlled by a genetic program that has been affected by environmental factors (Schumacher 1997, in Suriyanto 2007). In the postnatal period, jaw grows rapidly under the effect of genetics and environment. Genetics and environment are overlapping in affecting the growth of the jaw, causing cryptical changes in morphology. Genetic factors will bring local characteristics, while epigenetic factors will bring local and general characteristics. According to Hauser and de Stefano (1989), Epigenetics is a progressive determination and differentiation process of cells and tissues as a result of the genetic order in an environmental process. Furthermore, Hauser and de Stefano state that epigenetic is gene relations as a result of mutation affected by the environment during ontogeny. Epigenetic characteristics has a broader meaning than a research simply relying on morphometric variable. Epigenetics can also be used to record information on population dynamics. In particular, epigenetics can be applied in analyzing osteology with human skeletal remains of paleoanthropologists archaeology that is fragmentary, incomplete and poorly maintained.

Epigenetic characteristics of upper viscerocranium of samples of Nusa Tenggara showed the overall characteristics of Australomelanesoid, but some samples showed peculiarities. The male samples of Liang Bua, Lewoleba, Melolo and Ntodo Leseh showed significant differences ($p<0.05$) in the size of palatine foramen, the degree of expression of torus palatinus, the degree of completeness of tuberculum marginale, force projection of tuberculum marginale, the number of foramen infraorbitale, the degree of expression of infraorbitale foramen and the size of zygomaticofasiale foramen. This suggests that the aspects of size, degree of expression and projection play an important role in the manifestation of difference among the male samples. According to Hauser and de Stefano (1989), the manifestation of difference is influenced by genetical background which emerges first in male.

The samples of Liang Bua showed the least difference from the samples of Lewoleba. This difference was influenced by the samples' antiquity which were older than other samples and the strongest Australomelanesoid characteristics. Among the samples of Nusa Tenggara being examined, the samples of Lewoleba showed the strongest Australomelanesoid characteristics. It was consistent with the results of anthropometric measurements, which indicated that Lewoleba had the strongest Australomelanesoid characteristics.

Differences among samples further indicated variation in characteristics of Australomelanesoid. This variation is allegedly to be influenced by the geographical environment and adaptation to the surrounding environment. It can be seen in the samples of Melolo that showed the most unique characteristics. Melolo is located in the southest part of East Nusa Tenggara. The possibility to adapt to the environment is very influential on the characteristics of the population.

Instead, the samples of skull of Ntodo Leseh showed minor differences from the samples of Liang Bua and Melolo, but showed major differences from the samples of skull of Lewoleba. Similar to the samples of Melolo, the samples of Ntodo Leseh were located in the west of East Nusa Tenggara.

Based on this, we can conclude that mongolidization spreaded from the west to the east of Indonesia, shoved the natives to the east, but it was less intensive in Lewoleba. The remains of archaeological artifacts of Ntodo Leseh also showed antiquity similar to the one of Gilimanuk (Bali), namely a site with samples of skull at the west of Ntodo Leseh. Jacob (1967) and Glinka (1978, 1981) state that mongolidization moved from the west to east of Indonesia since the Iron Age until now (see Karafet et al. 2005).

Genetic Data

Samples of mitochondrial DNA (mtDNA) were taken from the skulls found in Liang Bua, Semawang, Gilimanuk and Melolo. The samples of mtDNA were analyzed using PCR technique. From the sequences, haplotypes were obtained. Table 2 shows the variation of haplotypes in each sample of the skull. Comparison among haplotypes of each of the samples showed that there was similarity between haplotypes in the samples of Gilimanuk and Semawang, namely G101A, G107A and T139C. The samples of Melolo had similarity with both populations. It was evident as the haplotypes in the samples of Semawang and Gilimanuk were found in the samples of Melolo, namely G101A, G107A, T139C, -130A, T139C, T149C and T159A. The diversity of haplotypes of the samples of Melolo showed a strong relationship between Gilimanuk and Semawang toward Melolo. Based on the antiquity, the samples of Melolo were older than the samples of Gilimanuk and Semawang, Thus do not rule out the possibility that Melolo population migrated to Gilimanuk and Semawang. Yet it can not be ignored that the populations of Gilimanuk and Semawang also migrated to Melolo and hybridized with the natives.

On the other hand, the samples of Liang Bua had the most variation of haplotypes, but did not show any similarity with the samples of Melolo, Semawang and Gilimanuk. It is as if Liang Bua stood on its own and was isolated from other populations on the island of Flores. Another possibility is the migration (Mongoloid) which came from another wave and did not reach Liang Bua.

Table 2. Variation of haplotypes of ancient population in eastern Indonesia (Koesbardiati, et al., 2016**)**

No	Sample	Haplotype
1	Semawang	
	- RIX	A109T
	- R XV	G101A, G107A, T117A, C129T, -130A, T139C, T149C, T159A
	- RXII	G111T
2	Gilimanuk	
	- Gilimanuk 1	G101A, G107A, T118A, C129T, T130A, T139C, T159C, T160A
	- Gilimanuk 2	G110T
	- Gilimanuk 3	G101A, G110T
3	Melolo	
	- Melolo	G101A, A109T, T127G, C128T
	- Melolo Palindi	G107A, C110T, T127G, -130A, T139C, T149C, T159A
4	Liang Bua - LB3	C101G, C105G, A107-, C110A, A111G, T112/113/114/117G, T120C, T121/122-, G124A, C126-, T127-, G133C, T134/136G, C138A, C140G, A142T, C144A, A145C, T147A, C149T, G150A

Dental Modification

Tooth is a fascinating part of the face. When one smiles, their front teeth are visible. When one speaks, their front teeth are also visible. In other words, tooth is not only a biological organ, but also a social organ (Scott and Turner, 1997), which becomes the center of attention and treatment. Tooth is part of communication devices contributing to the meaning of facial expressions. Therefore, tooth is more often modified to get a sense of cultural aspect. Dental modification is a way of manipulating tooth for the sake of beauty, initiation, rituals, symbols of status (marriage, tribe), wailing due to death etc. In Indonesia, dental modification has been performed since thousands of years ago. Currently, dental modification is not common anymore among the society. However, some societies in Indonesia still perform dental modification. Balinese people still conduct the tradition of tooth filing as a part of the Hindu belief system. Elsewhere, dental modification is performed in the context of ethnic status (Mentawai) and beauty (Kupang, NTT).

Observation on the shape of the teeth of the samples of Semawang, Gilimanuk, Gunung Piring, Ntodo Leseh, Liang Bua, Liang Toge, Lewoleba and Melolo found variations in the pattern of dental modification. Table 3 shows the variation of dental modification of the samples of Semawang, Gilimanuk, Gunung Piring, Liang Bua, Liang Toge, Lewoleba and Melolo.

Table 3. Pattern of dental modification in eastern Indonesia

Location	teeth modified	Type of dental modification
Sumbawa		
Gunung Piring	Upper left and right incisors and canines	Filing (occlusal surface)
Bali		
Semawang	Upper left and right incisors and canines Lower left and right incisors and canines	Filling (labial and occlusal surface) Filling (pointed shape)
Gilimanuk	Upper left and right incisors and canines Lower left and right incisors and canines	Filling (labial and occlusal surface) Filling (occlusal surface)
Sumba		
Melolo	Upper left and right lateral incisors	Extraction, blackening (chewing betel-nut?)
Flores		
Liang Bua	Upper left and right lateral incisors	Extraction, blackening (betel-nut chewing?)

Location	teeth modified	Type of dental modification
Lewoleba	Upper left and right lateral incisors	Extraction, blackening (betel-nut chewing?)
Liang Toge	Upper left and right incisors and canines	Filling (labial, occlusal and lingual surface)

Table 3 shows two major groups of the pattern of dental modification. The first group is dominated by modification (filing) on the occlusal surface. The first group consists of samples of Gilimanuk and Semawang in Bali, as well as samples of Gunung Piring in Sumbawa. Samples practicing filing were the samples of Liang Toge. Yet, the samples of Liang Toge had different variant of filing because the filing was not performed on the occlusal surface, but on the labial and lingual surfaces. The second group consists of samples practicing dental modification in the form of extraction. This group consists of samples of Liang Bua, Melolo and Lewoleba (See Koesbardiati & Suriyanto 2007).

Based on the aspects of antiquity, the group with occlusal filing pattern is from the younger age compared with group with the pattern of extraction. In other words, extraction is a pattern practiced first or early tradition. While occlusal filing is cultural influence brought by immigrants which was then allegedly as Mongoloid population. It shows the pattern of migration of Mongoloid that moves toward the eastern part of Indonesia.

Conclusion

In the period between neolitic and Iron Age, according to the antiquity samples examined, it appears that the Mongoloid migrated to Indonesian archipelago. The migration generally moved from the west and north of Indonesia toward the east. Based on the data of anthropometric, epigenetics, genetics, and dental modification, the migration took place in waves, shoving the natives to the east and the migrants acculturated and hybridized with indigenous people. Uniquely, morphological and epigenetic characteristics as well as similarities and differences in mtDNA haplotype in each sample showed an engaging process that occured between migrants and inhabitants of the region of Nusa Tenggara.

Variation in the pattern of dental modification also confirmed that a new culture was preferred making it more commonly practiced, for example, occlusal filing which was commonly practiced by the samples of group of younger antiquity. Occlusal filing pattern is still practiced today in Bali. It indicates that this pattern is younger, so that it is acceptable in the long term. On the other hand, extraction is an older dental modification pattern that is practiced as a tradition for local residents.

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INDONESIAN MEGALITHS AS THE RESULT OF THE INTERACTION BETWEEN INDIGENOUS PEOPLES AND HINDU-BUDDHIST KINGDOMS

Tara Steimer-Herbet and Marie Besse

Introduction

On the margins of the better known Hindu-Buddhist kingdoms of Srivijaya, Majapahit, and Malayu, adjacent indigenous societies were settled in the forests, mountains, and plateaus of Indonesia, where they practiced "primitive" religions based on ancestor cults and the spirits of nature, a shared cultural heritage from Bondowoso in East Java to Toba in North Sumatra. Bondowoso, Sukabumi on Java, Pasemah on Sumatra and Lore Lindu in Bada/Besoa valleys of Sulawesi are areas inhabited by societies with a megalithic tradition. Our selection is primarily based on the quality of the archaeological remains but we will also use examples taken from other areas such Jambi in central Sumatra, Lampung in South Sumatra or Sarawak (Malaysia).

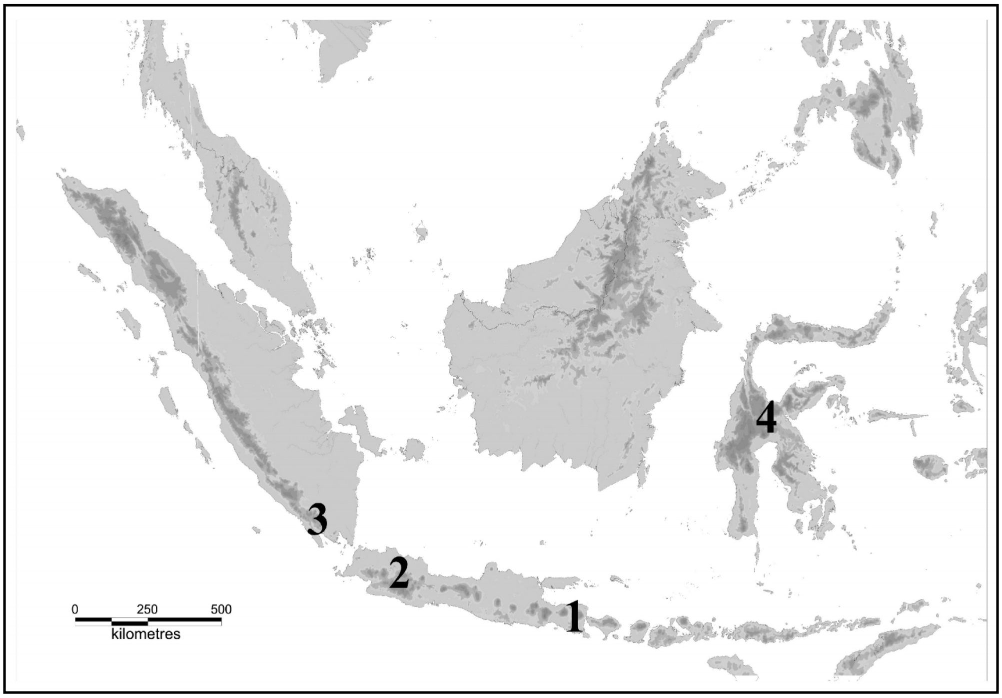

Figure 1. Map of the areas concerned. 1. Bondowoso valley (East Java); 2. Sukabumi region (West Java); 3. Pasemah Plateau (South Sumatra); 4. Lore Lindu (Central Sulawesi)

Most of the archaeological data on megaliths was collected during Dutch colonial rule. Two archaeologists of that period: Th. Hoop (1932) and R. Heine-Geldern (1945) suggested that the megalithic cultures had foreign origins perhaps coming from India, Laos, Japan or the Mediterranean. Indonesian archaeologists have kept on cataloguing these monuments without really questioning their origin and dates. At that time the discovery of polished axes in the graves of Cipari near Kuningan (East Java) constituted sufficient evidence for dating the megalithic tombs to the Neolithic period (3000-500 BC). Images of bronze drums resembling those of the Dong Son period were found on the reliefs of the Pasemah plateau, which helped lower the chronological range to the Paleo-metallic Period between 2000 and 500 BC. But excavations in Pasemah by Th. Hoop (1932), in Pakauman by W. J. A. Willems (1938), and more recently those of E. E. McKinnon in Lampung (1993), B. Prasetyo in Bondowoso (2006), J. Miksic in Minangkabau (2004), D. Bonatz in Jambi (2006), M. Janowski (2016) in Sarawak (Malaysia) revealed iron objects, glass beads, Chinese porcelain, and gold objects, all of these artifacts where acquired between the 7th and 15th century depending on the region. In the light of these discoveries, and despite the national desire to see these megaliths as evidence of an ancient civilization, the first Indonesian megalithic phenomenon is contemporary to the classical Hindu-Buddhist period. The second period of the Indonesian megalithic phenomenon will begin around the 16th century with the new arrivals of the Europeans traders in Sumba, Nias, and Flores.

Table 1. Dating of two megalithic sites in Indonesia issued from a table published by Prasetyo (2006, 166).

N°	Sites	Location	Context	Dating	Reference
3.	Doplang	Jember, East Java	Dolmen	580±100 BP	RDL GRDC [7] Bandung 1977
5.	Dawulan	Bondowoso, East Java	Dolmen (*pandhusa*)	1230±100 BP	RDL GRDC Bandung 1977

We know little about the lifestyle of the indigenous people of that period. But most of the megaliths are established in settlement contexts. In East Java or central Sumatra archaeologists (Steimer-Herbet 2013; Bonatz 2006: 318) have discovered stone pillars or posts holes (for wooden posts) that are house foundations near the megalithic sites, a sign of sedentary populations (Tjoa-Bonatz 2009: 198). Analysis of macro-remains mainly indicates a livelihood based on exploitation of roots and harvesting resources from the forest. Chinese ceramics, Indo-Pacific beads and iron tools, all of which were found at various

[7] Radiocarbon Dating Laboratory Geology Research and Development Centre.

megalithic sites, attested trade relations[8]. They are often to be found in the main axis of circulation or trading routes[9]. However, in contact with Hindu-Buddhist kingdoms, the demand for specific inland raw material[10] would appear to have significantly raised the prosperity of the settlements. These connections to Hindu-Buddhist kingdoms most likely explain the Indian influence[11]. As observed by D. Bonatz (2006: 322) in the highland of central Sumatra the initiative of the trade came from the Hindu-Buddhist kingdoms who tried to establish a system of tributary trade where small village communities rapidly developed; they were quick to adopt rice cultivation and used megaliths to honor their ancestors or even living individuals. The differences observed between the monuments and common burial methods shows the emergence of an elite in a hierarchic society. M. L. Tjoa-Bonatz (2009: 208) argues that the erection of the stones monuments can be understood as an elite-sponsored phenomenon within a polity, which may also have mushroomed into the establishment of federations. H. Forestier et D. Guillaud (2005: 31) do observe the link between a social organization and its spatial expression in the hamlet of Ngada in Flores. We have also seen this in Sumba, Nias, up to Pasemah, Minangkabau in Sumatra and Bondowoso in Java where clans signal their presence and rank in a symbolic stone monument placed in the collective space, nearby the ancestor grave, where everybody can immediately read one's lineage within the village context. It's difficult with the actual data to determine if in the pre-modern Indonesian megalithic societies the leadership system belongs to the big man type, or to a genealogically-based selection (Tjao-Bonatz 2009: 208). But the density of megalithic tradition in certain areas deserves to be described in order to better understand the patterns of the phenomena's appearance among local populations, a subject pretty much at the heart of current research in western megalithism.

"Pandhusa", cylindrical sarcophagi and dolmens from the Bondowoso valley (East Java)

In East Java, from Jember to Sitibondo, megalithic funerary monuments are located in rice fields and small traditional villages of the Bondowoso valley. In 1898, H. E. Steinmetz, a Dutchman, was one of the first to identify hundreds of megalithic monuments, which he called the "Pandhusa" and cylindrical sarcophagi (Kretek, Kemuningan, Tanggulangin, Pakisan, Tlogosari, and Sukosari Pakauman). He was followed by H. van Heekeren in 1931. In 1938, W.

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8 The article of M. L. Tjoa-Bonatz 2009: 204 mentioned the contact between highland and lowland, a phenomenon knows also in Pasemah's plateau, all axis of circulation or connecting places.

9 In the area of Jambi in Sumatra the megaliths are distributed along the tributaries of the Batanghari, M. L. Tjoa-Bonatz argues that the waterways can explain the concentration of megaliths (Tjoa-Bonatz 2009: 204).

10 They provided minerals mainly gold, animals products, such as ivory and birds' feathers (Miksic 1980) and forest products such as camphor and benzoin, goods upon which the wealth and power of Srivijaya's maritime trade was based (Bonatz 2006).

11 The influence of the Hindu-Buddhist kingdom is more or less visible depending on the areas.

J. A. Willems published the results of his excavation of the Pakauman monuments. In 1983 a team of Indonesian archaeologists from Yogyakarta became interested in these sites.

Since then 47 sites have been identified, including those of Wringin and Grujugan, which were excavated. The results of their excavations confirmed previous results established by W. J. A. Willems and H. van Heekeren that these rooms were tombs (Willems 1938; van Heekeren 1931). Chinese porcelain fragments, glass beads and clay as well as buffalo horns accompanied the deceased. Two samples of charcoal found in the Dawulan and Doplang dolmens and carbon dated by B. Prasetio (2006b: 166, cf. Figure 2) place Bondowoso Valley dolmens in a time range from the 7th century to the 14th century AD.

The stone cylindrical sarcophagi are of an impressive size. Situated in the middle of rice fields only their huge stone cylinder lids can be seen covering an underground burial chamber. The pictures published by W. J. A. Willems of the 1938 excavations showed upright slabs forming a rectangular funerary space covered by a stone lid. Grave robbers who were looking for treasure cut the cylindrical lid (Figure 3). It is therefore not uncommon to find holes in the rock or broken cylinders.

Figure 3. Picture of Bondowoso's tomb damaged by tomb raiders in Glinseran (©T. Steimer)

In the village of Grujugan (Figs. 4-5), two megalithic graves are still intact. These are dolmens; the first one called *Pandhusa* by the locals has a rectangular chamber identical to those of the cylindrical coffins but with a differently shaped lid. The stone has been cut so that its flat surface rests on the walls; the upper part is rounded into a sort of half-cylinder. The second tomb is built with crude blocks. Its cover rests on scattered blocks leaving an open space below.

Figure 4-5. Pictures of "Pandhusa" (left) and dolmen (right) from the village of Grujugan (©T. Steimer)

On the outskirts of Grujugan (Figure 6), between the road and rice fields, the remains of an indigenous traditional dwelling of the Bondowoso region can be seen. *Kenong*, cut stones with one or more protrusions on the top, served as a foundation for a wooden dwelling. In these settlement sites archaeologists have discovered similar materials to those found in the megalithic tombs: glass beads and earthenware, bracelets, and metal tools (Prasetyo 2006).

Figure 6. *Kenong*, foundation stone for a wooden dwelling in Grujugan (©T. Steimer)

Next to the foundation stones, lie two anthropomorphic statues, one of which has been straightened and is still in place. This sculpture is rough but its feminine curves are well rendered. The Bondowoso valley is rich in stone monuments. The humans groups who erected the megalithic monuments at that period lived in houses which were close to traditional Javanese houses in appearance. The livelihood model is not known but the possibility of exchanges of raw material like the sulfur of Kawa Ijen mines have enriched local populations, and most probably an elite among them, as attested by the rich imported artefacts found in monumental tombs. The carbon dates (Figure 2) show that the megalithic phenomenon started in the valley of Bondowoso before the arrival of the Majapahit Empire in the 13th century in the neighboring valley (Brantas). The increase of the megalithic monuments seems to parallel the intensification of the exchanges. Most of the artifacts discovered in the tombs or in settlements area come from the Hindu-Buddhist Kingdom. Despite its expansion the Majapahit Empire seemed to have respected inhabitants' traditions. The megalithic phenomenon in East Java does not survive to the fall of the Majapahit Empire.

Monumental Structures from the Sukabumi Region (West Java)

The Sukabumi region, close to the Hindu-Buddhist Kingdom of Bogor, is famous for the monumental structures like temples, pyramidal platforms, standing stones and stelae. Gunung Padang, one of the pyramidal platforms, is mentioned in the tales and legends of the people of Sukabumi area. Prabu Siliwangi, a Hindu king of the Bogor region, would have travelled there in the late 15th century. Discovered in 1914 by the Dutch N. J. Krom, the site located on top of a mountain disappeared again under the vegetation and was rediscovered in 1979 by the villagers of Karyamukti. It was the subject of an archaeological report in 1985 by the National Research Centre of Archaeology in Jakarta before falling again into oblivion. Since 2011, Gunung Padang is back on the front page of Indonesian media. According to electromagnetic surveys, a huge cavity was located under the megalithic remains, corresponding to the burial chamber of a pyramid which would pre-date Egyptian pyramids. Fortunately the site of Gunung Padang is classified as cultural heritage and therefore a protected area. The known remains are a series of terraces and stairs that rise 150m from the village square in Karyamukti to the top.

The staircase leading to the site is steep, but its four hundred steps are in good condition. The stone blocks used are from the Cikuta River about 300m away. Similar blocks can also be found in the rice fields a little further down the valley. The blocks are igneous prismatic rocks whose dark brown color contrasts with the green of the surrounding vegetation. The hill is arranged in 13 terraces but only the last 5 are sufficiently well preserved and developed. Shortly before reaching the summit a strong retaining wall supports the first of the last five terraces. At this location are the remains of a rectangular structure with an opening to the north, facing Gunung Gede. The floor of this structure is paved in stones. To access the fourth terrace one has to climb a narrow staircase in a partially collapsed retaining wall. Terraces 3, 2, and 1 are separated by low field gradients marked by standing stones. Lines of stones also delineate the East and West borders terraces. In the center, rectangular and circular buildings are distributed without apparent order (Figure 7).

Figure 7. Picture of terrace 1 in the site of Gunung Padang (©T. Steimer)

While researchers see similarities in this series of terraces with the Penanggungan temple in East Java built by the Majapahit in the 15th century, it is likely that the megalithic site of Gunung Padang is older. It is part of a set of homogeneous sites located on the slopes of Gunung Salak, Gunung Halimun, and in the Sukabumi area, all built around the 12th and 13th centuries AD. Surveys from Indonesian archaeologist (National Research Center of Archaeology) have documented dozens of standing stones sites (Tugu Gede, Salak Datar, Tenjolaya, Kampung Kuta Batu Jolan, Ciawitali, Pasir Gada), pyramidal platforms (Pangguyangan, Ciawitali, Lemah Ḍuhūr, Ciranjang) and statues (Ciarca). All of these monuments are flanked by stone seats, basins, and stones with pits in the surface (Tugu Gede Ciarca, Bukit Tongtu). The architectural style is specific to this region but we also observe a strong influence of the Indian iconography.

In this area it was really difficult to find remains of settlements. Megalithic monuments are all covert by a permanent cover. It is still impossible to determine their functions. Annual festivals in some of these sites could be reminder of persistent animist practice like in Tugu Gede, 20km north of Pelabuhan Ratu, where an up-right stone of 4m high is still honored. Each year after the harvest, the people of the region tie a white cloth to it and make offerings in honor of the spirits of nature (Figure 8). Other sites are abandoned and overgrown, yet some of them have been restored like the one at Pangguyangan, where an Islamic grave covers the top of a pyramidal platform. With its seven terraces and a small narrow staircase, the monument covered with Islamic inscriptions doesn’t overshadow its megalithic foundations belonging to another belief system.

Figure 8. Picture of the menhir in Tugu Gede (©T. Steimer)

Though there is no significant information on the use of Gunung Padang by the indigenous people of Sukabumi, the considerable effort needed to achieve the construction of the 13 terraces certainly involved more than one clan. This site, one of the most spectacular in Indonesia, was functioning as a gathering center for the people who erected the numerous meghalithic sites in surrounding area. If the role of the Hindu Kingdom from Bogor is not clearly identified in the Sukabumi region (nature of the exchanges), the visit of Prabu Siliwangi in Gunung Padang is a testimony of the good relations that inhabitants practicing megalithic tradition had with Hindu community.

Dolmens and Anthropomorphic Statues on the Pasemah Plateau (South Sumatra)

In his thesis "*Megaliths remains in South Sumatra*" (1932), Th. van der Hoop identified a similarity between this style of representation and conventions used in Javanese and Balinese wayang where features like those found on the statues would identify the character as a "*kasar*" or villain. According to him even though these figures resembled those of wayang, they were nevertheless part of the circle of the Ancestors that the Rejang, the indigenous tribes of the Pasemah plateau, believed in. The presence of helmets, arm band and leggings is reminiscent of warrior; however, large bags or objects on their backs would be too bulky for fighting.

Strangely enough and despite the many surveys carried out on the Pasemah's complexes since 1850, both during the Dutch Colonial rule (L. Uhlmann, E. P. Tombrink, H. O. Forbes, Th. van der Hoops, C. W. P. Bie, H. W. Vonk, C. W. Schüller) and after Independence (E. E. McKinnon, Soeroso, I. Caldwell), these monuments have never been convincengly dated. Bronze drums of the Dong Son period (2500 BP to 1700 BP) appear on a bas relief at Batu Tatahan and in a scene carved on a wall in Tegurwangi. These drum images place the megaliths of the Pasemah complexes as the oldest megaliths in Indonesia but these dates should be view with caution. Drawings made from a photograph taken in 2012 by one of us (TS) (Figure 9) shows that the figure is holding an object in his hands described as a kettledrum by I. Caldwell (1997: 176). If the object really turns out to be a kettledrum, in our point of view it is most probably a bag, I. Caldwell cautions however that this figure could be a reference to the mythical figures known in the Early Metal phase. Metal objects represented on Pasemah's stone monuments are not a strong enough reference to date these monuments, bronze items could have been brought to the region long after they were manufactured. In addition to that, the megalithic tombs excavated by Hoop (1932) at Tegurwangi contained large numbers of glass beads and a few metal objects both of which are recent, even this material has not been studied properly. With the recent work of J. Miksic (1986), E. E. McKinnon (1993), D. Bonatz (2006) and M. L. Tjoa-Bonatz (2012) on similar monuments in central and southern Sumatra, the date range is thought to be between the 7th and 14th centuries. These conclusions are based on carbon-14 dating, and from the types of pottery, and Chinese porcelain that date from the 5th Dynasty and Northern Song period found during excavations at the Kerinci/Sinamar sites in Jambi, in the Mahat Valley (Minangkabau) and in Sumberjaya in northwest Lampung.

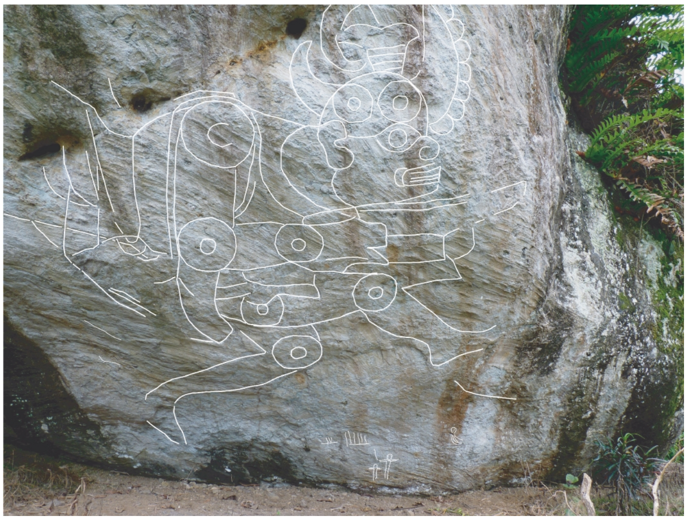

Figure 9. Drawing of the scene carved on a rock in Tegurwangi (©T. Steimer)

The stylistic qualities of Pasemah's sculptures surprise visitors. They do not have the delicacy of Hindu-Buddhist statuary, yet they exude a dynamic form in which the form-matter relationship expresses raw power. The rocks grainy rough andesite did not make the task of the sculptor easy, but he skillfully played with it. He used metal tools and did not express a need to polish his work in the majority of sculptures, leaving a bumpy and imperfect surface.

Figure 10. Picture of a man of Pasemah's Plateau in Belumai (©T. Steimer)

The Pasemah artists were gifted and driven by a specific purpose: to integrate their work into the environment, nature and carving were at the heart of their concerns. Men were facing the powers and spirits of nature which they respected and, at the same time, feared. Thus at Tegurwangu, four kneeling men can be seen who, in their original positions, were staring the four cardinal points of the compass. Did they represent the dead who were buried in the dolmens found behind them? Are they simply protectors of important people? Inside the dolmens, although no bones were found, rich funeral offerings were discovered: gold, bronze, glass beads and a set of amazing paintings in natural pigments that covered the interior walls. Paintings were also found at Tanjung Arau (called Tanjungara in van Heekeren 1958, Figure 21). At Tegurwangu these paintings represented a man and a buffalo, at Tanjung Arau (Kota Raya) a rooster and a bird (Soejono 1991). Unfortunately, since the opening of the graves, the paintings disappeared after exposure to the air, and today only spots of red and black pigment can be distinguished, ochre and white have disappeared (Figures 11-12).

Figure 11-12. Pictures of dolmens and paintings in Tanjung Arau (©T. Steimer)

In the Lampung region (South of the Pasemah Plateau), dolmens, standing stones, and large cylindrical tanks (known as Kalamba in Sulawesi) were discovered in Sumberjaya near Wai Besai, a tributary of the Tulangbawang River that flows into the Sunda Strait. As on the Pasemah plateau, the dolmen walls are covered with paintings.

The objects discovered around the statues or within dolmens are thought to come from trade with the kingdom of Srivijaya but there was also an important and previously unrecorded indigenous pottery tradition (7th – 14th century). Known for its maritime power and its long distance trading, the kingdom imported and exported goods through the ports of Indrapura, Muko-Muko, and Menjuto on the west coast, Pauh, Tembesi, Batang Asai on the east coast and Tulangbawang on the south coast (McKinnon 1993). The bags depicted on the statues of the Pasemah plateau may have been full of goods from the plateau (forestry products as honey or birds' nests, peper, camphor, benzoin, ivory, rhinoceros horns, feathers and gold[12]). Some of the earthenware sherds have heavy deposits of carbon which may indicate the burning of resins or some other source of material (McKinnon 1993). The natives of south and central Sumatra traded these goods for imported tools and materials, probably carrying it on their backs from one coast to the other. Perhaps the eyes bulging with effort and the grins on the lips of Pasemah statues are a testimony of their suffering during the journey; the sculptors have also highlighted their joints by using circles, perhaps signaling the Achilles heel of these heavy load carriers. This region would appear to have been part of a network of small Srivijayan riverine harbours which provided access to valuable products from an extensive mountainous hinterland (McKinnon 1993).

The amazing statues and cylindrical stone vats of Lore Lindu (Central Sulawesi)

The impressive leaning megalith known locally as Palindo (Watu Molindo) is 4.5m tall. This massive statue has a face that takes up a third of the block of granite. Only the front is polished, its back, roughly trimmed at the top, is undressed. A ring defines the shape of the

[12] The Bukit Barisan Mountains in western Lampung are known to have been a source of alluvial gold (McKInnon 1993).

face. On the top of the head, a protuberance perhaps represents knotted fabric or a crown. The ears, two protuberances are simply outlined in contrast to the nose, the eyes, and the mouth which are the result of meticulous work. The eyebrows and the bridge of the nose form a single line. The rain has left stains, but the color of the rock is clear. The face has no chin. Under the oval face a groove has been hollowed out, indicating the neck and shoulders. The line of the arm is barely marked and two small protuberances mark the nipples. The sculptor's chisel has been more incisive on the fingers of the hand, drawing attention to an erect phallus.

This statue is located south of the village of Sepe, in the Bada Valley in the Lore Lindu region. The first references to the Lore Lindu megaliths date back to 19th century with the descriptions of Dutch priests Dr. A. C. Kruyt and Dr. Adriani. Between 1917 and 1922, W. Kaudern (1938) made an archaeological inventory of the three connected valleys, Bada, Besoa and Napu. Classified by UNESCO in 1977 as a world biosphere reserve, Lore Lindu became a National Park in 1993. The region is rich in minerals: gold, sulfur, coal, and iron. Its fauna and flora are very diverse, cohabiting with the megalithic vestiges of the original inhabitants. The Bada and Besoa valleys, located 750m above sea level, are protected islets. The Bada Valley is cut in two by a wide river (Lariang); it is surrounded by hills 1200 to 1300m high and is covered with primary forest. A pass at 2000m takes you to the Besoa valley. Hidden in the hills or in the rice fields of the national park, anthropomorphic statues and cylindrical pitchers are not easy to spot.

Figure 13. Picture of the anthropomorphic statue of Loga in Besoa Valley (©T. Steimer)

In Bada, 14 anthropomorphic statues have been identified. Maturu, or "the sleeper", is 3.5m long, it can be seen by following a path covered with vegetation. Lying on its back the statue was designed to stand like the one in Palindo. The face is a bit different, elongated, and slightly convex; its forehead is marked with a headband. The arms are out of proportion and end in thick hands with detailed fingers. The hands are joined above an erect phallus. The statue at Langke Bulawa is not as tall (about 2.5m). Also male, the statue wears a crown or a slightly tall headdress held by a headband. The face is a mix of styles between the Palindo and Maturu statues. At Loga, the statues are closer to human size (Figure 13). The nose is clearly marked and the oval eyes traced back slightly, giving to it a different expression to the statues described above. Smaller in size, it is located on a hill overlooking the valley. On the facing hill are the remains of a former dwelling. The statue at Tinoe Badang-Kaya is of the same style as Loga, but has two very preeminent buttons for breasts. Deeper in the ground than the other statues, the phallus cannot be distinguished; it is nevertheless the representation of a man.

Hidden in a paddy field, a meter high statue looks more like a monkey than a man; so the inhabitants of the Bada call it, “Watu Oba”. Its small size distinguishes it from other statues. The sculptor has depicted a compact figure, head caught in the shoulders and without chin. The skull, thick and stretched backwards resembles that of a primate. The figure is standing; his arms have a hieratic position and meet on a protuberance, the outline of a phallus. Not far away lies the head of "Watu Balao". This statue was not meant to stand upright, the sculpted head is at the end of a natural block of stone. When the rice reaches maturity the stone face can hardly be seen. At the back of the head, on the surface of the rock, small cups and deep lines were carved out. The sculptor may have been trying to represent the skin of an animal.

What we observe it is that near the statues cylindrical stone vats known locally as *kalamba* can be found. In the Bada Valley they are not in good condition, and are often in fragments or missing a lid (site of Suso -Lore Barat) (Figure 14). Similar artifacts are known in Lampung south of Sumatra, Borneo (Arifin and Sellato 2003) and from Laos (Colani 1935).

The most beautiful *kalambas* are in the Besoa valley northwest of the Bada valley. It opens into the Napu valley towards the city of Palu. Fifteen sites have been identified here; the richest are Pokekea, Tadulako, Padalalu, Bangkelua, Halodo, Potabakoa, Padang Taipa, Padang Hadoa, and Entovera. Pokekea is the most important site in Lore Lindu Park where there is 27 *kalambas*. The one at the entrance to the site is exceptional. Its outer wall is decorated with a strip of faces whose features are similar to those on the statues at Bada and particularly that at Palindo. Also, at Pokekea, a group of 11 *kalambas* is interesting for its sculptures (0.92 to 1.80 m high and 0.77 to 2.16 m diameter.). In this group only the lids are decorated; from simple protrusions to small figures: monkeys and lizards.

Figure 14. Picture of Kalamba in Pokekea in Bada Valley (©T. Steimer)

Excavations done in 2000 by Dwi Yuniawati in Tadulako and Pokekea (2000; 2008) have established that *kalambas*, with or without compartments, served as multiple burial chambers. Enclosing a minimum of ten people, these tombs were made for families. Anthropologists have found traces of mutilation on teeth exhumed and evidence of cremation of the bones. Dwi Yuniawati mentioned funerary jars around kalambas. It is probable that the kalambas did not accommodate all the members of the tribe, but were reserved for important people and their families. Offerings accompanied the deceased: pots and earthenware jars, chalcedony beads (round or diamond shape), bark clothes, a grindstone, an iron axe, a spear, and an incense burner. The report of the researches does not specify if there were houses nearby.

Analysis carried out by a German team in 2006 (Kirleis et *al.* 2011, p. 174) on two of kalambas from Pokekea indicate a date range between 766-898 AD and 1146-1272 AD. The region of Lore Lindu abounds in resources, the inhabitants of valleys Bada and Besoa were probably at the heart of numerous exchanges with the Hindu-Buddhist kingdom of central Sulawesi.

Conclusion: Back to the Middle-East and the birth of megalithism

Despite recent excavations the data about societies with megaliths are still rare on the scale of such a large country as Indonesia. From them and from the available scientific documentation as well as observations in the field it appears however plausible that through exchanges of resources and services with Hindu-Buddhist kingdoms the descendant of the Austronesian in Java, Sumatra and Sulawesi acquired goods of prestige progressively affecting the local socio-political balance leading to an increased competition between leaders. This process led to the erection of megalithic monuments to bury the dead, honor, commemorate and/or communicate with the ancestors serving as a physical materialization of social status for individuals and groups. For cultures who did not use writing these stones, or these carvings, marked the landscape and efficiently transmitted a social memory from one generation to another. In Java, central and south Sumatra, and at Lore Lindu in central Sulawesi, megalithic monuments ceased to be erected when the Hindu-Buddhist kingdoms declined. Relatively recent in time compared to their middle eastern cousins the Indonesian megaliths are similarly the trace of a common cultural background that appear during period of coexistence and growing inter-dependence between indigenous people and state societies mastering writing. Their studies contribute significantly to the archaeological research of this native civilization.

In the case of Indonesian megalithism the social, cultural and political impact of contacts with larger, more sophisticated and expansionist societies can be documented. The patterns on which this influence plays out such as the asymmetry of the relationship between scriptural and non-scriptural cultures, between commercial empires and local economy, between believes in gods and on ancestor cults and the spirits of nature could prove useful models in our understanding of the Middle-East megalithism for which we can unfortunately draw on very little archeological evidence to when it comes to the inter-action between two social systems but whose patterns of ostentation are very similar to the Indonesian case. Our idea here is to draw from the resources of history and ethnology much more readily accessible to help solve the open questions pertaining to the role and usefulness of megalithism for societies that have found it an effective response to a given situation. In Indonesia Austronesian populations have twice adopted it (first age from the 7th to the 12th centuries and second age starting from the 16th until today) when confronted with foreign influence. Was it a way to better delimitate their own boundaries? Was it a way of managing and controlling increased resources as suggested by R. Adams for Sumba (Adams 2011: 25)? The answer to these questions could be important analytical clues for the study of sites where the resources of history and ethnology are not available. In the same line of thoughts the question of the disappearance of the phenomenon is an interesting one to ask in a comparative manner. Whereas it seems to have been linked to the declining fate of Hindu-Buddhist kingdoms in Indonesia would the end of state-society in the Middle-East be the reason for the disappearance of the great megalithic tradition there? The question remains open.

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AUSTRO-PROTOHISTORY: THE DISPERSAL OF MEGALITHS IN INDONESIA ISLANDS

Bagyo Prasetyo

Introduction

Austronesian is a language family that covers around 1200 languages and spoken by populations that inhabit more than half the globe. The dispersal of Austronesian populations within a very large archipelagic area is a big phenomenon in human history. It was a language family with the widest spread before the West colonized various parts of the world. The populations spread from Madagascar in the west to Eastern Island (Pacific area) in the east and from Taiwan-Micronesia in the north to New Zealand in the south. Austronesian-speaking groups emerged on ca. 7000-6000 BP in Taiwan before they dispersed in ca. 5000 BP to different parts of the world carrying with them the typical Neolithic culture that was characterized by among others agriculture, animal domestication, and sedentary life. In Indonesia, the Austronesian-speaking people are characterized by Southern Mongoloid race, with highly diverse physical appearances that depend on genetic, environmental, and cultural factors. Their ability to adapt to various environments has encouraged their development in space and time. Indonesian has a key position in understanding Austronesia. It has a vast territory at the centre of the dispersal area. Variability of habitation geography, as well as intensive interactions with the outside world, has made their cultures very diverse.

Austronesian diaspora in the Indonesian archipelago has changed the order of human life that existed before. Various types of findings and results of the new technology are present in the set of archaeological data found widespread on the islands. This evidence indicates the existence of significant cultural developments from their nomadic patterns of livelihood by hunting and gathering into a settlement by creating workshops for manufacturing tools in the open site like a stone pickaxe, shell pickaxes, and the domestication of animals as an early hallmark in the life of Austronesian-speaking people. Simple agricultural activities have been conducted with no direct evidence in the form of increased pollen of *gramineae* and clearing of field.

Austronesian technological innovation has changed from human habits that depend on the nature to efforts to control their natural surroundings. Groups were formed in the village, and they organized their lives in accordance with the common goals. They strive to produce mainly from agriculture and animal domestication. Various attempts were made to increase their productivity, but a number of problems arise that revolve around the things that are associated with human beings, soil, animals, plants, and taboo. As a result, the idea emerged that relates to a power beyond their'. Something they perceive as supernatural power that govern human life (Prasetyo, 2012). The death of someone was not regarded as matter of disconnection at all; instead, it still has a powerful influence on human life. Spirit of the deceased is considered to have life in his own nature. The emergence of inter-insular and inter-continental connections in the era of proto-history has further increased technological innovation in Austronesian-speaking people. Megalithic cultural influences came from the outside to be a means of manifestation in the relationship between the living and the dead. Problems of this paper is related to why so many megalithic are scattered in various places and how big the role of megalithic culture to Austronesian people's lives.

Aims and Methods

The development of the megalithic culture is very dominant in the life of the Austro-protohistoric people. Various forms and types of megaliths are found scattered in various places throughout the archipelago. Answering the research problem, the purpose of this study is to obtain the type, form, pattern and distribution of megaliths as a form of innovation and adaption to suit the environment of the islands. The method used is descriptive analysis with quantitative approach.

Distribution of Megaliths

So far the number of sites and megaliths spread throughout the archipelago is not known. However, over the years, research has increased the number of data on sites and megalithic objects. Evidence of the results of previous researches yielded at least 593 sites spread all over the archipelago. Similarly, a large distribution of megaliths has been found. Some of the larger islands become dominant places. The islands include Sumatra (North, South, and West Sumatra, Bengkulu, Jambi, and Lampung), Java (Banten, Yogyakarta, as well as West, Central, and East Java), Sulawesi (North, Central, and South Sulawesi) , Lesser Sunda Islands (Bali, Sumba, Sumbawa, Flores, Timor, and Sabu), up to the Moluccas and Papua (Prasetyo, 2006a).

Megaliths of Sumatra

Zwaan (1927), Schnitger (1939), and Callenfels (1924) record megalithic remain in the northen part, which include the islands of Samosir and Nias. The Megaliths of West Sumatra were described by Schnitger (1939) at Lima Puluh Koto (West Sumatra), while G.K.H Bont (1922) and Schnitger (1939) described those at Sarolangun Bangko in Jambi. Concerning megaliths in South Sumatra, these were established by Forbes (1885), Engelhard (1891), Tombrink (1870/71), Westenenk (1922), De Bie, and van der Hoop (1932) between Barisan and Gumai mountains at the Pasemah Higland. Hoop also reported megalithic finds in Lampung Area (1932).

Megaliths of Java

On the islands of Java, megaliths dominated almost the whole area of the west part (Pandeglang, Lebak, Bogor, Sukabumi, Cianjur, Garut, Tasikmalaya, Bandung, Cirebon and Kuningan) (Groeneveldt 1887; Vorderman 1890, 1894; De Quant 1899; Pleyte 1909; Muller 1856; Junghuhn 1844; Hasskarl 1842; Krom 1915; Hoop 1937). In Central Java megaliths were reported in Rembang, Pemalang, Tegal, Brebes, Wonosari (Bosch 1918; Krom 1915; Groeneveldt 1887; Hoop 1935). Megaliths were also reported by Bosch (1918), de Haan (1921), Steinmetz (1898), Willems (1941) in the eastern part of Java (Jember, Bondowoso, and Situbondo).

Megaliths of other parts of Indonesia

Moojen (1926), Nieuwenkamp (1926) and Callenfels (1931) reported some of megalithic finds in Bali; Bosch (1928) and Sierevelt (1929) in the eastern part of Kalimantan; Bertling (1931) in the northern part of Sulawesi; Kruyt (1938), Hoop (1932), Kaudern (1938), Raven (1926) and Grubauer (1913) in the central part of Sulawesi; Kruyt (1938) in Toraja (then in the southern part of Sulawesi, now in West Sulawesi); Kuperus (1937), Heekeren (1958), Zoelinger (1850), Ten Kate (1894), Kruyt (1922), Perry (1918), Muller (1857), Paul Arndt (1932) in islands of Nusa Tenggara; Rosenberg and Perry (1918) in Maluku islands and its surroundings. Unfortunately most of the early information is very limited, fragmentary, and usually only made as journey reports.

The serious attempts to study the megalithic remains after the Second World War were carried out by Indonesian scholars such as Soejono, Rumbi Mulia, Sumijati Atmosudiro, Sutaba and Haris Sukendar. They understood megalithic statues as the manifestation of ancestor worship (Mulia 1980:616; Atmosudiro 1980; Sukendar 1984a:10-11; 1993:336-340), while Soejono (1984:235-237) connects sarcophagus in Bali with religious purposes and concentrates on typological description. Recently, archaeologists study specific aspects of megalithic such as the practical astronomical function (Gunadi 1994), social organization and ideology, spatial and environment (Prasetyo 2008). Finally, the general aspect of megaliths gradually emerged. But to determine the true aspect of the culture, we need to accumulate more materials and at present the study of Indonesian megaliths still remains inconclusive.

Concerning the existence of proto-historic megalith~~ic~~ in Indonesia, there are some questionable points that still require explanation, such as: (a) what types of megaliths are there? (b) what does their spatial and temporal distribution tell us? how does this history relate to megalithic culture on the Mainland Asia? (c) how do they change through time?

In the context of this paper, the discourse on the dispersal of Indonesian megaliths will be presented as an effort to offer some insights into their presence in Indonesia. Based on many scholarly reports and my current research, the main interest on this topic will be to trace the typology of megalithic, distribution pattern (including the cultural charachteristic of the centres of megaliths), their long time-span, and relationship with other megalithic cultures in Asia, and finally the role of megaliths in Indonesia.

Types of Megaliths

Indonesian megaliths exhibit great variation on shape, size and degree of complexity. Many types of megaliths are found, but many scholars are still in dispute regarding the category of megaliths in Indonesia. Robert von Heine-Geldern (1945:148) reported types of megaliths like menhirs, dolmens, stone cists, stone jars, stone sarcophagi, stone sculptures, stone benches, stone walls, stone stairs, stone bathing places, assembly places, cairns, and terraced and stepped pyramids. Later, H.R. van Heekeren (1958:44-80), followed by Soejono (1984), distinguished megaliths as stone chambers, stone circles, stone mortars, stone avenues, cup-marked stones, stone seats, and upright stones. Currently, according to morphology classification, I classify Indonesian megaliths in to 22 main types: stone mortars, stone troughs, cairns, stone seats, stone ornaments, altars, spherical stones, monoliths, menhirs, phallus stones, cylindrical stones, stone terraces, human statues, animal statues, cubical stones, stone enclosures, dolmens, stone chambers, stone coffins (sarcophagi), stone boats, stone cists, and stone vats (Prasetyo 2013). On the whole the megaliths in Indonesia can be arranged into two major groups, namely structures and single objects. The grouping of megaliths is necessary in view of the larger number of types, and is based on the technique of construction. Structures are built up by pieces of stone, either natural or carved like cairns, stone terraces, stone enclosures, dolmens, stone chambers, stone boats, and stone cists, while single objects include megaliths which are commonly made of one stone piece or block of stone, either large or small. Types include stone mortars, stone troughs, stone seats, stone ornaments, altars, spherical stones, monoliths, menhirs, phallus stones, cylindrical stones, human and animal statues, cubical stones, sarcophagus, and stone vats.

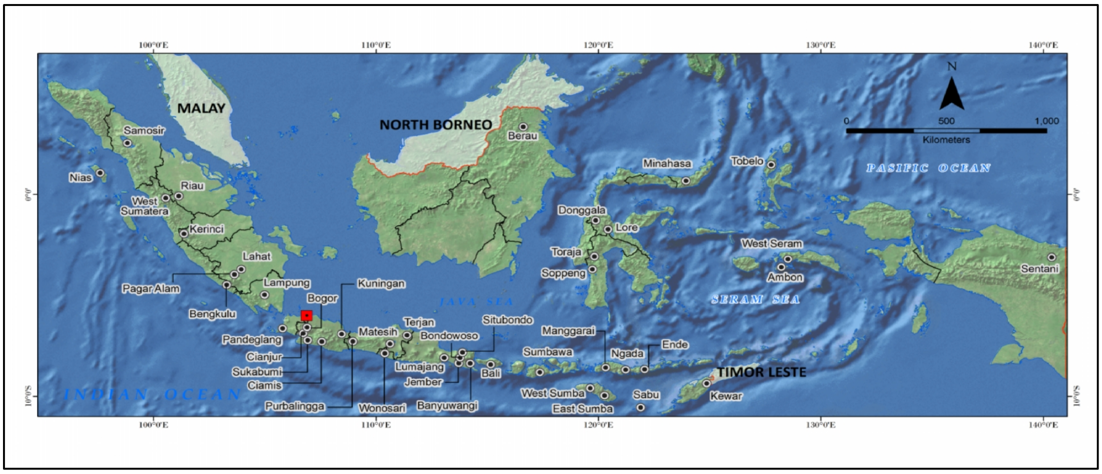

Figure1. The Dispersal of Megalithic Sites in Indonesia

The Centres of Megaliths

Coming to the question of dispersion of megaliths, the pattern is fairly clear. They show denser distribution in the inner part of archipelago and occur sporadically in different parts of regions (Prasetyo 2006:283-284). Megaliths of different types are usually found in groups or are situated in close distance to one another. There are centres of megaliths where certain forms with specific characteristics occur simultaneously. Such centres of local developments are to be found in Sumatra, Java, Sulawesi, Kalimantan, Bali, East Nusa Tenggara, Mollucas, and Papua.

The centres of megaliths in Sumatra Island are located on Nias, Samosir, Lima Puluh Koto, Kerinci, Pasemah Highland, and Lampung. A living megalithic tradition is still established on Nias Island (North Sumatra), particularly at the villages of Hilisimaetano, Bawömataluwö, Pulo Tello, Tundrumbaho, Tomori, Telemaera, Onowembo, Ononamolo, Sifarauasi, Orahili, Tetegewo (Zwaan 1927; Schnitger 1939; Mulia 1981). Megaliths of Nias are characterized by a great number of stone seats with animal heads on one side and tails on the other (*osa-osa*), stone terraces, stone table (*neogadi*), and standing square column stones (*behu*). Another living megalith tradition is described on the island of Samosir in Lake Toba (North Sumatra). Limbong, Lumban Raja, Naibaho, Tomok, Simanindo, Simarmata, Sipira, Tarutung, and Pancur are villages that have a number of sarcophagus, dolmen, and statue (Schnitger 1939:138-139, Simanjuntak 1982). Sometimes a sarcophagus has morethanone chamber. Recently statues were erected for a deceased king, after the last great festival of the dead in the region (Callenfels 1924:127).

A great number of upright stones (menhir) are found in Limapuluh Koto (West Sumatra) at the villages of Belubus, Guguk, Aur Duri, Koto Tinggi, Koto Tengah, Limbanang, Bawah Parit, Ampang Gadang, Anding, Ronah, Bukit Apar (Schnitger 1939; Sukendar 1984a).

Several upright stones at Bawah Parit are carved with geometric design (triangle and circle). Stone seats and stone mortars also reported at Kotorajo, Limbanang, Suliki Gunung Mas (Sudibyo 1985).

Megaliths in Jambi are found at Serampas, Renah Kemumu, Bukit Arat (Bonatz 2003; 2004), Muak, Pendung Mudik, Kumun Mudik, Pulau Tengah, Sungai Penuh (Prasetyo 2000a). The structures include dolmens, and upright stones (grouped in rectangles), but *meriam batu* (cannon shaped) are more dominant there. The last mentioned was also reported by Bont (1922) and Schnitger (1939) at Dusun Tua and Tanjung Putih (Sarolangun Bangko).

The Pasemah megaliths are found in the area of Pagar Alam and Lahat regions. Those regions have very rich megalithic remains including stone tables, upright stones (grouped in rectangular or circular arrangements), stone images (human and animal), stone chambers, stone mortars and stone through (Prasetyo 2006b).

Several types of megaliths are reported from Lampung Area, such as stone table and upright stones at Batuberak (Hoop 1932). Both are also found at Cabang Dua, Tlagamukmin, Pugungraharjo, Purawiwitan, Batutameng, and Bungin (Sukendar 1979; Indraningsih 1985).

Megaliths are found spread over the island of Java. Enormous numbers of megaliths in the western part of Java are found at the villages of Tenjo and Sangyangdengdek in Pandeglang (Groneveldt 1887, Vorderman 1894), Kosala and Lebak Sibedug in Lebak (De Quant 1899, Pleyte 1909), Gunung Salak, Pasir Angin, and Ciawi in Bogor (Muller 1856, Junghuhn 1844, Prasetyo 1995), Cisolok, Ciarca, Salakdatar (Vorderman 1890, Hasskarl 1842), Pangguyangan, and Tugugede in Sukabumi (Sukendar and Bintarti 1977), Gunung Padang (Krom 1915), Ciranjang, Lemah Duhur, Pasir Manggu, and Pasir Gada in Cianjur (Sukendar 1985), Cikalong, Cikapundung and Cililin in Bandung (Groeneveldt 1887, Muller 1856, Vorderman 1894), Sukaraja, Cipapar, Tarogong in Garut (Krom 1915), Gunung Cihcir, Gunung Galunggung, and Gunung Cakrabuwana in Tasikmalaya (Krom 1915), Cibuntu and Cipari in Cirebon (Hoop 1937, Asmar 1970). They are identified by a great proportion of upright stones, stone seats, stone troughs, stone mortars, stone statues, stone terrace, and slab-stone. Based on the stone statues, Hoop (1932:98) called them the Pajajaran type.

In the central part of Java megaliths are found at Terjan (Rembang), Matesih (Karanganyar), Bleberan, Kajar, Sukoliman, Wonobudho (Gunung Kidul), Cepu (Blora), and Banyumas (Hoop 1935: Flines 1949; Sukendar 1970). They are identified by a number of stone cists, stone seats, stone statues, upright stones (single or groups of rectangular and circular form), stone terraces, stone troughs, and stone mortars. Megaliths in the eastern part of Java are principally found in Bondowoso, Jember, Banyuwangi, Situbondo, Lumajang, Bojonegoro and Pacet (Mojokerto) (Steinmetz 1899; Haan 1921; Willems 1941; Heekeren 1958; Prasetyo 2000b and 2008). The megaliths consist of stone statues, upright stones (grouping rectangular and circle form), stone tables, stone chambers, stone mortars, stone troughs, cup-marked stone, sarcophagus, stone cists, and stone terraces. However, local variations are most common in Bondowoso and Jember – for instance *watu kenong* –which are upright stones designed in cylindrical shaped with knob on the top.

Bali has many megaliths, such as upright stones, sarcophagus, stone seats, and stone-paved paths (Heekeren 1958; Soejono 1984). They are established at the Busungbiu, Manuaba, Gianyar, Tegalalang, Pura Penataran, Pura Gunung Kawi, Tanggahan-Pekan village, Manuaba, Petang, Trunyan, Selulung, Sembiran, Tenganan, Gelgel, and Klungkung (Moojen 1926; Nieuwenkamp 1926; Callenfels 1931; Angelino 1921:281-285; 9; Heekeren 1958:58; Soejono 1984). A sarcophagus at Manuaba is associated with a stone mould for the casting of bronze kettle-drums of the Pejeng type (Heekeren 1958:54). Furthermore, Korn indicated that the sarcophagus at Petang is in association with funeral grave goods, such as spear heads, bronze rings, stone axes, fragments of necklaces and a spiral-shaped finger-stall (Heekeren 1958:55).

On Kalimantan, megaliths are reported at Kajang Pura, Lep Bakong, Long Poh, Long Sungan (Kayan Hilir), Long Kejanan, Long Nawang (Kayan Hulu), Data Kanuyan, dan Long Danum.(Bosch 1928; Sierevelt 1929:162-164). They include upright stones, dolmen, and stone container (sarcophagus?). Schneeberger in 1930 also recorded some of megaliths in Long Pulung and Long Berini (Schneeberger, 1979:67-68). Based on the uniformity of construction he called the object urn-dolmen: a large stone urn placed on top of four river stones or two stone slabs, and protected by a large stone slab supported by two other stone slabs. Sometimes, this large stone slab is placed directly on top of the stone urn as a cover, without the supporting slabs (Arifin and Sellato, 2003). A number of foreign researchers have also noted some tomb stones and carved stone pillars in Kayan Hulu (Tillema, 1938; Harrison, 1959; Whittier, 1974). Martin Baier in 1990 visited the remains of the megalithic tomb that serves as a container in the interior of Borneo and saw the forms of sarcophagi, stone coffins and dolmen (Baier, 1992: 161-75). In the same year Bernard Sellato carried out a brief survey at Pujungan, followed the next year with a systematic survey to know the history and relationship with megaliths belonged to the Ngorek community. Sellato in 1992 resume to conduct surveys and focus in the Apau Ping Area (District of Hulu Bahau) and visit some of the original settlement included 7 burial sites (Manguin 1995). Until the beginning of 1993there has been information about the existence of about 70 urn-dolmen sites and 15 settlement sites in the District of Pujungan associated with Ngorek cultural tribe. Research activities megalithic in Kalimantan border was last recorded in 1993 in Kerayan (Nunukan), Bahau Hulu, Pujungan, and Kayan Hulu (Malinau) that produced a number of megalithic remains in various forms (Arifin and Sellato, 2003).

Megaliths in Sulawesi spread over the northern, central, and southern parts. They are mainly concentrated at Minahasa (North Sulawesi), Lore and Palu (Central Sulawesi), and

Toraja (South Sulawesi). Cubical stones covered with high roofs – called *waruga*– are found around Minahasa. Both the container and lid were decorated with hocked style of human figures or tendrils, serpents and curls. Enormous numbers of megaliths such as stone mortar, upright stones, stone tables, stone vats, and stone statues occur in Central Sulawesi, particularly in Napu (Watunongko), Besoa (Pokkekea, Doda), Bada (Sepe, Tumpuara). Megaliths, especially upright stones, appear Tana Toraja in West Sulawesi (formerly part of South Sulawesi) (Crystal 1974:118-121).

In Nusa Tenggara, megaliths are mainly concentrated on Flores, Timor, Sumba, and Sumbawa. On Flores, megaliths are described in the Ende, Bajawa, Sikka, and Lio region (Meerburg 1891; Kate 1894; Rouffaer 1910; Arndt 1932). They include tombstones (*watu eboe*) that were constructed from long, slender stones planted in ground to serve as pillars (Rouffaer 1902); stone walls (*kota*), stone slabs (*nabe*); upright stones (*watu-lewa*), and stone tables (*nabe*) (Arndt 1932:11-12). On Timor megaliths are reported at a number of localities in southwest and central Timor (Perry 1918; Sukendar 1993). They include stone seats and tables, as well as enclosures (*ksadan*). On Sumba megaliths are informed in western and eastern parts of the island such as at Samparengo, Landuwitu-Ratimbera, Peremadita, Laonatang, Labai, Kopa, Lawiri-Ladesa and Lambanapu villages (East Sumba) (Perry 1918:11-19). They include stone seats, upright stones, and stone tables. Many of the upright stones are fully ornamented with carvings, such as fishes, crabs, crocodiles, and horses (Perry 1918:40-41). On Sumbawa, stone vats were found near Batutring (Western Sumbawa (Kupperus 1937:129-130). They were decorated partly in low relief and partly engraved with woman figure with up-stretched arms, human faces, and animal forms like lizard and snakes. Stone vats also found in Donggo Regency (Perry 1918:20), particularly at Rora and Palama villages (Prasetyo 2002).

Megaliths are reported on Maluku islands of Ambon, Aru, Halmahera, Kei, Tanimbar, Seram, and Watubela (Perry 1918; Kruyt 1906). Bastian and Perry (1918:21-22) reported stone table, stone seats, stone graves, and roughly carved images. Every village in Ambon placed a stone sculpture either in the forest or in a cave. On Halmahera at Lake Galela, the people of Gamsungi adulated a large stone shape (Kruyt 1906:208).

Megaliths of Papua – upright stones stone arrangements–are accounted at Doyolama (Jayapura). They erected at Tutari Hill together with stone pavement, stone enclosure, and engraved boulder stones with human, animal, geometric designs (Prasetyo 2001). The latest information of megalithic remains in Papua can be found in the Raja Ampat area and Srobu (Jayapura). The megaliths of King Amat and Srobu (Jayapura) consist of dolmen (Srobu) and stone terraces (Raja Ampat).

Chronology of Indonesian Megaliths

More than sixty years ago, Heine-Geldern assumed that megalithic culture constituted a last bloom of the quadrangular adzes culture. Furthermore, he proposed that the megalithic culture appeared on the Asian continent and spread toward Indonesia, in at least two phases, or even more, at different times. The first phase came at the end of Neolithic period together with the quadrangular adzes brought by Austronesian-speaking people at about 2000 BCE -1500 BCE, called the older megalithic. The second phase came during the early bronze-iron period at the same time with Dongson culture 4th- 3rd century BC, called the younger megalithic culture (Heine-Geldern 1945:151). Later two main waves of megalithic culture became intermingled and developed local variations (Heekeren 1958:44). Soejono – based on an outline of Indonesian prehistory –put the megalithic culture at the end of Neolithic period that dates back to about 1500 BCE (1984:458). So far the assumption made by Soejono and Heine-Geldern regarding the immigrants that spread the megalithic culture was merely based on observation of archaeological remains and comparisons within the dispersal area. The phase recognized by Heine-Geldern as the Neolithic period is still the subject of scholarly dispute. It is also due to lack of dating to determine when the megalithic culture appear for the early time in Indonesia. Hundreds of megalithic sites have been investigated since that time until now, but very view sites have been dated. In working out the problem it is necessary to establish the absolute chronology.

To reveal the dates of megalithic sites, studies on dates have been more intensively carried out since the last decade. Radio-carbon dates of megalithic sites in Sumatra, Sulawesi, and Java can be grouped into proto-histroric and historic dates. Thus far the oldest megalithic sites are found in Minahasa (North Sulawesi) and Besoa (Central Sulawesi). Laboratory test on traces of burning activity in megalithic context from inside one of the *waruga*s (stone burial jars) at Tatelu (Minahasa) shows a date of 2070±140 BP, which when calibrated reveals a range of 4th century BCE to 3rd century CE.

The megalithic sites at Besoa Valley (Central Sulawesi) show a Radio-carbon date of 2460±120 BP, which when calibrated with Stuiver-and-Reimer method, produces a date to the 9th– 3rd centuries BCE. The dates are parallel to the end of the prehistoric period, which is known as the proto-historic, a transition into the historic period. On the other hand, Radio-carbon dates of megalithic sites in Nias (North Sumatra), Limapuluh Kota (West Sumatra), Kerinci (Jambi), Pasemah (South Sumatra), Jember, Situbondo, Bondowoso, and Bojonegoro (East Java) yield younger age with a range of 15th – 17th centuries CE for Nias, 10th to 13th centuries CE for Limapuluh Kota, 3rd to 6th centuries CE and 13th to 17th centuries CE for Pasemah, 4th and 7th – 11th centuries CE and 13th century CE for Kerinci, 9th – 10th centuries CE and 10th – 11th centuries CE for West Java, and 6th – 11th to 15th – 17th centuries CE for East Java (Prasetyo, 2008).

Megaliths Continuity and Connection with Mainland Asia

According to the evidence of dating, thus far there are no absolute dates that significantly support the appearance of the megalithic in the neolithic period. In addition, no finds of a purely neolithic character have been found associated with megalithic structures or monuments through excavations in Indonesia. Van der Hoop's report on the excavation by Buning in the Cirebon area, which yield a stone-cist grave with three stone adzes in it, is still doubted as demonstrating a neolithic character. Although no items of metal were found, it might be possible that the dating is post-neolithic, like in Anakalang (West Sumba), where some quadrangular adzes were found in a small stone cist. These adzes certainly have no pure neolithic characteristics, but more belong to a continuation of that tradition (Prasetyo 2006c:288).

If the megaliths is not part of the Neolithic culture, who brought this phenomenon to Indonesia? On the Asian mainland, the use of metal had developed by the 2nd millennium BCE. Indications of a metal culture can be found in the Dongson area of Vietnam. Apparently, the development of metal technology in Vietnam had occurred at about the same time as that in Thailand, as can be seen at the sites of Non Nok Tha, Ban Chiang, and Ba Na Di in North eastern Thailand, which are dated to about 2000 – 500 BCE. The early development of the metal culture in Indonesia, called paleometallic phase, was distinguished by the appearance of bronze and iron at about the same time, which is around 500 BCE. Metal artefacts from this period are assumed to be ceremonial objects such as bronze axe of various shapes and decorations, and bronze kettledrums. The metal culture, and particularly the bronze culture, was often correlated with the Dongson Culture in North Vietnam. According to C14 dating, the peak of the Dongson Culture occurred at about 600 – 400 BCE (Bellwood, 1985:272).

What about the relationship between early metal age influences and the megaliths in Indonesia? Although Heine-Geldern proposed the development of the older megalithic culture during the neolithic stage, this is still disputable, whereas its presence during the metal age is more likely to be accepted. A number of excavations carried out in megalithic sites in Indonesia have revealed the metal-influenced characteristics of the findings, as in bronze and iron artefacts, within the megalithic complex. In Pagar Alam, Hoop excavated two stone-cist graves and found bronze ornamental fragments, a gold nail and a number of glass beads (Hoop, 1932:48-49). A number of excavations by de Haan, van Heekeren and Willems on megaliths in Jember and Bondowoso produced a picture of metal influences on these sites. De Haan discovered a dolmen in the area of Pasar Alas (Jember) containing human teeth, beads, and metal adornments (a gold ring) (Haan 1921:55-59). Willems, in his excavation of a dolmen in Pakauman, found human bones, cord-marked pottery, glass beads, and iron artifact (Willems 1941:41). In Wonosari, Gunung Kidul, Hoop excavated a stone cist grave, which revealed the presence of metal artifact together with glass beads and human bones (Hoop 1935).

Towards the first century CE, island Southeast Asia began to engage in the Medditeranean-India-China trade network, in which commodities from Indonesia lie cloves, nutmeg, and cinnamon were traded with commodities from the west, among others metal objects and beads. Relationship between South China and Indonesia increased when the metal technology (the Dongson culture) flourished rapidly. By the artifacts' dispersal we see that several centuries before CE there were two main works.

Southeast China as an area of interest in searching for the place of origin of the megaliths of Indonesia. A link can be established between the dolmens of Indonesia and Zhejiang, Southeast China based on dolmen typology. A comparative study between Indonesian dolmens (classified by Prasetyo) and Zhejiang dolmens in Southeast China, Korean archaeologists Cho Jinson and Wi Myeonghawan show that all there types correspond to the types widely distributed in Indonesia. These types are unsupported cap stone type, hybrid type a and table type a. But there is a chronological gap of approximately 1000 years between the dolmens of Indonesia (700-1450 CE) and those of Zhejiang (12th-4th century BCE).

Based on a carved stone block showing two human figures, a dog and bronze kettledrum in Pasemah, there are also stylistic similarities with the reliefs and sculptures of the Han Dynasty of China. These carvings of kettledrum are obvious through the depicting of bronze kettledrum of the Heger-I type. The following are some of the conclusion which Rouffaer proposes, the kettledrum must have been introduced to Indonesia from South China and Further India in the transition period between the prehistoric and the historic period, thus between 100 and 600 CE (Hoop 1932:88). A number of bronze arm and leg rings from inhabitants which were excavated in megalithic site in Tegur Wangi and elsewhere, this same decoration occur on various bronzes from Dongson.

Stone vats occur only in some part of Indonesia, particularly at Bada, Napu, Besoa (Central Sulawesi) (Yuniawati 2001), Samosir (North Sumatra) (Simanjuntak 1982), Bima (Prasetyo 2012), and North of Kalimantan (Prasetyo, 2015) noted similarities of form between Laos.

During the historic period, when Indian Influence came to Indonesia, some megalithic elements lived on. The influx of Hindu-Buddhist culture into Indonesia apparently had no indication that in several places in the archipelago, megalithic cultural influence continued to dominate people's activities for many centuries. As an example, although Java was under the control of Hindu Buddhist kingdoms, megalithic phenomena and the associated prehistoric belief systems still prevailed among the communities such as in

Bondowoso, Jember, Lumajang, Bojonegoro, Gunung Kidul. Likewise is the case in Sumatra, e.g. the megaliths of Pasemah, which were under the control of the Sriwijaya Kingdom.

Based on the elements often found in religious buildings in Indonesia from the classical period, there is a probability that they developed from terraced structure. It forms the basis of the uniquely Indonesian Hindu-Buddhist buildings, which then gradually developed and found their specific shapes in accordance with the religion's requirements. Between 8th and 10th centuries CE, the development of the architecture of religious buildings entered the acculturation phase, which was characterized by strong influence of Hindu and Buddhist cultural elements. The examples are Borobudur, Kalasan, and Loro Jonggrang temples. Then, the period between 10th and 15th centuries CE, in which Indonesian elements were more prominent, was the post-acculturation period. The examples are among others Sukuh Temple and the terraced building in Penanggungan temple complex.

With the coming of Islam culture, the megalithic elements still survived. For examples, the tombstones of *plakpling* type in Aceh, which are thought to be from 16th century CE, remind us of the shapes of menhirs that were commonly used during pre-Islamic period in Indonesia. The tombstones are found at Lamreh, Aceh Besar. Islamic burials are often compared to the megalithic tradition. The locations of the burials on hills or high places remind us to ancestor worship, which was common in megalithic tradition. The teachings of Islam never mention the placement of burials in high places.

At places where megalithic ideas were blooming a few times back like in Nias, Toraja, Sumba, and Flores, people were still using large stone to construct megaliths. The transportation of large stones needs involvement of many people and distribution of food and property. Even in areas where the megalithic tradition is extinct, megalithic objects are worshipped without awareness of their function and meaning.

Conclusion

The Indonesian archipelago, which is located between the Asian mainland and Pacific islands, has a strategic position. This is not only today, in term of relationship between countries throughout the Asia-Pacific region, but also in the past. The Indonesian megaliths played an important role in the process and coming to the question of dispersion of megaliths, the pattern is fairly clear. They show denser distribution the inner part of archipelago and belong to a time bracket varying from circa 400-300 BCE to the recent time.

Megalithic culture in Indonesia particularly in view of the fact that its influence seems to extend to the present day. While not everyone is quite aware of its historical significance, there is no denying that the prevalence of folk-beliefs regarding supernatural powers that these megaliths are supposes to possess is indicative of living megalithic tradition.

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INTER-ISLANDS RELATIONS: THE JAVANESE FACTOR IN BARUS AND PADANG LAWAS, NORTH SUMATRA (9TH – 16TH C. CE)

Daniel Perret and Heddy Surachman

Introduction

This paper deals with history of inter-islands relations, especially Java and Sumatra during the historical period. The focus here is on direct or indirect connections between the western half of the present province of North Sumatra and Java between the ninth and the sixteenth century CE.

Surveys and excavations conducted in North Sumatra during the last twenty years, mostly within the framework of French-Indonesian cooperation projects, as well as the study of monuments, stone and metal images, inscriptions and artefacts found previously in the region, reveal a number of indications which shed new light in the fields of religion, economy, daily life and politics related to these connections. They also raise the question of the importance of navigation along the west coast of Sumatra a millenium ago and perhaps earlier.

Religion

The earliest indications of a Javanese presence in North Sumatra are probably the remains of the Śaivite temple of Simangambat located west of the Barisan Range, near Siabu. Simangambat, in the Mandailing-Natal *kabupaten* today, was strategically located between two rivers networks, the Batang Angkola network oriented northward and the Batang Gadis network with its spring to the southeast, in the Muara Sipongi region, and its mouth in the Indian Ocean at Singkuang. The architecture of the Simangambat temple combining stone and brick, as well as its decoration, point to a direct influence by Central Java monuments dating to the ninth century CE (Soedewo 2014). On the eastern side of the Barisan Range, in the upper reaches of the Barumun River, the Śaivite temples at Pagaranbira and Porlak Dolok were probably "outposts" or counterparts of the Javanese settlement related to Simangambat temple, a community which exploited precious minerals and forest products of the Barisan Range perhaps mostly destined for the Javanese markets through the west coast. Today, Padang Lawas people, in the lower reaches of the Barumun River, still remember the existence of tracks leading from the upper reaches of the same river across the mountains to the village of Siabu (Perret 2014c: 299, 327).

This Javanese community may have taken part in the building of the first religious complex in Padang Lawas, probably devoted to Śaivism and based on a Central Java model, at the beginning of the tenth century. This early Javanese, especially Central Javanese, architectural footprint, has been recently highlighted, especially as regards two structures still visible inside the main religious complex of Si Pamutung, near present Binanga on the Barumun River, dating between the end of Central Java and the beginning of East Java periods (Degroot 2014). But the role of Javanese in the Padang Lawas architectural history was not limited to the early centuries, as it appears also in a thirteenth century structure showing affinities with the architecture of East Java (Singhasāri-Majapahit). Therefore, based on religious architecture alone, the presence of communities of Javanese origin throughout Padang Lawas history is plausible.

Still regarding material religious culture, it must be recalled that East Java was probably at the origin of the Padang Lawas *makara*s. It has been recently suggested that although the position of these sculptures on the lower end of staircase handrails derives from a tradition initially widespread in Central Java (eighth and ninth century AD), it was possibly through contacts with East Java that they began to be produced in Padang Lawas no later than the thirteenth century CE. The Padang Lawas *makara*s do not fit completely with those of Java, probably because they incorporated external features, Indian in particular. Further south, in the Muara Jambi area, *makara*s uncovered in Solok Sipin (including one dating to 1064 CE), seem to show affinities with the Padang Lawas *makara*s. It was suggested therefore to date these Padang Lawas *makara*s in a time bracket mid-eleventh – beginning of thirteenth century (Klokke 2014; Perret 2014c: 318).

Several miniature free standing stone *stūpas* are very similar to architectural components of Central Java. Van Lohuizen-de Leeuw (1980: 280-1) has suggested comparisons with monuments from Tugurejo (Kendal area) and Cupuwatu near Yogyakarta. She has dated these monuments adorned with bands showing suspended garlands or festoons, between the second half of the ninth and the beginning of the tenth century CE. This hypothesis fits with the dating of the earliest monuments at Si Pamutung in Padang Lawas. The shape of such monuments is also reminiscent of a temple bell from Candi Kalasan (Central Java, ninth century), topped by a lion image (Fontein in A. & E. Eggebrecht 1995: notice 31). Three sculptures of Pagaranbira, in the upper reaches of the Barumun River, showing bulbous shape and elongated top, have recently been compared with Central Javanese examples (Soedewo 2014: 195). As is the case for *makara*s, most of these miniature free standing stone *stūpas* would be the results of combinations between Javanese and northeast Indian monuments (Perret 2014c: 323-4; Bautze-Picron 2014: 120, 121).

Javanese bronzes related to religion figure also among Padang Lawas finds, such as two Central Javanese offering trays (*talam*s) and a *kendi* uncovered in the Liang Abuan cave. The Prajñāpāramitā image found at Biaro Haloban (Bautze-Picron 2014: 110), as well as two mirrors, which fragments were recovered respectively at Napagadung Laut, upstream on the

Batang Pane River, and in the Si Pamutung excavations (Perret & Surachman 2014: 413-4), may be added to this list. Bronze *talam*s, probably of Javanese origin and dating to the Majapahit period, were also found at Barus Bukit Hasang (Perret & Surachman 2009: 430-2).

Still in Padang Lawas, the Tandihat I inscription, dating to 1179 CE, incised on a block of tuff originally belonging to a sculpture or to a religious structure, mentions a Hulun Kambang, unfortunately without any additional detail (Griffiths 2014: 225-6). This individual probably blessed something at that time. It has been recently proposed to interpret this expression as a local adaptation of the Old Javanese *hulu kĕmbaŋ*, that appears in the *Rajapatigundala*, an Old Javanese compilation of regulations for ecclesiastics mentioning Kṛtanagara (Perret 2014c: 330). Zoetmulder (1982, I: 845) defined it as "a religious person with a particular function (chief of a group?) in a community of hermits". This definition would fit with the context of this unfortunately too fragmentary inscription. One would assume that this *hulun kambang* ordered a permanent structure, even the whole temple complex at Tandihat I, or blessed one image there.

In Barus, ancient Muslim gravestones of type 2, dating to the 15^{th}-16^{th} centuries, present a stylized anthropomorphic face reminding of the *kāla* pattern, very common in the Hindo-Buddhist Javanese art (Perret, Surachman & Kalus 2009: 481).

Economy

It has been suggested that the foundation of a settlement in Padang Lawas by the mid-ninth century CE was related to developments in the Strait of Malacca at the time. The growth of maritime trade with China from the ninth century on combined with the explosion of commercial activity between India and China from the mid-tenth century on, stimulated the development of trading places in the Strait of Malacca, for example in Kedah, Peninsular Malaysia, among other places. In South Kedah, the Kampung Sungai Mas site, a prosperous trading settlement, since the ninth century CE at least, stimulated, if not the foundation, at least the development of the Sumatran coastal trading settlement later called P'anēs in an Armenian source, located in the vicinity of the mouth of the Barumun River. This settlement was the gateway for the natural resources of the interior. Logically, in turn it would have stimulated the foundation of a settlement in the interior to centralise the natural resources mainly available to the west, southwest and north of Padang Lawas. This settlement was Si Pamutung, at the confluence between the Barumun and the Batang Pane rivers, founded by the mid-ninth century CE. It is quite possible that members of the Javanese community settled near Simangambat, Pagaranbira and Porlak Dolok, as mentionned earlier, played a role in the very foundation of Si Pamutung. This settlement would have thus been developed, on the one hand by people from the Strait of Malacca who entered Padang Lawas through the coastal settlement located near the mouth of the Barumun, on the other hand by

Javanese previously settled in Mandailing or in the very upper reaches of the Barumun. The presence at Si Pamutung of a population from Mandailing-Natal could not but facilitate the delivery of resources, especially gold and forest products, from this region towards the Strait of Malacca (Perret 2014c: 334-5, 338). Si Pamutung underwent a period of prosperity starting in the tenth century CE. Its cosmopolitan population probably included a significant community of Javanese origin until the end of the thirteenth century.

Other ancient economic relations with Java have been suggested for the coastal sites of Barus Lobu Tua, settled between the second half of the ninth and the end of the eleventh century CE, and Barus Bukit Hasang, settled between the twelfth and the beginning of the sixteenth century CE. In his description of the trade between Sunda and Java with the west coast of Sumatra at the beginning of the sixteenth century, the Portuguese Tome Pires mentions only the port of Panchur, that is Barus, and refers to the west coast of Sumatra as the "Panchur coast". He explains that before the foundation of Melaka, by the beginning of the fifteenth century, ships from Gujarat, a region in the northwest of India, sailed along the west coast to reach Java, and he details the triangular trade system they conducted at the time (Pires 1990, I: 161-2, 170, 180).

It does not seem far-fetched to think that this triangular trade system, in which Barus played a major role, was already in place in the ninth century CE. The first stage took place between India and Barus: traders from Gujarat brought shipments of textiles to Barus to be exchanged for local products such as gold, camphor and other forest products. Despite the challenges of sailing along the west coast of Sumatra, these products were then carried to Sunda in West Java, or to Gresik, on the north coast of East Java, to be exchanged for spices from the Molluques. From Java, these Indian traders sailed back to sell their cargoes in India.

The west coast maritime route was also used to carry other goods between Java and Barus. This is the case, since the end of the sixteenth century at least, for salt from Jortan and Gresik, which passed through Banten before to reach Barus, where it was exchanged for benzoin and other goods (Perret 2009: 626). Barus Lobu Tua seems also to have been a place where Indians and Javanese cooperated to exploit gold deposits in the interior, gold destined for both the Javanese and the Indian markets (Guillot et al. 2003: 47, 68, 290). Javanese were also very likely much interested by camphor, a famous product from the interior of Barus since ancient times. Used as a medicine in Jawa, it is mentionned several times in the Javanese version of the *Rāmāyana* (Guillot et al. 2003: 47).

Another likely connection between North Sumatra and Java is the use of coinage, especially coins of the *mā* type that existed in Java at the same time. Finds of gold and silver coins bearing the sandalwood flower design are reported in Barus since the mid-nineteenth century. Three gold coins of this type were found during excavations conducted in Barus Lobu

Tua in the 1990's. Without any doubt, Java was the reference for this coinage even if we are now sure that Barus itself issued this type of coins (Guillot et al. 2003: 47, 283-4, 286).

The recent Si Pamutung excavations have also yielded coins of the *mā* type, bearing the stylised sandalwood flower design. One of them is probably made of a silver-based or tin-based alloy, while the other could be of silver or electrum (Perret & Surachman 2014: 402-4). No identical equivalents seem to have been documented so far. Their dimensions, weights, general shapes and designs lead to think that both were probably minted in the same issuing centre. Based on the simplified shape of the character *mā* on the obverse, a dating posterior to mid-tenth century has been suggested by comparison with the graphic evolution of this character on coins from Java (Wisseman Christie 1996: 253). On the other hand, as no *mā* coins were found in the excavations of the Barus-Bukit Hasang site, founded in the twelfth century, a dating for these two coins between mid-tenth and the end of the eleventh century is likely. As we have suggested the presence of Javanese in Padang Lawas at the time, the use of these coins by Javanese cannot be ruled out.

Daily Life

Dozens of rings and gemstones were uncovered in uncontrolled excavations conducted in the Barus Lobu Tua site between the second half of the nineteenth and the beginning of the twentieth century. The large quantity of such finds raise questions as it is unparalleled in Sumatra. Several bear short inscriptions very similar to inscriptions found on numerous Javanese rings. We suggest to interpret this corpus as an additional indication of a Javanese presence in Barus between the end of the ninth and the end of the eleventh century CE (Perret et al. 2016).

Excavations at Si Pamutung in Padang Lawas have highlighted the common use, probably mainly in the thirteenth century CE, of *kendi*s refillable through the bottom (Desbat 2014: 199, plate 19 p. 219) known in Java by the name of *kendi maling*. These *kendi*s found at Si Pamutung could therefore be Javanese imports or at least influenced by Javanese containers. They are totally absent in Barus (Perret 2014a: 467).

Other indications are found in Old Malay inscriptions from North Sumatra. The title "Pu" in "Pu Sapta", that appears in the Sitopayan II stone inscription, Padang Lawas (Griffiths 2014: 226-7), likely dating no later than the thirteenth century CE, was common at the time in Old Javanese, meaning "master", "lord" or "Sir", and often, but not exclusively, used for religious persons (Zoetmulder 1982, I: 1149; Pigeaud 1963, V: 328). The surname "Sapta" has also a meaning in Old Javanese that is "seven". Therefore, it would make sense to attribute a Javanese origin to Pu Sapta mentioned in this text. In the same inscription, the surname Buddhi could also refer to another individual of Javanese origin (Perret 2014c: 349). In Old Javanese, this word means "intelligence, reason, mind, discernment" (Zoetmulder 1982, I:

266), and the surname itself is mentioned in the Lintakan inscription, Central Java, dating to 919 CE (Sarkar 1972, II: 163, 166).

In the Sitopayan I stone inscription (Griffiths 2014: 226-7), also from Padang Lawas and also likely dating no later than the thirteenth century CE, the "Rangit" of the name "Si Rangit" could be linked also to Old Javanese, as *rengit* means "small fly" (Zoetmulder 1982, II: 1539). Therefore, this surname would perhaps characterised a person of small physical stature.

The Mount Sorik Merapi Old Malay stone inscriptions (Griffiths 2014: 233-235), located to the southwest of Padang Lawas, close to the Simangambat temple already mentionned, also contain information which could reveal Javanese connections. One of the four known inscriptions bears a date equivalent to 1242 CE and the corpus, likely related to defuncts, has been situated in the twelfth-thirteenth century CE range (Griffiths 2014: 234).

The title "Dara" appears twice in the Mt Sorik Merapi inscriptions: "Dara Panu" (D.53) and "Dara Nayana" (D.85). In Old Javanese, "Dara" is a common title for a married woman (Zoetmulder 1982, I: 365; Pigeaud 1963, V: 203), which would suit well to the context of inscription D.53, whereas in Malay, the word *dara* is never used alone. In the episod of the Javanese military expedition to Malayu, that would have occurred a few decades after the Mt Sorik Merapi inscriptions, the Javanese *Pararaton* recounts that troops brought back two princesses, Dara Petak and Dara Jingga. According to the same text, the first became wife of Wijaya, the first Majapahit ruler (Kṛtarajasa, 1293-1309), while the second married a prince and gave birth to a boy who would became ruler at Malayu (De Casparis 1995: 928-9). Furthermore, the same title "Dara" appears several times in the *Hikayat Raja Pasai*, a Malay text dating to the fifteenth century (Guillot & Kalus 2008: 75-6), and in the *Hikayat Aceh*, an other Malay text posterior to the *Hikayat Raja Pasai*. As far as we know, the Mt Sorik Merapi inscriptions provide the earliest evidence of this title in Sumatra. Therefore three possibilities are suggested: both defuncts were of Javanese origin and lived within a Javanese community in Sumatra; they belonged to an acculturated community of Javanese origin, in which the use of "Dara" was residual; the title was a borrowing from Old Javanese by a non-Javanese population. The same possibilities apply for both Dara Petak and Dara Jingga in the *Pararaton* (Perret 2014c: 349).

We face the same uncertainty for the surname "Panu". Whereas it appears as a surname in the Old Javanese Gilikan II inscription (Central Java), dating to c. 923 CE (Damais 1970: 747), in Malay, *panu* refers to *panau* meaning "light painless spots or marks on the human skin, regarded as beauty spots or otherwise" (Wilkinson 1959, II: 837). The origin of "Dara Nayana" in the inscription D.85 is also unclear. However, in Old Javanese *nayana* means "eye, gem" (Zoetmulder 1982, I: 1180), whereas this word seems unknown in Malay (Perret 2014c: 349-50).

The word *kalus* appears in front of the title "Hang" in inscription D.53 from Mt. Sorik Merapi, that mentions "Kalus Hang Jayasu…" Thus, this individual bore two titles. The word *kalus* as such seems unknown in Old Javanese, but it is perhaps related to *kaluṣa*, of which a meaning could be "to lead the life of a hermit" (Zoetmulder 1982, I: 780). This meaning would be conceivable in the context of the inscription. Surnames beginning with "Jaya" are common in Old Javanese. There seems to be no evidence in Old Javanese of Prajñavardhanī (inscription D.65), but surnames beginning with *prajña* (wise, prudent, wisdom, intelligence, knowledge), or *vardhanī* (from *vardhana*: increasing, causing prosperity) (Zoetmulder 1982, II: 1385, 2207), are attested in Old Javanese (Perret 2014c: 350).

Another type of data is much more speculative. They are the modern names of Padang Lawas religious complexes, which might be related to Java. Thus, Pamutung could find its origin in an Old-Javanese word based on *amutung* (to feel offended, angry; see Zoetmulder 1982, II: 1466). As regards Topayan, it might be related to the place name Toprayan common in the Yogyakarta region.

The *Ming shilu*, a Chinese official source from the Ming Dynasty, mentions that in 1418 the ship of a Chinese official was blown to the country of Banzu'er, generally identified with Barus, where the passagers were detained. When the head of the Javanese village of the place heard of this, he sent them to the king in West Java. The king consigned them to a Javanese to bring them back to China (Ptak 1998: 135). This mention provides evidence that a community originating from the kingdom of West Java, its capital being probably Banten Girang near today Serang, was living in Barus at the beginning of the fifteenth century and held a position strong enough to interfere in Barus external relations (Perret 2009: 625).

Politics

The sculpture inventory of Padang Lawas shows the profusion of lion figures, a quintessential symbol of royalty, especially in Java. In Central Java, lion figurations are uncommon, except in Prambanan, where their style clearly differs from the styles of the Padang Lawas lions (cf. for example photo coll. Oudheidkundige Dienst –OD- 291, and Degroot 2013: 66, 71). Free standing lions also adorn Borobudur (Miksic 2010: 49). Elsewhere, eight figurations have been recorded in eight different temples, most of them identified as Hindu (Degroot 2009: 182, 257, 259, 293, 318, 328, 333, 334, 339). At Kalasan, small lion images adorn mouths of *makara*s, and several other figurations are visible, including two images adorning Tārā's throne (Krom 1923, I: 257-8, 262). In East Java, at the time of Padang Lawas, lion figurations adorn angles of Candi Kidal's structure, dating to the mid-thirteenth century AD (ibid., II: 59-60; Kinney 2003: 92). At Singosari (c. 1300 AD), a large statue of Parvati is erected on a large *yoni* base with a small seated lion supporting the spout (Kinney 2003: 143-4).

The Padang Lawas sculptures include small lions showing irrealistic postures, especially sculptures which seem to combine a front half of lion with a back half of cat or dog. The specific morphology of these lions appears clearly on the inscribed lion from Tandihat II (Perret 2014b: no. 112), on a lion from Bahal II (Perret 2014b: no. 80), and on another lion sculpture from Bahal III (Perret 2014b: no. 102). It recalls the morphology of terracotta lions at Candi Bumiayu I, in South Sumatra, including one which seems to pull a chariot (observ. D. Perret, Oct. 2008), or the two horned lions with bulging eyes on a bas-relief at Candi Jago/Tumpang in East Java (photo OD 206)(second half 13th c. – first half 14th c.). The posture of the lion cub that seems to greet, placed between the front legs of the inscribed Tandihat II lion (Perret 2014b: no. 112), is reminiscent of the posture of a Prambanan lion (photo OD 291), wearing anklets, like the Tandihat II image.

In Java, at the same time, lion was also associated with royal power. The Pucangan inscription (East Java, 1041 CE) states that during his consecration ceremony, Airlangga (c. 991-1049 CE) sat on a lion-throne (*siṅhāsana*) (Kern 1917: 105, 110). The same applied for Kertanagara (r. 1268-92 CE), as recounted in the *Deśawarṇana* (Robson, ed., canto 84 p. 86).

Other possible political connections with Java can be found in the vocabulary used in Padang Lawas inscriptions (Perret 2014c: 307-309). The Paṇai inscription, dated palaeographically to the eleventh century, mentions a *kabayan* interpreted as owner of a royal Buddhist complex (Griffiths 2014: 215-217). The same word occurs in the later Sitopayan I inscription already mentionned above. Here a *kabayan* orders the construction of a religious structure. Both occurrences, perhaps three centuries apart, are interesting because the use of *kabayan* is unknown elsewhere in Sumatra before. By contrast, Javanese inscriptions attest of its use for the whole period of ancient occupation of Padang Lawas, between mid-ninth and the end of thirteenth century CE (Perret 2014c: note 70 p. 307). During the eleventh-twelfth centuries in Java, apart from administrative duties as high ranking official, he seems to perform military duties (Sedyawati 1994: 223-4, 233). While obviously referring to a position of authority, it is likely that the function of *kabayan* varied according to places and time.

The title 'pāduka śrī mahārāja', translated as 'his majesty the king' appears twice in the Padang Lawas epigraphic corpus: the Porlak Dolok inscription, clearly dating to the thirteenth century, based on the archaeological context, and the Sitopayan II inscription (Griffiths 2014: 219-224, 226-228), probably dating no later than the thirteenth century. The Porlak Dolok bilingual inscription, in the very upper reaches of the Barumun, mentions a *pāduka śrī mahārā(ja)*, owner of a building (*(mā)ligai*). At Sitopayan, it was for a *pad(u)ka śri mahār(ā)ja* that a *biara* was built and Buddhist images installed. Very curiously, in both cases, the name of the ruler is lacking, suggesting that for the sponsors and readers of these texts, there was no doubt about his identity.

These two occurrences of *pāduka śrī mahārāja* are the earliest in Sumatra. By contrast, numerous rulers of East Java carried this title between the ninth and the thirteenth century CE. These mentions of *kabayan* and *pāduka śrī mahārāja* attest that Padang Lawas political elite adopted, at least partially, a Javanese model from the eleventh century CE onward (Perret 2014c: 308-9, 348).

Another political indication might be associated with the Tandihat I stone inscription bearing a millesime equivalent to 1179 CE (Griffiths 2014: 224-6). In the 1930's, Schnitger saw an incised *candrakapāla* emblem that is a combination of skull and moon crescent (Schnitger 1936: 13, footnote 1 p. 38). In fact, several sides of this piece of tuff were sawn. Only a half of the incised motif is left, and it still shows something looking like a half moon crescent, while the motif incised above is unclear. The *candrakapāla* emblem is mentioned explicitly in at least one stone inscription in East Java, the Panumbangan I/Plumbangan II inscription (1042 Ś/1120 AD), village of Plumbangan, Blitar regency (Krom-Brandes 1913, no. LXIX: 162). Krom (1926: 287) defined this emblem as a skull with elephant tusks. Completely erased, unfortunately, it is impossible to compare it with the half-motif on the Tandihat I inscription. The *candrakapāla* is mentioned in another text in the Blitar region, the Pagiliran inscription -1056 Ś/1134 AD- (Suhadi & Kartakusuma 1996: 25). Still in East Java, the region of Kediri have yielded at least two other inscriptions, on which a *candrakapāla* emblem was identified.

To sum up, the motif incised on the piece of stone bearing the Tandihat I inscription is probably an emblem, but what is left is too fragmentary to assert that it is a Javanese one. However, it is perhaps no coincidence if this symbol appears in Padang Lawas, at a time when emblems seem to systematically adorn royal inscriptions in East Java (Perret 2014c: 307-8). The *Bhāratayuddha*, a text elaborated in Javanese royal courts from mid-twelfth century states that the princes of the "gold country" acknowledged the authority of the sovereign Jayabhaya (Krom 1926: 292). Provided this "gold country" is really Sumatra, including Padang Lawas, one may speculate that this submission was perhaps the consequence of a Javanese military expedition that would explain the upheavals at Si Pamutung in the middle of the twelfth century.

A last milestone is the Old Malay/Sanskrit inscription dating to 1286 CE, on the base of the Amoghapaśa stone image, originating from the religious complex of Padang Roco, in the present regency of Dharmasraya (West Sumatra province). This sculpture was sent with an official delegation by Kṛtanagara, the ruler of Singhasāri in Java, to the ruler of Malayu. To date, it provides the earliest evidence of the existence of the Malayu kingdom centre far upstream on the Batanghari. The settlement, that would be the capital of this kingdom, has yet to be uncovered. This shifting of Muara Jambi capital toward the high lands could only stimulate the gold extraction in the region.

This Javanese presence in the upper Batanghari may perhaps be linked with an indication of significant contemporary Javanese presence at the Si Pamutung site in Padang Lawas as mentionned above (Perret 2014c: 347): the numerous *kendi*s refillable through the bottom uncovered on the site, a type of container well known in Java (Perret 2014a: 467). Might this type of vessel be evidence of an expedition launched in the framework of the Pamalayu operation to eliminate a competitor of Malayu? This hypothesis would explain one of the main conclusions of recent archaeological researches on Padang Lawas: the end of Si Pamutung, its main settlement, by the end of the thirteenth century.

Conclusion

Considered individually, few of these observations and hypotheses are irrefutable, but examined together, their number, variety and datings, invite to seriously consider the religious, economic and political roles of people of Javanese origin in North Sumatra, especially between the ninth and the beginning of the sixteenth century CE. However it cannot be denied that the lack of extensive researches on contemporaneous archaeological sites in other regions of Sumatra may contribute to put too much emphasis on the role played by Java in the history of North Sumatra. Hopefully, future investigations on Sumatra history will probably help to rebalance the general picture.

Beyond the history of relations between North Sumatra and Java for the period under consideration here, this study sheds light on the west coast of Sumatra maritime route, which may have also played a significant role for contacts and migrations in much earlier periods.

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THE NEOLITHIC CULTURES OF LINGNAN (SOUTHERN CHINA)

XIE Guangmao

Introduction

Lingnan is defined here as an area in the south of the Five Ridges, mainly including the provinces and regions of Guangxi, Guangdong, Hainan, Hongkang and Macao (Fig. 1). It shares the border with Vietnam and faces the South China Sea. It is characterized by a karstic landscape, especially in Guangxi and western Guangdong, where karst mountains contain many caves and rock shelters. Most of the main rivers flow from northwest to southeast, and converge into the Pearl River. There are many basins, big and small, and most of them are distributed along the main river channels. This region has a tropical and subtropical moist monsoonal climate. Flora and fauna are rich and diverse.

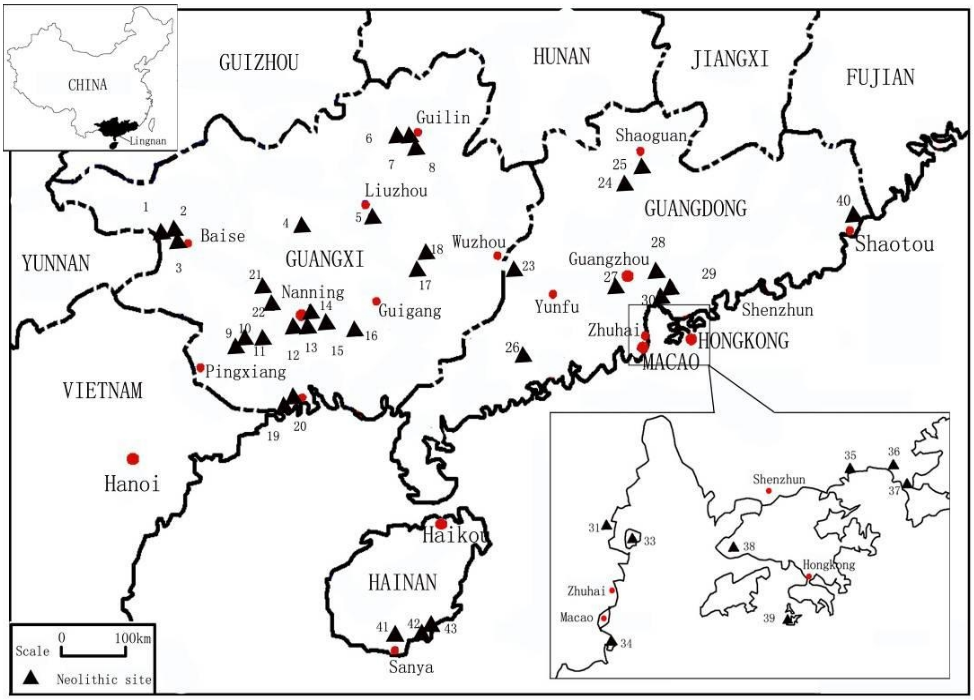

Fig.1 Location of Lingnan and distribution of the main Neolithic sites in this region (1.Baida; 2.Kantun; 3.Gexinqiao; 4.Beidaling; 5.Liyuzui; 6.Dayan; 7.Zengpiyan; 8.Miaoyan; 9.Chongtang; 10.Hecun; 11,Ganzao; 12.Baozitou; 13.Huiyaotian; 14.Dingshishan; 15.Qiujiang; 16.Xijin; 17.Datangcheng; 18.Xiangsizhou; 19.Yapushan; 20.Malanzui; 21.Dalongtan; 22.Leidong; 23.Huangyandong; 24.Niulandong; 25.Shixia; 26.Dushizai; 27. Xiqiaoshan; 28. Jinlansi; 29.Wanfu'an; 30. Haogang; 31. Longxue; 32.Caotangwan; 33. Houshawan; 34. Heisha; 35. Dameisha; 36. Dahuangsha; 37. Xiantouling; 38.Yonglang; 39.Dawan; 40. Chenqiao; 41. Luobidong; 42. Shigong; 43. Qiaoshan)

In Chinese archaeological terminology, the Neolithic begins with the occurrence of pottery and ground stone tools. The Neolithic in Lingnan can be divided into three stages: early (12000-8000 BP), middle (8000-5500 BP), and late (5500-3500 BP) (Fu 2004). Although pottery and ground stone tools occurred very early in Lingnan, agriculture in this region made its appearance only after 6000 BP. Therefore, much of the Lingnan Neolithic involved hunting and gathering.

The study of the Neolithic in Lingnan can be traced back 80 years to the 1930s, when de Chardin and Per Wenzhong conducted archaeological surveys in Guangxi that led to the discovery of several cave sites (Pei 1935). More extensive archaeological work has been completed since 1949, especially in the 1970s and 1980s. Hundreds of sites have now been discovered, dating to the early, middle and late Neolithic, and nearly 100 sites have been excavated.

Typical Sites

Cave sites

Cave sites are situated in mountain areas, especially in eastern Guangxi and western Guangdong where karst landforms are highly developed. The main sites include Dushizai, Huangyandong, Niulandong in Guangdong, and Zengpiyan, Jiaoziyan, Dayan, Miaoyan and Liyuzui in Guangxi. The representative sites are Huangyandong and Zengpiyan.

Huangyandong

Huangyandong is located in Fengkai County of Guangdong. It was discovered in 1961, and excavated in 1964, 1978, 1989 and 1990. Three cultural layers were identified with two human skulls and 589 stone artifacts recovered. Features of fire-use were also found. Stone artifacts are the main cultural remains with chipped stone tools predominating (Fig.2). Ground stone tools are very rare. No pottery was found. Raw materials for tool making are mostly sandstone cobbles. Chipped stone tools, including choppers and scrapers, are unifacially flaked, leaving a large cortex on the tool surface. Ground stone tools are roughly ground with concentration on the edge. Perforated stones are also common. The Huangyandong site was dated by radiocarbon analysis between 11,930 to 10,950 BP, and represents the initial Neolithic in Lingnan (Song et al. 1983).

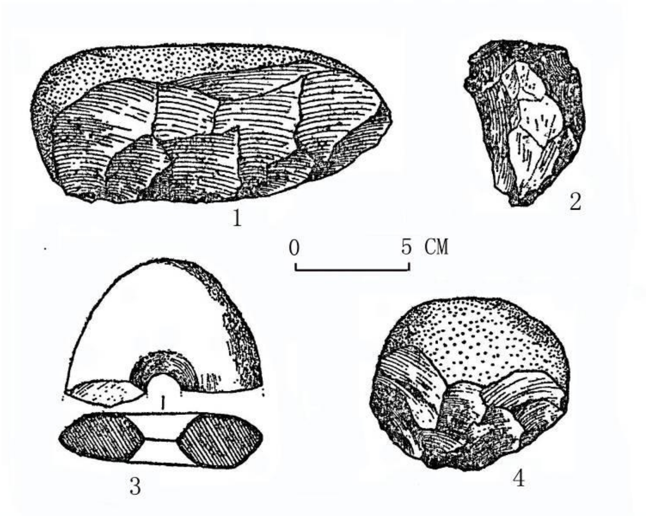

Fig.2 Stone tools from the Huangyandong site
1. 4. Choppers; 2. Scraper; 3.Perforated stone

Zengpiyan

Located on the southern outskirts of Guilin City, Guangxi, the Zengpiyan site was excavated in 1973 and 2001. Large quantities of stone, bone and shell implements, pottery, and shell remains, as well as burials in a crouched position, were recovered (Fig.3). It was dated between 12,000 and 8,000 BP. The cultural remains can be divided into five phases that represent three cultural developments, with Phase I as the first stage, followed by phase II to IV as the second, and phase V the last.

The cultural remains of the first stage (12000-11000 BP) are characterized by early pottery and a toolkit of stone, bone and shell. Quantities of aquatic and terrestrial animal remains were found. The majority of stone tools were made by direct percussion and are flaked unifacially, and choppers, points and perforated stones dominate the stone tool assemblage. Most of the bone and shell tools are drills, points, and pieces of shell knives. Pottery vessels were fired at very low temperatures and were made by hand pinching, indicating a very initial stage of pottery production and the earliest pottery found in China to date.

During the second stage (11000-8000 BP), cultural remains contain flaked pebble tools, ground bone and pierced shell tools similar to those of phase I in terms of both manufacturing techniques and typological compositions. The major characteristic of this phase is a technical development of ceramic production. The quantity of potsherds increased.

Pottery now involved slab construction. Remains of terrestrial animals, birds, shells, fish, and plants suggest that hunting, fishing, and gathering were major subsistence strategies.

At the third stage (8000 and 7000 BP), the cultural contents changed significantly. Shell tools were absent. The quantity of flaked pebble and bone tools now reduced significantly, and a substantial quantity of well-ground stone axes and adzes were recovered. Ceramic production developed further. The quantity, typological variety, decoration motifs all increased or diversified significantly. Like the previous stages, remains of animals and plants also indicated that hunting, fishing and gathering were major subsistence strategies (Fu et al. 2003).

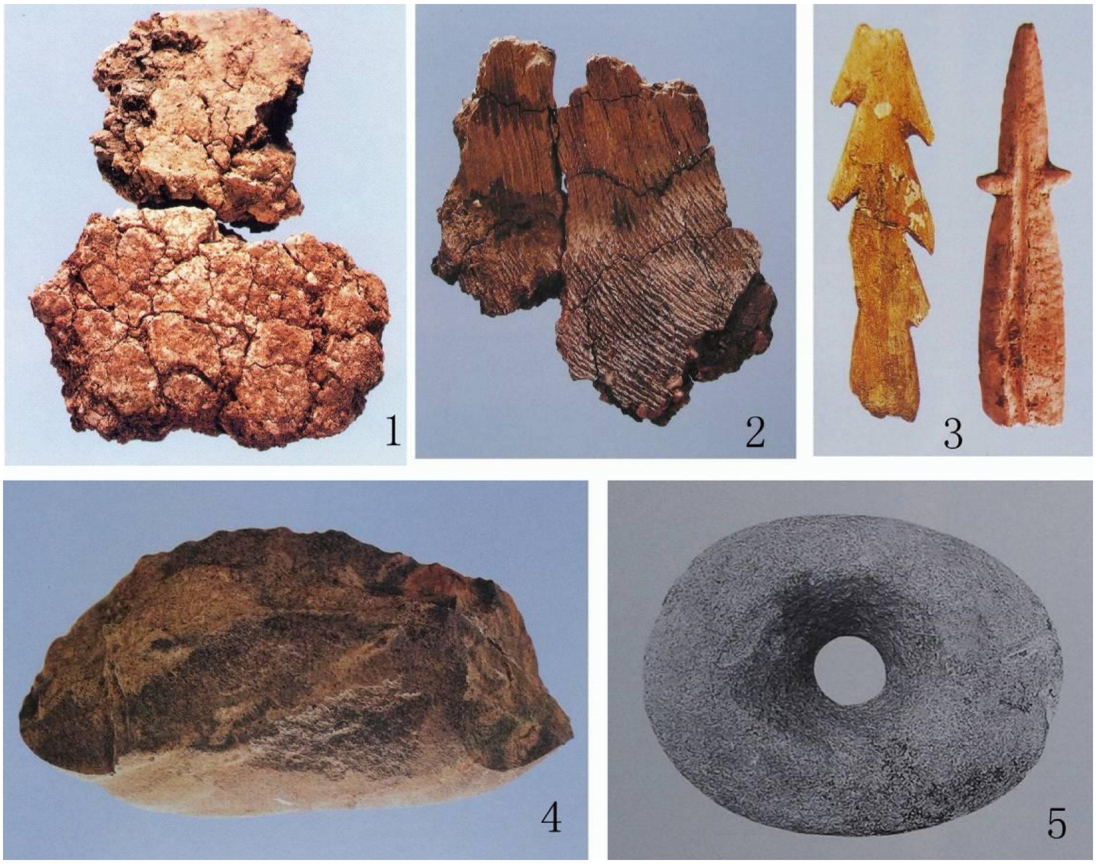

Fig.3 Cultural remains from Zengpiyan site
1.2. Potsherds (1. Phase I; 2. Phase II); 3.Harpoons; 4. Chopper; 5. Perforated stone

Liyuzui

This site is a rock shelter, and is located on the outskirts of Liuzhou City, Guangxi. It was excavated in 1980 and 2003. Large quantities of stone, bone and shell implements, pottery, and shell remains, as well as burials in a flexed position, were unearthed. The cultural remains can be divided into three phases, with phase I being described as Palaeolithic, and phases II and III, Neolithic. The cultural remains of phase II are characterized by large quantities of flaked implements, a small number of potsherds and a few bone tools. The stone artifacts include small flint implements and large pebble choppers, scrapers and perforated stones (Fig.4). The cord-marked potsherds were tempered with coarse sand. Pots with a round base are the main form. Bone tools include needles, drills and knives. Flexed burials were also found. This phase was dated to about 9,000 BP. In phase III, stone implements are dominated by ground axes and adzes and small flint implements, but large pebble tools are virtually absent. Apart from bone tools similar to those of phase I, shell tools such as knives are present. Cord-marking on the potsherds became smaller. This phase was dated to 6,500 BP (He et al 1983).

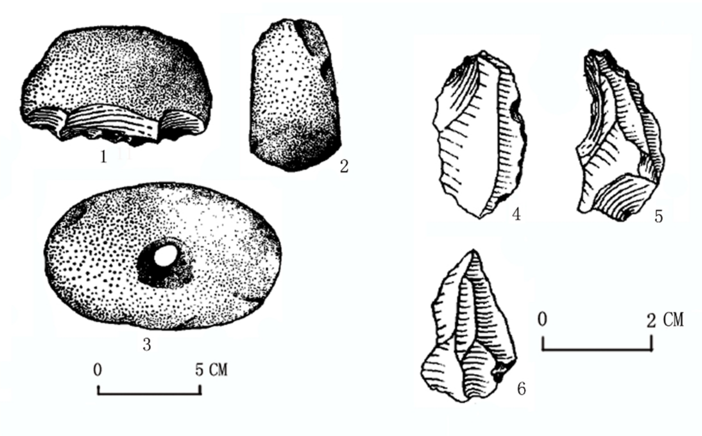

Fig.4 Stone tools from Liyuzui site
1. Chopper; 2. Ground adze; 3. Perforated stone; 4. Scraper; 5.6.Points

Open-air sites

Midden sites

Midden sites include fresh water midden and coast midden sites. Fresh water midden sites are large in number, and distributed throughout southern Guangxi and the Pearl River Delta, which are on the banks of rivers and later are distributed on the coast. The main sites include Dingshishan, Huiyaotian, Baozitou, Xijin, Qiujiang, Ganzao, Hecun and Chongtang in Guangxi, and Jinlansi, Wanfu'an, Haogang, Caotangwan in Guangdong. They date between 10,000-5,000 BP. The representative site is the Dingshishan site. Coast midden sites are mainly distributed in the southern coast of Guangxi and eastern coast of Guangdong. About 10 sites have been discovered. The main sites are Yapushan, Malanzui in Guangxi, and Chenqiao in Guangdong, with Yapushan being representative of this type.

Dingshishan

It is a typical fresh water midden site. Situated in the southeastern suburb of Nanning City of Guangxi, it was excavated for three seasons from 1997 to 1999. Large quantities of stone (tektite), bone and shell implements, pottery, and shell remains, as well as numerous burials were unearthed (Fig.5-6). There are four phases, with phases II-III belonging to the Dingshan culture. The cultural remains of phase I are characterized by numerous flaked tektite implements, a few perforated stones and potsherds with coarse cord-marked decoration. It is dated to 10,000 BP. In phases II and III, dated from 7,000-8,000 BP, ground stone tools, and shell tools were present, while flaked tektite implements decreased dramatically. Both the quantity and diversity of pottery increased in this period, and the firing temperature was higher. Decorative motifs included cord and basket impressions. Shell knives are common and most of them are in triangular shape. Numerous burials were found, with the skeletons interred in various flexed positions, as well as a special type of dismembered position. In phase IV, dated to 6,000 BP, sand tempered pottery still dominated, but fine clay pottery and the application of potter's wheel also occurred. Vessel forms increased (Fu et al 1998).

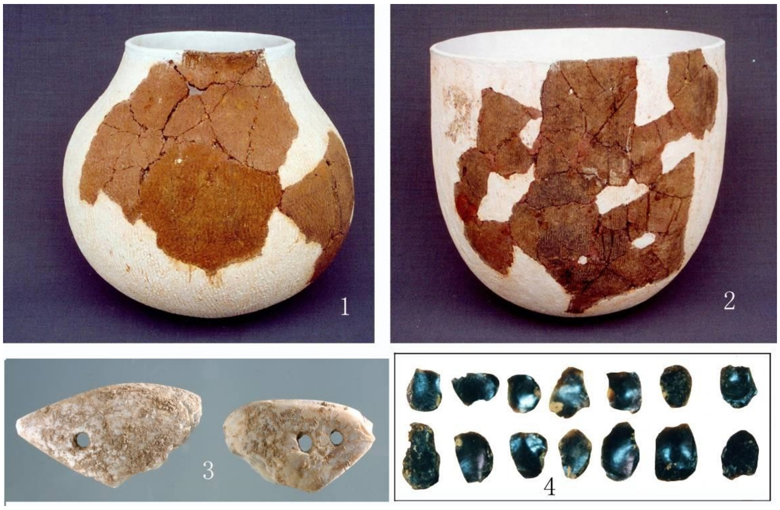

Fig.5. Cultural remains from Dingshishan site
1.2. Pots; 3. Shell knives; 4. Tektite implements

Fig.6 Burials from Dingshishan site
1. Skeleton in flexed position; 2. Skeleton in dismembered position

Yapushan

Dating to the middle Neolithic (about 7000 BP), the Yapishan site is an estuarine midden site. Unlike midden sites along inland rivers, the deposits of Yapushan contain, apart from terrestrial animal remains, numerous marine shells. Cultural remains include stone artifacts, pottery, and tools made of shell and bone. Chipped stone tools are the largest in number, including choppers, picks, handaxe-like tools, net-sinkers and balls. The handaxe-like tools are presumed to have been used for opening oysters (Fig.7). Ground tools include axes, adzes, chisels, etc. Bone drills, arrows, and shell spades and rings were also recovered. Course sand tempered pottery was decorated by cord, basket and line impressions (Mo et al. 1961).

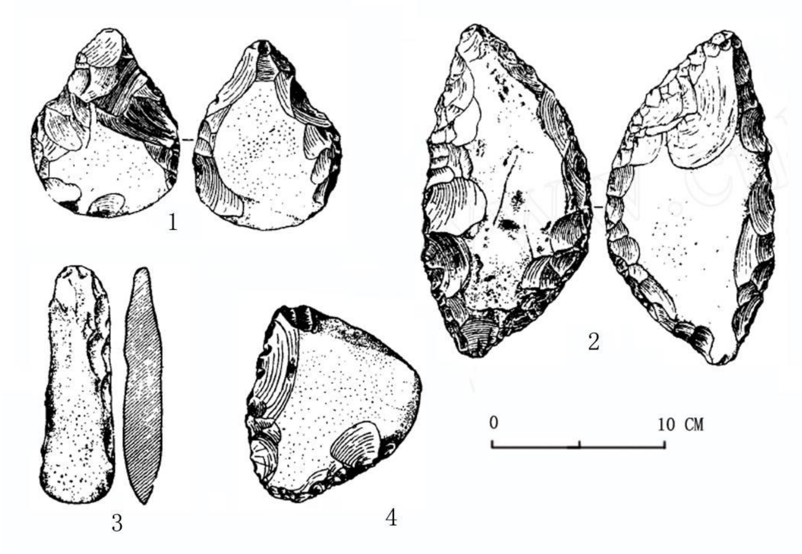

Fig.7 Stone tools from Yapushan site
1.2. Handaxe-like tools; 3. Ground axe; 4. Chopper

Sand-dune site

The sites of this type are characterized by deposits mainly of sand and are distributed along the coast. The main sites are Dameisha, Xiaomeisha, Dahuangsha, Xiantouling, Houshawan, Longxue in Guangdong, Dawan and Yonglang in Hongkong, and Heisha in Macao. The representative site is Xiantouling.

Xiantouling

This site is located on the northeastern coast of Dapeng Bay in Shenzhen, Guangdong. It was discovered in 1981 with a distribution area of about 30000m^2. Three seasons of excavation were conducted from 1985 to 2006, and a total of 2300m^2 was exposed. Cultural remains of the Neolithic and Shang period were found, with the former dominating. The Neolithic remains are very rich. Features, including hearths, building bases, erected stones and burned ground were discovered. Both types of clay pottery and sand-tempered pottery were also recovered. Sand-tempered pottery includes pots and stands, and the pots were decorated by cord-marking. Clay pottery was common, and can be divided into white pottery, painted pottery and, rarely, black pottery. Types include pots, kettles, cups, plates, stem cups, bowls, etc. Incised designs and pressed patterns were made on the wares surface. Other main cultural remains are stone artifacts, which include adzes, beaters, drillers, discs, whetstones and others (Fig.8). This site was dated by 14C from 7,000BP to 6,000BP.

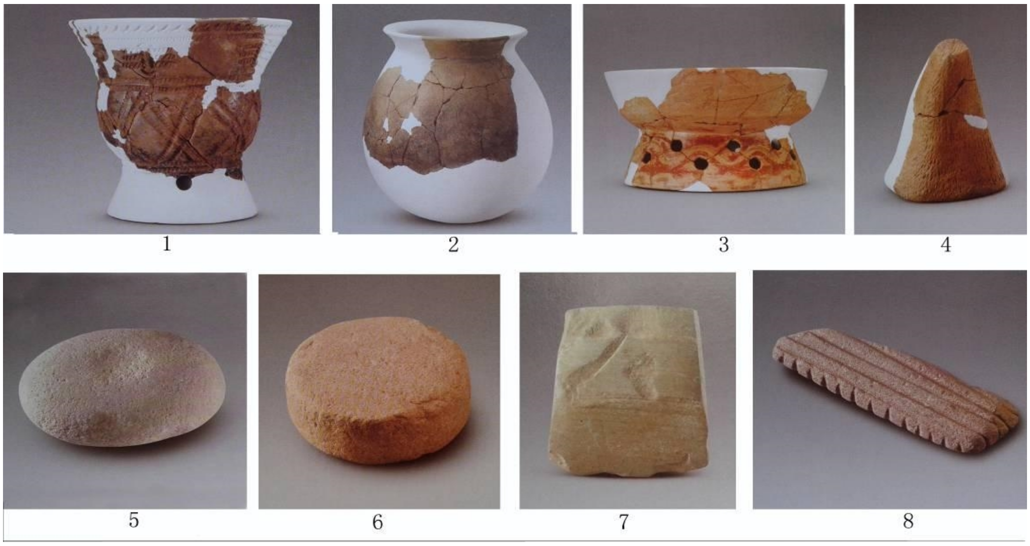

Fig.8 Cultural remains from Xiantouling site
1. Cup; 2. Pot; 3. Plate; 4. Stand; 5. Pitted stone; 6. Disc; 7. Adze; 8 Beater

Five phases of the cultural remains were identified which represent three stages, with Phase I to III as the first stage, phase IV as the second, and phase V the last. During the first stage (7000-6400BP), cord marks on the sand-tempered pottery are rare. White pottery is common, and there are a few black pottery remains. Cups, plates, pots and kettles are the main types. During the second stage (6200BP), cord marks on the sand-tempered pottery are coarse, and incised designs appeared. White potteries became less abundant. Plates, stem cups, kettles, stands are common. During the third stage (6000BP), coarse cord marks and incised designs are the main decoration pattern. Painted pottery decreased dramatically, and white pottery became rare. Kettles, bowls and stands are the main types (Li et al. 2013).

Sites on terrace/hillside

The sites of this type are mainly distributed on the terraces or hillsides in river valleys. The main sites include Gexinqiao, Baida, Kantun, Beidaling, Datangcheng, Shangta, Xiangsizhou, Leidong and Dalongtan in Guangxi, and Shixia, Xiqiaoshan in Guangdong. They were dated between 9,000-5,500 BP. The representative sites are Gexinqiao, Xiqiaoshan and Shixia.

Gexinqiao

Located about 10 km west of Baise City in Guangxi Province, the Gexinqiao site was excavated in 2002 and 2003. A stone workshop and two burials were found, and large quantities of stone artifacts, a few potsherds, as well as numerous terrestrial and aquatic animals were recovered. The stone workshop covers an area of about 500 m^2. Within the workshop, numerous densely packed stone artifacts were recovered. The stone artifacts include cobbles, hammer-stones, anvils, whetstones and choppers as well as unfinished items in different stages of manufacture, and associated debitage. Two burials were discovered in the centre of the excavated area. The skeleton of a female was found in a flexed position and was relatively complete, while the other was fragmentary.

Cultural remains include stone artifacts and pottery. Stone artifacts dominate, most of which come from the stone workshop. They can be divided into six categories: raw materials, percussion stones, abrading stones, chipped implements, ground implements and debitage (Fig.9). Sandstone dominates among the raw material types. Percussion stones were originally unmodified cobbles. They are irregularly pitted on one or both ends, and sometime on the sides. Both normal and grooved whetstones were found. Chipped stone tools are common but choppers are the main type. Most of the ground tools are axes, adzes and grinding stones. The edges of the axes and adzes were finely ground, while other parts of the body retained the pecking scars. There is little pottery and all is fragmentary. The paste is rather coarse, with sand as the major tempering agent. Various sizes of cord-marks are the only surface finishes. The vessel form is probably pot/kettle.

Fig.9 Stone implements from Gexinqiao site

1. Mortar; 2. Grinding tool; 3. Concave chisel; 4. Beater; 5. Whetstone; 6. Pick

Based on stratification and cultural remains unearthed, the Gexinqiao assemblage consists of two phases. Phase I is dated to about 6,000 BP, and Phase II to 5,500 BP (XIE et al. 2012).

Shixia

The Shixia site is located in Qujiang County, Guangdong Province. It was excavated from 1973 to 1976, and 4000m^2 was exposed. The cultural remains excavated from this site were divided into four stages: stage I, II, III and IV. Stage I and II belong to the Neolithic period, stage III and IV to the historic period. During Stage I, the cultural remains are small in abundance, and the main recovered artifacts are pottery. Sand-tempered pottery and clay pottery were also found, but with sand-tempered types dominating. Cord marks, incised designs and impressed patterns were made on the pottery surfaces. Types are kettles, pots, plates and lids with kettles predominating. During stage II, features, including house bases, ash-pits, kilns and graves were discovered. More than 3,000 stone artifacts, pottery wares, bone implements and jade items were unearthed（Fig.10）. Stone tools include *jue*-picks, shouldered/stepped adzes, chisels, broad-axes and arrows, which were all polished. Sand-tempered pottery and clay pottery were found. The main types include tri-pots, stem cups, plates, pots, kettles, etc. Tri-legged vessels and ring-footed vessels were common. Cord marks, incised designs and pressed patterns were often made on the surface of the sand-tempered pottery wares, and clay pottery was decorated with geometric patterns. 102 burials were discovered, and most of them are secondary burials. In the first burials, the dead were interred in a straight position. Funerary objects changed with different burials. The cultural remains of this stage were dated between 6,000-5,500BP, and were named the Shixia Culture (Zhu 2012；Zhu et al 2014).

Fig.10 Cultural remains from Shixia site

1. Ground *jue*-pick; 2.Stepped adze; 3 Jade *cong*. 4. Stem cup; 5. Tri-pot; 6. Broad-axe

Dalongtan

In southern Guangxi there is a large distribution of Neolithic sites where many big stone spades were recovered. Cultural remains from these sites are very simple, including a great number of big stone spades, a few pottery artifacts as well as some other objects. These sites are often found on the low hills. The representative site is the Dalongtan site.

The Dalongtan site is located in Long'an County, Guangxi Province. It was excavated in 1979 and 2014. Features including burials and ritual remains were discovered. Hundreds of stone artifacts and potteries were recovered（Fig.11）. Big spades and unfinished products were often arranged all around the grave bottom. Sacrifice pits and spots were lined or encircled by erected big spades, often with the tips up. Burnt red earth fragments were found in the pits or in the ritual area. Stone artifacts included spades, preforms of spades, axes, adzes, etc. Most of the spades are very large, and some even are over 70 cm long. Although some of the big spades had been finished with polishing, no edge was made along the tip, indicating they are not functional. Contrasting with the big spades, some other spades are very small (only several centimeters long), and also indicate that they are not practical implements. Potteries are very rare, and most are potsherds. Sand-tempered pottery and clay pottery were found with the sand-tempered dominating. They were decorated mainly by cord marks. This site dates between 5,000-4,000 BP (Chen et al. 1982).

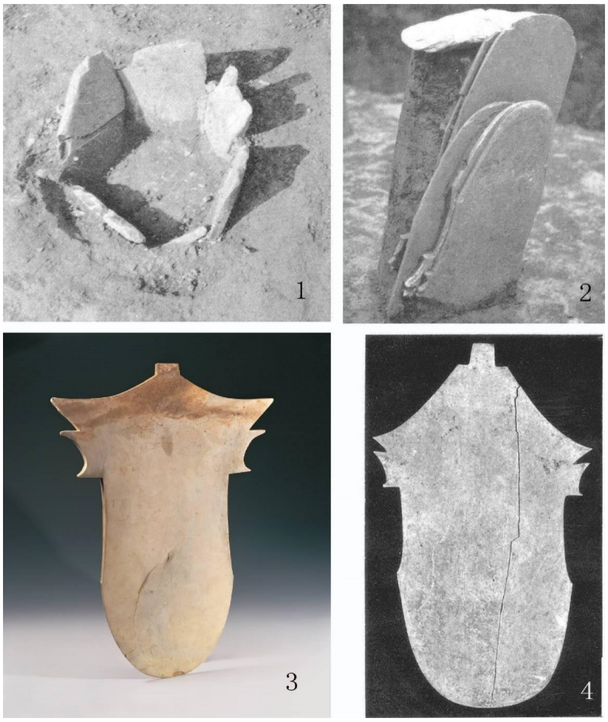

Fig.11 Cultural remains from Dalongtan site

1. Big spades arranged in a circle; 2. Erected big spades with the tips up; 3.4. Big spades

Cultural Characteristics of the Neolithic in Lingnan

In the early Neolithic in Lingnan, chipped stone implements are common and dominate the stone tool assemblages. They were unearthed from most of the sites and were made on cobbles. Only at a few sites were chipped stone implements found that were mostly made on flakes. Technologically, direct hard hammer percussion is the main method for flake manufacture and for tool retouching. Most of the tools were simply made and were flaked unifacially, leaving a large area of cortex on the tool surface. Ground stone tools are underdeveloped. Most of the ground tools are axes and adzes. The edges of the axes and adzes were finely ground, while other parts of the body retained pecking scars and the original cortex. In addition, perforated stone tools are widely found. They are often made on flat-round cobbles of sandstone with a hole in the middle. There is little pottery and all is fragmentary. The paste is rather coarse, with sand as the major tempering agent. Various sizes of cord-marks appear on the only surface finish. The vessel form is probably pot or *fu*-kettle with a round base.

In the middle Neolithic, chipped stone implements continued to exist and comprised an important part of the stone tool assemblage. Ground stone tools increased and, technologically and typologically, are similar to those of the early period. Perforated stone tools continued to exist. Sand-tempered pottery and clay pottery were found, and the main types are still pots and kettles. Apart from cord-marks, basket-patterns occurred. Painted pottery appeared but is almost entirely distributed in the Pearl River Delta. The vessels are mainly stem cups, plates, pots, kettles etc.

In the late Neolithic, chipped stone implements decreased dramatically and ground stone tools increased and dominate the stone tool assemblage. Shouldered stone tools such as axes, adzes and spades are common, and in Guangxi a cultural developed characterized by big spades. Shouldered and stepped adzes also occurred. Sand-tempered pottery continued to exist, but became less abundant. Clay potteries are prevalent, especially in Guangdong. In the Pearl River Delta, painted potteries are also common in this period.

Burials were widely identified throughout the Neolithic in Lingnan, especially at the midden sites. Human skeletons were interred in various flexed positions, and a special type of dismembered position was found at some midden sites in Guangxi. The secondary burials did not occur until in the late Neolithic.

The economics of this period in Lingnan was a broad-spectrum strategy of hunting, gathering and fishing. In the mountain area, the prehistoric people lived mainly on hunting and gathering with association of fishing. Animal remains found are mainly terrestrial species, and grinding stone tools for plant food procession were unearthed from many sites. In the coast and river valley, fishing is the main economical activity, for aquatic species are abundantly found at these sites. In the late Neolithic, rice remains as well as farming tools were discovered at some sites, indicating rice farming made its appearance during this time.

Discussion and Conclusion

Chipped stone implements existed for a long time in Neolithic Lingnan

In most parts of China, chipped stone implements decreased gradually in the post-Palaeolithic period, and along with the increase of ground stone implements in the Neolithic they were quickly replaced by the later. In Lingnan, however, chipped stone implements continued to exist for a long time and did not disappear until the end of the late Neolithic. In the early and middle Neolithic, they played an important cultural role. The reasons for this may be as follows:

Lingnan is located in a tropical and subtropical region. There was a hospitable and stable environment with a rich and diverse plant and animal ecosystem during the late Pleistocene to Holocene. This provided the prehistoric people in this region with favorable living conditions. Mammalian fauna communities of the late Pleistocene continued to exist throughout the Holocene. Like their ancestors in the Palaeolithic, the Neolithic people must have exploited an abundance of meat from these animal species by hunting. In addition, people of this period also exploited various plants. This is confirmed not only by the recovery of plant food remains from Neolithic sites, but also by the plant food processing stone tools. Because of the rich natural food resources in this region, agriculture did not appear until the late Neolithic age (after 6000 BP). For these reasons, there was little change of the economic pattern from late Palaeolithic to Neolithic ages, and, if any, the Palaeolithic people lived on hunting and gathering associated with fishing, while the Neolithic people lived on hunting, gathering and fishing. Because the prehistoric economics of this period in Lingnan was a broad-spectrum strategy of hunting, fishing and gathering, the chipped stone implements, which were adapted to this economic pattern, continued to exist throughout the Neolithic period, and were an important part of their culture in the early and middle Neolithic period.

Perforated stone tools, stone beaters and stone spades are typical cultural elements, and were developed in Lingnan.

Perforated stone tools are widely found in Neolithic Lingnan. They had been taken as a criterion of the Mesolithic age in South China. They were found at most of the early and middle Neolithic sites, especially those in Guangxi. Made on flat-round cobbles, perforated stone tools vary in size from about 20cm to 6cm in diameter. They can be dated back to as early as 20,000 BP.

Stone beaters were recovered from many sites in Lingnan, especially in western Guangxi and the Pearl River Delta. Most of these tools were made of sandstone. They can be classified into several types（Cameron 2007）. The stone beater excavated from the Dingmo site in Guangxi was AMS dated to 7,898 ± 34 BP. It is the oldest stone beater ever discovered in the world (Li et al 2014). Next to the Dingmo beater are those from the Xiantouling sites dating to 6,600 BP (Zhu et al. 2014). These indicate that stone beaters originated in Lingnan. The stone beaters are considered to be the tools for bark-cloth making and part of the archaeological package that is considered to be associated with the Austronesian expansion from Lingnan across the Pacific (Deng 2011). Therefore, the stone beaters from Lingnan are significant materials for the study of cultural exchange.

Based on the data available, big spades originated in Guangxi and dispersed to the neighboring areas. Currently, near 100 sites or localities bearing big spades have been discovered. They are densely distributed in southern Guangxi, the area of Nanning.

Painted pottery, microliths and Shixia culture are outside cultural elements.

Painted pottery, occurring about 7,000BP in China, were prevalent in the Huanghe valley during the Neolithic. In the Changjiang valley, painted potteries were also found at many sites, especially from the Qujialing and Daxi cultures. In Lingnan, however, painted potteries were only found in the Pearl Delta in the middle and late Neolithic. They were likely introduced from the Daxi culture in Hunan.

Microliths made their apperance in the upper Palaeolithic in North China and became the main cultural artifact recovered from some sites. In South China, there are few records about microliths, especially during the Neolithic. There is a unique case of microliths found from the Xiqiaoshan site in Lingnan. Although there are some debates on whether they are the true microliths or not (Deng et al 1991), the Xiqiaoshan microliths are not developed locally because they appeared suddenly and have limited variability time and space.

Shixia culture was only distributed in northern Guangdong. The cultural aspects are so unique that it was obviously imported from outside. It is likely that Shixia culture is similar to the Liangzhu culture in Zhejiang Province. Therefore, it is considered to be introduced from the Liangzhu culture.

The Neolithic of Lingnan made its appearance as early as 12,000BP and ended at about 4,000BP. It inherited aspects from the Palaeolithic in the same region and developed locally. The Neolithic cultures in Lingnan are characterized by the long-term existence of the chipped stone implements, polished shouldered-axe/adz, sand-tempered pottery with cord marks, and flexed burials. Perforated stone tools and bark cloth stone beaters are also widely found in this region. The characteristics of the Neolithic cultures here mainly resulted from the natural and ecological environments of this region. Although some cultural elements from outside can be identified, they are very limited in time and space and do not change the main characteristics of the local culture.

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THE ORIGINS OF ORANG MELAYU

Amri Marzali

Introduction.

Where are Orang Melayu from? A number of hypothesises have been proposed by different experts; linguists, archaelogists, palaeoanthro-pologists, population genetics, etc. However all the hyphothesises are related with the origins of the Indonesian peoples (Austronesian speaking peoples) in general. They don't speak specifically about the origin of different Indonesian ethnic groups in Indonesia, particularly Orang Melayu.

Kern, confirmed by von Heine Geldern, for example, stated that the ancestors of the Indonesian peoples are the Austronesian who came with quadrangular axe, in 2000 BC, from China through western way (Slametmulyana 1982: 24-30). Oppenheimer, based on genetics and other evidences, argues for three waves of migration (Oppenheimer 2012: 19-28). Bellwood refers to the Austronesian (Mongoloid of southern type) who migrated from Taiwan through the Phillipines islands before 3000 BC (Bellwood 2006: 82). Teuku Jacob, a palaeoanthropologist, believed the Sunda subcontinent as the cradle of the Austronesians (Jacob 2006: 11). Lastly, R.A. Blust and Adelaar pointed to Borneo as the homeland of the Malayic speakers (cited in Andaya 2001: 317).

On the other hand the indigenous peoples of Indonesia rely on their mythologies and legends. The Bugises, for example, in the mythology of Galigo, believed that their ancestor was To Manurung who descended from *Boting Langit* (the upper world), married to a princess called *Nyili Timo'* from the lower world, eventually resulted in all the Bugises of South Sulawesi (Mattulada 1991:10). The Bataks of north Sumatra, according to their legends, were the offspring of a god called *Debata Mulajadi Nabolon*, who slipped off from the upper world to a hamlet called *Sianjurmulamula* on the step of Gunung Pusuk Buhit, at the fringe of Toba Lake (Vergouwen 1986:7).

The last case, the Minangkabause of West Sumatra, according to Tambo Alam Minangkabau, are the descendants of the youngest son of Adam, who was brought down by angels to this world, and landed on a place called Rum Land. In this Rum Land he became King Iskandar Zulkarnain, who married a fairy from heaven. The fairy was given birth to three princes; those were Sultan Sri Maharaja Alif, Sultan Sri Maharaja Dipang, and Sultan Sri Maharaja Diraja. Furthermore the princes wandered the world. Sri Maharaja Dipang became the king of the Chinese Land, Sri Maharaja Alif went back home and became the king of Rum Land, while Sultan Sri Maharaja Diraja landed on Gunung Merapi (Mount Merapi) in

Sumatera Island, and developed the Minangkabau community at a place called Lagundi nan Baselo (Djamaris 1991: 210 - 213).

According to anthropological perspective all the hypothesises and mythologies can be simplified into two categories, namely the theoretical proposition of the scientists (ethics) and the subjective beliefs of the local peoples (emics) (Harris 1972: 568). In this paper I will combine both perspectives in the method of ethnohistory, namely "*The study of especially native or non-Western peoples from a combined historical and anthropological viewpoint, using written documents, oral literature, material culture, and ethnographic data. It is also the study of the history of various ethnic groups that may or may not exist today*" (Harkin 2010; Vansina 2014). As stated above, the discussion in this article will be based on different resources, namely oral history, folklores, old manuscripts, written documents, archeological remnats, situs, and artifacts, and ethnography.

The Mythology

What is called Orang Melayu in this paper is a group of peoples who nowadays claim themselves to be Orang Melayu, lived in one of 19 van Vollenhoven's law areas, namely the area number 5 in a map showed in Schiller and Hoebel (1962; see appendix). This law area consists of East Sumantra, Riau, Malay Peninsula, and parts of West Kalimantan. When asked about the origin of Orang Melayu, they usually refer to an old manuscript called *Sulalatus Salatin*.

Below is a quotation from *Sulalatus Salatin* (part II/1 untill part II/3), telling the story of the origin of Orang Melayu (Samad Ahmad 2013: 19-30).

> *"Alkisah maka tersebutlah perkataan sebuah negeri di tanah Andalas, Palembang namanya; nama rajanya Demang Lebar Daun, asalnya daripada anak cucu Raja Sulan juga. Adapun negeri Palembang itu, Palembang yang ada sekarang inilah. Muara Tatang nama sungainya, di hulunya itu ada sebuah sungai Melayu namanya. Adalah dalam sungai itu ada satu bukit bernama Bukit Si Guntang; di hulunya Gunung Mahamiru, di daratnya ada satu padang bernama Padang Penjaringan. Maka dua orang perempuan balu berhuma padi, terlalu luas humanya; adalah namanya seorang Wan Empuk dan seorang namanya Wan Malini. Maka terlalulah jadi padinya. Tiada dapat terkatakan; telah hampir akan masak padinya itu"* (Samad Ahmad 2013:19).

(Once upon a time there was a country in Andalas called Palembang. The king was Demang Lebar Daun, a descendant of Raja SulanConcerning with Palembang, it is Palembang now. The river is called Muara Tatang, at the upper was Melayu river. In the river there was a hill called Bukit Si Guntang; at the upper was Gunung Mahamiru, at the plain there was a field called Padang Panjaringan. There were two widows working on a rice field, too wide was the field, their names were Wan Empuk and Wan Malini. The rice was ripen richly. Not enough word to express it. The rice was almost harvested).

The above paragraph reveals two facts, those are concerning with the actors ("the who") and the location of the event ("the where"). The first actor is Demang Lebar Daun, the king of Palembang, the descendant of Raja Sulan (King Sulan). from India. The second actor is two shifting cultivators, namely Wan Empuk and Wan Malini. The venue is Palembang country, on the side of Muara Tatang river, on the upper of which is Melayu river, near Bukit Si Guntang, on the upper of which is Gunung (Mount) Mahamiru, and Padang Penjaringan on its land. Up to this point we can't draw conclusion of the origin of Orang Melayu. We need some more information.

Below is another paragraph of *Sulalatus Salatin,* to find "the what," "the when" and "the how" in the event.

> "*Maka dilihat oleh Wan Empuk dan Wan Malini di atas tanah yang menjadi emas itu ada tiga orang lelaki muda teruna, muda wangsa, duduk di atas lembu putih seperti perak, lengkap ketiganya itu memakai pakaian anak raja-raja yang bertatahkan ratna mutu manikam; memakai mahkota ketiga, terlalu sekali elok parasnya… Maka Wan Empuk pun fikir dalam hatinya, "Anak raja mana orang muda ketiga ini, sekonyong-konyong ada di Bukit Si Guntang ini, dari mana gerangan datangnya? Dan apa bangsanya? Baik aku bertanya kepadanya; entah sebabnya maka padiku ini berbuahkan emas, dan tanah negara bukit itu pun seperti emas*" (Samad Ahmad 2013:20-21).

(Then seen by Wan Empuk and Wan Malini three young men, handsome youngsters on their golden field, sat on a silver white cow; all three wore royal costumes full of accessories; all three wore crown, too lovely their faces…Wan Empuk wandered, "Whose princes are these three young men, suddenly appear in Bukit Si Guntang, where are they from? And what kind of people are they? It's better if I inquiry them; why my rice turns into gold, and the hill land also looks like gold").

The above paragraph reveals what is happening to the primitive cultivators (the what), that they are visited by three handsome, noble guests with conjuring weapons and wearing luxurious dress. Then communication between the hosts and the visitors happens. The visitors introduce themselves.

> *Maka sahut Nila Pahlawan, "Adapun kami ini bukan daripada jin dan peri, dan bukan kami daripada bangsa indera; bahwa adalah kami ini daripada manusia. Asal kami daripada cucu Raja Iskandar Zul-Karnain, dan nasab kami Raja Nursjirwan Adil, raja*

> *masyrik dan maghrib, pancar kami daripada Raja Sulaiman ʻalaihi s-salam, dan nama kami Nila Pahlawan, … Krisyna Pandita, dan … Nila Utama; dan nama curik kami ini Si Mandang Kini, dan kayu ini Cap Kempa namanya, dan pedang ini Badram Balawa namanya, dan lembing ini Lembuara namanya*" (Samad Ahmad 2013:21).

(Then answering Nila Pahlawan, "About us, we are not genies or ghosts, and we are not a kind of deities; we are human beings. We are the grandchildren of King Iskandar Zul-Karnain, and our grand-grandfather is King Nursyirwan, the king of Masyrik and Maghrib, our ancestor is King Sulaiman ʻ*alaihi s-salam*, and our names are Nila Pahlawan, … Krisyna Pandita, and … Nila Utama; and the name of our machette is Si Mandang Kini, and this stick is Cap Kempa, and the sword is Badram Balawa, and the spear is Lembuara).

By comparing the above story with 1) Kern-von Heine-Geldern's theory of the migration of the Indonesian peoples from Tonkin around 2000 BC, 2) Bellwood's theory of the migration of the Austronesian out of Taiwan in 3000 BC and arrived in Sumatra around 500 BC, 3) archaelogical findings on the establishment of Buddha kingdoms in certain places in Nusantara by Indian adventurers in 4-6 centuries, and 4) ethnographic studies of the Austronesian cultivators in Riau and Jambi, we may reconstruct a more logic and full story.

The Interpretation

The encounter of the primitive culivators, Wan Empuk dan Wan Malini, with three grandchildren of King Iskandar Zul-Karnain could be assumed as happen in a period between 1st–6th century, when many adventurers of Indian royal families went to Malay archipelago looking for gold. In this period, certain areas in Riau, Jambi, Palembang had been occupied by groups of Autronesian shifting cultivators, who according to Kern-von Heine-Geldern arrived in these area in 2000 BC or 500 BC according to Bellwood. They are the ancestors of the Sakai, the Bonai, the Talang Mamak in Riau and the Suku Anak Dalam (Anak Dalam ethnic group) in Jambi (Effendy 2008; Hamidy 1991; Rab 2002; Suparlan 1995; Handini 2005; Prasetijo 2011).

Each group was organized in chiefdom political system (*sistem politik perbatinan*), led by a chief (*Batin*) occupied and controlled a forest area now called "hutan tanah ulayat." Thus there was not any kingdom in these areas yet. Demang Lebar Daun was not a king, instead he was a chief.

The chiefdom (*perbatinan*) led by Demang Lebar Daun in Palembang could be one of the Suku Anak Dalam groups (Orang Hutan or Orang Kubu). Nowadays a number of these group live dispersely in the Province of Jambi. They are not found in Palembang. If nowadays these peoples are found by Handini and Prasetijo don't practice shifting cultivation, but foraging, it could be assumed as being caused by backward evolution, adjusting their way of life to the environment of Jambi (Handini 2005; dan Prasetijo 2011).

In the 5th or the 6th century, the Suku Anak Dalam group led by Demang Lebar Daun was visited by a group of royal adventurers from India, led by three brother princes, Nila Pahlawan, Krisyna Pandita, dan Nila Utama. They were looking for gold. The visitors were much richer, more elegant, more handsome, more luxurious, and more powerful than the hosts. They were literate and armed with machetes, sticks, swords, and spears. In short, they were more civilized than the local Astronesian cultivators.

Due to this uncomparable condition, the head of Suku Anak Dalam declared submission to the visitors. They took the position as servants and treated the Indian royal adventurers as masters. They would comply in every matters with the masters, and asked the masters not to harm them and be rude to them (Samad Ahmad 2013:25).

The Venue (**the where**)

Where is exactly the location of the encounter of these two subjects? A number of places have been mentioned in the manuscript, namely: *Muara Tatang, Sungai Melayu, Bukit Si Guntang* dan *Padang Penjaringan.* If it is accepted that the event took place in the 5th or the 6th century, that before Sriwijaya, then the venue must be in Jambi. A number of informants I interviewed in Jambi in October 2015 said the places can be around Muara Jambi or Muara Tebo, not in Palembang. I myself have not done any study to verify the validity of the statement.

If the writer of *Sulalatus Salatin* said the places are around Palembang, we may argue that it is normal in a mythology or legend the story is linked with a big kingdom, in this case with Sriwijaya. It may also be argued that the writer of *Sulatus Salatin* deliberately mention this place in order to make the story consistent, in which Palembang is the homeland of Paramesywara, the founder of Melaka.

Orang Melayu

The next paragraph in the manuscript can be understood more easily. The head of the Indian adventurers asked for a woman from Suku Anak Dalam to be his wife. The Batin Demang Lebar Daun agreed to surrender one. However, since local people suffered from skin disease (fungus or *kedal*), every girl surrendered was returned by the visitor to her group in the next morning.[13]

Eventually the visitor agreed to marry the last girl, because the girl was the daughter of the Batin Demang Lebar Daun. The Batin humbled himself to ask the visitors to accept his

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[13] According to an Indonesian medical doctor who take care a group of Orang Asli in Malaysia Penansular, skin disease like fungus (panau, kurap, kedal) is endemic among the Orang Asli. The same case is also found by anthropologist Suparlan among Orang Sakai in Riau and by Handiri among the Suku Anak Dalam in Jambi (Suparlan 1995: 304; Handini 2005: 96).

daughter as wife, eventhough if the girl suffered from fungus disease (*kedal*) like previous girls. This is said in the following paragraph.

> *Maka sembah Demang Lebar Daun, "Barang maklum duli tuanku Yang Maha Mulia, jikalau anak patik telah terambil ke bawah duli, jikalau ia kena penyakit seperti patik-patik yang lain, …janganlah tuanku keluarkan dari bawah istana tuanku. Biarlah ia menjadi gembala dapur Yang Maha Mulia, dan menyapu sampah di bawah peraduan duli tuanku. Seperkara lagi, patik mohonkan anugerah ke bawah duli Yang Maha Mulia, segala hamba Melayu jikalau ada dosanya ke bawah duli, patik pohonkan jangan ia difadihatkan, dinista yang keji-keji, jikalau patut pada hukum syarak bunuh, tuanku; jangan duli tuanku aibi*" (Samad Ahmad 2013: 25).

In short, eventually inter marriage took place between all visitors and local women. The marriage resulted in a mix-blood group, the distinctive Orang Melayu Jambi. They established a new small kingdom, namely Kerajaan Melayu Jambi (Melayu Jambi Kingdom) led by the Indian royal visitors. This was the first kingdom ini this area and visited by a Buddhist monk from China, I Tsing, in 671 AD. This historical reconstruction, including the historical evidence of the visiting of I Tsing, confirmed my hypothesis that the venue of the event was in Jambi, around Muara Tebo or Muaro Jambi.

Jambi Preceded Palembang

As reported in Chinese old manuscript, I Tsing, in his journey from China (Kwang Tung) to Nalanda (India), stopped in a commercial port called Mo-lo-yeu in Jambi in 671 AD. Slamet Mulyana is certain that Mo-lo-yeu is Chinese word for Malayu or Melayu, which originated from the word *malai* in Tamil to refer to hill. In *New Tang History*, the kingdom established some years before the coming of I Tsing, because in 644 AD the kingdom had sent commercial envoys to China (Mulyana 196x:58; Munoz 2009:156). Slamet Mulyana assumed the Jambi port was not the center of the kingdom of Melayu. The center was located in the upper of Batang Hari, near Muara Tebo (Mulyana 196x: 63,122-123).

However, if the name of Malay kingdom is originally related with Malay river, the small branch of Batang Hari River, it could be concluded that the location of the kingdom is in Muaro Jambi, where there are three small rivers, namely Melayu, Johor, and Jambi. Anyhow, wherever the center of the kingdom, this place could be assumed as the venue where the Indian visitors and the local people encountered.

Usually the name of an ethnic group is not created by the people themselves, but by the visitors or neighboring groups who frequently make contact with them. In the case of Melayu, the name could be given by the Indian-Tamil speaking visitors. As mentioned by Slamet Mulyana, Melayu stemmed from the word "malai" in Tamil language to refer to hill.

Thus we have three indicators in searching for the original place of “melayu,” those are Melayu river, hilly area, and gold deposit, the valuable mineral that were looked for by the Indian visitors.

On the other hand, according to a historical record (Bukit Siguntang inscription) the kingdom of Sriwijaya successfully defeated the kingdom of Melayu Jambi in 682 CE (Munoz 2009: 168). This statement was confirmed by I Tsing report. When he returned to Jambi in 685 CE, this kingdom had already under the control of Sriwijaya (Muljana 196?: 57-61).

When Sriwijaya was defeated by Chola from India in 1025, Melayu Jambi was step by step recovered. In 1079, 1082, and 1089 this kingdom was reported as sent envoys to China. Eventually, Jambi was considered a new political and commercial center replacing Sriwijaya in Melaka strait. On the other hand, Palembang turned down to become vassal of Melayu Jambi.

Conclusion

It could be assumed that the first Orang Melayu were the result of intermarriage between a group of Indian adventurers (Arya-Weddoid race) and the Austronesian-shifting cultivator-women of Jambi (Mongoloid southern type race). The event took place approximately at the end of the 6th century or in early the 7th century. Orang Melayu were the first civilized group in this area, and established the kingdom of Melayu. The kingdom became a famous center of Buddhism in Nusantara. They didn’t rely on shifting cultivation like their ancestors, but on commercial activities.

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TECHNO-CULTURAL DEVELOPMENT OF TORAJA TEXTILES IN RELATION TO AUSTRONESIAN ORIGIN: MATERIALS, DYES, LOOMS, AND WEAVES

Keiko Kusakabe

Introduction

Many of the Torajans discussed in this paper reside in Tana Toraja and Toraja Utara regencies of South Sulawesi, while in the linguistically broad sense 'Torajans' are dispersed throughout Central, West, and South Sulawesi as described in the ethnographical study, *West Torajans of Central Sulawesi,* by A.C. Kruyt [1938]. Etymologically speaking, 'Toraja' was the name for peoples dwelling on the mountains of Central, West, and South Sulawesi, given by the people settled along the coast, the Bugis. Contemporarily, however, only the people living in the mountains in northern South Sulawesi are identified as Torajan, which provides a name for their administrative division.

The aim of this paper is to define the heart of Torajan textile traditions against a background of diversely spread of textile production and culture in Sulawesi, going upstream to Austronesian origin and down to the contemporary movement of textiles. Also, this paper also has the special purpose of analyzing the development of Torajan textiles on the basis of the interrelationship of materials, dyes, looms, and weaves in terms of technological anthropology. Torajan textiles are characterized by indigenous features, specifically mud-dyeing, the simplest backstrap loom, and utilization of plant fiber and plain-weave up to the beginning of the 20th century. In current development, Torajan textiles still bear features from an early date as to style of loom and method of weaving.

The discussion begins in the first chapter with a complicated three-dimensional distribution of textiles in the highlands of Sulawesi, from techno-cultural and -ecological viewpoints. The first concerns the contrast between beaten bark in Central Sulawesi and woven cloth in South and West Sulawesi, the second between weaving of non-ikat[1] in Toraja-Mamasa and ikat in Kalumpang-Rongkong. The third dimension concerns cotton in the mountain region and silk along the coast; contemporarily, cotton is replaced by polyester and silk by viscose. With the latter two dimensions, for reasons of space, I will give only the outline.

The second chapter highlights the development of Torajan textiles, based on experimental field data collected by this writer over more than a decade. Description begins

[1] In this paper, non-ikat indicates a cloth designed solely with stripes or warp- and/or weft-patterning, while ikat indicates the technique of tying and dyeing threads before weaving begins. In addition, each term—non-ikat and ikat—can also mean the cloth produced with that particular technique itself.

with a transformation into three stages in the techno-cultural development of textiles. The first stage is the Era of Natural Dyes in the time of indigenous religion, Aluk To Dolo, the second, the Era of Chemical Dyes with signs of identity as Torajan, the third, the Era of Colored Polyester Yarn in current modern times, which is coincident with the Green Revolution[2].

An attempt is made in the third chapter to reveal the factors that have brought said transformation with an interplay of religion, politics, economy, culture, and agriculture. However technology penetrates these transformations in various forms of adaptation and creation. Thus this paper pursues the answer to why or how backstrap-loom weaving has been handed down to this day, using an anthropological as well as a technological approach.

Textiles in the Highlands of Sulawesi

Three-Dimensional Distribution of Textiles

This paper attempts to analyze diverse textiles in the highlands of Sulawesi as three-dimensional from the techno-cultural and -ecological viewpoints. The first contrast lies between barkcloth and weaving, the second between the ikat technique and non-ikat, the third between cotton and silk weaving, in the contemporary sense of polyester and viscose. The first divergence between barkcloth-making and weaving indicates an essential turn in technology from the physical processing of fibers to a constructive. The second divergence between ikat and non-ikat technique occurs from the inflow of a new technique to create a more flexible design than that on weavings. The third contrast concerns an ecological factor linked to socio-politics and religion. The ecological situation differentiates between coastal and mountain people as to the acquisition of material for weaving. In the following, each dimension of textile production, along with cultural exchanges and trade, is discussed. (See Map 1.).

Barkcloth Production and Backstrap-Loom Weaving

This section will focus on the epoch, the 'Weaving Revolution', as it were, in which the people began to weave wild plant-fibers or the down of the kapok[3] tree on the simplest backstrap loom. This is a definitive conversion of textile technology from physical to constructive processing in human history. The former, to create flat fiber, is the technology for extending bark fibers; the latter, the technology for constructing knotted fiber or spun kapok-down and cotton as warp and weft of linear materials.

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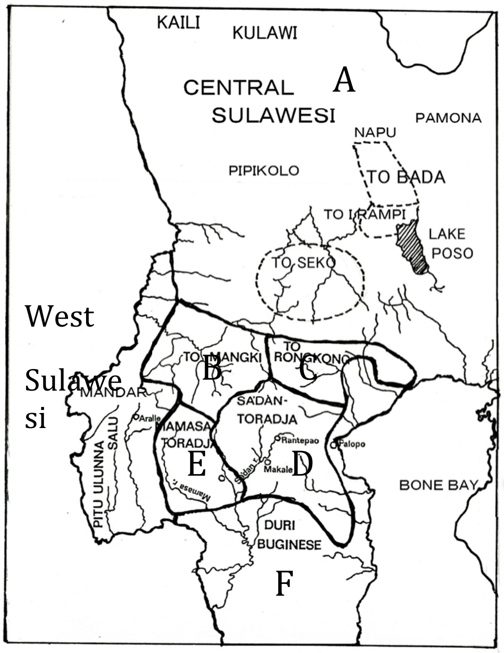
[2] The government promoted an early variety of rice crop to bring harvests to up to twice a year, using chemical fertilizer and irrigation facilities, which brought great change to social life in Indonesia from the 1970s.

[3] Kapok tree: Ceiba pentandura (L).

There is great cultural contrast among the mountain peoples who dwell in the highlands in central Sulawesi: barkcloth and weaving cultures (see map1). S. Kooijman mentioned that in Indonesia, the production of ornamented barkcloth barely remained, with the exception of examples in small or remote islands: "textile fabrics have replaced tapa everywhere". In the archipelago, where people have experienced strong cultural influence emanating from the Asian Continent, this took place in early times and only a few fragments of ornamented barkcloth in those areas have been preserved [Kooijman 1963: 4].



A: Bark-cloth: Bada, Kulawi, etc.

B: Warp ikat weaving (cotton): Kalumpang

C: Warp ikat weaving (cotton): Rongkong

D: Stripe weaving (cotton): Toraja

E: Stripe weaving (cotton): Mamasa

A complete map of Sulawesi

Map 1. Distribution of Textiles in Central, West, and South Sulawesi.

The region of barkcloth-making in Central Sulawesi is divided by the Palu valley into east and west which were identified as East Toraja and West Toraja by A.C. Kruyt. They were settled by the Kulawi, Kaili, Bada, Pamona, Mori, Wana and Da'a people, and so on, with a distribution of more than twenty languages. Most of the peoples in this area have been making barkcloth, leaving aside the people of less-developed societies such as the Da'a. When visiting the Bada Valley in 2000, the author documented a woman with her family stripping a *bea*[4] tree of its bark, then wetting the bark in the river, wrapping the strips in

[4] According to Kooijman, *tea* (*Artocarpus Blumei)* is one of the most favored trees to have been used for barkcloth- making in Sulawesi [Kooijman 1963: 57]. *Bea*, most probably *tea*, is a species of *Artocarpus* (breadfruit).

banana leaves and putting them away for a few days for fermentation. She beat the long narrow pile of bark, 12 layers in the end, on a wooden stand with a wooden beater and then a stone beater for a few days, until she had a large tubular cloth (Figure 1). In Bada, the stone beater is called *ike* and the wooden one, *peboba*. Kooijman's research demonstrated that the technique of barkcloth production attained a remarkable level of sophistication in the highlands and that barkcloth had an important role in culture linked to the head-hunting custom [Kooijman 1963: 56, 18-19]. It is noteworthy that in the Indonesian archipelago, barkcloth production has continued into the 21st century.

Figure 1. Woman is beating barks using the wooden beater. This is the first procedure for production of bark-cloth. Bada, Central Sulawesi, 2000.

Some reports prove that barkcloth production did occasionally appear in the weaving areas mentioned above. A.C. Kruyt recorded the textile situation in Rongkong in the first half of the 20th century, as follows:

It is an unsurprising fact that the manufacture of cloth by beating bark is unknown here, for the weaving technique was not adapted after the immigration, but had been brought from the original place with immigration. The people, however, said that most men were wearing loincloths made of cotton, but some did beat the bark of the *ta'ra* tree and made it into loincloths [A.C. Kruyt 1920a: 374].

This description suggests that in Rongkong, weaving was of major importance for clothing in everyday life and rituals, whereas barkcloth-making still continued on a minor scale for making men's loincloths. Another case is reported by Mahmud; in Kalumpang, three kinds of cloth made from bark have been known: *pekkaro, sassing,* and *kundai* [Mahmud 2007: 98]. This indicates that the people still had memory of barkcloth production in

Kalumpang where diverse textiles had flourished. Thus, quite possibly, coexistence of two technologies was distributed extensively over a long span of time. In a way, this special feature represents cultural strata of textiles in central Sulawesi.

Bartering Buffaloes and Stone Beaters for Cloth

Bartering buffaloes and stone beaters for cloth among peoples supports the coexistence of barkcloth-making and weaving production in the highlands. Peoples in the barkcloth area used ikatted cloths obtained through barter with Kalumpang and Rongkong people. Taking the Bada people for example, one woman showed us how to wear a large ikat, *pori si tutu,* from Rongkong as a pleated skirt, when the author visited in 2000. Also, vast numbers of ikatted sarung from Kalumpang and Rongkong have been found in the highlands [Fukuoka Art Museum 2006:36-50]. In his description of clothing in Seko, A.C. Kruyt mentioned that more than half the women were wearing an ikatted sarung from Rongkong with a jacket made from beaten bark [Kruyt 1920b: 399-340].

Remarkably in Rongkong, fine ikat cloths were used not for everyday clothing for themselves; plain-woven cloth or that acquired from traders was usually worn as dress. In old times, women wove a cloth with fibers taken from leaves of the *ka'doe* tree and only later began to plant cotton for spinning into thread [Kruyt 1920a: 374]. Ikatted sarung and cloths (e.g. *the pori si tutu*) were such invaluable artifacts as to be used only for their rituals or export items as shown Diagram 1; this is based on descriptions in "De to Rongkong" and "De to Seko" by A.C. Kruyt, but it is the author's suggestion based on field data, that a buffalo was exchanged with a stone beater.

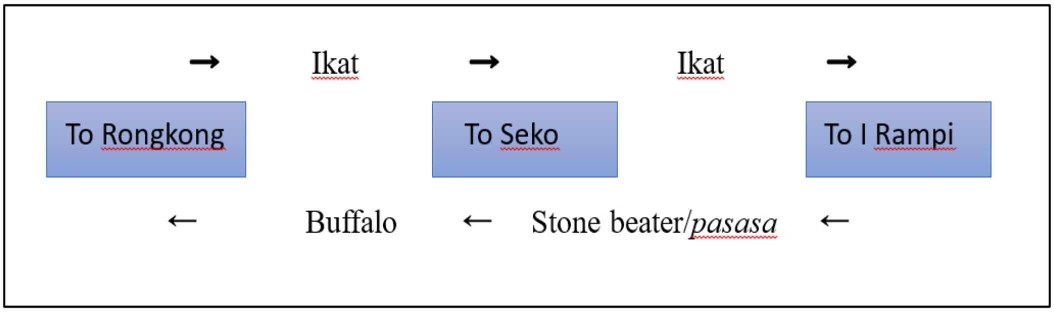


Diagram 1. Barter among three peoples in the highlands of central Sulawesi.

Kruyt mentioned that the Seko learned the technique of barkcloth-making from the I Rampi who inhabit in the north part of Lake Poso. It is said that *pori si tutu*, ikat from Rongkong, was exchanged for ten stone beaters called *pasasa* [Kruyt 1920b: 340]. In fact, on my trip to Seko passing by Rongkong in 1998, the author noticed a number of stone beaters were kept in the village; also in the Bada Valley, the local informant mentioned that they did not know where stone beaters had come from and had no skill in making them. As shown in the Kruyt report, the stone beaters found in both regions had quite possibly been made by the people of I Rampi which borders Bada to the north and Seko to the south. These complicated distributions of stone beaters, barkcloth-production, and weaving in central Sulawesi represent the various stages of a “melting pot” [Simanjuntak 2008: 224] occurring from encounters of ethnic groups bearing different cultures and technologies.

The Heart of Torajan Textiles

This chapter turns to the main subject, the essentials of weaving technology, which includes materials, dyes, looms, and patterns, through the centuries-long transition of Torajans themselves. Also, another aspect of textiles, which is usage, is discussed with cloth playing a certain role in human life.

An Outline of Torajan Textiles Used in Rituals

The Torajans have possessed huge numbers of heirloom textiles that they put to use in East and West rituals. Many of them were brought to the island through east-west ocean trade since the 16th century. They are known as *maa’,* sacred cloths whose names are recited in Torajan myths. Among them, Indian chintzes with picturesque figures made the most striking impression on the Torajans, but not such an essential influence as to bring a substantial change in technique. Above all, the locally-made *maa’* are noteworthy with their depictions of figurative and geometrical designs on a cloth using the indigenous mud-dyeing technique (see Table 1).

Picturesque, dyed cloths, *maa’*, are displayed in great number in Rites of the East, *rambu tuka’,* while many kinds of weavings play an important role in Rites of the West, *rambu solo’* (see Table 2). Yet, most of the heirloom *maa’* have vanished from the land, reappearing on the world market. Also, many old weavings exclusively connected to the funeral rites of the Alk To Dolo, the indigenous religion, are becoming obsolete because the majority of the people have converted to Christianity. With contemporary fashion, however, some favor cloth carrying the *sekong kandaure* design hand-woven on a backstrap loom; this is worn with a ponco-style pullover top.

Table 1. Dyed and Painted Cloths Used in the Torajan Rituals

English Name	Local Name	Dyeing Technique	Place of Production
Indian Cloth	*Maa’*	Mordant & resist dyed	India
Printed Patola	(*Cinde*)	Print	Dutch
Locally-Made Dyed Cloth	*Maa’*	Paste resist mud-dyed	Toraja
Ceremonial	*Sarita*	Resist mud-dyed	Toraja

Banner		Paste-resist dyed Batik	Dutch (Unknown)
Loin Cloth	*Peo Puang*	Batik (beeswax resist)	Kalumpang
Shibori	*Roto*	Tie- and stitch-resist	Rongkong
Batik	*Bate*	Batik (compound wax resist)	Java

Table 2. Weavings Used in the Torajan Rituals

English name	Local name	Technique	Place of production
Loincloth	*Pio/peo*	PW, Supplementary weft or Warp patterning.	Toraja
Pastor's Attire	*Bayu lamba'*	Ridge PW, Tablet weaving.	Toraja
Sarong	*Dodo*	Ridge PW, Tablet weaving.	Toraja
Woman's Jacket	*Pokko'*	PW, Stripe.	Toraja
Funeral Hood	*Pote lullung*	Open-worked PW, Tablet weaving, LM braiding.	Toraja
Funeral Headband	*Pote talika/beke'*	LM braiding.	Toraja
Pouch	*Sepu'*	PW, Warp patterning or Supplementary Weft	Toraja
Band	*Kamandang*	Tablet Weaving	Toraja
Ceremonial Cloth	*Sekomandi*	Warp ikat	Kalumpang
Ceremonial Cloth	*Pori si tutu*	Warp ikat	Rongkong
Ceremonial Cloth	(Unknown)	Warp ikat	Sumba
Shawl	*Selendang*	Warp ikat	Sumatra
Tali Tau Batu	*Tali tau batu*	*Tali tau batu*	Rongkong
Dagger Belt	*Tali bennang*	Tablet Weaving	Bugis lands
Tablet Weaving	(Unknown)	Tablet Weaving	Middle East

PW: Plain weave, LM braiding: Loop Manipulation

Materials and Dyes --- Three Stages in Development

From the view of materials and dying, the transition in Torajan textiles is divided into three stages with an interplay of technology and socio-culture: the Era of Natural Materials and Dyes, the Era of Chemical Dyes, and the Era of Colored Polyester Yarn.

Era of Natural Materials and Dyes

The first stage is the Era of Natural Materials and Dyes up to the end of the first half of the 20th century. The life of the people was founded on Aluk To Dolo, the indigenous religion, and an ecological cycle based on one rice harvest a year, with considerably less communication with societies on the outside. Meanwhile, life inland was underpinned by intermediate trading; there was also the custom of head-hunting; conversion to Christianity and Islam were more effective in eliminating head-hunting.

They utilized wild pineapple fibers to weave cloth for their everyday apparel using a backstrap loom. In Toraja, clothing – sarung (*dodo*) for women and loincloth (*pio*) for men – was usually made of fabrics woven from finer pineapple fibers called *pondan*[5]. Remarkably, some fabrics display combined weaves of pineapple and cotton fibers, exemplified by the priest's long coat or *bayu ramba'* woven with a cotton warp and a pineapple weft (see Table 2). In funerals, women wove coarse cloth using wild *pondan daa'* for wrapping the dead in the north part of Toraja meanwhile in the southwestern part of Tana Toraja, kapok or *kapu* down was spun to weave cloth for a shroud. This cloth is referred to as *karoro'* in both regions. In the weat part of Tana Toraja, distinct old fabrics are often preserved or used as a symbol through funerary rites; the fragment of a shroud is mud-dyed in the *ma' bolong* rite held as part of funerary rites after the deceased has been interred [Kusakabe 2013], and in Simbuang, a fragment of kapok fabric was stiffened with broth taken from cassava[6] in the *mattodo'* rite of the funeral.

After cotton cultivation was introduced later on, ritual attire, sarung, loincloths and the like were produced with masterfully woven fabrics made of handspun cotton thread[7]. These garments made of cotton were used exclusively by members of the high class, on the other hand, fabrics made of pineapple fiber were used for everyday clothing, often among the common people. With regard to dyeing, natural dyeing methods for plants were little known[8], but mud-dyeing was practiced using *bilatte/bilangte*[9] leaves throughout Toraja, which took place in the blackening rite, *ma' bolong* (Figure 2). On the other hand, locally-made *maa'*, made using a resist with mud-dyeing, specifically displayed in celebration rituals, creating an iconic Torajan design, a lyrical scene with buffaloes and a cattleman surrounded by cross motifs (see Table 1).

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[5] *Pondan* refers to pineapple or *nanas* in Indonesian. *Pondan daa'* fiber is rougher than that of *pondan;* the plant does not bear fruit.

[6] In Simbuang, mourning custom strongly continues in which mourners observe eating steamed corn and cassava, called *ko'dong,* as a taboo even among Christians.

[7] Torajan chant for the *merok* feast mentions that the third of the eight beings, Laungku, is the ancestor of cotton.

[8] In old times, indigo dye, called *tarun,* was known but there is no evidence of its fermentation technique. Aged weavers in Sa'dan related that they had boiled *tarun* with mud to obtain a deep blue color or boiled *tarun* down to obtain black.

[9] Bilatte/Bilangte: Homolanthus populneas.

Figure 2. The woman wearing the mourning hood, the pote, is pounding bilatte leaves in the stone mortar at the blackening rite. Mengkendek, Tana Toraja, 2005.

Era of Chemical Dyes

The second stage is the Era of Chemical Dyes after the Second World War, when industrial goods entered into the local markets, resulting in easy acquisition of materials for weaving colorful cloths, with which the people began to show signs of identity as being Torajan (photo 3). Also, this Era occurred at the change from homespun cotton to industrial cotton yarn followed by chemical dyes. A.C. Kruyt gives us the useful piece of information that it took place before the first European War when industrial cotton yarns came into the shop in Palopo for the first time; importation was interrupted with the war that followed. Thus, it is probably between the First and the Second World Wars that industrial yarns became popular in the towns of Sulawesi.

Figure 3. The old splendid loincloth, the pio, is woven using home-span cotton andchemically dyed. Supplementary-weft patterning. Toraja Utara. 2012.

As for chemical dyes, referred to locally as *one teck* or *kasumba*, it is said that after the Second World War, weavers popularly use them in Sa'dan village. Chemical dyes gave richly striped patterns to such Torajan textiles as the *pa'miring* and *paramba'.* This was developed into a form of traditional clothing in their favorite red-and-yellow-striped design with matching trousers or *seppa*, and for women, a top or *bayu pokko'*.

Era of Colored Polyester Yarn

The third stage is the Era of Colored Polyester Yarn in current times, following the Green Revolution in agriculture. The introduction of early-maturing varieties of rice with chemical fertilizers brought such a great change in social life as that a majority conversed from Aluk To Dolo to Christianity; it gave the most definitive turn for textiles since certain kinds of authentic textiles had been maintained through ritual performance of Aluk To Dolo, such as the mourning headband and hood, *the pote.* Coincidentally with the times of Green Revolution, people began to use polyester yarn instead of cotton, without reeling and home-dyeing. Despite of a great change in materials and dyes, however, we find that in the villages striped patterns and the backstrap loom have an early origin, which continues in Torajan textiles today.

In the third stage, colored polyester yarn made the weaving process very efficient and gave variety to the colored stripes. One informant in Simbuang reported that there were 13 procedures to make industrial cotton yarn into sarung: 1) preparing reeled yarns, 2) soaking in the water, 3) mixing with cassava/ *ubi* (*nandei*), 4) boiling, 5) chemical dyeing with *one teks*, 6) stepping the yarns, 7) removing cassava (*dikomba*), 8) drying the wet yarns, 9) reeling (*unusan*), 10) warping (*dipatama*), 11) weaving (*ditenun*), 12) cutting, and 13) sewing. It is said that it took two weeks until before warping. How laborious it looks, especially the work for stiffening the warp with cassava starch! As opposed to that process, only three procedures are required for polyester yarn: warping, weaving, and sewing. Currently in Simbuang, many sarung woven with modern polyester yarn were used to wrap the dead today, without an inner wrapping of very course kapok cloth (Figure 4).

Figure 4. The dead surrounded by many sarungs is seated in the pa'bambangan rite. Simbuang, Tana Toraja, 2015.

Looms and Weaves

The Torajans, as well as the Mamasan, Kalumpang, and Rongkong people, have been engaged in weaving on a backstrap loom of the simplest form. This loom has been active in local weaving production with increasing local need; in addition, village women are fascinated with today's opportunity to learn weaving as a new occupation. It is a central question of this paper as to why this very old loom has such an important role in local textile production even today, especially at a time when the global economy is expanding into local life. In pursuing an answer to this question, the advantages of using this loom are taken into account from several viewpoints: technology, organization of production, local culture.

Technical Aspects of Backstrap-Loom Weaving

The first discussion begins with a technological aspect of backstrap-loom weaving. The simplest backstrap loom is equipped with a heddle connected to the odd-numbered warps by strings (string heddle) and a shed stick (large bamboo rod) that is inserted under the even-numbered warps (Diagram 2). In plain weave, the opening is created when odd-numbered warps are lifted up by lifting the heddle (1) and when even-numbered warps go up by moving the shed stick backwards (2), and vice versa in turn. Then the weaver inserts the weft into the opening from right to left, then left to right, and so on. Focusing on warp-tension in aforesaid manipulations, in the first, a weaver moves forward from the waist up to loosen the tension in the warp, while in the second, she backward to tense the warp by pushing her outstretched legs against a wooden block on the floor. In this way, on back-strap loom, a plain-weave is achieved by asymmetrical manipulations controlled through weavers' body actions; in this reason, this loom is occasionally called 'body-tensioned loom'. On a floor loom, on the other hand, it is done symmetrically, lifting and lowering warps with multiple reeds.

This type of backstrap loom has a circular warp and no reed or *sisir*[10]. Instead, it is equipped with a special coil rod around which each warp thread is wound in turn when warping is done before setting warps on a loom[11]. This device functions to keep the long circular warp in constant position with the correct density [c.f Niessen 2009: 465]. A coil rod is referred to *limulun* (Sa'dan)*, butun* (Simbuang)*,* or *kumba'* (Mamasa)[12]. (Figure 5, 6 and Diagram 2 around here!)

In comparison, the backstrap loom used in Bugis and Mandar regions is equipped with a reed into which each warp is inserted in order to keep constant density with a regular width in the cloth being woven. In these regions, the warps are stretched on the loom parallel to the floor and not as long as those in Toraja: more or less a meter, since each end of the warps is wound around a wide board set horizontally on a wooden stand. On this loom, the weaver still has to control warp tension with her waist, but the tension in this case is not as strong as that in Toraja. Thus, the simplest backstrap loom generally produces thicker fabrics with a dominant warp owing to the higher density and stronger tension of the warp on the

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10 Local term for a reed is *sisir*, meaning a comb.

11 There are two methods in which the coil rod is set up in the course of warping. In the first, each warp is wound around the warp post or warp beam which is situated near the weaver; in the second, a special post is raised next to the heddle/shed stick device to become a coil rod on the loom. In Mamasa, the first method is called *sobeko,* the second *dikumbai'*. Sa'dan weavers work with the first method, Simbuang and Mamasan weavers with both at their convenience.

12 After warping, in Sa'dan, 2-meter-long warps are stretched diagonally towards the floor but in Simbuang usually to weave three sarung, 30-meter-long warps are set on a loom at first and then 3 or 4 meters of those are stretched, a part of the warp being tied with string.

loom. The second type, however, results in thinner fabrics with balanced warp and weft. It provides a key point for us to evaluate cloths produced by varying looms with regard to modern clothing, as mentioned in Chapter 3.

Pelras found in further study that besides the two types of backstrap loom, above, a third type using a comb is known in the southeastern part of the peninsula along the Gulf of Bone. It looks as though it has a continuous warp but the warp, in fact, is discontinuous[13]. He suggested that this loom represented a transition stage between the first and second types [Pelras 1997: 244]. Yoshimoto classified backstrap looms in Indonesia into four types, 1- 4. Table 3 is made and partly touched up by the author based on the classification in *System of Indonesian Textiles* [Yoshimoto 1978: 244-248][14]. This table indicates that 1 type, such as Torajan, represents a primary type of loom, and 4 type, such as Bugis-Mandar, the developed type of loom, while the middle two types, 2 and 3 are analyzed as transition types (see Photo 5, 6). This variation of backstrap looms represents development of diverse textiles throughout the Indonesian archipelago.

Table 3. Classification of backstrap looms distributing in Indonesia.

Item /Loom type	1	2	3	4
Distribution	Toraja-Mamasa (Sulawesi) Batak (Sumatra) Dayak(Kalimantan)	Sangir Islands Talaud Islands	Gorontalo (North Sulawesi) Kajang (South Sulawesi)	Bali, Lombok, Java, Bugis Mandar (South, West Sulawesi)
Coil rod or Reed	Coil rod	Reed	Reed	Reed
Warp form	Circular/ continuous	Circular/ discontinuous	Circular/ discontinuous	Straight/ Discontinuous
Stretched warp	Diagonally	Diagonally	L- shaped	Parallel
Stand	No stand	No stand	No stand	Stand with board

[13] Sangir loom is identical to the loom described by Pelras; Rita Bolland shows a figure discontinuous circular warps on this loom [Bolland 1991:183].

[14] He presented his extensive study on this subject; the first type of backstrap loom is dispersed among the Batak, Dayak and Torajans, and so on, who belong to the Proto-Malay group of poeple and the second throughout Sumatra, Java, Bali, and so on: people who accepted the Hindu, Buddhism and Islamic cultures [Yoshimoto 1980: 244, 247].

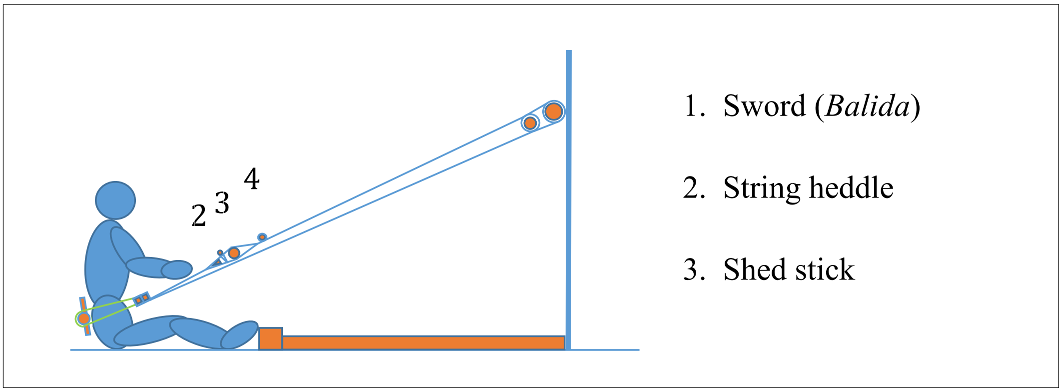

Diagram 2. Figure of the first type of backstrap loom (Computer graphics: Takako Suzuki)

Figure 5. The woman is weaving cloth with warp-patterning technique, sapa, on the 1 st type of backstrap loom. From the left, a coil rod (limulun), a shed stick (kaberan), a string heddle (doke-doke), and a sward (balida). Simbuang, Tana Toraja, 2015.

Figure 6. The woman is weaving silk sarung on the 4 th type of backstrap loom using a reed (sisir). Pol-Mas, 2014.

Patterns and looms

There is a correlation between loom and pattern as well as texture of fabric, as mentioned above. Table 4 shows that the backstrap loom commonly creates designs using the warp-patterning technique in Sa'dan and Simbuang, as well as in Mamasa, however it creates designs using the weft-patterning technique only in Sa' dan and Mamasa, not Simbuang; it is quite an important fact that weavers in Simbuang are not acquainted with the weft-patterning technique. In summary, the warp-patterning technique[15] covers all stripe-weaving areas: Toraja (Sa'dan and Simbuang) and Mamasa, while weft-patterning[16] covers all except Simbuang since it is an isolated area and behind the times where weavers hardly acquire a new technique followed by a trend in fashion, all the way.

The distribution shown in Table 4 leads us to a hypothesis that the warp-patterning technique is intrinsic to this type of loom, while weft-patterning was presumably introduced at a later time with influence coming from a different weaving area. The loom was then adapted to this technique. In Toraja, they use 2 or 4 pattern sticks plus manual manipulation

15 Warp-patternig techniques in Indonesia are classified into four types (1, 2.1, 2.2, 2.3) by the author. At present, that distributed in Toraja-Mamasa is Type 1, namely, "alternating warp-float patterning on a plain-weave ground" [Kusakabe 2015: 20-21].

16 In *Floating Threads*, Achjadi described supplementary weft-patterned weaving in Indonesia into four types: continuous, discontinuous, inlaid, and wrapping weft-patterned weaving [Achjadi 2015: 14-15]. The type dispersed in Toraja-Mamasa is a discontinuous-weft type at present, but a continuous-weft type commonly appeared in loincloth, *pio*, in the early days .

to form supplementary weft-patterned designs[17] on the simplest backstrap loom, while in Bali, Lombok, Sumatra, etc., many pattern sticks are used to repeat small motifs systematically on the developed type of backstrap loom with a reed. In 2015, the local government tried to adopt the Lombok loom in Tana Toraja, which ceased in a year.

Table 4. Local names and distribution of warp- and weft-patterning techniques.

Technique/ Region	Sa'dan (kab.Toraja Utara)	Simbuang (kab.TanaToraja)	Mamasa (kab.Mamasa)
Warp-patterning	*pa'bunga-bunga*	*Pa'sapa*	*Sakka*
Weft-patterning	*pa' ruki'*	----	*baju or sungki'*

In the current situation in Toraja, weft-patterning decoration, *pa'ruki* (Figure 7) is quite popular but the warp-patterning called *pa' bunga-bunga* seems to be almost lost. Likewise, *songket* in Bali and Sumatra, which is a supplementary weft-patterned weave, attracts many women living in Indonesian cities today, while warp-patterning is apt to be taken no notice of [c.f. Achjadi 2015; Kusakabe 2015: 20-21,194-195, 228-231, 238-240].

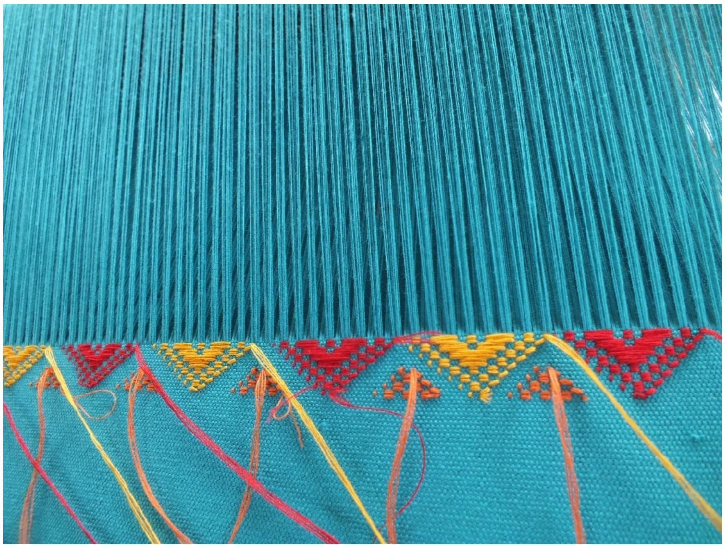

Figure 7. Movements of color supplementary weft threads of the pa'ruki' technique achieved in manual manipulation. Tana Toraja, 2005.

[17] A pattern using 2 sticks is called *pa'ruki'* with discontinuous supplementary weft and that using 4 is called *kalaa'pa'* with continuous.

Contemporary Revival of Backstrap-Loom Weaving

There is increasing need for hand-woven local clothing followed by revival of local cultures and customs. Especially, the *sekong kandaure* pattern appears at the highest of Torajan popularity in the town today (Figure 8). The following description on contemporary movement of local weaving reveals a new birth of weaving groups in the outskirts of the town.

Figure 8. Two women wearing the fashionable skirt and blouse with sekong kandaure decorations, the pa'ruki' at anniversary of the foundation of Tana Toraja Regency.

Local Fashion and the Traditional Loom

The current preference of women is to wear, not a sarung, but a top and *rok* or dress with weft-patterned designs along the edges of body and sleeves. Warp-patterned designs, on the other hand, are looked upon as being out of fashion; people prefer colorful motifs worked in supplementary weft and lined up horizontally on their clothes, not vertically; in the current Polyester Era do symbolic designs popularly appear on clothing with *sekong-kandaure*, *patekko,* and *buttu-batik* motifs executed in the *pa' ruki'*[18] technique. People also love to wear clothing with the traditional striped pattern at offices or rituals. Furthermore, the fabrics hand-woven for them are much better than the factory-made textiles soled in the shops, if they have enough in their budgets for wearing these dresses. Striped hand-woven

[18] In the old times, these motifs merely decorated on other genres of artifact: beaded accessory, relives of the traditional house, or bamboo hat/ *sarong*, etc.

cloth for a set of top and skirt costs approximately Rp.350,000 and that with *pa'ruki'* designs more than Rp.1,400,000, with tailoring charges on top of that.

The government has made a regulation that officers must wear clothes tailored from locally-made cloth/*tenun* Toraja on Saturdays. In the villages, women are passionately learning to weave on the back-strap loom in response to such demand arising in the city; clothes/*baju* require
cloth measuring 70cm in width and 400cm in length. In Simbuang, most women still weave long narrow cloth 40 cm wide to tailor into a sarung, although a few have begun to weave wide cloth for clothes/*baju* to orders, yet there are few specialized weavers there. These details show that a new clothing style leads to change in cloth woven on loom as to size (width and length) as well as aforesaid texture, and then requires a loom adapted to the new situation; in 2016, the local government began to introduce a type of ATBM, which is semi-automatic floor loom.

Social Aspect of Backstrap-Loom Weaving

We turn now to the social and cultural effects that backstrap-loom weaving both gives and
takes. Backstrap-loom weaving has continued in the Toraja lands for thousands of years. As of the second stage, the Era of Chemical Dyes, the people have been attempting to adapt to new materials and dyes in accordance with new demand from the changing social situation. Taking in advance that through the transition, materials, dyes, and segments of weaving techniques have changed one after another, the loom has never changed in such a complete way.

The author's research in the villages since 2014 shows that many new weavers have been developed through group or *kelompok* activities in the villages where weaving had already disappeared. The local government's program with financial support has an important role in these group activities; at the same time, increasing demand for locally made cloth is attracting women to backstrap-loom weaving.

The backstrap loom is a very flexible tool from the points of economy and technology; weavers can work anytime anywhere without any investment in facilities. After weaving, the rolled loom is tied to the beam of the house or granary. Such a convenient tool peculiar to home-industry is conducive to linking textile production to local need; it forms a social aspect in backstrap-loom weaving. On the local consumers' side, they can choose a weaver with an expected level of skill and order cloths with colors, texture (thin or thick) and size as well as design to their taste. These linkages, on the one hand, are built on inter-communication within a local community, and on the other hand, built up in turn.

The same is mentioned in the case of interrelationships among weavers. Weavers are compelled to take ad hoc measures by sharing, for example, weaving orders and working together on warping, while simultaneously participating in community events and rituals. Information is circulated fast through local communities, without there being an independent medium for propaganda. Therefore, backstrap-loom weaving is a work undertaken by women not only to earn money but also work together with particular weavers in the community, even they work for production of commodities because their activities, in the other word "management system", cannot be built up without a community bond in the village. Thus, we possibly say that backstrap-loom weaving is half-embedded in society and is not being reduced entirely to production for the market economy [c.f. Planyi 1957]. Thus, backstrap-loom weaving has the possibility of continuing in the villages but not in the urban areas.

Conclusion

This paper, in the first part, described diverse textiles produced in the mountain regions of Sulawesi as a background to the development of Torajan textiles, focusing on a contrast between bark-cloth making and back-strap loom weaving. Specifically, this paper has paid special attention to data in literature and research revealing coexistence and mutual exchange of both textile cultures. In the second part, the development of Torajan textiles proper was discussed from the viewpoint of technology in order to analyze various complicated situations, highlighting materials and dyes, looms and patterns as essentials of weaving. Materials and dyes among the four reveal a character adaptable to factors arising from outside, but looms generally conform to the land with a unique life and circumstances, as shown in the many types of loom characteristic to this region. In the process, we discovered that new methods, such as *pa'ruki'* (supplementary weft weaving), could facilitate the weaving of new types of pattern on the loom, such as the Torajan *sekong* (hook) and *doti langi'* (cross) motifs created on the simplest backstrap loom (see Photos 5, 8). Likewise, it is a critical study to understanding the interrelationship of these four essentials of the weaving technique, to achieve a precise analysis of the technical aspect of the contemporary movement: in brief, the interlacing of warp and weft on the loom. Meanwhile, we should not forget that the loom is also affected by social conditions as discussed in the third chapter. Accordingly, we will come to understand the significance of the above-mentioned popularity amongst Torajans for *pa'ruki'* decoration from diverse angles. Finally, it is hoped that this paper may be of help in undertstanding the situation of textiles in Toraja as well as in Indonesia today.

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MARITIME PEOPLE AND WETLAND SETTLEMENT

Bambang Budi Utomo

Introduction

Jambi and South Sumatera regions in the central area of Sumatera are mostly peatland area where big rivers emptied leaving mud material sediments. Some of these areas are now in the form of delta, such as delta of Batanghari between Berbak River and Nyiur River and delta of Musi (Anwar et al. 1984: 245-266). This area is nowadays used as settlement by the transmigration people and settlers from South Sulawesi who intentionally open the land for agriculture. How was the condition before the born of Kadātuan Śrīwijaya, a maritime kingdom powered by maritime peoples? C-14 analysis on *nibung* posts discovered in the peat-land indicates that the area had been inhabited at least since 4th century CE.

The biosphere is the living environment of human that might influence human's life, but on the other side human might also exploit the environment by transforming it for the sake of human development (Bintarto and Surastopo 1987). The earth surface where people live is classified based on their natural landscape, i,e. mountainous area, hilly area, valleys, and coastal lowlands area. This paper will discuss the occupations in wetlands.

Wetlands are area where the land is saturated by water permanently, such as swamps area (including mangrove swamps), freshwater marshes and peat-lands. The soil contained drifted wood chips from the upstream that are deposited in low current shallow water. Water from this kind of land could be freshwater, brackish and/or salty water. However, those are not suitable as drinking water due to high acidity level.

Compared to other ecosystems, wetland area has high level of biodiversity. Wetland vegetation includes freshwater swampy forests, peat swamp forests, mangrove forests and marsh grass lands. And within that vegetation live a wide range of animals from specific animal species in wetlands such as fish, frogs, snakes, lizards and alligators, and various kinds of birds and mammals such as tigers and elephants.

Most people assumed that wetlands are less fertile or even infertile, and therefore it is not suitable as habitation. But the fact is, since 1970s the wetlands area in eastern coastal area of Sumatera -from Jambi to South Sumatera- was used as transmigration areas, and the migrants opened the peat-land and convert them into rice fields and fishponds.

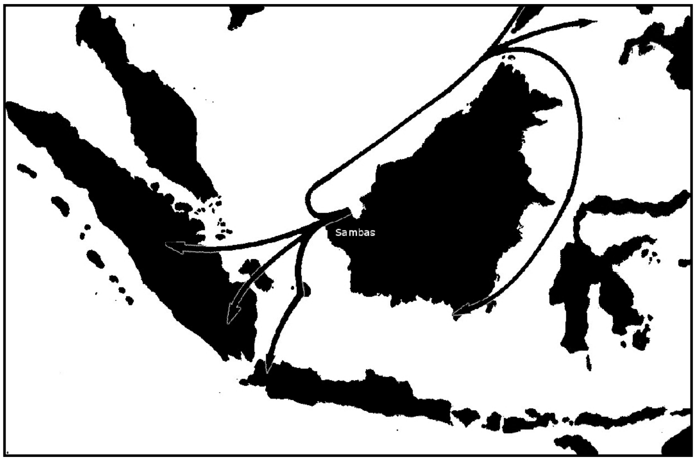
Most wetlands in Sumatera are freshwater marshes, peat-lands and mangrove forests, and they occupy mainly the eastern coast, only small part is in the western coast area. The largest area of wetlands is around the estuary of Musi River and Batanghari River.

The people who inhabit the wetland area are maritime community people that are believed to be the people who were behind the Srivijaya civilization. This people were very skillful in water combat, either on river or sea, and their technology development in boat construction as steadfast transportation mode at that time was their monumental work-piece. It was that transportation mode that made Srivijaya as victorious kingdom in the Archipelago, at the least in the western part of the Archipelago.

Recent community that reside the wetlands and shallow water area are the Laut ethnic people. They are known with several names, such as *Orang Laut* ("Sea People"), *Ameng Saweng*, and Bajo ethnic people. Since most of them live on boats and move from one shallow water to another for temporary residence, they are also known as "sea gypsies".

Dispersal

The spreading of the Austronesian-language people lasted from 3000 BCE to the first Millennium CE. They originated from Taiwan, and by crossing the islands they eventually landed in Sulawesi and Kalimantan. Based on stone tools discovered in Kalimantan, and the folklores as well, some archaeologist and linguist reconstructed their route to the Archipelago.



In West Kalimantan, the Austronesian-language people, who James T. Collins called Ancient Melayu-language people, occupied the swampy area, wetlands, and deltas of river system (Collins 2005, 4-5). From here, at around 1st century CE, they continued their journey crossing the South China Sea through the Island of Tambela and Riau Islands to Sumatera, and part of them moved to Malay Peninsula and Jawa Island.

In Sumatera they landed in the eastern coastal area, particularly in the area now known belong to the provinces of Jambi, Riau, South Sumatera, and Lampung. In the South Sumatera Province area, they resided in the swampy eastern coast which was formerly swampy mangrove forest. In these wetlands they built their houses on posts high above the water level, and made their living as fishermen and probably as merchants. Remains of this people are found in Karangagung and Air Sugihan (Budisantosa and Tri Marhaeni 2005),[1] and the only mode of transportation used at that time was boats with different sizes, the smallest have the length of approximately 3 meters.

Ancient cultural remains from Karangagung are found in Karangagung Tengah site, particularly in Mulyaagung, Karangmukti, Sariagung Sukajadi, and Bumiagung. They are in the form wood posts, boat rudder, potsherds, glass and stone beads, metal artifacts, anvil[2], fishing net sinkers, whetstones, and glass and metal bracelets, and anthropomorphic bronze pendant. C-14 analysis show this site is from at least 4th Century CE (Budisantosa and Tri Marhaeni 2005:2). These findings suggest that the area were occupied since prehistoric times or at least protohistoric period. The anthropomorphic bronze pendant is likely from prehistoric times.

The site location in coastal area near Malacca Straits allows it to be connected with other distant region such as India and China. Potsherds with strong feature of Arikamedu (port in South India) potteries were found at Karangagung Tengah site. Arikamedu potsherds were also found in Buni, Batujaya, and Patenggeng in the northern coast of West Jawa, and Sembiran in Bali. Arikamedu pottery commonly characterized by having circular concentric decorations (*romano roulleted*) on the inner surface of the pottery. On the outer body of the pottery, some were plain and some were decorated with incised technique.[3] These archaeological evidences indicated there was a connection with India,

[1] In similar site in Karangaagung discovered as well at Kuala Selingsing site (the State of Perak west coast, Malaysia). The site was a mangrove forest with cultural remnants of habitat remains and prehistoric burial, pottery, stone beads, glasses, fish bones, shells and tools made from ivory and bones. Moreover, artifacts/hardware made from glass from Iran or Iraq on 10th Century CE was also discovered. In general, dated of the site was between 3BCE to 11CE (Nik Hassan Shuhaimi 2004: 70-71)

[2] This type of artifact was discovered as well at Air Sugihan site, made from terracotta with a diameter of 7cm. According to Abu Ridho, one of the discoveries in Air Sugihan was a weighing scale's mass/cube for products trading which was not for weighing precious metals.

[3] Arikamedu pottery had two different body surface characters, one with rough surface commonly in red and the other with smooth surface in semi-dark color. The pottery's density is fairly hard like stoneware as it was well-burnt by high temperature burning technique.

whether the former Karangagung's people who went to India or Indian's trader who went to the Archipelago.

Settlement remains on eastern coastal Sumatera were also found at Air Sugihan site. The discovery of ancient cultural remnants from this site was including stone and glass beads, anvils, metal and glass bracelets, metal artifacts, pottery, and ceramics. Temporary dating for this site was based on the discovery of two teapots from Sui Dynasty (581-618CE), China. Abundance carnelian stone beads found in this site indicate they were from India, because within that period (around 6th century CE) these types of beads was important commodity from India and were shipped through Arikamedu. There were also gold beads with similar shape as the carnelian beads (double cone), which according to According to Sumarah Adhyatman had a style from 3rd-7th century CE (Adhyatman & Arifin 1993:126).

These archaeological evidences indicate that relationship with India has been established for a long time. Based on the dating of Karangagung site, at least the relationship with India has started since 4th century CE, older than dating of the *yūpa* from Muara Kaman (Kutai, Tenggarong, East Kalimantan) which is accepted as oldest evidence of relationship with India in Indonesian history. In other words, this was the starting place where the Archipelago people started to "invite" Indian culture into the Archipelago before the expansion of Hinduism and Buddhism. At the time Srivijaya Kingdom was founded in 7th century CE, the habitation on the swampy coastal area on the estuary of Musi River still existed and even might growing broader. The inhabitants of the settlement were then becoming the human resources to defend Srivijaya from enemy's invasion as written in Chinese chronicle, *Chau Ju Kua* (Hirth & Rockhill 1911:65).

Maritime Activities

The nowadays Austronesian-language population is more than 350 million, live within the area from Madagascar in the west to Easter Island in the east, and from Taiwan in the north to New Zealand in the south. The "red thread" that unites them includes agriculture techniques, boat-making techniques and pottery-making techniques (Tanudirdjo 2005), and stilt houses. Those characteristic are very common in the Archipelago, especially the coastal area, around the river, and swampy area. Eastern coast of Sumatera is the area which archaeological sites are rich with remains of ancient wooden posts, boat hulls and oars.

The relation between human and its environment is not always deterministic since human might transform their living environment (Suparlan 1980:20).

Theoretically, the wetland areas in eastern coast of South Sumatera are not suitable as habitation. Natural resources that could support human lives were very minimal; it even seemed to be none. However, there must be some methods that have yet to be known on how they were able to lived and survived. We can see from how they built their houses, which raw materials were gathered from surrounding area.

One overgrown plants in wetlands area is *nibung* (*Oncosperma tigillarium syn. O. Filamentosum*), a species of palm tree that grows in Southeast Asia swampy area. This plant grows straight upwards and could reach the tall of 25 meters, has no branches and the trunk is extremely hard and not brittle that it could be pushed down onto wetland or shallow water and be used as poles for stilt houses. Nibung trunk is also highly resistant to decomposition; if the submerged part has reached equilibrium point and not in contact with open air, it will not decompose but get stronger instead.

The use of *nibung* trunks as stilt house poles in the past was revealed during the excavation at Kertamukti 1 site, Air Sugihan (Ogan Komering Ilir Regency, South Sumatera) in 2007. The archaeological excavation took place at a transmigration settlement area which previously was streams and swamps area. Remains of stilt house were found, and it shows that *nibung* trunks were used as poles.

In 2012 an excavation was accomplished at Sugih Waras site (Sub Sugihan Estuary, Banyuasin Regency). Nnumbers of indicators of ancient village were discovered, such as poles made from *nibung*, kitchen wastes, house or boat’s decorations in the form of engraved boards of human figures, pottery fragments, shells and bronze metal artifacts. Observing from the soil layers of the excavation’s wall, this village has been building houses by using wooden pillars made from *nibung* which located might be on the natural riverbank in the past. These *nibung* poles were plunged unevenly into soil/water. It was plunged not straight to form four-square floor plan. If compared with current houses built above the water, the placing of the wooden pillars on the bottom of the house was also uneven.

The group people that lived in the wetland area of eastern coast of Sumatera were more likely developed due to trading factors rather than environmental factors (Budi Wijayna 2015, 78-85). Even though their surroundings were very limited but it could support their trading activities. In addition to trading, subsistence provisions of the past villagers on the tidal eastern coast Sumatera were hunting and fishing. Archaeological evidences that show the presence of those activities was the findings of wild boar bones and teeth, fish bones and shafts, and bird bones. The consumption of prey animals fulfilled their protein necessities, while their carbohydrate necessities were fulfilled from the consumption of *nipah* palm *(Nypa fruticans)* fruits.

Little is known about when the Indonesian ancestors were introduced with the skill of boat making. Only few archaeological or historical data that managed to reveal it. Cave paintings were the oldest but few archaeological data that depict the shape of boat from prehistoric period, which was still very simple at that time. Comparing with boat making technique among traditional people, it is more likely were made with the similar technique. Firstly, large diameter tree was cut and then the trunk is dug using simple tools, such as stone adze. The width of the dugout's walls has to be estimated, not too thick nor too thin. It has to be able to keep the balance and sustain any bumps into corals or tough shoreline thus it will not wreck. Outriggers are mounted onto the left and right side of the body. This type of boat is called dugout canoes, have the length of approximately 3-5 meters and 1 meter width. The boat making technique is still practiced among simple traditional fishermen who look for fishes in the rivers, lakes, or shallow waters.

According to maritime historians, outrigger canoes played important role in the inter-islands trading between the Archipelago and the mainland of Southeast Asia during prehistoric times. Exchanging of technology between mainland Southeast Asia and China can be accomplished due to this trading relationship, i.e. technology in temple building, city construction and of course boat making. From the boat ruins that are found in the western part of the Archipelago abundantly, experts conclude the manufacture technique could be grouped into *Southeast Asian Region* and *China Region,* according to the region origin (Manguin 1987, 63-64).

The Southeast Asian tradition boat making technology have unique features, among others are the V-shaped hull with high prow, symmetric shape of the bow and stern, no watertight partitions on the hull, no use of iron nails, and double rudders on both left and right side of the boat. In joining the wood planks of the hull to the ribs, they use fiber ropes *(Arenga pinnata)* instead of iron nails and joining the planks along the side they use wooden or bamboo pegs. This technique is known as sewn-plank and lashed-lug.

What is learnt from boat remains found at Samirejo, Kolam Pinisi, Tulung Selapan, and Air Sugihan – all located in South Sumatera – as well as Punjulharjo in Rembang, and Sambas in South Kalimantan, is that the technology used in their construction techniques are vary. Those are (a) sewn-plank technique, (b) wooden/bamboo pegs technique, (c) combination of sewn-plank and wooden/bamboo pegs technique, and (d) combination of wooden pegs and iron nails technique. All these techniques could reveal the dating aspect of the boat itself.

The oldest written evidence related to the use of wooden/bamboo pegs technique as boat making technique in the Archipelago are found on Portuguese sources from early of 16th century CE. It was mentioned that Malay and Javanese trading boats, called *jung* and with capacity more than 500 tons) were built without any single of metals. To join the planks or the ribs they use only wooden pegs. This kind of boat making technique is still found in the Archipelago, for instance the trading boats from Sulawesi and Madura which capacity is more than 250 tons.

Boats that were made with Chinese tradition technology are mostly have no keel (rounded bottom), the hull is designed with structured bulkheads, planks joining use iron nails, and have single central system steering. Most of ancient boats remains discovered in the Archipelago were built using the Southeast Asian tradition technique, however not many could be known about the complete shape even tough planks with *tambuko* and *Arenga pinnata* fiber rope were found among the ruins. Ancient boat remains discovered at Punjulharjo site (Rembang) could be said as an almost-complete boat hull remains from around 7th-8th century CE (Abbas 2010:45). It has the length of approximately 15 meters and the width than could be revealed was approximately 3 meters. But still no further data was gained from the remains. However, complete shapes of ancient mode of water transportation from same period are depicted on Borobudur temple reliefs. There are about 10 reliefs with various water vessels depiction on it, from simple small water vessel for 2-3 passengers to large sailed and outrigger boats for long distance journey.

The shape of boat as depicted at Borobudur temple enable long distance network to be established in the Archipelago. Large outrigger boat with double sail masts enable it to sail to far distance as to China and India.

They would spend days even months in the sea due to their long distance sailing activity. To fulfill their daily need they had to prepare themselves with food and drinks, cooking utensils, etc. Among shipwrecks cargo discovered on seabed are clay "movable"stoves that are known as *tungku sepatu* ("boot stove"), which also is discovered within the wetlands archaeological sites either in complete shape or in fragments.

Excavations at the Margo Mulyo site, Muara Sugihan, Banyuasin Regency, South Sumatera in 2011 by The National Research and Development Center of Archaeology discovered pieces of boat's wooden planks, rudders and oars. Those boat remains are associated with *nibung* posts, ceramics and pottery sherds, clay stoves, beads and coconut shells. Nowadays people of Kayuagung area in South Sumatera use similar shape clay stove which they called *tungku kran* (*kran* stove), and this people use to bring it when they travel with their traditional boat, the *kajang* boat.

According to Peter Bellwood (2000) the discovery of clay stove at Bukit Tengkorak site is associated with seafaring activity in Sabah-Sulu area. They used the clay stoves as part of their equipment in a boat. "Tungku kran" reminded the archeologists to stoves used inside boats in Srivijaya era and even this type of pottery was discovered at many settlement sites in Southeast Asia prehistoric period. One of them was found inside the remains of Srivijayan ship from 10th century CE which sunk in Java Sea on the west side of Cirebon. Barang Muatan

Kapal Tenggelam/BMKT (Sinking ship's cargo) from that ship was first discovered by a fisherman in 2003. That ship (Hirth and W.W. Rockhill 1911, 65) loaded with many items made from metal, stone, clay, glass, wood, ivory and bone which originated from China, Persian/Arab, India and the Archipelago. It estimated was from 10th century CE and a possibility that it was departed from Palembang before sunk in Java Sea.

Maritime Ethnic Group

The Laut ethnic people or *Orang Laut* is the term used for social groups that lived in various coastal areas of the Archipelago, such as eastern coast of Sumatra, Malacca Straits to Myanmar, eastern coast of Malay Peninsula to Thailand, around Kalimantan, Sulawesi to The Philippine, and East Nusatenggara waters (Barnes 1996). In Kalimantan, Nusatenggara, and Sulawesi they are popular with the name *Sukubangsa Bajau* (Bajau ethnic group) (Harris, 1980), in Bangka and Belitung as *Amang Sewang*, and *Orang Selat* in Malacca. They do not settle at one place but move from one shallow water area to another, live on boats that are grouped and tied together on the mouth of big rivers. Some of them might live on fisherman villages built above estuary water. Their houses are called *rumah kolong* (stilt house), and the under part of the house poles are used to tie their boats.

Description alike the *Suku Laut* is found on Chinese chronicle from year 1225, describing the people of *Swarnnabhūmi* Kingdom (Hirth & Rockhill 1911: 65). It is mentioned that they lived around the city or on raft-houses with *nipah* leaves roof. They are very skillful in water combat. In battle with other countries, they would gather, fulfill any requirements and pick their own commanders and leaders. They were being liable for their own provisions of weapon and food. They are described as dare to die. Could it be the *Orang Laut* are their descendants?

From their background point of view, the *Orang Laut* is believed descendants of the Austronesian-language people who migrated from mainland Asia some 2,500-3,500 years ago. They spread into the Archipelago and mainland Southeast Asia to Champa. This people is classified into the Proto-Malays with physical features of Mongoloid.

The *Ameng Sewang* ethnic group (Setyobudi1987) could be an example in understanding the socio-cultural pattern of the seafarers as a whole. Old manuscripts mentioned that the *Orang Laut* have been living on boats for a long time and that they live in groups, occupying the shallow waters and never live on the land. The *Orang Laut* believes that land is the place for the dead while sea is the place for the livings and to find a living.

The sea is where seafarers live and find their living. It was Karimata Strait, a wide strait that connects South China Sea to the Java Sea, where they tried to find their living. This strait is known as a dangerous waters system, especially during west monsoon wind season. Within this season, seafarers will not sail. They took shelter in certain bay or estuary of a river which was protected from ferocious winds or waves. They can stay in months until the season reached a period of calm.

Bajau ethnic group is originated from Sulu Island in the Southern Philippines. This ethnic group lives a seaborne lifestyle and used to be called "Sea Gypsies". *Sama-Bajau* is the language of Bajau ethnic group. Since hundred years ago, they have spread to Sabah and throughout the Archipelago. They were one of the ethnic groups in Malaysian State of Sabah. Kalimantan tribes are suggested had migrated from the north (Philippine) in prehistoric time. Those Moslem Bajau ethnic group was the last migration wave from north of Kalimantan who entered East Kalimantan coast through South Kalimantan and occupied the surrounding islands prior to the moslem people of Buginese ethnics, including the Bugis, Makassar and Mandar ethnic groups.

The Bajau ethnic groups settled into several areas such as East Kalimantan (Berau, Bontang, etc.), South Kalimantan (Kota Baru) where they are known as Bajau Rampa Kapis people, South Sulawesi (Selayar), Southeast Sulawesi, West Nusatenggara and East Nusatenggara (Komodo Island).

The *Orang Laut* language has a similarity to *Bahasa Melayu* (Malay Language) which is considered as local Malay language. At present their common occupation is as fishermen. Similar to the Bajau ethnic group, *Orang Laut* have sometimes been called the "Sea Nomads" or "Sea Gypsies" due to their seaborne lifestyle, moved from one shallow water area to the others.

Sekak tribe is one of the maritime ethnic groups who inhabited along the north coast of Bangka Island and mostly still followed animism and dynamism religions. However, some of them have recently followed Islam and Christian religions. Unique features of this ethnic group are they always lived along the shoreline and their occupation as fishermen. Sekak ethnic group originated from Malay ethnic group which has similarity on their language and dialect with *Bahasa Melayu*, but there is a quite distinctive dissimilarity with society who lived in Bangka Island which is darker in skin color. At the glimpse there are similarities with other ethnic groups in Indonesia mainly in mainland Sumatera. Nowadays, Sekak ethnic group is not an isolated ethnic group anymore as they have adapted to foreign cultures.

Closing

The dispersal of Austronesian-language people that is assumed from Sambas (West Kalimantan) to eastern coast of Sumatera occurred at the least since 1st century CE. Their new living environment was swampy or peat-land area and they built their stilt houses using *nibung* plant trunk. They made their daily living by hunting and trading. They were doing short distance and long distance trading, traveled beyond the ocean.

In this area, they developed boat and ship building techniques which is known as Southeast Asian traditional technology, the sewn-plank and lashed-lug technique. The complete shape of their boats is assumed to be similar with those that are depicted on the reliefs of the Borobudur temple (8th century CE). The size of the boat is estimated has a length of 15-25 meters and the width of the hull is approximately 3-5 meters. For a long distance sailing, a pair of outriggers is assembled at the left and right side of the boat, as well as one or two masts.

During the Srivijaya period, these migrant communities actively joined to raise the kingdom, at the least as human resources to defend Srivijaya from enemy's invasion from the sea as mentioned in Chinese chronicles.

In the present context, these seafarers are known as community of maritime ethnic groups. They were called differently across several places in the Archipelago, such as *Bajo ethnic* group, *Ameng Sewang* and *Sekak*. Most of them lived with a seaborne lifestyle by moving from one shallow waters to the others on river estuaries. Some of them settled in the seashore and built their stilt houses above the shallow water, and make living as fisherman and trader.

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A SHIFTING PHENOMENON IN TOMINI-TOLITOLI LANGUAGE GROUP: TAJIO AS A CASE STUDY

Luh Anik Mayani

Introduction: Language Situation and Language Vitality in Indonesia

It is estimated that one-tenth of world languages are spoken in Indonesia. Ethnologue (2014) reports that there live about 719 languages in Indonesia: 707 are living and 12 are extinct. One of those living languages is Bahasa Indonesia (Indonesian) which has become the national language based on the Indonesian Constitution 1945, Article 36. Thus, Indonesian is not only used as the lingua franca between ethnic groups, but it is also used in govermental administration and as medium of communication in schools. The domination of Indonesian over local languages has definitely become greater as for three decades (1960s–1990s) the education system in Indonesia had been highly centralized. School and university curricula were centrally developed without considering local people's aspirations or needs. This situation is noticed by Mühlhäusler (1996: 205) as he claims that the dominant role of Indonesian is reinforced by its use in education at all levels. He even labels Indonesian as a "killer language" (ibid:20).

Mühlhäusler (2002:385) compares that the spread of Indonesian is parallel to the spread of French in France in the 19th century: as the national language, Indonesian is becoming more important, while smaller/local languages are pushed to the edge. Indonesian is predominantly used in schools, written communication and governmental administration. It is gaining prestige both on the regional and national levels. On the contrary, the prestige of local languages is becoming lower and the domains where local languages are used are getting limited.

Based on that fact, the language situation in Indonesia is categorized as type 3, a competitive ecology (Mühlhäusler 2002: 384). This type is characterized both by power differential and by constant restructuring of the ecology.

As local languages are gaining less power and having lower prestige than Indonesian, the language vitality of local languages are becoming worse. Within three years, the vitality status of some local languages are declining as shown by Table 1. Comparing the data reported by Ethnologue in 2013 and 2016, it can be seen that there are three languages losing their institutional use; eleven languages are no longer classified as developing languages; there are thirteen more languages which are now in vigorous use; one more language which is in trouble; and another language which is dying.

Table 1. The status of living languages in Indonesia in 2013 and 2016

Status of language vitality	2013	2016
Institutional (EGIDS 0-4) — The language has been developed to the point that it is used and sustained by institutions beyond the home and community.	21	18
Developing (EGIDS 5) — The language is in vigorous use, with literature in a standardized form being used by some though this is not yet widespread or sustainable.	97	86
Vigorous (EGIDS 6a) — The language is unstandardized and in vigorous use among all generations.	248	261
In trouble (EGIDS 6b-7) — Intergenerational transmission is in the process of being broken, but the child-bearing generation can still use the language so it is possible that revitalization efforts could restore transmission of the language in the home.	265	266
Dying (EGIDS 8a-9) — The only fluent users (if any) are older than child-bearing age, so it is too late to restore natural intergenerational transmission through the home; a mechanism outside the home would need to be developed.	75	76
Total	**706**	**706**

Another study on language vitality in Indonesia is done by Anderbeck (2013). He reports that the 178 local languages in Indonesia are endangered or getting worse. In his report, he also presents a trend line showing that the number of dying or dead languages in Indonesia is exceeding 300 in under two decades.

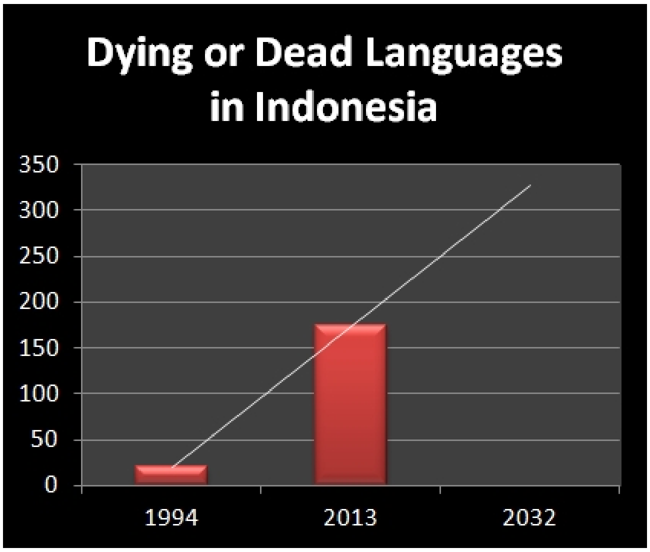

Figure1. Trend line for dying or dead languages in Indonesia (Anderbeck 2013: 15)

Language Shift in Indonesia

Following Fashold (1984: 213), the term language shift is defined as a situation in which a community gives up the use of a local language completely in favour of another one, or is being pushed into that direction. In general, a shift has taken place if the community members have collectively chosen a new language over the traditional one.

Having more that 700 living languages, it has been often a common knowledge that Indonesian people are bilingual or even multilingual, being able to speak at least one local language (i.e. their mother tongue) and the national language, Indonesian. However, as a shift has taken place, bilingualism or multilingualism in local languages and Indonesian is not always the case in Indonesia. Nowadays, in big cities like Jakarta, there are many children who are raised as bi- or multilingual in Indonesian and English, Mandarin or other foreign languages. Children no longer acquire their mother tongue.

The language shift in Indonesia has been noticed by some scholars. Steinhauer (1994: 755-6) states that the linguistic situation in Indonesia, i.e., being a developing, multilingual, polyglossic society, is highly dynamic and subject to pressures, shifts and changes. There are some social factors behind the dynamic character of Indonesian languages. Among others he mentions that increased mobility as an aspect of modernization has its effects on the language behaviour of individuals. On the national level, domains of the regional languages have been taken over by Indonesia. As knowledge of Indonesian becomes a precondition for national development, parents of same linguistic background decide not to transmit their own language to their children. They rather use Indonesian with their children (ibid: 772).

In line with Steinhauer (1994), Mühlhäusler (1996: 205) notices that the bilingualism appears to be a transitional kind towards monolingualism in Indonesian. The number of people who speak Indonesian as a second language has reached 70 per cent and the proportion people who speak Indonesian as their first language is about 15 per cent.

A recent study done by Anderbeck (2013) reports a more dramatic finding: Indonesia suffers from language endangerment. A significant number of Indonesian languages are now being lost. He states that the contributing factors of local language endangerment in Indonesia include among others urbanization, more frequent travel, political centralization, and Indonesian-medium education.

Tomini-Tolitoli Language Group

Sulawesi is home to 113 indigenous languages. Tomini-Tolitoli is a language group which is spoken in Central Sulawesi. The term Tomini-Tolitoli was introduced by Masyhuda (1975/81) in order to indicate a certain subgrouping, and also as an alternative to the East

Coast-centered term 'Tomini', which was first used by Adriani and Kryut (1941) (Himmelmann 2001: 14–16).

To date, it is still unclear whether the Tomini-Tolitoli languages for a low-level genetic subgroup of Western Malayo-Polynesian or whether they are just geographically related (Himmelmann 2001:19). Based on an extensive linguistic survey conducted from August 1988 to January 1989 and from February 1993 to April 1993, Himmelmann (2001) classifies eleven languages as belonging to this group: Totoli, Buano, Ampibabo-Lauje, Lauje, Tialo, Dondo, Balaesang, Pendau, Dampelas, Taje and Tajio.

Within the Tomini-Tolitoli language group, Himmelmann makes a further distinction between the Tolitoli subgroup and the Tomini subgroup. Tolitoli and Tomini in this subgrouping are primarily used as geographical terms rather than genealogical ones. This is based on observations concerning lexical and phonological similarities and dissimilarities between Tomini-Tolitoli languages. The tentative subgrouping of the Tomini-Tolitoli languages proposed by Himmelmann is as follows:

Tolitoli subgroup
- Totoli
- Buano

Tomini subgroup
- Northern Tomini
  - Ampibabo-Lauje
  - Lauje
  - Tialo
  - Dondo
- Southern Tomini
  - Balaesang
  - Pendau
  - Dampelas
  - Taje
  - **Tajio**

(Himmelmann 2001: 19–20)

Note that the Tomini subgroup proposed by Himmelmann is fairly similar to the one proposed by Adriani and Kryut (1914) and Barr and Barr (1979).

Tomini-Tolitoli area has been a complex language ecology which involves at least one Tomini-Tolitoli language and Indonesian. Bi- and multilingualism have been a common phenomenon in the area for quite a long time. However, the ongoing sociocultural changes have reduced the usage of the Tomini-Tolitoli languages. Of the 113 languages spoken in Sulawesi, it is reported that some are threatened; a few are even reported to be near extinction, while other languages give every appearance of vigorous use. According to Mead (2013: 2), who has conducted a study on the vitality of the indigenous languages in Sulawesi, the threat is multifaceted, among others, near-total domination of the national language, economies of scale, improved transportation infrastructure, influxes of outsiders, and more villages receiving electricity which means more villagers watching TV in Indonesian.

What are listed by Mead (2013) for languages in Sulawesi has also been found by Himmelmann (2010: 52–60) who did a case study in northern Central Sulawesi. He claims that there are two endangerment scenarios which play a major role in the language shift in the Tomini-Tolitoli area: the immigration and the emigration scenarios. In the immigration scenario, members of another speech community from outside the area 'take over' a Tomini-Tolitoli speech community. In the emigration scenario, members of a Tomini-Tolitoli speech community migrate to educational and/or occupational centers in- and outside the Tomini-Tolitoli area.

Furthermore, he also states that there are three other factors which contribute to the ongoing language shift: the use of Indonesian as the dominant language in schools, the rapid introduction of television, and the much improved transportation system (ibid: 60–61).

The Tajio Language and its Speech Community

Tajio is spoken by approximately 12,000– 18,000 speakers (figures taken from (Himmelmann 2001) and (McKenzie 1991) respectively) in Central Sulawesi province. Tajio people inhabit a continous stretch of villages on the East Coast (*Pantai Timur*), extending from the village of Toribulu in the Kecamatan Ampibabo (Ampibabo subdistrict) to the village of Sipayo in the Kecamatan Tinombo (Himmelmann 2001: 32). The blue dot in the inserted picture in the following map shows the area where the Tajio is spoken.

Figure 2. The speaking area of Tajio[1]

[1] The map of Indonesia is taken from Google map and the inserted Sulawesi map is from Mead (2013: 113).

Due to the politics of decentralization practiced by the Indonesian government, and the consequent establishment of new subdistricts, Kasimbar, which previously belonged to the Ampibabo subdistrict, became a new subdistrict, the Kasimbar subdistrict, in 2004. Thus, Tajio is now spoken in four subdistricts: Ampibabo, Kasimbar, Tinombo and Sindue. The neighbouring languages of Tajio are Ampibabo-Lauje, Pendau and Lauje.

The geographic center of the Tajio speech community is Kasimbar and, perhaps unsurprisingly, Kasimbar is an alternative name for the Tajio language, or at least its main dialect (see Himmelmann 1991, 2001). Kasimbar is located ca. 200 km north of Palu, the capital of the province of Central Sulawesi; it takes about four hours to reach the village by car.

According to folk memory, the old name for Kasimbar is *Tanainolo*, which also referred to the area inhabited by the Tajio and Pendau people. Its inhabitants lived in groups led by leaders called *Toi Bagis*, each ruling an area called *boya*. The settlements of the *Tanainolo* people in *boya* changed when Mandar[2] traders came to this area: at the end of the 17th century, powerful Bugis and Mandar Kingdoms in South Sulawesi took control of the Tomini-Tolitoli coastlines along with their Kaili allies whom they had subjugated some time before (Himmelmann 2001: 51).

Today the subdistrict Kasimbar consists of the following eight villages: Donggulu, Laemanta, Kasimbar Selatan (South Kasimbar), Kasimbar, Kasimbar Barat (West Kasimbar), Tovalo, Posona and Silampayang. Unfortunately, there are no official data which give reliable information about the number of Kasimbar inhabitants who speak Tajio as their first language. The only data available for the Kasimbar subdistrict is the population breakdown, based on the 2010 census; this is presented in the following table.

Table 2. Population in the Kasimbar subdistrict (2010 census)

Name of village	Number of inhabitant
Donggulu	3,611
Laemanta	2,169
Kasimbar Selatan	3,043
Kasimbar	4,526
Kasimbar Barat	1,249
Tovalo	1,882
Posona	2,620
Silampayang	1,831
Total	**20,931**

2 Mandar is the name of an ethnic group that spreads over the island of Sulawesi.

In addition to the two native groups of the Tajio and the Pendau, Kasimbar is inhabited by other indigenous groups such as the Kaili people, especially Kaili Ledo and Rai. Mandar and Bugis are early migrants originally from South Sulawesi; other migrants from North Sulawesi come from Minahasa, Sangir and Manado. Due to a transmigration project by the Indonesian government, which re-located inhabitants from over-populated parts of Indonesia to less populated areas, migrants from Bali and Java came to Kasimbar in the 1970s.

Language Shifti in Tajio Speech Community

As the Tajio area are inhabited by different ethnic groups, the area becomes more heterogeneous with respect to linguistic affiliations. In addition to Tajio and Pendau, the three major languages for being the everyday language in Kasimbar with mixed population are Indonesian, Bugis, and Kaili.

Among the older Tajio people, Tajio is still used in everyday communication. Tajio elders are either bilingual in Tajio and, to different degrees, in Indonesian, or multilingual in Indonesian and at least one further language they have come in contact with. For example, one of my language consultants, Bapak Jafar Tanggulado (at the time 69 years old), speaks Indonesian, Kaili and Pendau, in addition to Tajio.

Kaili is often well known by older speakers of a Tomini-Tolitoli language because it seems to have been a lingua franca in the area for about 200–300 years (Himmelmann 2010:56). Kaili is used as the main language for social interaction among speakers of the local languages (i.e., Kaili and Tomini people). Bugis has been a dominant language since the coming of Mandar traders at the end of the 17th century.

Language shift has occurred in Tajio speech community as Tajio native speakers have chosen Indonesian over Tajio language. Indonesian is not only used in schools, but also in the home domains. During my stay in Kasimbar and West Kasimbar, I hardly heard the younger generation (i.e., people under the age of 20) speak Tajio. Tajio children are no longer learning their native language. Instead, they use Indonesian within the family as well as in school.

In schools, Indonesian is chosen as the medium of communication because not all teachers in the village of Kasimbar coming from the Sulawesi area. Thus, many of them do not speak Kaili or Bugis. Meanwhile, the students are not only the Tajio children, but also the children of the immigrants. Therefore, either in formal or non-formal situation in schools, Indonesian is used in communication between teachers and students in the village of Kasimbar. However, among Tajio teachers and staffs, Tajio is still used in non-formal situation.

In mixed marriages, Indonesian is frequently chosen by the parents as the lingua franca. Consequently, their children grow up in an Indonesian-speaking environment. But, even in native Tajio families, I found that even parents who do speak Tajio rarely do so with their children. The children usually prefer to speak Indonesian with each other, although most of them still understand Tajio.

These observations are in line with the findings reported by Mead (2013).[3] According to his classification, which is based on the vitality/endangerment rating scale from UNESCO, Tajio is a "definitely endangered language" (Mead 2013: 113). According to the EGIDS scale, Tajio is on level 7, which means it is shifting. A language is rated as shifting when the speakers of the child-bearing generation know the language well enough to use it among themselves but no longer transmit it to their children.

Karan (2011) states that language choices correlate strongly with economic behavior, thus major economic changes can also cause major linguistic changes. In case of Tajio, two economically-motivated types of mobility which have their effects on language shift are emigration and immigration (cf. Himmelmann 2010).

Tajio elders and parents believe that good command in Indonesian can elevate either social or economic status of their children. Thus, they prefer to speak Indonesian to their children. Members of Tajio's younger generation who have received a higher level of education than their parents tend to become *pegawai* (public servant) rather than working as rattan drawers, farmers or fishermen. As a consequence, they tend to leave the village and search for work in the cities.

Immigration has shown its effect on the language use in the Tajio area as more immigrants continue to move into the area due to the transmigration project in 1970s. Immigrants do not only come from the Sulawesi area, but also come from the island of Bali and Java. On the one hand, these new comers cannot speak any Sulawesi languages, such as Kaili or Bugis. They can only speak their own native languages (Balinese or Javanese) and Indonesian. On the other hand, the Tajio speakers cannot speak Javanese or Balinese. Therefore, Indonesian then serves as a lingua franca used in interaction between the Tajio people and the immigrants. In a wider sense, Indonesian is used in interaction between speakers of local Sulawesi languages and the non-Sulawesi migrants.

In addition to emigration and immigration, modernization which is generally marked by electricity including the widely spread of television and much improved transportation system also supports the language shift in Tajio speech community. The national TV programs are all presented in Indonesian and the young generation of Tajio

[3] The rating system used in this research is the UNESCO rating system and the EGIDS (the Expanded Graded Intergenerational Disruption Scale) rating system. The vitality of Tajio is based on evidence from recent fieldwork and direct observation in a representative sampling of locations (Mead 2013:113).

consider the Jakarta lifestyle including the language (Indonesian) is a definition of being modern. This situation supports the common assumption that speaking Tajio means old modish while speaking Indonesian means modern.

The much improved transportation system makes people-mobility easier. There are more Tajio people leaving their village to seek for a better job or opportunity in the cities or even abroad. Some of them had ever worked abroad as hausemaids or seasonal workers. Therefore, in addition to education, the emigration of Tajio people is also caused by the much improved transportation system.

Furthermore, as in most other parts of Sulawesi, the majority of the population in the Tajio area are now Muslims (Balinese migrants, who kept their Hindu beliefs, are an exception). Thus, religious ceremonies such as weddings and funerals follow mainstream Indonesian Islam. While in many ceremonies Muslim tradition intermingles with traditional Tajio elements, knowledge of the origins of these practices is restricted to a few older people and has been effectively lost within the younger generation. Religious ceremonies thus do not serve as a domain where the local language could survive.

During my last visit in Kasimbar, for example, Bapak H.M. Pamasi (then 73 years old), who could spontaneously make *pantuns* (a kind of traditional rhyme) for wedding proposals, passed away. With his death, this tradition, which had not been properly transmitted to the younger generations, ceased to be remembered. Likewise, other traditional practices, such as playing the traditional instrument *santum*, making *sumpit* (a kind of blowing spear) and weaving rattan to craft *bingga* or *tambobo’* (a traditional container to carry goods or paddy), are today rarely practiced in Tajio villages (at least not in the two villages I visited, Kasimbar and Kasimbar Barat).

Conclusion

Following Mühlhäusler (2002: 384) who classifies the language situation in Indonesia as type 3, a competitive ecology, it can be concluded that Tajio also suffers from the same situation. Indonesian is not only used as the medium of communication in schools, but it has already replaced Tajio in the home domains.

The language shift in Tajio speech community is basically caused by two economically-motivated types of mobility: emigration and immigration. In addition, modernization has also its affects on the language behaviour of the Tajio speakers.

It seems that the endangerment process of Tajio cannot be stopped but we (outsiders) can at least try to slow it down. Documenting the language and writing a Tajio grammar have been a good start to revitalize the language. Personal approach to the Tajio native speakers about the importance of saving the language may be a way to save Tajio from the death. A “new” belief that speaking native language is not old modish and being bi- or multilingual is an advantage have to be campaigned in all over Indonesia. Elders and parents must be aware that they can sustain the loss by transfering their knowledge and local values on to their children and grandchildren.

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SMALL ISLAND AS A BRIDGE TO AUSTRONESIAN DIASPORA: CASE IN HERE SOROT ENTAPA CAVES, KISAR ISLAND, MALUKU

Alifah, Mahirta, and Sue O'Connor

Introduction Current Austronesian Community on Kisar Island

Kisar Island is part of Southwest Maluku district, Maluku Province. Kisar Located in the southeast island of Wetar with a distance of 47 km and in the north of the Timor island with a distance of 25 km. Kisar Island is a small region with the furthest distance of 10.18 km north-south and the furthest distance of 8.52 km east to west with an area of 36 km2 (based on measurements on google earth imagery dated 14 December 2015).

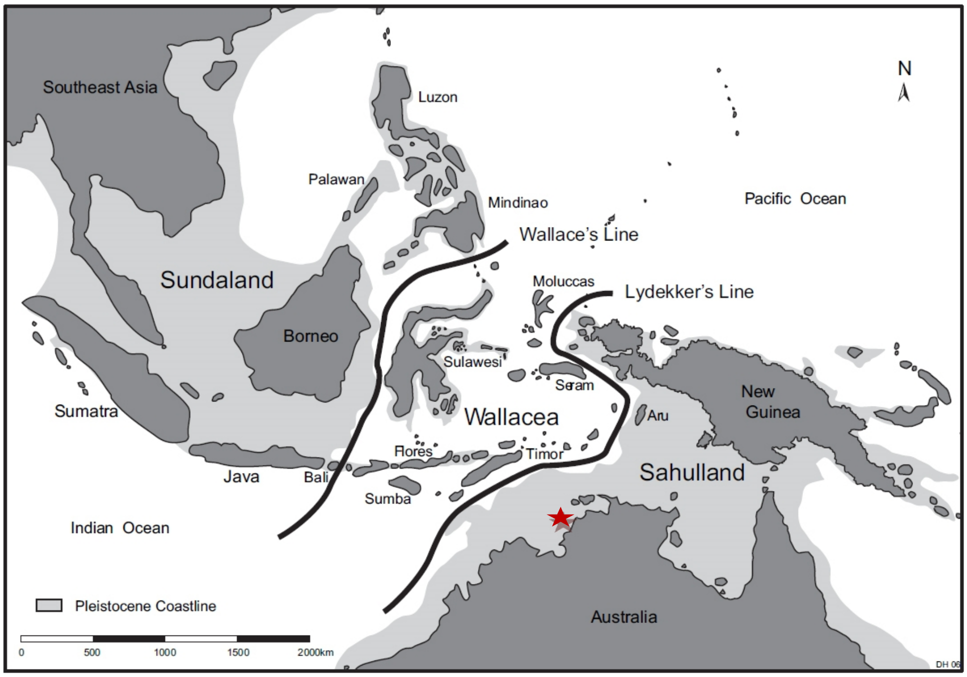


Figure 1. Position of Kisar Island (asterisk) among other islands in Wallacea (source: http: hmgf.fmipa.ugm.ac.id).

Currently, Kisar Island is inhabited by two indigenous groups which have the different characteristics of cultures and languages (Soewarsono, Masnun and Suartina 2001: 1). The first group is people Oirata or often referred to Ohirata. These communities have a non-Austronesian language or called by NAN. This community has come from Timor island (de Jong, 1937). Another opinion states that Oirata language is the Trans New Guinea (Nazarudin 2013: 8). Oirata is a group of minority language users. It is not more than 10% of the Meher language (Soewarsono, Masnun and Suartina 2001: 1).

The second community is Meher as the majority and inhabits seven of the nine villages on Kisar Island. There are Wonreli, Lekloor, Abusur; Lebelau, Purpura, Nomaha; and Kotalama. Meher community has a language known as Kisar language. This language was included in the Austronesian language family. It is showing their ancestors who were the Austroneisa speakers.

Tracing of Meher community existence (Austronesian Current)

Currently in Kisar Island left several old settlements buildings and Kisar community called Negri lama. The place is marked by a stone fortification located in the hills on the beach. Kisar people believe that the place was the beginning of their ancestors settled in Kisar Island after sailing from their home areas which are located on outside Kisar Island. The finds include stone fortifications, which are Negrilama Nomaha, Negrilama Purpura, Negrilama Lui Puru Ula, Negrilama Sokon and Negrilama Nomaha. Society believes that before occupying the central part of the island, it was the first time their ancestors settled and formed a community.

Figure 2. Stone Fortification in Negrilama Purpura (Source: Alifah, 2015).

Evidence of Austronesian Presence in Caves Settlement

Austronesians have always identified with the pottery, pendulum nets and outrigger boats. While non-material culture attached to it in the form of sailing skills, farming (mainly rice and bananas), settlement proficiency, domesticated animals such as dogs, pigs, chickens also become the markers of their presence. Some markers presence Austronesai can also be found on cave dwelling in Kisar Island include the presence of a boat that is represented in the form of cave paintings and pottery artifacts findings on the top layer of cave.

Here Sorot Entapa Cave, one of the caves on the Kisar Island is a niche with a width of 9.57 meters, 3.7 meters high and 11.2 meters deep. In front of the cave stretches a savanna bordering the coastal cliffs. Here Sorot Entapa cave is currently on the second terrace, limestone hills in the southern coastal. Potential archaeological cave is owned by the findings of the cave paintings of anthropomorphic patterned, geometric, boats and abstract shapes scattered on the walls and the roof with the highest concentration in the roof and walls of the cave inside.

Figure 3. Some of the cave painting motifs found in Here Sorot Entapa cave (Source: Alifah and Willibrord, 2015.

In addition to cave paintings, on the surface of the cave floor were also found some sea shells. Excavations in the Here Sorot Entapa cave carried out on two boxes, namely boxes A and Grid B with 1x1 m. Box A is near the East side of the cave wall, was a box B is in the middle of the cave.

Figure 4. Left: Box A end condition (right) and Box B (left). Right: Sorot excavations at Here Entapa Cave (Source: Elena Piotto and Alifah, 2015).

The results of excavations carried out in the Here Sorot Entapa Cave are pottery at the beginning of spit (1) to (9) with a vertical distribution that is getting down less and less.

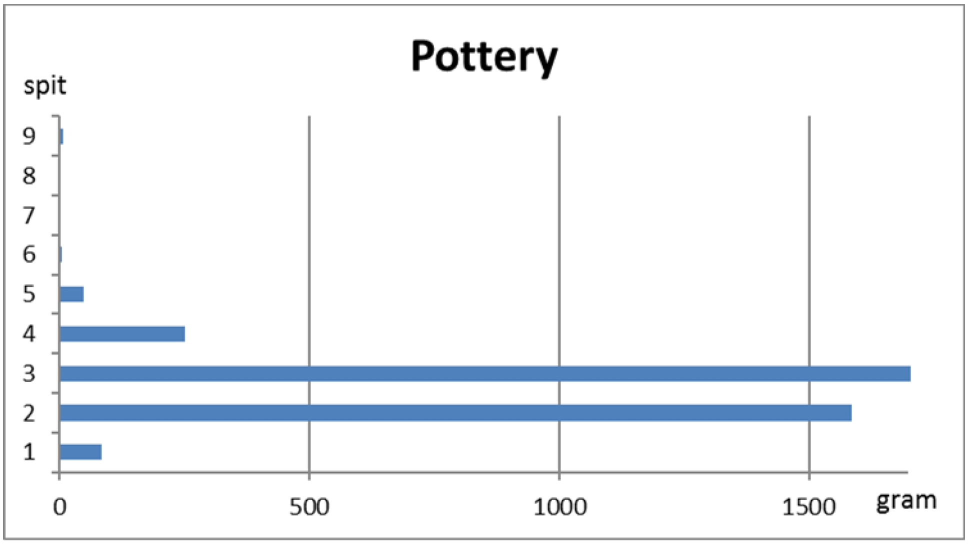


Figure 5. Graph the findings of fragments of pottery in Gua Here Sorot Entapa.

The pottery finds from this excavation cannot be reconstructed, because almost all the finds was fragmentary and not showing the edge or base part of pottery.

Figure 6. Fragments of pottery finds in Here Sorot Entapa Cave (Source. Alifah, 2015).

The dating obtained from charcoal samples which come from the spit (1) to spit (6) showed the time corresponding to the period of the Austronesian migration are 4.957.-1890 Cal BP (Mahirta et al. 2016: 2).

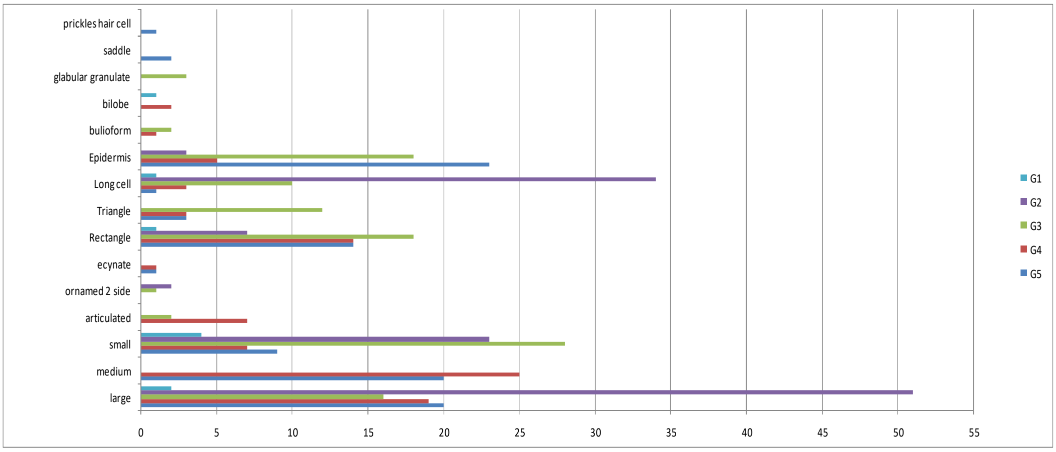
Table 1. Dating with charcoal samples taken from one of the squares of excavation. (Source: Mahirta et al, 2016.

Lab No.	Sample Name	Spit	d^{13}C	C ^{14} Age	Calibrated Date
ANU 47724	HSE TPB EU2-1	2	-29	2.050±29	1.890-2.040
ANU 46323	HSE TPB SE	3-4	-26.312	2.250±24	2.152-2.318
ANU 46324	HSE TPB SF	4 ?	-4.35685	2.250±31	2.149-2.332
ANU 47725	HSE TPB EU4-5	4	-27	3.858±32	4.089-4.405
ANU 47726	HSE TPB EU6-7	6	-29	4.209±37	4.572-4.836
ANU 46321	HSE TPB SB	6?	-17.6227	4.314±26	4.663-4.957

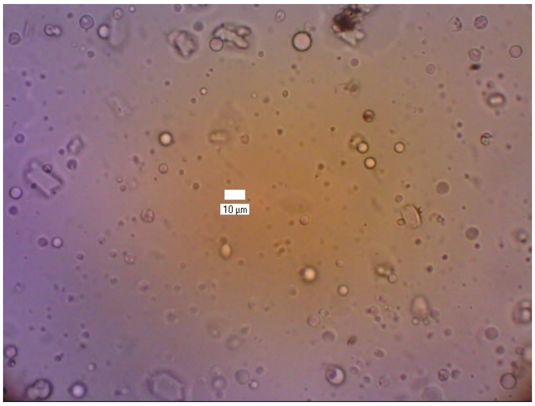
Their Adaptation to the Environment of Transit Place

The deployment process through a variety of new territories demanded the Austronesian language speakers to adapt to the new environment that they came into. Adaptation can be seen in how they perform resource utilization and processing plants in the neighborhood. To know this, micro-botanical analysis will be done on the marker where Austronesian artifacts are pottery. Micro-botanical analysis was done on samples taken from the residues of pottery from each spit namely (1) to (5), while pottery from the spits (6) and (9) are not sampled since the amount is not representative. Sampling was conducted using leaching residue distilled water with an eyedropper tool and direct preparat.

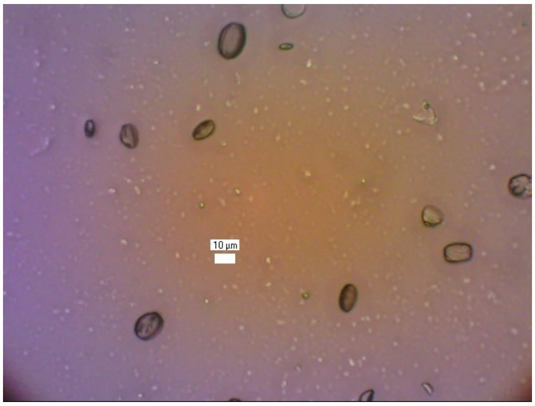
This residue sampling was conducted to determine the existence of evidence of the plant in the pottery and identify the five samples of addressing the existence of micro-botanical phytolith and starch attached to the inner surface of the pottery.



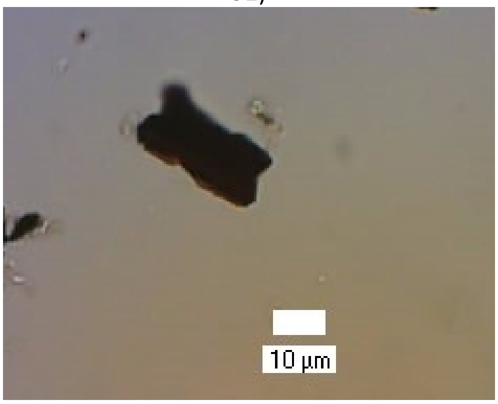
Phytolith identification results from the five samples taken showed the presence of plant utilization by cave dwellers of Here Sorot Entapa with earthenware media. Types of plants that can be identified from the phytolit are dominated by Poaceae plant species and some of them are species of trees shed leaves, shrub, as well as palm, while the finds show starch granules as a more specific indication of of starch grains from bananas and sago.



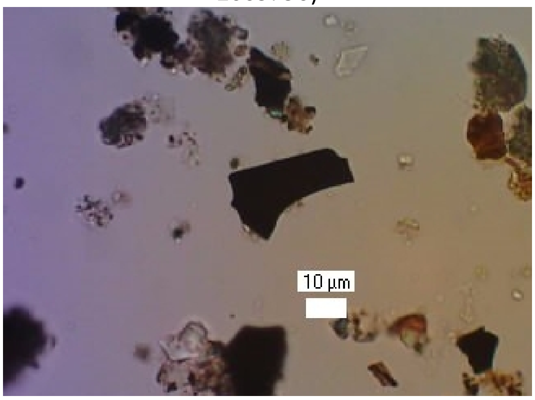
Starch of *musa acuminata*. (Source: Lanfer 2009: 92)



Starch of *Metroxylon sagu*. (Source: Lantfer 2009: 90)



Phytolith shape found in many families Poaceae Phyllostachys genus. (Source Yongji and Houyuan, 1993: 3)

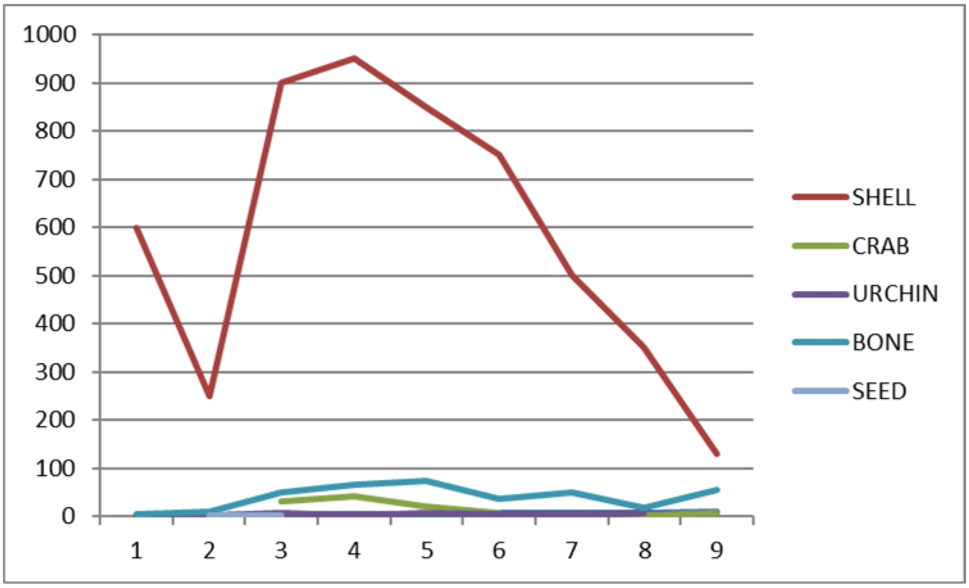


Buliform phytolith shape found in many plant grass. (Source: Piperno 2006: 189).

The results of the micro-botanical analysis obtained from residue samples show compliance with the regional environmental conditions on the island of Kisar. Kisar is an island composed by limestone and volcanic formations old (Burhan G., et al. 1997; Faiz, et al. 1996). The island is mostly composed of cerrado grasslands, overgrown trees or groups of trees scattered. The central part of the island is more fertile and covered by palm groups such as coliforms (a type of sap), sago and some tree species (forest mango, banyan tree and shrub) (observations by the authors in the field). Minimal water supply conditions resulted in Kisar Island's highly dependence on rain water as the fresh water source for animals and plants on this island.

Figure 7. Crop burning in savanna Nomaha due to extreme hot weather at the peak of the dry season (Source: Alifah, 2015)

Food sources most widely available on the island are the marine resources such as fish and shellfish. This is also reflected in the number ecofact finds found from the excavation.



Kisar Island as a Bridge to Spread

Some archaeological finds in the island of Kisar show similarity to other islands, especially the island of Timor. The similarity can be seen in some of the motifs in the form of cave paintings boat motifs, anthropomorphic, and geometric (see: O Connor, 2003). Besides, the stone fort, which by the Kisar people referred to as the Old State, also has similarities with the stone fortress that on the north coast of the island of Timor.

Peter Lape argued that some stone fortification in Timor has a function as a fortress to protect the sources of water and food by one group of people. As a trigger for the construction of these forts is a change in environmental conditions that resulted in declining water resources and food so that it inflicts conquest and warfare. Lape also stated that the group would lose out from the island of Timor and look for new areas in the north (Lape and Chin-Yung, 2008).

Some of these similarities are evidenced on a link of Kisar Island with other island dwellers at the same time. The quantity of the archaeological finds in the Here Highlight Entapa Cave indicates that the number is not too much. Likewise is the diversity of findings of ecofact bits. Those are indications that this location was not used as a location for permanent residence but only as a temporary shelter. However, this assumption remains to be reconsidered in light of the possibility that at least the number and type of ecofacts and finds in the dwelling caves can also because human cave dwellers have moved to a new residential location that is an open site on the island.

Conclusion

Results archaeo-botanical studies conducted show that the environmental and botanical resources on Kisar Island are very minimal for the island to be used as permanent residential location. The adaptation process is done by utilizing Austronesian plants available in the neighborhood and bringing new plant species from the outside.

There is a linguistic study, which states that the existence of the Austronesian speakers on Kisar Island is also found in other islands, namely the island of Timor. When exactly they attended and inhabit the Kisar Island and other small islands in the southeastern part of the Wallacea region is still not known with certainty. However the dating of Here Highlight Entapa Cave in context with the findings of pottery at least can be used as a picture, which is about 4,000 BP.

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TRADITION AND FUNCTION OF *CILI* ON AGRICULTURAL RITUAL OF SUBAK IN BALI

I Nyoman Wardi

Introduction

The island of Bali as part of the territory of the Republic of Indonesia covers only 5636.66 square kilometers with a population in 2015 reached 3,957,600 peoples (The Central Bureau of Statistics of Bali Province, 2015). Ethnic Bali which is now more influenced by Hindu culture is part of the speakers of Austronesian language as the result of interaction and social sedimentation and cultural history of the past. In the context of the Indonesian archipelago (*Nusantara*), in the micro-spatial scale, Bali with its quite dense and varied historical traces, social and cultural heritage, coupled with fertility and exotic natural resources, becomes a major force (magic power) that attracts researchers as well as domestic and international travelers to come to Bali.

Bali is also called the Island of Gods, as indicated by the diversity and uniqueness of cultural heritage in the forms of tangible (material culture) and intangible (values, symbols, norms, institutions). One of them is an agricultural ritual tradition, especially *CILI*-making, which is conducted by the institute of Subak in Bali. The *Subak* culture in Bali cannot be separated from the history and physical condition of the natural environment around it.

According to a geologist from the Netherlands, Mohr (in Geertz 1983: 38-42), physically there are four important elements of nature related to agricultural activities, especially rice cultivation, namely: fire, water, land (soil) and air. Fire is associated with volcanic activity (volcanism) and contributes to soil fertility and as a supplier of nutrients for plants. Water is associated with the formation of volcanic lakes and short rivers, heavy-containing sludge that flows from the valleys of a volcano toward the fields or downstream (ocean). River valleys are small in the crevices of the volcano into a powerful driving force to put the paddy fields in the landscape. Soil (land) or the topography is hilly or mountainous, and ramps with good drainage grooves formed by the river in the mountains, very suitable for the development of traditional irrigation techniques (Bali: *subak* technology). Similarly, the air associated with equatorial climate with humid temperatures and adequate rainfall in the monsoon season, is a supplier of water for agricultural irrigation and other economic and cultural activities.

It seems to Bali as a small island that the *subak* activities and its cultures are much influenced by those natural factors as ecological barriers.

This paper is intended to describe and reveal the traditions and cultural functions of *CILI* which was present in an agrarian culture (rice cultivation) conducted by the institute of Subak in Bali. In addition, *CILI* is a culture that came from the farming activities in the fields, which affects the aspect of social, cultural and other economic areas, so it is deemed important.

Methodology

In this study the efforts of collecting, analyzing and interpreting data were conducted. Data collection was conducted through surveys, in-depth interviews and literature study. In-depth interviews were done with the head of *Subak* (*pekaseh*) and artisan of offerings (*jero serati*). Meanwhile, the literature study was conducted by tracing the sources of traditional literature/manuscript (*Lontar*/Chronicle) as well as research reports, publication of journals or books. The data were analyzed by descriptive-qualitative with cultural semiotics approach. Semiotics is the science of signs. In the view of Semiotics, when the entire socio-cultural practices can be seen as language practice, then everything can also be seen as signs. This is possible because of the breadth of understanding that sign. Signs can have two meanings (understandings), namely: (1) denotative: the meanings that can be learned on the physical objects (the principle of anatomical, material, functional, and others), and (2) connotative: meanings that contain a deeper meaning (ideological, mythological, theological) that underlie physical forms, in this case the greatness of God (Piliang 2006: 314). In the analysis of tradition and functionality of *CILI*, it is emphasized on the significance of *CILI* phenomena that are connotative meaning.

History of Rice Cultivation and the Emergence of the Subak Institution in Bali

Myth of Rice in Bali

Associated with the myth of the existence of paddy (rice) in Bali, in the script of *Bhuwana Mahbah*, there is disclosed as follows. It is said that *Sang Hyang Kasuhunan Kidul* (Brahma God?) through the power of his *yoga-meditation* successfully created four groups of humans or *catur jadma* (Brahmins, Kshatriyas, Wesya and Sudra). In addition, through the power of his *yoga-meditation* Sang Hyang Kasuhunan Kidul, then created four kinds of seeds of life (grain of rice), namely white, red, yellow, and black which were then awarded to mankind in earth (*bhumi*). There were 4 birds ordered to carry the seeds of life to the world to be given to men. Those four birds were the pigeon (*dara*), *sugem bird*, *puteh bird*, and....? bird (black pigeon?). *Sugem bird* brought red rice seeds. *Puteh birds* carried yellow seeds wrapped in a silk cloth of golden yellow. But on the way, the seeds that were carried by the *puteh* bird of were taken by Gandarwa (giant) Sang Tumraras. All the seeds were eaten, and there were few leftovers that fall to the Earth. The scattered seeds then grow into turmeric (Bali: *kunyit*) (Sura et al. 1996: 8, 29). According to the script of *Tantu Pagelaran*, the fourth of the birds was the vehicle of Sri Goddess. Figure of Dewi Sri (Sri Laksmi Dewi) in Indonesia (Bali) constitutes a quite popular figure as a goddess of rice (*Dewa Nini*).

The three types of rice seeds described above are also called plain rice (white rice or Oryza sativa L. and *ketan rice*/ white sticky rice), red rice (Oryza nivara), and black rice or injin (Oryza sativa L. indica). Since the yellow grains disappeared or become turmeric, then if the Hindu community in Bali make *segehan offerings* (made of rice) in the five-color offerings (white, red, yellow, black, and a mixture of all four of these colors (Bali: colors of *brumbun*), then in order to get a yellow color, usually they mix white rice with turmeric.

In the context of sacrificial rite or *mecaru* (*bhuta yadnya*), the four base color is a representation of the cosmic (macro-micro cosmos) in the context of *catur bhuwana* (four parts of the world). The white color is placed on the east direction/space as a representation of the Sang Hyang Iswara, red as a representation of south space with the God of Brahma, the color yellow is a symbol of western space with the god Mahadeva, and black is a symbol north cosmic space with its presiding deity, that of Lord Vishnu. Meanwhile, for the space in the middle is placed four mixing colors which are also called the color of *brumbun* with its presiding deity Bhatara Siwa (Siwa God).

The three types or varieties of rice (Oryza sativa L.) mentioned above (plain white rice and *ketan/* white sticky rice, red rice, and injin/black rice) are regarded as local varieties of rice and are still cultivated by *subak* communities in Tabanan, especially in mountainous areas, such as the villages of Wongaya Gede, Wongaya Sibetan, Jatiluwih, and other surrounding villages in the district of Penebel-Tabanan. For local communities, cultivation of three varieties of rice are very important, not only to meet the basic needs of rice (economic function), but also for the benefit of social-community (*ngejot*, *majenukan*/funerals) and the function of religious rituals (offerings or many kind of cakes made of rice for religious ceremonies).

But according to another version (original Balinese source), the myth of the rice seed dispersal is associated with animal (dog). According to the information from several *Subak*s in Bali (*pekaseh* Sanggulan-Tabanan Subak/2013 and *Subak*-Village Semana Mambal Badung Regency/2016) the dog was as a messenger of Lord Siwa and was assigned to bring rice seedlings to *bhumi* (earth) to be cultivated as the main source of people's lives. This myth version related to the origin of the spread of rice seedlings seems more genuine, and possibly older than the version above, since there was the role of dog animal as a messenger from heaven. As it has known, dog was one of pet animals domesticated by Austronesian-speaking societies since ancient times (prehistoric). Dogs have multiple functions. When hunting and gathering food, the dog helped humans and played an important role to capture the prey. In addition, the dog also serves as a house keeper that was very loyal and so favored by his master. Until now dogs also function as a pet to guard a house in Bali. Associated with the epic story of Mahabharata, dog also was reported as one of the animals that went to heaven to accompany the oldest brother of Panca Pendawa, namely the Dharmawangsa.

History and the Emergence of Rice Cultivation by Subak in Bali

Based on the evidence of the findings of the remains of rice and analysis of radio carbon that has been done, it is hypothesized that the rice carried and spread from its origin, the valley of the Yangzi (Central China) (in 6500 BCE) to Southern China, Northern Thailand and Taiwan (3000-4000 BC). The spread of rice then continued to India and Central Thailand, and parts of Southeast Asia via the northern part in 2500 BCE. After all rice cultivation was then confronted with the limits of cultural and ecological (cultural and environmental) barriers in the eastern part of Indonesian equator, so that rice never grows in the Pacific Islands, with the exception in the Mariana Islands of Micronesia. So the rice plants were taken to the equatorial regions of Southeast Asia by farmers from the people of the Austronesian language speakers around the middle or end of the third millennium BCE (Bellwood et al. 1992: 167).

Meanwhile, from the archaeological excavations in coastal of North Bali (Buleleng), namely in Pacung Beach and Sembiran, were found in the form of remnants of charcoal (husk) of the cell granules estimated to be of Oryza Sativa type of Oryza type (rice). Oryza charcoal granules were found as tempering (impurities) in fragments of pottery of roulette type Arikamedu (South India). Pottery of roulette type containing the remains of rice husk was estimated to be imported from India. Based on a comparative study of the findings of roulette pottery of Arikamedu - South India, it is estimated that the pottery is dated between 200 BCE to 200 CE (Ardika 1991: 70-71, 135-137, 179). However, based on the analysis of radio carbon (AMS Carbon Dating) against the remnants of rice husk on roulette pottery, the results was quite surprising, showed the year of 2660 BCE with a possible deviation ± 100 years, or show calendar year with mean age 818 BC after calibrated (Bellwood et al. 1992: 162-166).

Based on the findings of the grains of rice phytoliths that were also found in a layer of soil (depth between 3 m-3.5 m) on the site, it is estimated that paddy has also been cultivated in Bali. This means that based on the evidence, the rice plant (Oryza sativa) has also been cultivated in Bali at the time. In excavations at Pacung and Sembiran were also found beads and remains of human consumption. Among them were bones of pigs, cattle, dogs, goats/deer, birds, fish, and bovine.

These spectacular archaeological findings have changed the views of experts on the archaeological history of Bali, particularly related to the contact of Bali with India, which was previously interpreted as no earlier than the VIII century CE. Based on the findings of roulette pottery of Arikamedu (South India) in Pacung and Sembiran, then contact Bali with Indiais estimated to take place between the years 200 BCE to 200 CE (Ardika 1991: 71, 135-137) or perhaps earlier, around 818 BCE according to the manual analysis results of the carbon dating of the rice husk (Bellwood et al. 1992: 162-166).

Contact of Bali with the outside (foreign) traders is explicitly stated in the Bebetin AI inscription (896 AD) with the mention of the term *banyaga*. The existence of foreign traders, especially India, through a major sea port in North Bali, was expected to do with the trade of spices and sandalwood and other commodities from the region of Eastern Indonesia. Thus it can be said that the findings of burnt Oryza (Oryza sativa or rice) along with roulleted pottery of Arikamedu (South India), and the findings of the grains of rice phytolith (rice phytoliths) on a layer of soil at the site of Sembiran, indicate that rice cultivation has been quite popular in Bali in the early centuries CE, even very likely that in prehistoric times, in the year 818 BCE. Later, when the Dutch colonial dominated and based in Bali, Bali was known as a fertile area and rice production were exported to the outside (Malacca and Singapore). Therefore, the possibility of cultivation of rice in Bali took place earlier than the period mentioned above as well as the findings of the remains of rice in other areas in Indonesia or Southeast Asian region, because the relationship Bali (Indonesia) with other countries in Southeast Asia is quite close. In addition to rice cultivation, the local communities (Bali) is estimated to have also been domesticated domestic animals such as pigs, cattle, dogs, buffaloes, and other animals.

Then, the observed data which was written on the inscription, in Ancient Bali Period, have explicitly disclosed various agricultural lands, especially rice/paddy field (*sawah*). Implicitly in the oldest inscription of ancient Bali, namely Sukawana A.I (Saka 804 or 882 CE) has revealed the existence of rice (paddy). In the inscription that mention the sacred building at *Ulan Bukit Cintamani* as major issues which caused the inscription was published (as the *sambandha* of an inscription), there was mentioned:

> "… *sesan yalapna marhatuangna paneken di hyang api, kajadyan atithi. An ada huma, parlak, padang, ngmal, kajadyan tmuan hyang tanda, tathapi tua bilang, paneken ditu di satra, pyunyanangku kajadyan pamli pulu, tiker pangjakanyan anak jalan almangen*…" (Goris 1954: 53-54).
>
> Meaning: '*... of the spirit / cremation?). In order to present it as the property of the Fire God (Hyang Api), used as a charge for welcoming guests (atithi). If there is (of inheritance in the form of immovable property), which is like paddy field (huma), parlak (gardens), padang (the expanse of grassland), mmal (horticultrure), to be*

used as a ritual (piodalan) for Hyang the rest of the (wealth of the deceased) were taken to the death ritual marhantu (purification Tanda God. But if there is (inheritance) money (wilang), that is dedicated to my goodness (pyunyanangku) to Satra (rest houses or public buildings) as the cost of buying the contents of pulu (rice) to be cooked and buy mats for people traveling (ngalu?) that benighted (stay) there ... '.

Then in the inscription of Bebetin AI which dated to the Saka’s year 818 or 896 AD (Goris 1954: 55) has already mentioned *undagi pengarung*, which is the master craftsman that creates tunnels to penetrate the ridges barriers to the distribution of irrigation water from the river to the fields (*sawah*/*paddy-field*). Building *awungan* (tunnel) requires technological equipment of metal (iron). Meanwhile, the production and use of metallurgical equipment (metal) have been known from the metal period which was estimated to be the influence of the culture of Dong Son (Vietnam). The expression *undagi pengarung* indicates the existence of an organization (institution) which was engaged in the management of irrigation water for paddy (Subak). But explicitly, the existence of *Subak* (traditional agricultural institution) is mentioned on an inscription of *Raja Purana-Klungkung* dated from Saka 994 (1072 CE). The inscription was issued during the reign of Raja Marakata (Pemda Daerah Provinsi Bali 1980: 52).

Literally the word of ‘*subak*’ is derived from ‘*suwak*’ that means 'divide or distribute water' for irrigated farming, especially in rice cultivation in paddy fields. Starting from the verb "*suwak o*r *subak*" (divide/distribute water), in a recent development it is transformed into the name of a traditional farm organization which is quite popular in Bali, namely the Institution of Subak. Thus it can be said that the existence of Subak Organizations in Bali has a very close relationship with the activities of water management in rice cultivation in paddy fields.

Institution of Subak in Bali now not only plays an important role in water management in a fair and equitable way, with all customs rules and the determination of the sanctions in *awig awig* (traditional law) of Subak, but also determines the type of rice varieties and cropping patterns in the fields. In addition, the Institute of Subak was also instrumental in the implementation of the ritual which is done routinely in the cycle of rice cultivation in paddy fields. Now some Subak institutions also have cooperative enterprises. Until now the Subak institution and paddy cultivation activities still exist and are the major factors enactment of the World Cultural Landscape of Bali Province by UNESCO (2012).

Based on the data illustrated above, it can generally be interpreted that the cultivation of rice (Oryza sativa) in Bali has likely been already known in prehistoric times. Perhaps the time is not much different from the rice cultivation in other Southeast Asian region as mentioned above. Data recording on the inscriptions of ancient Bali also mentioned the terminology of sub-ethnic (*soroh*) *kubayan* in Bali, which apparently in term of ethno-linguistic can also be a common thread that ties Bali with other regions, such as Java and also with some ethnic groups in the Philippines. Those people are part of the Austronesian's culture or language practitioners which were estimated coming from southern China and Taiwan. Similarly, the myth associated with dogs and farm life, particularly in the cultivation of rice above, apparently hinting the periodization of rice cultivation in Bali quite old (pre-Hindu/Prehistory).

Tradition and Function of *CILI* on Ritual of Subak in Bali

The CILI Establishment on Ritual of Subak

Cultural traditions with regard to objects, ideas or cultural values are inherited from one generation (past generation) to generations of heirs (the present generation). The concept of tradition is broadly defined as the overall of material objects and ideas that come from the past and still (alive) and affect the lives of citizens in recent time. Cultural heritages of the past, whether tangible or intangible, are still alive and had strong ties and affect the lives of today's society (Sztompka 2004: 69-70).

In the general case, a cultural tradition (heritage), which comes from the past, can survive in the midst of life in today's society if the tradition is deemed useful and provide benefits for life. Similarly, the tradition ritual to make *CILI* in agrarian rituals (rice cultivation) is still practiced by Subak organizations in Bali.

As an agrarian society that was originally subsistent, rice plants get the attention and care that is very special and privileged from farmers (*krama Subak*) in Bali. That is because the rice plant is seen as rice which is the only principal source of energy to meet basic needs (food) for families and communities in rural areas. That is why the rice plants are exalted, a ritual and *CILI* was created by farmers (Subak) in Bali and is regarded as one of the tree of life (*Kalpataru*) from heaven.

According to the farming community (Subak) or native Balinese, the word of *CILI* is often interpreted literally as 'pretty/beautiful' and 'small'. The word 'small' can be interpreted as an essence in the sense that paddy rice produces a substance (soul) of farmer's lives. The God who enshrines on rice in Bali as the main source of people's lives often revered as *Sanghyang Manik Galih*. Meanwhile, the 'beautiful' or 'pretty' can be attributed to expectations of the condition of the society (farmers) that live in harmony, good, and prosperous. In general it can be defined that *CILI* is a kind of ornament symbolically made from young coconut leaves (Bali: *busung*) or from palm leaves depicting figures of people (god figure) or a person's face (god) made by Subak's communities in Bali in agricultural rituals, especially in rice cultivation in paddy fields. The tradition to establish the *CILI Prerai* (*CILI*-face) can remind us of the tradition of making face mask ornaments on bronze nekara, as well as nekara in Penataran Sasih Temple (Pura Penataran Sasih) at Pejeng Village-Regency of Gianyar which is hypothesized to be from the prehistoric period (Bronze Age).

In addition to the agricultural ritual (Subak), there is also a *CILI* made from rice (cake) for ceremonies (*Dewa-Yadnya* and *Manusa-Yadnya*). There is even *CILI* made of clay (terracotta) and used as a decoration and functioned as repellent reinforcements in the structure of the tile roof (*pemugmug*) in traditional Balinese architecture (Widia et al. 1989/1990: 11-13).

The tradition of making *CILI* in the culture of Subak is usually done in the context of the Rice Goddess ritual (Dewi Sri / Sri Laksmidewi). Based on the results of survey and interviews with informen which are generally subak members and wife of the artisan of offerings (*Jero Serati*), in one cycle of rice cultivation, there are a series of agrarian ritual that needs to be done to honor the goddess of rice (Dewi Sri). The rituals are intended to ensure that rice plants can survive (free of pests and plant diseases), grow strong and fertile, and produce an abundant harvest of rice (rice panicles are *jelih* and *lambih*).

The tradition of making *CILI* by *krama Subak* (farmers) in Bali are usually carried out during the ritual in paddy fields, namely in ritual of: (1) *Mabiyu Kukung* (*Mabeya Kukung* or also called *Ngiseh*), (2) ritual of *Nyangket* / *Nyeetin* / *Ngetusin* (*Ngadegan Dewa Nini*), and (3) *Mantenin Padi di Lumbung* (ritual of Rice Goddess in ricebarn/granary (*lumbung*/ *jineng* / *glebeg*).

Ritual of *Mabiyu Kukung*. Ritual of *mabiyu kukung* is performed when growing rice is aged around 60- 70 days. Rice is analogous to a human in a pregnant condition and cravings (*persarian padi* phase). Perhaps some of rice panicles are already come out (*mlupusin*). Like to a pregnant mother, *krama Subak* (farmers) present offerings which contain (salad/*reraceman* of fruits, such as a young jackfruit called *katiwawalan*, and young guava cuttlefish, crushed brown sugar and salt. In this ritual also offered cream (*param*/*masembuat*). In addition, the ritual is also accompanied by purification offering (*pangresikan*) made of *dapdap sakti* leaves, *CILI sasat* (symbol of cleansing and fertility), rice (*beras*), thread redeem, *gebogan* (glutinous cake made of produce of their own fields, *biyu*/banana, cooked duck's egg, *pepesan tlengis*, *pepesan kakul* (meat of paddy field 's mollusk cooked and wrapped in leaves), *pencok kacang* (beans), and others. The offerings are presented in *pengalapan sawah*/Shrine (*palinggih*) of *Ulun Carik* (intake or point of entrance of water in the fields). Besides that, the ritual or sacrifice and praying is also centered and presented to the Rice Goddess (Sri Laksmi Dewi) in the *Subak's Temple* (*Pura Bedugul*). The ritual purposed is that the rice panicle and its grains are good, save, healthy, full and steady (*jelih*). In some subaks, they are very concerned about the condition of paddy and pest/plant disease at the moment. If there are any *mrana* (pests and diseases) that attack rice (rice pest, insects, birds, leafhoppers, etc.), they (subak) will perform a ritual called *nangluk mrana*. The ritual is intended to appeal to the god of rice and plant pests and diseases in r to attract and control it and do not disrupt the rice of farmers. After the ritual took place, it will be accompanied by begging permission in advance, so that *rerencangan* (forces of Rice Goddess) in the manifestation of pests and plant diseases *druwe* (reserved) *Ida Bhatara* go away *(manggingsir*). After that, the farmers decided to do eradication of pests and diseases in modern ways with pesticides, insecticides or other types of poison.

Ritual of *Nyangket*/*Nyeetin*/*Ngetusin Ngadegan Dewa Nini*. Before *ngampung* (harvesting rice), farmers must perform the *nyangket* ceremony or also called *ngetusin* or *nyeetin rituals*, i.e. ritual to establish (*ngadegan*) *Dewa Nini* as a symbol of the goddess of rice (Dewi Sri / Sri Laksmi Dewi). In this ritual, farmers make or *ngreka* (*ngadegan*) *Dewa Nini* or *pratima* of rice as a symbolic shrine of Dewi Sri. According to the farmers, rice which is selected and used to make *Bhatara/Dewa Nini* must be of the best quality. *Dewa Nini* is created in pairs, which consists of *Dewa Nini Lanang* (masculine) and *Dewa Nini Wadon* (feminine). Both *Dewa Nini Lanang* and *Wadon* are then combined and just called the *Dewa Nini* as a symbol of Dewi Sri (the Goddess of Rice).

Dewa Nini who has been harmonized is then decorated with *CILI Prerai*/CILI face made of coconut or palm leaves. There are in some Subaks, such as Subak Mambal-Badung, call the *CILI*/*Dewa Nini Wadon* (feminine) as a *CILI Dedari*/CILI Bidadari (Angel *CILI*) while the *CILI/Dewa Nini Lanang* is called *CILI-Naya*. *Dewa Nini* who has been harmonized is then decorated with *burat wangi*, various shapes and decoration, *sri*, colorful of fragrant flowers (frangipani, *cempaka*, *sandat*/*kenanga*, hibiscus, and other types of flowers) and perfumic oils (*miyik-miyikan*). Once decorated, the *Dewa Nini* then enshrined in *Palinggih Pangalapan* located on the upstream of rice fields. The offerings then presented. Ritual is focused on *palinggih* (shrine) in water intake on the rice fields upstream and *tebenan* (downstream of rice fields) or *Palingih Jero Dangka* / disposal of water or *pengutangan yeh* (water outlet). Offerings of *soda* or rice rhombus (*katipat-kelan*: a pair of *katipat* consist of six rhombus), poached of duck's egg, *ulam* or batutu's duck or chicken meat, or roasted wild boar (*babi guling*), and other offerings. In addition, with regulatory subak presents the *sarin tahun* (annual rice tribute ceremony), in the form of rice's grains or one bunch of rice to *prakanggen* or forces of Ida Bhatari Sri existing in *palinggih carik* or paddy field's shrine at upper part of paddy field. If the rice harvest is over, the *Dewa Nini* (Dewi Sri) as a symbol of the Rice Goddess is carried or led to farmhouses with ritual *pamendakan* (picking-up ceremony) completed with offerings. When the rice is dry, the rice is raised and *Dewa Nini* is stored in a granary (*jineng, glebeg, klumpu*). Then it will be proceeded with the ritual of rice barn or ritual for Rice Goddess in granary (*mantenin padi di lumbung*).

Mantenin Padi di Lumbung (Ritual of Rice Goddess in a granary (*lumbung*/*jineng*/*glebeg*). After the rice is considered fairly dry, then the ritual of raising (*menekang*) of rice to the barn (Subak Bali: *jineng, glebeg, klumpu. lumbung*) is performed. On certain days (each farmer has a calculation based on the lunar calendar of traditional Balinese astronomy about good days/*dewasa ayu* and bad days/*dewasa ala*), the farmers select the *dewasa ayu* and the ritual of Rice Goddess in a granary is performed with complete offerings. The *lumbung* (granary) is decorated with *penjor* (*mamenjor*). The good day to perform the ritual of rice barn should generally be the day that contains element of *sri*, for example *Sri-Soma-Umanis*, *Sri-Kajeng Umanis*, *Anggara Kasih* or another good day (according to the Balinese calendar calculations). If possible the day of *mateninin padi in a granary* is the best day (*dina*), in which there is a double of *sri* or *sri tumpuk*/*sri susun* (in one day, more than one sri of 10 *wewarans*/meeting of 10 traditional Balinese weeks of the Balinese calendar). In this case the *Dewa Nini* and her escorts (if any) is decorated with *CILI* again. The old *CILI Prerai* is replaced with new ones made of palm leaves or coconut. *Dewa Nini* is decorated with various flower fragrance and the leaves of croton (*puring*), such as leaves (*don*) of: *teteg*, *nagasari*, *don dinding ai*, *don tebel-tebel*, *don kayu sugih*, *don kayu tulak*, grass of *kentawali*, *don pis-pisan putih* (white pis-pisan), and other types of croton leaves. According to *krama Subak* (farmers), some types of those leaves are already scarce and hard to find.

Function and Meaning of the CILI

Based on the description of Subak rituals and the traditions of making *CILI* above, it can be stated that *CILI* has the function of aesthetic (beauty) and magical religious purposes, namely as a symbol of *Dewa Nini* (Rice Goddess); the latter is more popularly called Dewi Sri (Sri Laksmi Dewi). In Bali the word "*Nini*" is an abbreviation of the word *Niyang* (*Ni-Hyang*?), which means grandmother, and is a higher/more polite form of the word *dadong*. The word "*Nini*" (grandmother) belonging to ancient Balinese language is part of the Ancient Malay (Austronesian) language. The opposite of the word "*Nini*" or *Niyang* (grandmother) is *Kiyang* (*Kakyang*) which means grandfather (*Pekak*) or senior and respected people. While the word "*dewa/deva*" is derived from the Sanskrit word, and it means ray/shine or light (sacred). Possibly the concept of *Dewa Nini* is originated from an ancestral worship which was already known in prehistoric times from the speakers of Austronesian language. With the entry of Hindu culture, then the word "*dewa/deva*" absorbed and combined with the local concept to refer to the God of Rice (*Dewa Nini*). Later, after the influence of Hinduism more stable, *Dewa Nini* then more popularly known as Dewi Sri (Sri Laksmi Dewi).

In the context of the subak ritual in Bali, *CILI* figure which generated in binary-opposition: *lanang -wadon* (masculine-feminine) when building (*ngadegan*) *Dewa Nini* (Dewi Sri / Sri Lakshmi Goddess) as mentioned above has meaning unification or cosmic marriage. The union or marriage in the cosmic nature of the magical-religious meaning contained fertility. Meaning of the fertility can be equated with the concept of phallus-yoni or lingga-yoni's meaning in Hinduism. Through the ritual establishment of *Dewa Nini Lanang -Wadon* as a symbol of the Dewi Sri, krama Subak (farmers) expect rice yields will be solid (*jelih*), long and large grains of rice (*lambih*) and abundant.

Similarly, when the rice ritual in the barn (*lumbung, jineng, glebeg*), *CILI* in the form of *Dewa Nini Lanang-Wadon* as a symbol of Dewi Sri (Sri Laksmi Dewi) is made with the expectation of paddy (rice) as sources for energy in the fulfillment of primary needs (food) , citizens in everyday social activities can be frugal (*inih*), and can produce positive energy and productive, healthy, strong and survived (*rahayu*), stable (*tegteg*) and sustainable, thus maintaining the prosperity and well-being (*moksartam jagadhitam*) as a primary goal of public life in accordance with the guidance of philosophy in Hinduism.

The *CILI* as a Source of Inspiration to Creative Economy In Tourism Industry in Bali

Life in the modern era is characterized by the development of technology and science which is very rapid. The development of technology, especially in the field of transport and telecommunications indirectly lead to the development of the tourism industry that is global. It can be beneficial for emerging of creative economy.

The concept of the creative economy first emerged and is known as John Howkins (2001) wrote the book: *Creative Economy, How People Make Money from Ideas*. John Howkins is a citizen of British Nationality who has multi profession. John Howkins defines the creative economy as an economic activity that makes creativity, culture, heritage and the environment as the foundation of the future. Development and application of the concept of the creative economy is inspired by the work of Robert Lucas (Nobel laureate in economics). He stated that the force which drives economic growth and development can be seen from the level of productivity cluster talented people and creative people or humans who rely on the ability of science possessed. Meanwhile, Richard Florida (2001) of America who developed the concept of the creative economy, states that essentially all human beings are creative. The difference is on its status, because there are individuals who specifically work in the field of creative and get direct economic benefits of this activity (Moelyono 2010: 218 -219).

Based on the above, it can be stated that the concept of creative economy is an attempt to find a model of sustainable development as a competitive economic climate and has reserves of renewable resources through the exploitation of capital creativity. Creative economy is a manifestation of the spirit of survival. Important messages offered by the creative economy, namely the use of a renewable resource reserves are infinite, the idea, talent, and creativity.

For the life of tourism in Bali, various cultural potential can be developed as a mine of rupiah/dollar through the development of creative economy. Among them is the development of the cultural tradition of *CILI* that can be packaged in a variety of creative economic products in the industry of cultural tourism in Bali. The development of *CILI* on the creative economy of cultural tourism in Bali is also in line with the vision and mission of the Bali Provincial Regulation Number 2 of 2012 on Cultural Tourism. According to Local Government Regulation (*Perda*) Number 2 of 2012, the cultural tourism of Bali is tourism which is based on the Balinese culture animated by the teachings of Hinduism and the philosophy of *Tri Hita Karana* as the main potential by using tourism as a vehicle for the actualization, to realize a dynamic reciprocal relationship between tourism and culture that makes them evolve in synergy, harmony and sustainable to provide welfare to the community, cultural and environmental sustainability.

Associated with the development of cultural tourism in Bali, in Article 8 (2) of The Regulation Number 2 of 2012 stated that the tourism industry should:

1) be characterized by the culture of Bali;
2) have a vision of preservation of Balinese culture; and
3) participate in the development of Balinese culture.

The objectives of the cultural tourism of Bali, are among others to:

1) create jobs and business opportunity to improve the welfare of the community;
2) preserve Balinese culture animated by the values of Hinduism, and preserve the nature, environment and natural resources;
3) elevate the image of the nation;
4) strengthen patriotism and unity of the nation; and
5) strengthen friendship among nations.

In cultural tourism in Bali, cultural tradition in making *CILI* that was originated from an agrarian ritual life (Subak) can be an inspiration in the development of creative economy of the local community to foster employment and business opportunities in order to increase revenue, life standard and welfare of the people of Bali.

As has been illustrated, *CILI* as a symbol of Dewi Sri (Sri Laksmi Dewi) contains the meaning beautiful (aesthetic), fertile, and prosperous, which can inspire considerable potential and actual economic development of the creative community in Bali. The tradition of agrarian culture and the meaning of the word *CILI* that are laden with beauty, fertility, prosperity and well-being of this life seem to have inspired some of the craftsmen and artists in Bali to make *CILI* as a trade mark or a theme in their works. Among them, the craft of weaving developed by "Setia Cap *CILI*" located at Jalan Ciung Wanara Number 7 Gianyar, a large company that has long been (the 1980s) developed a variety of local craft products of woven fabrics. According to the shop keeper and shop owners which were found and had been interviewed, the word *CILI* is associated with something pretty or beautiful. Woven fabric products they produced in the form *kamben* (sarong), clothing materials, bags and other products. The woven handicraft industry accommodates dozens of local labors (generally women as weavers) derived from the surrounding community. In accordance with the trade mark, woven handicraft industry “Setia Cap *CILI*" is very concerned about the quality of products and services, so that various worldwide tourists who are interested and like the products visit this place. Besides sold in the shop, some products are also exported abroad.

In addition to woven fabric and handicraft products, *CILI* culture also inspires a few artists to develop the works that is unique and interesting. For instance Supada Pande, an art teacher, who uses *CILI* as the objects of his paintings. Furthermore, Ketut Arsana is known for his *CILI* style. In form of paintings, *CILI* made of Chinese coins (*uang kepeng*) combined with color wash is very harmonious in composition, and make impressive and unique paintings.

In other areas, namely ceramic (terracotta) designs created by the artist Ketut Arsana got their inspiration from the shape of *CILI* that was developed at Pejaten Village in the District of Kediri, Tabanan. Based on inspiration from the *CILI*, he successfully created various forms of ceramic art objects, namely terracotta statues, *tungku pasepan* (furnace censer), ashtrays, fountain statues, and others. The commodities are good as souvenirs and marketed to tourists who visit the craftsmen at Pejaten Village, District of Kediri, Tabanan (Widia et al. 1989/1990: 13).

Likewise in the art of carving crafts, there appears to be some *CILI* figures made of *palimanan* stone and used as a decoration on the wall of house fronts. Similarly, the world of tourism, such as Jean's Tour Travel Agent in Jalan Nusa Indah Denpasar, since the 1980s uses *CILI* made of palm leaves and decorated with orchids as welcoming souvenirs, which were greeted very enthusiastically by tourists from abroad.

Various other handicraft products would be developed based on the wisdom of rooted local culture, especially *CILI* as a trade mark. In culinary tourism, for example, can be developed *CILI* restaurant or Dewi Sri Restaurant which emphasizes cleanliness and hygiene, pleasure and distinct flavor that is locally Bali. The presentation would also be accompanied by the hospitality, gentleness, cleanliness and modesty as an expression of cultural characteristics and local communities of Bali.

In the performing arts in Bali, *CILI* is inspiring for the artists/dancers (*pragina*) and intellectual figures in works of art to design performing arts of *Drama Gong* and *Dance*. *Drama Gong* entitled "*CILI-Naya*" is quite popular in Bali around the 1970s and 1980s, as well as *CILI-Naya Drama Gong* from the village of Sangha Langit in Buleleng Regency and several other areas, such as Petak Village, Gianyar. Then the staging of *Drama Gong* art with titled "*CILI-Naya*" dimmed in line with developments and changes in the orientation of community life and development of a wide range of entertainment and performing arts in the electronic media, ie TV. However, *CILI* as the inspiration of artists seems to never stop. Later in the modern era, which is characterized by the rapid advancement of communication technology, transportation, and multimedia technologies, *CILI* still inspire the performing arts world, particularly dance. Among others a work of Prof. Dr. Dibya from Institute of Art Denpasar produced a CD titled *CILI-Naya* that was sold in cassette/VCD stores. Indirectly as the art of the dance, the art of music which is composed also get a touch of *CILI* and the feel of such beauty.

The storylines which were staged in *CILI* was a nuanced performance art that, in general portray the importance of the female figure in public life. *CILI-Naya* is identified as a female figure with a fine character, intelligent, thoughtful, beautiful externally (physical appearance) or internally (inner beauty). *CILI-Naya* figures also described as a steadfast woman, patient, mentally tough and unyielding in defending and upholding the values of goodness and truth, and she is sociable in the community. This *CILI* character seems quite familiar and easy to get sympathy from the general public. *CILI* which contains the meaning of moral, socio-cultural and ecological values is expected to not only inspire the spiritual world, art and culture and the economy, but also can be the role model of behavior, imagination and creativity for the public, especially for the women of Bali in the modern era, and other women in Indonesia, even the females at the global level.

Thus the importance of *CILI* was rooted in an agrarian culture (Subak), through widened magic power and spirit of Balinese culture in the practices of social culture in Bali in a ritual context, the discourse of social, imagination in the work of art, both intrinsic and instrumental in fulfilling the needs of sustainable society. They (traditional society) are sometimes unaware of the cultural traditions of *CILI* which have been conducted in daily life like breathing person that is taken for granted and look *CILI* as something mediocre.

It seems like the figures of *CILI* which tells grandeur, nobility, beauty, gentleness, fertility (welfare), tough and unyielding in upholding the value of goodness and truth is very easy to get a place and sympathy in the hearts of the wider community, both the general public, intellectual community and the business community. *CILI* is very suitable to be developed in various aspects of the creative economy related to equality of femininity and masculinity and gender welfare in the life of the modern world.

Conclusion

CILI is a kind of ornament symbolically made from young coconut leaves (Bali: *busung*) or from palm leaves (Bali: *don lontar*) depicting figures of people (figure god) or a person's face (god) made by Subak's communities in Bali (in agricultural ritual), especially in rice cultivation in paddy fields.

The tradition of making *CILI* by *krama Subak* (farmers) in Bali are usually carried out during the ritual in paddy fields, namely in ritual of: (1) *Mabiyu Kukung* (*Mabeya Kukung or also called Ngiseh*), (2) ritual of *Nyangket* / *Nyeetin* / *Ngetusin* (*Ngadegan Dewa Nini*), and (3) *mantenin padi di lumbung* (ritual of Rice Goddess in ricebarn/granary.

There is also *CILI* made from rice (cake) for ceremonial equipments (*upakara*) such as in the ceremony of *Dewa-Yadnya* and *Manusa-Yadnya*. There is even a *CILI* made of clay (terracotta) and used as a decoration and functioned as repellent reinforcements in the structure of the tile roof (*pemugmug*) in traditional Balinese architecture;

In term of Subak ritual, *CILI* has the function of aesthetic (beauty) and magical religious purposes, namely a symbol of *Dewa Nini* (Rice Goddess); the latter is more popularly called Dewi Sri (Sri Laksmi Dewi).

In the context of the subak ritual in Bali, *CILI* figure which generated in binary-opposition, *lanang-wadon* (masculine-feminine), when building (*ngadegan*) *Dewa Nini* (Dewi Sri/Sri Lakshmi Goddess) as mentioned above has a meaning of unification or cosmic marriage. The union or marriage in the cosmic nature of the magical-religious meaning contains a fertility value.

The cultural tradition in making *CILI* that was originated from an agrarian ritual (Subak) become an inspiration in the development of arts and creative economy of local communities to foster employment and business opportunities in order to increase revenue, life standard and welfare of the people in Bali.

It is necessary to do cultural socialization and revitalization of the tradition and important function and meaning of *CILI* in social life. Revitalization in various forms and ways need to be done to touch and revive public knowledge and awareness about the root of the history and significance of *CILI* in the traditional Balinese civilization in the modern era that is global, complex, and so dynamic.

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Pictures

Figure 1. Wife of Subak (Jatiluwih Village) demonstrating how to make cili from coconut leaves

Figure 2. *Cili Prerai* for decoration of the *Dewa Nini* (Rice Goddess) as the result of the subak wife's demonstration

Figure 3. Temporary shrine in the paddy field with *CILI* decoration (Ritual of Mabiyukukung -Subak Gadon II Beraban Village-Kediri-Tabanan) (doc. 2015)

Figure 4. Mabiyukukung Ritual by wife of Subak (doc. Museum Subak-Tabanan)

Figure 5. *Dewa Nini* (lanang/masculine-wadon/feminine) as a symbol of Rice Goddess on the paddy field's shrine **when farmer is harvesting rice-Subak Senapan Banjar Anyar Village -Kediri Tabanan (doc. 2013)**

Figure 6. *Cili Prerai* (*Cili* Face) from palm leaves and *Dewa Nini Lanang* (Masculine) – *Wadon* (Feminine) symbol Rice Goddess from Subak-Umajero Village District of Busungbiu-Buleleng (doc. 2016)

ARCHAEOLINGUISTICS FOR A STUDY OF ETHNIC GROUP FORMATION: A CASE STUDY OF SPEAKERS OF AUSTRONESIAN IN NORTHERN SUMATRA

Ery Soedewo and Deni Sutrisna

Introduction

Austronesia (linguists also refer to it as Malayopolinesia) was first referred to a family of language whose spread stretches from Madagaskar in the west to the Easter island in the east. It then developed as not only the naming of a language family but has also been referred to the speakers of the language along with their cultures. Antropologists and archaeologists, and even biologists then adopt the language family naming to call people who speak the language, and also refer to it as a representation of the culture, into their various studies. In the island of Sumatra, especially in the north, some ethnics were found to have originated from a single ancestry, two of them are Gayo and Karo.

Gayo is a tribe in the regency of Central Aceh and the regency of Bener Meriah, of Nanggroe Aceh Darussalam province. These area of Gayo people is known as Gayo Land, which is familiar to Gayo people as *Tanoh Gayo,* which means "the Land of the Gayo" (Rusdi 2011: 19). Presently, not only do Gayo people settle at the above-mentioned regencies, but also a major part of Southeast Aceh and a small part of East Aceh. This whole *Tanoh Gayo* area is geographically bound by a series of mountains and hills of Barisan Mountain-range stretching northwest-southeast. It is also associated by the ancetors' cultures from generation to generation.

Ka Yo' in Acehnese means *fear*. This version tells a story on the incoming of Islam to Aceh, which was followed by the refusal of some coastal people to convert to Islam and escaped to the hinterland (Said 1961: 17 in Rusdi 2011: 24). This word was initially only addressed to the escapees who then joined with the local people (not the native Gayo people who had inhabited the area for long). This oral tradition needs more research, especially concerning the coming of Islam to Central Aceh.

Another oral tradition related with Gayo is associated with Linge kingdom. It is told that the first Gayo man is named Genali, who came from a place called "Rum" (Turkey) and was washed ashore in an island (Sumatera) that was known as *Buntul Linge*. On the other hand, at the same time in Johor there settled a kingdom whose people partly made their living as fishermen. One day, it was described that a group of fishermen set sail to fish in the sea and found an island and a boy there (Sumatera). This boy, who was later named

Genali, left a gift for the king to the fishermen. Shortly, presented with a gift, the king and the fishermen visited the island and later on the king sent one of his daughters, along with some courtiers of Johor kingdom, to marry Genali. Genali and the princess settled at Buntul Linge Island with their offsprings and started Linge kingdom. Legend says that their offsprings were later called Gayo.

Marcopolo, who visited the kingdom of Peureulak (Perlak) in 1291 CE, witnessed that the subjects were Muslims. The rest who rejected Islam escaped to the hinterland and found a “small sea” (Lake Laut Tawar). The natives called their kingdom *Lainggow* (Linge or Lingga) and addressed their king *Ghayo-Ghayo* (Gayo), meaning the Holy King of the Mountain (Majid, 1980 in Rusdi 2011: 28).

Another oral tradition says that the ancestors of Gayo were the Karo people (North Sumatera province). This assumption was based on similar typical characteristics shared by Gayo and the sub ethnic of Batak Karo: some language dialects and the use of smaller clan such as *Cibero, Melalatoa (Melala),* by some groups of Gayo community until now, are also used by Batak Karo people. Melalatoa (1961: 25-34, in Rusdi 2011: 28) suggested that during the reign of King Sengeda (a King of Linge), *Tanoh Gayo* was already visited by foreign people, especially Batak people. A group of 27 Bataknese led by Lebe Kader came to Gayo to avenge some Bataknese rumored to have been killed by Gayo people. This group of Batak men managed to conquer the village of Bebesan (presently the subdistrict of Bebesan). They decided to settle and married some locals. Their offsprings were later known as the Batak 27 who would later be the future Gayo people (Rusdi 2011: 29).

Traditionally, Karo people believe that they started as Haru and was later named Haro, and finally called Karo, which mostly now settle in Karo regency. Their oral tradition suggests that Haru or Aru was the past-name of Karo. Putro commented similarly (1981: 55 in Soraya 2009: 2):

> “at the reign of Sultan Ali Mukhayat Syah, the first Sultan of Aceh at the end of the 15th century at the foot of Mount Seulawah, presently Aceh Besar, there existed the Kingdom of Haru/Karo. Its people were Haru people who were later known as Hindhu Tamil and was called Sembiring in Karo”.

Another oral tradition says that the kings of Haru were among others Bataknese and Acehnese. The Haru people were then divided as the Kingdoms of Haru Wampu, Lingga Timur Raja, and Haru Deli Tua that collapsed in the 16th century. The split up of Haru was soon followed by their spread to various places and formed such ethnics as Karo, Simalungun, Pakpak, Alas, Gayo, Singkil and Keluat.

Subject Matter

An oral tradition says that both Gayo and Karo were of a family sharing the same social or cultural attributes. However, as time developed, they gradually differed both socially and culturally, which may have been caused by external cultural contacts – as well as the process and different levels of acceptance towards a new distinct culture – between the people of Gayo and Karo, which resulted in varied appearances and performances. This oral tradition also suggests that their relative separation period was the 16th century CE, the truth of which is open to question. If this is not true, when was the more accurate separation period of Gayo and Karo?

Theoretical Framework

Prior to answering the question on the separation period of Gayo and Karo, it is important that the word ethnic be defined. Joseph (2004: 162-163) suggested that the identity of an ethnic is more focused on shared ancestry and cultural heritage rather than political bakground for the sake of autonomy. Pejros (2004: 155) on the other hand argues that variety of societal groups can be identified through their varied ritual or material culture, behaviour of the people, languages, and other attributes. Fearon (2000: 4) further confirmed that the identity of an ethnic is defined by similar ancestry and a set of ethnic categories such as physical appearances, complexion, culture or any linguistic traces. Two of the experts, except Joseph, explicitly stated that language is a major differing factor of an ethnic. Therefore, to discover the separation period of Gayo and Karo ethnics, such an aspect of linguistics as morphology is chosen. A diachronic linguistic study of a language elements is called historical comparative linguistics.

The most suitable aspect of linguistics to be used to study a comparative linguistics is morphology. In fact, the formal structures of languages do not provide problems as opposed to the structures of meaning do. The rules of linguistic cognate are convincingly formulated through the use of similar forms that have been investigated and studied systematically (Keraf 1984: 33).

Threfore, any languages in the world are theoretically subject to becoming objects of comparisons. Every language in the world shares universal characteristics that include:

1. Structure and meaning. Every language possesses certain typical structures associated with their unique meaning to allow referencing.
2. Every language possesses a set of the smallest functional units called *phoneme* and *morpheme*.
3. Every language possesses certain word classes or parts of speech, noun, verb, adjective, pronoun, and number.

Historical comparative linguistics simply uses similarities of struture and meaning as a reflection of the same historical heritage. Cognate languages of the same proto language will always display the following similarities (Keraf 1984: 34):

1. Similar phonetics and phonology;
2. Morphological similarities, similarities in word and grammatical forms;
3. Sytactical similarity, similarities of words relationship in a sentence.

One of the ways to determine the grouping and separation period of cognate languages is through lexicostatistics that is often confused with glottochronology. It can be generally stated that:

1. Lexicostatistics is a technique in classifying languages that prioritises lexicons statistically and groups them based on percentage of similarity and differences.
2. Glottochronology is a historical linguistics that attempts to group languages on time depth or the calculation of cognate languages. In this case, a language is not dated absolutely in a certain year, but instead generally counted using a unit of millenium.

In fact, those techniques are often used simultaneously due to the use of lexicostatistics in determining the age of a language. On the other hand, grouping a language through lexicostatistics concerns time as a basis. In fact, the grouping of languages based on age or dating inevitably is concerned with those terminologies with the same understanding. Thus, lexicostatistics or glottochronology can be defined as: a technique to discover data for an older period of time in languages to date and group them (Keraf 1984: 122).

A number of observations on some languages resulted in four basic assumptions that may be used as a starting point in search for the age of a language or the differences among languages. The basic assumptions are as follows (Keraf 1984: 123-125):

1. Some vocabulary of a language is difficult to change compared to some other. Such is basic vocabulary, which are words intimate to a language as well as elements significant to the survival of that language. Such basic vocabulary includes:
   a. Pronouns;
   b. Numbers;
   c. Words on body parts (and characteristics or activities);
   d. Nature and its surroundings: air, sky, mountain, etc. with their characteristics or activities;
   e. Daily items such as stick, knife, house, etc.

   Morrish Swades suggested the use of 200 basic vocabulary he considered universal, meaning that it is found in all languages in the world.

2. Basic vocabulary retention is constant at all time. This second basic assumption suggest that a language basic vocabulary should always have a certain percentage to remain in 1000 years. The acceptance of this assumption will mean that a certain percentage of 200 basic vocabulary of a language will survive 1000 years, and the rest of the vocabulary will also last after 1000 words in the same percentage.
3. All languages share similar basic vocabulary change. This 3rd assumption has been tested in 13 languages, some of which have written records. The result shows that in 1000 years, the basic vocabulary of a language will have 86,4 % -- 74,4 % of survival rate, or with the average of 80,5 %.
4. The separation time of the two languages can be calculated when the percentage of the cognate words of the two languages are discovered. This fourth assumption is a logical consequence of the 2nd and 3rd basic assumptions. This assumption applies on condition that neither delaying nor accelerating factors of the separation time are found, such as a conquer or any other forms of contacts. A conqure of a linguistic people may speed up a change when the conqueror imposes the use of its language.

Methodology

To implement the above four basic assumptions, certain steps are to be taken. Such steps represent a technique in lexicostatistics. The following are the steps:

1. Collecting basic vocabulary of the cognate words;
2. Determining the cognate words of the word partners of the two languages;
3. Calculating the two languages separation time;
4. Calculating the margon of error to get a more accurate separation time.

The four procedures are implemented in this study to determine the separation period. The following are the steps relevant to the subject matter.

The first thing to do is to collect basic vocabulary, which contains 200 words based on the list arranged by Swadesh. The table below is the list of the 200 words of both Gayo and Karo languages.

To differentiate similar sounds in the table below, phonetic alphabets are used. The following are the vowel or consonant sounds represented at the vocabulary table along with the intended sounds in daily Indonesian utterances:

- ɛ: the sound e such as in b**e**b**e**k, n**e**n**e**k, or kak**e**k
- ɔ: the sound o such as in p**o**t**o**ng, g**o**t**o**ng, or l**o**w**o**ng
- ʔ: glottal stop sound (stop at the uvula) such as the symbol **'** for the final sound of tida**k**, kaka**k**, or cepa**k**
- ŋ: nasal sound at the mouth ceiling (velar) such as in a**ng**sa, ba**ng**sa, or bara**ng**

- j: an assimilated sound of y which can not be described ortographically (in written) such as in **tia**ng, s**ia**ng, or l**ia**ng
- ʷ: an assimilated sound of w which can not be described ortographically (in written) such as in l**ua**ng, t**ua**ng, or b**ua**ng
- ʒ: the sound such as j in **j**anji, **j**alan, or **j**arang

Result and Discussion

No	Gloss	Gayo	Karo
1	Abu (*ash*)	dul	abu
2	Air (*water*)	wih	lau
3	Akar (*root*)	uʲɛt	urat
4	Aku (*I*)	aku	aku
5	Alir (*flow*)	gɛh	malər
6	Anak (*child*)	anaʔ	pupus
7	Angin (*wind*)	kuyu	aŋin
8	Anjing (*dog*)	asu	biʲaŋ
9	Apa (*what*)	əŋgeh	kai
10	Api (*fire*)	lara	api
11	Apung (*float*)	ampung	bɔmbaŋ
12	Aren *(sugar palm)*	pɔla	paŋuh
13	Asap (*smoke*)	asap	cimbər
14	Awan *(cloud)*	awan	əmbun
15	Bagaimana (*how*)	kunəʲa	uga
16	Baik (*good*)	jəroh	məhuli
17	Bakar (*burn*)	mutəloŋ	tutuŋ
18	Balik (*turn*)	mulaʔ	mulih
19	Banyak (*many*)	dəlih	məlala
20	Bapak (*father*)	ama	bapa
21	Baring (*lay*)	gogolɛhɛn	gəmpaŋ-gəmpaŋ
22	Baru (*new*)	ben	mbaru
23	Basah (*wet*)	basah	bərnaʔ
24	Batu (*stone*)	atu	batu
25	Beberapa *(some)*	pəpiʲən	piga-piga
26	Belah (*split*)	bəlah	taka

No	Gloss	Gayo	Karo
27	Benar (*true*)	bətul	tuhu
28	Benih (*seed*)	inih	bibit
29	Bengkak *(swell)*	kəmuŋ	bəsar
30	Berenang (*swim*)	nawə	ərlaŋe
31	Berjalan (*walk*)	rəmalan	ərdalan
32	Berat (*heavy*)	bərət	mbərat
33	Beri (*give*)	nosah	bərɛ
34	Besar (*big*)	kul	galaŋ
35	Besi (*iron*)	bɔsi	bəsi
36	Bilamana (*when*)	səluhən	ndigan
37	Binatang (*animal*)	binataŋ	rubi^{j}a
38	Bintang (*star*)	bintaŋ	bintaŋ
39	Buah (*fruit*)	u^{w}ah	bu^{w}ah
40	Bulan (*moon*)	bulan	bulan
41	Bulu (*feather*)	wuʔ	buʔ
42	Bunga (*flower*)	bungə	buŋa
43	Bunuh (*kill*)	wunuhən	wunuh
44	Buru (*hunt*)	mukarɔ	buru
45	Buruk (*ugly*)	buruʔ	məʒin
46	Burung (*bird*)	manuʔ	pəriʔ
47	Busuk *(rotten)*	busuʔ	maciʔ
48	Cacing (*worm*)	ketɔl	gai^{j}a
49	Cium (*kiss*)	ci^{j}um	əma
50	Cuci (*wash*)	mənəsah	ərduhap
51	Daging (*meat*)	dɛŋkɛ	dagiŋ
52	Dan (*and*)	tah	ras
53	Danau (*lake*)	lut	lau
54	Darah (*blood*)	darah	darəh
55	Datang (*come*)	sɛluʔ	rəh
56	Daun (*leave*)	uluŋ	buluŋ
57	Dekat (*near*)	dəkat	ndihər
58	Dengan (*with*)	dəŋan	ras
59	Dengar (*hear*)	məŋə	bəgi

No	Gloss	Gayo	Karo
60	Di dalam (*in*)	uʷas	bas
61	Di luar (*out*)	darat	darat
62	Di mana (*where*)	kusiŋᵊ	iʒa
63	Dingin (*cold*)	səjuʔ	mbərgəh
64	Diri (*stand*)	səsuʔ	cindər
65	Di sini (*here*)	i siʲən	i ʒenda
66	Di situ (*there*)	i suʔ	i ʒah
67	Dorong (*push*)	tulaʔ	sɔrɔŋ
68	Dua (*two*)	roʷa	duʷa
69	Duduk (*sit*)	kunul	kundul
70	Ekor (*tail*)	uki	ikur
71	Empat (*four*)	opat	əmpat
72	Engkau (*you*)	ko'o	əŋkɔ
73	Gali (*dig*)	kuruʔ	kuruʔ
74	Garam (*salt*)	pɔʷa	sira
75	Garuk (*scratch)*	kaʲo	gərgau
76	Gemuk (*fat*)	gətɔl	əmbur
77	Gigi (*tooth*)	ipɔn	ipɔn
78	Gigit (*bite*)	ket	karat
79	Gosok (*scrab*)	gusuʔ	gusgus
80	Gunung (*mountain*)	bur	dɔlɔŋ
81	Hantam (*punch*)	dərə	cuba
82	Hapus (*erase*)	apusən	apus
83	Hati (*liver*)	ati	ate
84	Hidung (*nose*)	ɨʲuŋ	iguŋ
85	Hidup (*life*)	murip	ŋgəluh
86	Hijau (*green*)	iʒo	mərata
87	Hisap (*suck*)	siluʔ	cɔpcɔp
88	Hitam (*black*)	itəm	mbiriŋ
89	Hitung (*count*)	bilaŋ	kira
90	Hujan (*rain*)	urən	udan
91	Hutan (*jungle*)	utən	karaŋən
92	Ia (*he/she*)	boh	ɨʲa

No	Gloss	Gayo	Karo
93	Ibu (*mother*)	ine	nandai
94	Ikan (*fish*)	gule	nuruŋ
95	Ikat (*tight*)	ikɔt	rakuti
96	Isteri (*wife*)	banan	ndəhara
97	Ini (*this*)	ɔʲa	ɛnda
98	Itu (*that*)	suʔ	siʲa
99	Jahit (*sew*)	ʒəitən	nʒarum
100	Jantung (*heart*)	ʒantuŋ	pusuh
101	Jatuh (*fall*)	mətuh	ndabuh
102	Jauh (*far*)	gip	ndauh
103	Kabut (*fog*)	məmun	gəltəm
104	Kaki (*foot*)	kidiŋ	nahe
105	Kalau (*if*)	ikə	adi
106	Kami (*we*)	kitə	kita
107	Kamu (*you*)	kou	kam
108	Kanan (*right*)	kuʷɛn	kəmuhən
109	Karena (*because*)	hanakati	pərban
110	Kata (*say*)	ceraʔ	ŋərana
111	Kecil (*small*)	kucaʔ	kitiʔ
112	Kelahi (*fight*)	pəlulu	rubat
113	Kepala (*head*)	ulu	takal
114	Kering (*dry*)	kəriŋ	kərah
115	Kiri (*left*)	kiri	kaʷəs
116	Kotor (*dirty*)	kotɛʔ	məlkət
117	Kuku (*nail*)	kukut	silusilu
118	Kulit (*leather*)	kulit	kulit
119	Kuning (*yellow*)	kuniŋ	məgərsiŋ
120	Kutu (*louse*)	kutu	kutu
121	Ladang (*field*)	əmpɔs	ʒuma
122	Lain (*different*)	lɛn	laen
123	Langit (*sky*)	laŋit	laŋit
124	Laut (*sea*)	lut	laʷət
125	Lebar (*wide*)	ləlaʔ	mbəlaŋ

No	Gloss	Gayo	Karo
126	Leher (*neck*)	rɔŋaʔ	kərahɔŋ
127	Lelaki (*man*)	rawan	dilaki
128	Lempar (*throw*)	təkar	bəntər
129	Licin (*slippery)*	jəral	mədalit
130	Lidah (*tongue*)	dɛla	dilah
131	Lihat (*see*)	ɛŋɔn	nɔn
132	Lima (*five*)	lima	lima
133	Ludah (*saliva*)	wihnawa	cidur
134	Lurus (*nose*)	bətul	pintər
135	Lutut (*nose*)	uku	tiʷən
136	Main (*play*)	main	maen
137	Makan (*eat*)	maŋan	man
138	Malam (*night*)	gələp	bərŋi
139	Mata (*eye*)	mata	mata
140	Merah (*red*)	ilaŋ	məgara
141	Mereka (*they*)	gəmawa	kalaʔ
142	Minum (*drink*)	minum	minəm
143	Mulut (*mouth*)	awah	babah
144	Muntah (*pugh*)	ploʷah	mutah
145	Nama (*name*)	gərəl	gəlar
146	Napas (*breath*)	kəsah	kəsah
147	Nyanyi (*sing*)	didoŋ	rənde
148	Orang *(people)*	gəma	ʒəlma
149	Padi (*rice*)	page	rom
150	Panas (*hot*)	pɔrak	las
151	Panjang (*long*)	naru	gədaŋ
152	Pasir (*sand*)	one	kərsik
153	Pegang (*hold*)	amat	ʒəmak
154	Pendek (*short*)	kɔnɔt	gəndəʔ
155	Peras *(squeeze)*	ramas	pərəh
156	Perempuan (*female*)	banan	dibəru
157	Perut (*stomach*)	tukə	bəltək
158	Periuk *(pot)*	bəlaŋa	kudin

No	Gloss	Gayo	Karo
159	Pinang *(areca nut)*	pinaŋ	mayaŋ
160	Pohon (*tree*)	bataŋ	bataŋ
161	Potong (*cut*)	kərat	kərət
162	Punggung (*back*)	puduʔ	guruŋ
163	Pusar (*belly botton*)	pusɔʔ	pusuŋ
164	Putih (*white*)	putih	məntar
165	Rambut (*hair*)	uwuʔ	buʔ
166	Rumput (*grass*)	gərpi	dukut
167	Satu (*one*)	sara	sada
168	Sawah (*rice field*)	kume	saba
169	Sayap (*wing*)	kəpɛk	kabəŋ
170	Sedikit (*some*)	tikiʔ	sitiʔ
171	Siang (*day*)	talu	cigər
172	Siapa (*who*)	sahan	ise
173	Sempit (*narrow*)	pɛdɛt	picət
174	Semua (*all*)	bɛwɛnɛ	kərina
175	Suami (*husband*)	rawan	pərbulaŋən
176	Tajam (*sharp*)	təjəm	təlap
177	Tahu (*know*)	tahu	kutə
178	Tahun (*year*)	tun	taun
179	Takut (*afraid*)	tərih	mbiʲar
180	Tali (*rope*)	tali	nali
181	Tanah (*land*)	tanoh	tanəh
182	Tangan (*hand*)	pumu	tan
183	Tarik (*pull*)	eʲat	rintaʔ
184	Tebal (*thick*)	təbəl	təbal
185	Telinga (*ear*)	kəmiriŋ	cupiŋ
186	Telur (*egg*)	tənaruh	naruh
187	Terbang (*fly*)	tərbaŋ	kabaŋ
188	Tertawa (*laugh*)	kədiʔ	tawa
189	Tetek (breast)	susu	tɛtɛʔ
190	Tidak (*no*)	gərə	laŋ
191	Tidur (*sleep*)	nome	mədəm

No	Gloss	Gayo	Karo
192	Tiga (*three*)	tulu	təlu
193	Tikam (*stab*)	təniʔ	təbaʔ
194	Tipis (*thin*)	nipis	mənipəs
195	Tiup (*blow*)	ɟupən	əmbus
196	Tongkat (*stick*)	tikon	cikən
197	Tua (*old*)	tuə	metuʷa
198	Tulang (*bone*)	tulən	tulan
199	Tumpul *(dull)*	tumpul	tumpul
200	Ular (*snake*)	nipe	nipe

Non-cognate words **Cognate words** **Ignored words**

Counting cognate words

The second step in this lexicostatistics is counting the cognate words. To determine the cognate words of the two languages in investigation, the following procedures need considering (Keraf 1984: 127--133):

a) Ignored gloss.

The first step is to remove ignored gloss. Ignored gloss includes empty words, a gloss that bears no equivalance in either of the languages being investigated. The second step is to remove all loan words from both cognate or non-cognate words. For example the words *es* and *salju* in Malay which are loan words from non-cognate words. The third step is to remove derived words of an item or about an item that shows that it is not a root word, for example the word *matahari* Malay, or *panon* 'mata' Sundanese, which are clearly not root words; thus, they must be considered *zero*. The fourth step is to remove a gloss of two similar words, one of which is a root word and the other is a derived word of the same root word, thus the gloss of the root word is considered, while the derived word is ignored. For example, the gloss *'path'* in English is provided with the word 'jalan' Indonesian, while the gloss *'to walk'* is provided with the word 'berjalan'. Thus, in this case, the gloss *'path'* is used and the gloss *'to walk'* is considered empty.

Based on the above conditions, glosses to be excluded from the classification of cognate and non-cognate words are loan glosses of either cognate or non-cognate words, such as the word *kudin* which means baked clay pot in Karo, and is adopted from the Sanskrit *kundika*, while the original word in Austronesian languages simply mean clay pot.

b) Isolation of bound morpheme.

When bound morphemes are discovered, prior to comparison to get cognate or non-cognate words, all the bound morphemes need isolation. For example, the gloss *'give'*, which in Indonesian means 'memberi', must have its bound morpheme isolated, which result in the isolation of the root word 'beri' to be compared. For ease of note, the word will be isolated as follows: *beri* (*mem*-).

c) Classification of cognate words

Only upon the completion of the above procedures will the comparison of word partners in both languages of Gayo and Karo start to find their linguistic relationship. Similar words in a partnership will be classified as cognates, and the opposites are classified as non-cognates.

Calculating the separation time

The separation time of the two cognate languages of the known cognate word percentage is discoverable through the following formula (Keraf 1984: 130-131):

$$W = \frac{\log. C}{2 \log. r}$$

Where W = the separation time in thousands (millenium) of years ago; r = retention or constant percentage in 1000 years (see (Keraf 1984: 123-125, especially point 3 on the basic assumption on differentiation on two or more languages), also termed as *index*; C = persentage of cognate words; log = logarithm of.

Prior to the formula application to determine the separation time of Gayo and Karo languages, the following items must be considered: the first is the number of complete word partners of the two languages – which are based on Swadesh word list, reduced by some unconsidered words based on the procedure of 'a' *Gloss* - is 199 words. The calculation shows 62 cognate words or 31 %. The following is the formula application.

$$W = \frac{\log. 0{,}31}{2 \log. 0{,}805} \qquad W = \frac{-1{,}171}{2 \times -0{,}217} \qquad W = \frac{1{,}171}{0{,}434}$$

$$W = 2{,}698$$

The result shows the separation time in thousands of years, thus, in order to convert to an ordinary year the final result is multiplied by 1000 to produce 2698. The calculation tells the separation of Gayo and Karo languages in 2698 years ago. In other words, it can be assumed that Gayo and Karo languages were still a single language 2698 years ago.

However, a single moment separation, i.e. 2698 ago, between two languages was so unlikely that it should have taken place in a gradual process. Thus, a relative separation period must be set, which requires a certain calculation with the following statistical technique.

Calculating a margin of error

A common way of avoiding errors in statistics is by approximating that an event happens in a certain period of time instead of within a span of time. During this separation period, there was an accumulated differences between the languages in comparison that resulted in the disintegration (Keraf 1984: 131).

In statistics, a special method was developed to calculate the margin of error that may arise. Such margin of error is developed to assume for the following three possible situations:

1. The calculation accuracy is approximately 68 % of the truth, or 0,7 of the truth;
2. The calculation accuracy is approximately 90 % or 0,9 of the truth;
3. The calculation accuracy is approximately 50 % or 0,5 of the truth.

A standard error is usually applied to calculate a margin of error, which is 70 % (0,7) of the truth. A standard error is calculated by the following formula (Keraf 1984: 132):

$$S = \sqrt{\frac{C\,(1-C)}{n}}$$

where: S = a standard error in the percentage of cognate words; C = percentage of cognate words; n = the number of words in comparison (either cognate or non-cognate). The order of calculation is as follows:

1) 1 minus C;
2) C is multiplied by the result of (1);
3) The result of (2) is divided by n;
4) Producing the square root of (3);
5) The result of (4) is a margin of error of the cognate words percentage assuming that 0,7 is the real truth.

Upon the result acquisition, the next step is to calculate the standard error of year:

1) The margin of error of the cognate percentage of no (4) is added to C;
2) The number of (1) is then treated as a new C, which will be included in the period calculation formula;
3) The new period calculation in (2) is deducted from the number of the first period (see 3.3 / separation period). This new number is then added to and deducted from the first number (3.3) to acquire the margin of error of 0,7 of the previous condition.

When the above formula is implemented in Gayo and Karo languages, the standard error of the two langauges are:

$$S = \sqrt{\frac{0,31(1-0,31)}{199}} \qquad S = \sqrt{\frac{0,31}{(0,69)}}$$

$$S = \sqrt{\frac{0,2139}{199}} \qquad = \sqrt{\begin{matrix}0,00107\\4467\end{matrix}} \qquad S = 0,03$$

The result of this standard error is (0,03), which is then added to the percentage of the cogante to get a new C: 0,31 + 0,03 = 0,34. Based on this new C, the separation period is now recalculated using the previous separation time formula (3.3).

$$W = \frac{\log.\ 0,34}{2\ \log.\ 0,805} \qquad W = \frac{-1,079}{2 \times -0,217} \qquad W = \frac{1,079}{0,434}$$

$$W = 2,486$$

Now, to calculate the margin of error, the previous period (2698) is deducted from the new period (2486) = 212. This number is to be added to and deducted from the previous period (2698) to acquire the relative age or period of separation of the two languages.

Thus, by considering the number of the margin of error on the standard error (0,7 of the true condition), it can be concluded that:

1) Gayo and Karo languages were a single language in 2698 ± 212 years ago.
2) Gayo and Karo languages were a single language in 2910 -- 2486 years ago.
3) Gayo and Karo languages started to diverge from a proto language between the years 898 BCE -- 474 BCE (calculated from the year 2012)[4].

[4] Referring to the time when lexicon (vocabulary) data were recorded in 2012

Discussion

Linguists suggest that the languages being analysed in this study – Gayo and Karo – are the members of Austronesian, which covers all languages stretching from archipelagos of Madagaskar (off the east coast Africa) and Rapanui (South American west coast), and between Formosa (Taiwan) and New Zealand (Keraf 1984: 203). In the studies by palaeoanthropologists and geneticists, the speakers of Austronesian who settled the areas being discussed are genetically classified on Mongoloid. Bellwood (2007: 71) suggested that the majority of the present settlers of Indonesian-Malaysian archipelagos originated from South Mongoloid. Nearly are all the South Mongoloid population of Austronesian speakers, except for a small number of groups in the east of the archipelagos such as Tobelo and Galela ethnics in Moluccas who speak West Papuan (Bellwood 2007: 74). Bellwood (2007: 79) further quoted Nei and Roychoudhury (1993) that the South Mongoloid are genetically closer to the North Mongoloid (Chinese, Korean, and Japanese) than the native Americans. Furthermore, Bellwood (2007: 79) quoted Hill and Serjeantson (1989) to confirm the closeness of the Oceanic Mongoloid (Micronesians and Polinesians) with the South Mongoloid at the Southeast Asian archipelagos. The oldest evidence of the presence of Mongoloid people in Gayo was discovered at Loyang Ujung Karang site, moreprecisely at the excavation pit S2T3 spit 7-8. The dating of the data showed a period of time between 4400 ± 120 BP (Wiradnyana & Taufiqurrahman, 2011: 75-76). Morphological characteristics of the Mongoloid skulls were among others of an oval shape, a slightly protruding mouth, front teeth with a hook of *klas II Kennedy*, big spade-shaped incisors, oval forehead, and high square eyesockets (Yondri,2010:4 dalam Wiradnyana & Taufiqurrahman 2011: 76).

Identifications by Wiradnyana and Taufiqurrahman (2011) on the race of human remains at Loyang Ujung Karang as well as the statement by Bellwood (2007: 11) on races and their languages concluded that human skeletons at Loyang Ujung Karang were of South Mongoloid, and, thus, were speakers of Austronesian. Two languages of Austronesian family in Sumatra are Gayo and Karo. Their separation period calculation shows their relative unity as a language was approximately 2698 ± 212 years ago, or in other words, Gayo and Karo were initially a single language in 2910 -- 2486 years ago. Thus, it is fair to assume their divergence period from a proto language was between the years 898 BCE -- 474 BCE (calculated from the year 2012 upon the lexicon/vocabulary data collection). It may also be interpreted that prior to the years 898 BCE-- 474 BCE Gayo and Karo were a single language, or in other words, the ancestors of Gayo and Karo speakers prior to the years 898 BCE -- 474 BCE were a community of the same language. However, an unknown cause had separated them gradually between the years 898 BCE -- 474 BCE.

The glottochronologic dating seems to correlate with the result of two dating activites on a number of organic data of burning ashes, charcoals, and bones surrounding

Lake Lot Tawar, which suggests a lengthy timespan of using period as seen on the following table:

Box	Spit	Depth from soil surface	Type of sample	Period (years ago)	Sites	Period of culture
S3T10	17-18	70-80 cm	Burning ashes	7400 ± 140	Loyang Mendale	Mesolithic
S4T14	13	130 cm	Bones	5040 ± 130	Loyang Mendale	Mesolithic
S2T3	7-8	70-80 cm	Bones	4400 ± 120	Loyang Ujungkarang	Neolithic
U2T1	7	40-50 cm	Charcoals	3580 ± 100	Loyang Mendale	Neolithic
S2T3	3-4	30-40 cm	Bones	2590 ± 120	Loyang Ujungkarang	Neolithic
U3T1	Lot 1	20 cm	Bones and burning ashes	1900 ± 110	Loyang Mendale	Neolithic
U2T1	Lot 3	20 cm	Bones	1870 ± 170	Loyang Mendale	Neolithic
U2T1	Lot 4	10 cm	Burning ashes	1740 ± 100	Loyang Mendale	Neolithic

Source: Wiradnyana and Taufiqurrahman 2011: 111

Two results of dating of archaeological data surrounding Lake Lot Tawar correlated with glottochronologic dating are samples of two excavation pits of S2T3 spit 7-8 and of S2T3 spit 3-4 at Loyang Ujung Karang site. Such correlation between excavation pit of S2T3 spit 7-8 with glottochronologic dating appears at the identification of human remains discovered at the depth of Mongoloid race, probably from 4400 ± 120 (4520 – 4280) years ago. The importance of the glottochronologic identification is the information of the Mongoloid men's settlement period of Lake Lot Tawar prior to their linguistic separation, which was one of the indicator of two different sub-ethnics creation. To discover the correlation between human remains dating with glottochronologic dating, the result of the human remains dating is deducted from 1950 (agreed BP) 1950-4520 = -2570 and 1950-4280 = -2330. The result shows that the bone samples of excavation pit S2T3 spit 7-8 Loyang Ujung Karang site originated from a period span of 2570 - 2330 BCE. On the other hand, the glottochronology of Gayo-Karo is 898 BCE - 474 BCE. Thus, it may be interpreted that the later generation of the men of Loyang Ujung Karang of the excavation pit S2T3 spit 7-8 used to live together as the same proto language speaker for almost 2000 years Lake Lot Tawar, and finally separated from a big family of the same proto Gayo-Karo speakers.

The importance of the glottochronologic dating of Gayo and Karo languages is their correlation with the dating result of bone samples of excavation pit S2T3 spit 3-4 Loyang Ujung Karang site of 2590 ± 120 (2710 -- 2470) years ago. The result is then deducted from 1950 (agreed BP) 1950-2710 = -760 and 1950-2470 = -520, and finally it was discovered that the bone samples of excavation pit S2T3 spit 3-4 Loyang Ujung Karang site came from between 760 -- 520 BCE. The comparison between time span of the bone samples (760 -- 520 BCE) with the period of Gayo-Karo glottochronology (898 BCE -- 474 BCE) shows a 46 year – 138 year difference. This means that the human remains of the excavation pit S2T3 spit 3-4 at Loyang Ujung Karang site is another speaker of proto Gayo-Karo who experienced a gradual, direct separation process of Gayo and Karo languages.

The dating of Gayo and Karo glottochronology and the dating of human remains of the excavation pit S2T3 spit 3-4 at Loyang Ujung Karang site suggest that the traces of activities and human remains of Loyang Mendale Lot 1, Lot 3, and Lot 4 are traces of people experiencing a linguistic separation from proto Gayo-Karo into 2 distinct group of languages, Gayo and Karo. Furthermore, Fearon (2000: 4) and Pejros (2000) stated that one of the distinct identities of a community group and ethnic is the language. Thus, it can be interpreted that the men or traces of men activities discovered at Loyang Mendale of Lot 1, Lot 3, and Lot 4 are the human remains of activities of men whose ethnicity was Gayo or Karo. The fact that the area surrounding Lake Lot Tawar was the settlement of Gayo ethnic, who spoke Gayo language, suggests that the men or traces of activities of men at Loyang Mendale of Lot 1, Lot 3, and Lot 4 are human remains or traces of human activities of Gayo people.

Glottochronology dating and archaeological data clearly show logical correlations between them, which contradict the oral tradition of the separation of Gayo and Karo ethnics. An attempt on correlating glottochronology, archaeological data, and the oral tradition of the separation time of 16th century CE would show a wide gap, which is an indication of inaccuracy in on of the data. Such inaccuracy is surely not to blamed on either the glottochronology dating or archaeological data which show correlation compared to the oral tradition. Thus, it may be confirmed that the separation period of the speakers of Gayo and Karo had taken place in between the years 898 BCE -- 474 BCE (the end of the 10th century BCE – the 5th century BCE rather than at the 16th century CE as the oral tradition suggested.

Conclusion

Gayo and Karo ethnics are linguistically diverged from a single language-proto Gayo-Karo ancestor whose separation took place gradually in 2910 -- 2486 years ago (approximately between 898 BCE -- 474 BCE) rather than in the 16th century CE according to the prevailing oral tradition. The ancestors (speakers of proto Gayo-Karo) of both languages speakers settled the area of Lake Lot Tawar as a community for approximately 2000 years before separation. The correlation of both linguistic and archaeological data related with the area surrounding Lake Lot Tawar shows that the emigration of the ancestor of Austronesian language speakers settling the lake area in about 4000 years ago (the year 2000s BCE) took place in between 898 BCE – 474 BCE to the south, which resulted in the formation of two ethnics of different languages the Gayo and the Karo. The ancestor of Gayo speakers remained to settle at the surrounding area of Lake Lot Tawar, while the Karo speakers emigrated to the south of Lake Lot Tawar in 898 BCE – 474 BCE.

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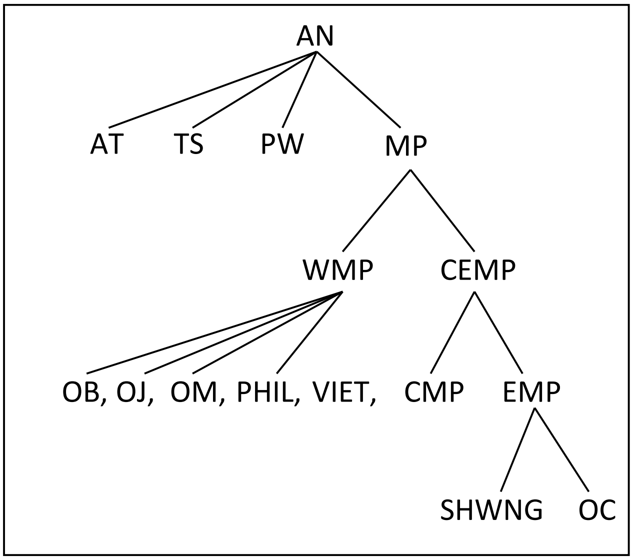
THE CONTRIBUTION OF SANSKRIT TO THE BALINESE LANGUAGE

Ni Luh Sutjiati Beratha

Introduction

Blust (1980: 11) categorizes Balinese as West Malayo-Polynesian and the subgrouping of the Austronesian languages as presented in the following diagram.



AN = AUSTRONESIA
AT = Atalayik (Formosa)
TS = Tsouic (Formosa)
PW = Paiwanic (Formosa)
MP = Malayo-Polynesian (all languages outside Formosa)
WMP = Western Malayo-Polynesian
CEMP = Central-Eastern Malayo Polynesian
CMP = Central Malayo Polynesian
EMP = Eastern Malayo Polynesian
SHWNG = South Halmahera-West New Guinea
OC = Oceanic
OB = Old Balinese
OJ = Old Javanese
OM = Old Malay
PHIL = Vietnam branch

Similarities of languages are important characteristics inherited by Austronesian speakers spread from Madagascar (west) to Easter Island (east), Formosa/Taiwan (north) and New Zealand (south). The experts identify common traits of Austronesian speakers, despite the interactions and changes in culture and biology for centuries. The general characteristics possessed by Austronesian speakers are mentioned as follows: first, most of Austronesian speakers outside Melanesia and the Philippines have biological characteristics classified as southern Mongoloid race (Southern Mongoloid); second, according to culture, Austronesian speakers in the past had a tradition of tattooing the body; third, the use of sail in canoe/boat; fourth, in ethnography and in prehistory, Austronesian speakers had style/art style, and social characteristics associated with birth order for siblings; and fifth, the worship of ancestors who are considered the forerunner/founder of the descent.

Before Austronesian speakers moved to Taiwan, they were likely to come from southern China with the characteristics of farming culture. Archaeological findings at the site of Hemudu on the southern coast of Hangzhou Bay, Zhejiang Province reflects a village originated from 7000 years ago that had produced a number of findings, among others: the pottery, stone axes, agricultural equipment made of wood and bone, wood craftsmanship for boat making / canoe, paddle boat, spinning wheel for weaving, webbing, ropes and remnants of rice. In addition, at the site, it was also found animal bones that have been domesticated, such as pigs, dogs, chickens, and also possibly cattle and buffalo (Bellwood 1995: 98).

According to Bellwood (1995: 100), Proto Austronesian community (PAN) and Proto Malayo-Polynesian (PMP) had been farming or named agricultural society, making pottery, making building/ woody house, and domesticating pigs. Neolithic in Taiwan is estimated to come from 3000-4000 BC with the same evidence as archaeological findings in Southern China. Archaeological evidences in the form of rice, pollen, and forestation for agricultural land in Taiwan are from 3000 BC.

Around 2500-1500 BC, archaeological findings (assemblage) were found consisting of red earthenware and domestication of pigs in the Philippines, Sulawesi, North Borneo, Halmahera, to the East. However, in western Indonesia, it has not been found / reported site with such character.

Recent archaeological evidence indicates that contact between Bali and India has already existed at least at the beginning of our century (Ardika and Bellwood 1991). It seems that trade contact between Bali and India is also accompanied by the appearance Sanskrit in Balinese community. Sanskrit and Old Javanese words have already appeared in Balinese inscriptions as early as the late nine century AD. Old Balinese is the language which is only known from the Old Balinese inscription dating from 882 or probably earlier is now considered a dead language. In the tenth century, Old Balinese was eventually replaced by

Old Javanese as the language of inscriptions. The ninth and the tenth centuries were periods of strong Javanization of Bali. Old Balinese gradually evolved into Modern Balinese. Some vocabularies of Balinese occur in Old Balinese inscriptions derived from Sanskrit, or Old Javanese. PAN phonemes system which existed in Balinese is presented below.

PAN has four vowels, including: * i, * a, * e, and * u

According to Dempwolff (1924) PAN vowel consists of /i/, /u/, /a/, /e/. Brandstetter was originally stated that PAN had six vowels, but it was only found one sound of /e/ and /o/ so that the two sounds were eliminated in its reconstruction (Dahl 1977: 14). Phoneme /e/ and /o/ by Brandstetter (1916a: 10) are very common in Polynesian Malay language family, especially languages are there in Indonesia, but /e/ and /o/ are still doubted found in PAN because there is not found evidence of the cognate in languages outside of Indonesian language. The above example supports the idea Brandstetter stating that /e/ and /o/ are only found in languages existing in Indonesia, they are the family of West Polynesian Malay language.

PAN consonant consists of: * w, * y, * p, * t, * c, * k, * b, * d, * z, * g, * m * n, * ng, ny *, * l, * r, * s, * q.

Meko Mbete (1990) proposed that semi vocal / w / and / y / may be already found in languages belonging to Western Polynesian Malay language. These two phonemes are found in words between vocals. In addition, PAN * r> r * or * R. * R is the apical trill, while * R may sound velar. According to Collin (1981: 12-14), Polynesian Malay proto * R may be the sound of vilar fricative, however Sneddon (1984: 39-40) considers * R a uvular fricative sound as * R can be transformed easily into a / r / or / h /. In Balinese language, this phoneme seems sometimes O so that PAN * R> h> O.

Modern Balinese is characterized by speech levels, i.e. every sentence which is used by Balinese contains speech levels indications. In Modern Balinese, speech levels are divided into two: in this paper it is called *Basa Bali Kepara (BBK)*, and *Basa Alus* (high level Balinese) or *Basa Bali Alus (BBA)*. As mention before that Balinese inscriptions use three languages, namely Old Balinese, Old Javanese and Sanskrit; they have contributed to both high and low speech levels. When languages are in contact with each other borrowing inevitably occurs. Old Balinese borrows Sanskrit words and Old Javanese words. One reason for the borrowing is that Old Balinese lacked words for certain concepts and those words existed in Sanskrit or in Old Javanese. It seems that most of the Sanskrit words and Old Javanese words still exist in Modern Balinese.

There are only a few differences between sentences on various levels morphologically and syntactically. Speech level phenomena are far more sensitive to lexical selection than to morphology or syntax. The levels are determined principally by the selection of vocabulary. It appears that most of the Sanskrit words which occur in Modern

Balinese belong to the high level (BBA). However, Old Javanese lexical items which still exist in Modern Balinese belong to both BBK and high levels (BBA). The existence of Sanskrit words indicates that there is a contact between India in Bali. This paper aims to discuss about the contribution of Sanskrit and Javanese to the Balinese language. More specifically the aims are: (1) how Sanskrit and Javanese influence Balinese which are reflected in lexicon, and morphology, and (2) how do they relate to sociolinguistic factors, such as speech level variation.

Linguistic data were taken from *Etimology Volume I* (1980), Volume II (1984), and Volume III (1986). The data will be compared with data of Balinese language taken from *Prasasti Bali I and II* (Goris 1954). The approach used in this paper is synchronic comparative, i.e. by `comparing inscriptional Old Balinese with Modern Balinese varieties. The Old Balinese word-list compiled by Goris (1954) in *Prasasti Bali II* is used to confirm Old Balinese words which still occur in Modern Balinese. This word-list is also used to account for borrowings from Sanskrit and Old Javanese. The result is an etymological picture of how the Modern Balinese lexicon has evolved.

Diachronic Studies of Lexicon and Morphology

The evolution of speech levels in Balinese and borrowing from Sanskrit and Old Javanese are going to be discussed below.

Evolution of Speech Levels in Balinese

It is not easy to determine the time when speech levels first appeared in Bali due to the scarcity of data, therefore, the opinions are varied. According to Granoka *et al*., then occurrence of speech levels in Bali was caused by the caste system (1984-1985: 16-17). This means that speech levels may have existed in Old Balinese because of the adoption of the caste system under the influence of Indian religion. For instance, the word *brahmawangsa*, ‘brahman descent’ (Zoetmulder 1982: 255) belonging to the *brahmans'*, already occurs in one of the earliest inscriptions found in Bali, namely Trunyan AI, dated 891 AD (003 2b 1), although the names of the four castes (*Brahmana, Ksatriya, Wesya, Sudra)* appeared for the first time one and half centuries later, namely in the inscription Sembiran A IV issued by Anak Wungsu, dated AD 1065. The text is as follows:

> *“…irikanang karaman i julah saddhikara sapasuk parimandalanya kabaih, brahma, ksatriya, wesya, sudra, hadyan hulun matuha rarey, lakilaki wadwan grhasta,…”*

Other scholars, such as Bagus (1979) and Bawa *et al.* (1985) argue that there are no speech levels in Old Balinese. While the occurrence of words such as *umanugrahen* ‘to grant favour’ (202 2), *kibhaktyan* ‘respect’ (005 1-2) or the honorific *(i)da* (210 2-3), may support former opinion. However, based on my close reading of the Old Balinese inscriptions seem to confirm the latter, i.e. there was no speech level differentiation in Old Balinese. Since in the evolution of the Balinese language, the Balinese language in mountainous areas which occupies intermediary position between Old Balinese and Modern Balinese, the lack of speech level differentiation in mountainous Balinese seem to support the findings of Bagus (1979) and Bawa *et al.* (1985).

The occurrence of speech levels in Balinese develop gradually. The speech level phenomenon which exists in Modern Balinese now may have come about due to Javanese influence. Among the language in Indonesia, four have speech levels: Javanese, Sundanese, Madurese, and Balinese. The first three of these languages are used in the island of Java. But when the first speech levels first appeared in Java is also not certain.

Some scholars believe that speech levels may have existed in the Old Javanese before the fifteen century. According to Pigeaud, in the mid-fourteen century the Javanese kings were addressed in honorific language (1962, IV: 8). *The Suma Oriental* which was written by Tome Pires, who spent his time in Malacca and India between 1512-1515, seems to support the argument that speech levels in Java might have developed as early as AD 1500.

Clynes (1989: 122-124) also proposes that Javanese speech system was well developed in the earlier sixteen century and appeared in Bali after the fall of the Majapahit empire. However, most scholars are of the opinion that speech levels in Java were developed in the seventeenth or eighteenth century (Soebardi 1975: 56; Rickleft 1976: 468).

As to Balinese, Zurbuchen (1987: 18) gives the following diagram on the evolution of spoken Balinese.

Time	**Linguistic Base**		**Source of influence** (historical period)
AD 500	Old Balinese		
The first Old Balinese inscription (882 AD)		←	Sanskrit (pre-Javanization)
AD 1100	Sanskrit Balinese		
		←	OJ/ Kawi (pre-Majapahit)
AD 1400	Kawi-Balinese		
		←	Javanese (Majapahit & after)
(AD 1700/1800)	High Low		

Zurbuchen claims that the existence of Balinese speech levels may have been crucially influenced by the Javanese after the fall of Majapahit, at least in the late seventeenth century AD. She proposes that speech level in Bali may have occurred in the late seventeenth century or at the beginning of the eighteen century AD, and this seems possible because this is supported by the appearance of *Geguritan Linggapetak* dated in 1753 is in Modern Balinese, and based on my close reading on this text, it seems that speech level differentiation does occur in the text.

Lexical Sources for Modern Balinese Speech Levels

Political contact between Java and Bali had existed since the tenth century AD when the Balinese king, Dharmmodayana Warmadewa married a pricess from east Java, Gunapriya Dharmapatni and ruled Bali from AD 989-1011. This indicates that at that time a strong relationship between Java and Bali did exist. Borrowing in one form or another or in one direction or another may have occurred since that period. Data from the inscriptions prove that Old Balinese was used as a court language from AD 882 to AD 1050. After this period, Old Javanese appears to have become more dominant. It became the language of the court and administration and all associated inscriptions are in Old Javanese. However, although Old Javanese was a court language in Bali for a long period, this does not mean that Old Javanese is necessarily direct predecessor of Modern Balinese speech levels. All the three languages used in Balinese inscriptions, namely Old Balinese, Old Javanese, and Sanskrit have contributed vocabulary to both high and low speech levels in Modern Balinese. Sutjiati Beratha (1992: 259-260) states that there are no Old Balinese affixes borrowed from Sanskrit or Old Javanese.

Old Balinese Contribution

An analysis of Goris' Old Balinese word-list of 3067 shows that 20% of the items have no Modern Balinese equivalents. Of the remaining items, about 60% are neutral as to speech levels, 10% are high and 10% are low. Of the words used in Modern Balinese low i.e. about 87% are from Old Balinese, 11% from Old Javanese and 2% Sankrit, whereas according to my account, of the words used in high level, only about 56% belong to Old Balinese, 19% to Old Javanese and 25% to Sanskrit. Some of the words are illustrated below.

OB	**MB/high**	**MB/low**	**Meaning**
angan	*angan*	*keneh*	thought
banyu	*banyu*	*yeh*	water
bras	*beras*	*baas*	rice
gnar	*genah*	*tongos*	place
kmit	*kemit*	*jaga*	to guard

unggah	*unggah*	*penek*	to climb

OB	MB/low	MB/ high	Meaning
aba	*aba*	*bakta*	to bring
amah	*amah*	*ajeng*	to eat
bajah	*bayah*	*taur*	to pay
bli	*beli*	*tumbas*	to buy
idih	*idih*	*tunas*	to ask
lwas	luwas	lunga	to go
nyak	*nyak*	*kayun*	willing

Borrowing from Sanskrit

When languages are in contact with each other, borrowing inevitable occurs. Old Balinese borrows Sanskrit words, especially those which can be categorized as nouns: proper names, names of the gods, temples, offerings and lunar calendar. One reason for the borrowing is that Old Balinese lacked words for certain concepts and those words have already existed in Sanskrit. The occurrence of Sanskrit words in Old Balinese inscriptions suggests that the contact between Bali and India may have already existed since the ninth century CE or probably earlier (see also Ardika and Bellwood 1991). In the first Old Balinese inscription, that is 001 Sukawana AI dated 882 CE, there are about 29% Sanskrit words and 71% Old Balinese words, whereas in the last Old Balinese inscription reviewed here, that is Trunyan C dated 1049 CE, only 8% are Sanskrit words, 83% Old Balinese and 9% Old Javanese. The older the inscriptions, the more words appear to have been borrowed from Sanskrit. It seems that most of the Sanskrit borrowings still exist in Modern Balinese, the great majority of which recur in high levels. According to (Sutjiati Beratha 1992: 258) there are about 705 Sanskrit words, of which about 680, or more than 90% belong to the high vocabulary. Some of these words are illustrated below.

Sanskrit	MB/ high	MB/ low	Meaning
ambara	*ambara*	*langit*	sky
anugraha	*anugraha*	*pabaang*	grant
cihna	*cihna*	*ciri*	sign/ mark
pradnya	*pradnya*	*dueg*	intelligence
warsa	*warsa*	*tiban*	year
wastra	*wastra*	*kamen*	clothe

Sanskrit	MB/ low	MB/ high	Meaning
karana	*karana*	*mawinan*	because
marga	*marga*	*margi*	road
mula	*mula*	*tandur*	plant

It should be noted that Old Balinese corpus shows that there are not affixes borrowed from Sanskrit.

Borrowing from Old Javanese

As indicated above, Old Balinese also borrowed certain words from Old Javanese since at least from around the eleventh century AD, or probably even prior to this period. Thus, in the inscription Trunyan C dated 1050, it is found the following words which replace the Old Balinese words (including from Sanskrit) occurring in the earlier inscriptions.

	OJ	**OB**	**Meaning**
401 1b 1	*dum*	*bhagi*	‘divide’ [<Sanskrit]
401 Ob 1	*wetan*	*kangin*	‘the east’
401 Ob 2	*kidul*	*kalod*	‘the south’

On the other hand, in some Old Javanese inscriptions found in Bali, some Balinese vocabulary is always found. Some of these words are as follows.

303 2 4 *lngis*	‘oil’
305 3b 4 *tangkalik*	‘horse breeder’
305 2b 3 *psu*	‘go out’
602 3b 1 *wingkang*	‘boundary of a lake’

Although the evidence is limited, these words can be used as indications that borrowing in one form or another or in one direction or another has occurred.

According to Sutjiati Beratha (1992: 260), 360 Old Balinese words have Old Javanese cognates. Approximately, 9% of these words are used in high levels in Modern Balinese, 23% are used in low level and 68% neutral in Modern Balinese.

Old Balinese words which Old Javanese cognates used in high level in Modern Balinese includes:

OB, MB/ high	**OJ**	**MB/ low**	**Meaning**
ajeng	ajeng	amah	to eat
lali	lali	engsap	to forget
pendem	pendem	tanem	to bury
rabi	rabi	kurenan	wife/ husband
susu	susu	nyonyo	woman’s breasts
uning	uning	tawang	to know
hatur	atur	bang	to give

Old Balinese words which have Old Javanese cognates used in low level in Modern Balinese include:

OB, MB/ low	**OJ**	**MB/ high**	**Meaning**
alap	alap	ambil	to take
bapa	bapa	aji	father
diri, didi	diri	raga	oneself
jaja	jaja	sanganan	cake
kayu	kayu	taru	wood
kuren	kuren	rabi	wife/ husband
mata	mata	panyuryanan	eyes
rumah, umah	rumah, umah	puri	house

Speech Levels in Modern Balinese

Below, it is going to be discussed sociolinguistic variation and conflict and change in speech level selection in Modern Balinese.

Sociolinguistic variation in Modern Balinese

Modern Balinese is characterized by speech levels (*masor singgih basa*). It is interesting to note that every sentence which is said by Balinese contains speech levels indications. The speech levels in Modern Balinese are generally divided into: low level Balinese *Basa Bali Kepara (BBK)* and high level Balinese *Basa Bali Alus (BBA). Kepara* lexically means 'common' while *alus* means 'refines'. *BBK* is used between intimates and to those of lower status, while the *BBA* is used to address people whom one does not know well (non-intimate) or to whom one feels respect because of their status (cf. Bagus 1979; Clynes 1989). *BBA* is further divided into honorific *Basa Bali Alus Singgih (BBAS)* and deprecatory *Basa Bali Alus Sor (BBASo)*.

The difference between *BBAS* and *BBASo* is The *BBAS* is used to address people of higher status with whom one is not on familiar terms. It is normally used for honorific second, and third person reference, but never with the first person (Bagus 1979; Zurbuchen 1987; Sutjiati Beratha 1992). The *BBAS* is used to refer to any person's activities toward a highly respected person. It can also be used when the speaker (lower status than addressee) wants to refer to himself or the people of the same status or lower than himself.

An expression such as *titiang nunasang antuk singgih'* which means 'may I know your status' is normally used by the speaker to address people before starting a conversation if the speaker does not know the status of the addressee. The use of the right levels is very important although it is also realized that it is very complex. For example, if low level is used to address people oh high status, it is considered rude; on the other hand, if high level is used to address commoners (if the status of the people is obvious) it is said to be too polite. It is also considered in correct and sounds awkward.

In Modern Balinese, there are two dimensions of sociolinguistic variation, i.e. speech level and level of formality. These two dimensions interact in a complex way. In the discussion of “The Pronouns of Power and Solidarity”, Brown and Gilman (1972) have distinguished *power* and *solidarity* as separate sociolinguistic factors. Power is a relationship between at least two persons and it is non-reciprocal in the sense that both cannot have power in the same area of behavior. Solidarity is the general relationship and it is symmetrical (Brown and Gilman 1972: 258). Power may refer to people of higher status, while solidarity refers to the closeness of the relationship between speaker and addressee. These categories can be applied directly in the Balinese case. In this article it is proposed that Modern Balinese speech levels is determined by status and familiarity. In Modern Balinese, people of higher status will normally be addressed with BBA (high level forms), while lower status persons will be addressed with BBK (low level forms). This is to show that the issue is more complex. The high level language is an expression of reverence, while low level language expresses condescension or intimacy.

Status in Balinese is determined by caste, wealth, kinship and age, as well as occupation. In addition, familiarity (intimacy) refers to the relationship between the speaker and the addressee, whether they are close or not close is also used to determine the speech level. The reciprocal use of low level only occurs between people who are intimate although they may be different in status.

The following diagram will illustrate the typical speech level selections among two persons of differing status or familiarity.

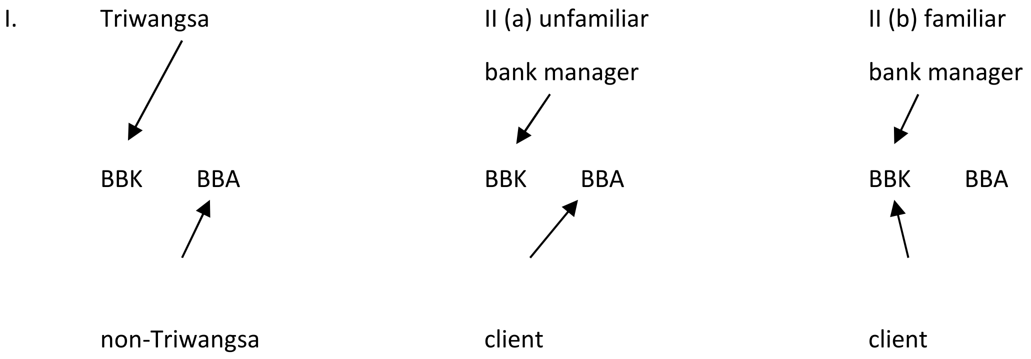
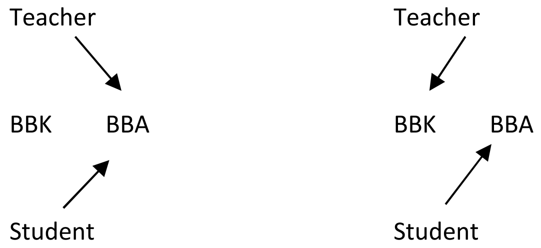


Diagram I shows that when the Triwangsa people talk to non-Triwangsa, the Triwangsa usually speak in BBK, and the non-Triwangsa will speak in BBA (either BBAS or BBASor). This rule outranks all others. For Diagram II, among non-Triwangsa, a bank manager and a client will use BBA to one another if they do not know each other well.

However, they may speak BBK reciprocally if they are very good friends.

III (a) formally   III (b) informally



A teacher of non-Triwangsa normally speak BBA or BBK to non-Triwangsa students outside school, but BBA is often used when the situation is formal. The student, however, will always answer in BBA.

IV (a) outside home   IV (b) at home

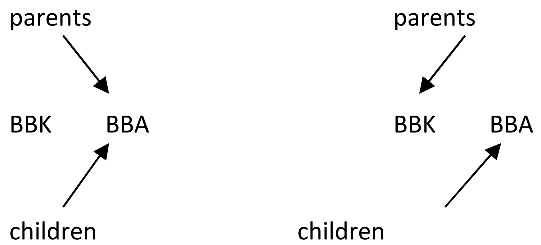


Diagram IV shows that parents of non-Triwangsa speak BBA when they are talking to their son/ daughter outside the house. However, they will use BBK at home. The son/ daughter will answer in BBA to the parents whether at home or outside the house.

V (a) not close friend   V (b) close friend

Friends of the same status (Triwangsa or non-Triwangsa will use BBK to one another if they are very close. However, if they are not intimate they will use BBA reciprocally.

On many occasions, level of formality can be a very complex matter. BBA and BBK can be used in a very formal situation, for instance, when someone proposes to a woman. In this occasion, BBA is used when a member of man's family talks to a woman's family, but if she wants to discuss something with his/her own family, BBK will be used.

Below, it will be presented a dialogue between Triwangsa (a priest) with a servant at Griya (in informal situation).

Priest	: *Aduh, guleme*		*tebel*	*pesan*	*di*	*langite*. (BBK)	
	wow cloud DEF		thick	very	PREP	sky DEF	
	'The cloud is very thick on the sky'.						
Servant	: *Patut Ratu,*	*punika*	*maka* ***cihna***		*jagi*	*sabeh.* (BBAS)	
	right majesty	DEM	as	sign	FUT	rain	
	'(That's) right majesty, that's the sign (it's) going to rain'.						
Priest	: *Kamenne*	*suba*	***ka-****duduk?* (BBK)				
	clothe DEF	PERF	PASS collect				
	'Have the clothes been collected (by you)?'						
Servant	: ***Wastrane***	*sampun*	***ka-****ambil*. (BBAS)				
	clothe DEF	PERF		PASS collect			
	'The clothes have been collected (by me)'.						

The dialogue above shows a Triwangsa man (i.e. a priest) speaks with non-Triwangsa (i.e. a servant) in informal situation because it takes place at Griya (a priest place). From this it can be understood that the priest uses BBK to the servant, and the servant always answers in BBA. The words, e.g *cihna* 'sign', and *wastra* 'clothes are Sanskrit words, and are always used in high level (BBA). In addition, the prefix *ka-* is used in high level occurring with the second person agent. However, *ka-* which is used in low level (BBK) has the second person agent occurs in the *ka-duduk* to collect'.

Conflict and Change in Speech Level Selection

There are also cases of raising and lowering of speech registers where someone may select a different speech register than that normally used. High level is used when the speaker wants to involve the prestige of the speaker. For instance, a woman normally uses BBK to address her uncle, but when a stranger is present, she will used BBA to indicate that he is respected by his family. On the other hand, lowering register is also often found in kinship relation between speaker and addressee. For instance, when a Triwangsa woman marries a non-Triwangsa man, before getting married the man would address the woman in BBA; but after the marriage they would use BBK.

Great changes that have taken place in Balinese society since the twentieth century have had an impact on then language, particularly on the speech levels. The change here is in the usage of levels especially in high level. Formally, words of high level were used to address members of Triwangsa people. But nowadays, it is very common in Bali non-Triwangsa of a high status use BBA among their family. This may indicate that educational achievement and wealth normally bring high social status. On the other hand, the Triwangsa people whom are normally addressed in high level (BBA) by non-Triwangsa are addressed in Indonesian. Indonesian is chosen to avoid the complex usage of speech levels, because Indonesian does not have lexical speech levels.

Changes in status also cause the change in speech levels. For instance, if non-Triwangsa woman married a Triwangsa man, before she was married her sister or brother would use BBK (low level) to address her; afterwards, as a wife of an aristocratic man, she would be addressed by her family in high level (BBA). This is presented by the following dialogue.

Nyoman : *Sampun tuni* *Jero rauh?* (BBA)

PERF long title arrive

'Have you been here for long?'

Jero Ratna : *Sing, iyang mara sajan,* *bapa kija?* (BBK)

No 1^{st} just INTEN father where

'No, I have just (arrived), where is father?'

Nyoman : *Ipun* *kantun* *nunas* (BBASor)

3^{rd} still eat

'He is still eating'.

The conversation between Jero Ratna and Nyoman shows that in Balinese, after a non-Triwangsa woman becomes a member of the Triwangsa family, she will be given the title *Jero* 'house of aristocrat' and her original given name is also changed into a name which is given by the Triwangsa family. As a member of the Triwangsa people, she will then be addressed in high level. The Old Javanese word, e.g. *bapa* 'father,' occurs in low level. This passage illustrates a further complication – the fact that status of discourse referent can affect speech level selection.

Conclusions

This paper discusses about the contribution of Sanskrit and Javanese to the Balinese language. The Old Balinese was influenced by other languages, such as Sanskrit and Old Javanese. Therefore, borrowing of lexical items from Sanskrit and Old Javanese has existed. From the Old Balinese inscriptions, it is understood that Sanskrit words occur in inscriptions dated AD 882. The appearance of Sanskrit words indicates contacts between India and Bali has existed in the ninth century AD or probably earlier. In the tenth century, Old Balinese was eventually replaced by Old Javanese as the language of inscriptions. The ninth and the tenth centuries were periods of strong Javanization of Bali. In relation to speech levels, Sanskrit words are used in high level (BBA) and Old Javanese words occur in high and low levels (BBA and BBK) in Modern Balinese.

Old Balinese appears not to have had speech levels, although this is still a problematic issue. The occurrence of Modern Balinese speech levels might have been influenced by Javanese. However, as mentioned before that Sanskrit words, and honorific forms which were used to address the kings, did occur in the Old Balinese inscriptions. This may suggest that some forms of speech levels might have existed since the ninth century or prior to this period.

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THE CONTINUITY OF AUSTRONESIAN TRADITION ON ISLAMIC AND EARLY COLONIAL PERIOD IN MALUKU

Wuri Handoko

Introduction

Evidences of Islamic cultural influences, adoption, and conversion of Maluku's natives seems to have rooted religion influences background which can be traced back to pre-historic religion system, originated from Austronesian language-user. In religion aspect, it was clear that animism and ancestor's worship have broadly disseminated and deep-rooted which can be sure comes from very ancient era (Newton & Barbier 1988; Bellwood 2000: 229). Some experts beliefs that the emerge of megalithicum tradition was an impact of Austronesioan groups migrations (Kaudern 1938:179; Geldern 1945: 148; Prasetyo Bagyo dkk 2004). The importance of ancestor's whorship which become the native's unique characteristic, migth be influenced by the dissemination of Austronesian peoples (see Bellwood 2000: 205-206). In many aspects, this society group were culturally closest to their Austronesian ancestors (Bellwood 2000: 190).

Andaya (2015) noted, that linguistic-historian had stated that from East-Indonesia, the Austronesian continuing their migration until they reach pacific islands by approximately 1500 BC. East-Indonesia continued to exiled from international trading route which was centered on Nusantara-Malaya region and only from around XV century, foreign trade regularly and intesively opening new trade-route. By that time, detailed record of Maluku written at the beginning of XVI century, in that era, Maluku had just converting their monarchy institution system in Europe and Islamic model. With that facts, it will be possible to detect some indigenous aspects of Maluku's culture. Up until the XVIII and XIX century, pacific communities relatively unaffected of foreign influence, except for a brief-layover spot of traders, stranded-sailor and rare European expedition. Native customes and rituals of pacific communities by that were stronger and documented far-better compared to any other similar cases of Indonesia. The bonds of Ancient-austronesian origins between pacific occupance and East-Indonesia, allows the emerge of similarities of certain traditions and customs, especially in study-cases of Maluku. Samples from Pacific Islands have proved-usefull to complete and deep interpretating of certain custom and attitudes of Maluku's peoples (Andaya 2005: xxiii-xxiv).

In Maluku, the possibilities is that living culture and religion seems more affected pre- and proto- historic era. In many cases, there was clues that Islamic and even Christianity aspects had conserving the older megalithicum tradition which broadly disseminated in Austronesian world. The characteristic of Maluku's people tradition for ancestor-worships, apparently was influenced from Austronesian religion.

Austronesian Diasporas: The Influence on Islamic Conversion Practice

Most popular theory about the origin of Austronesian's culture diaspore is the "*Out of Taiwan"* theory, which stated that the origin of Austronesian comes from Taiwan. This theory firstly stated by Robert Blust based on studies of Austronesian Language clusters. By that, Blust simply conclude that the origin of Austronesian language users was from Taiwan (Blust 1984-85, 1995 in Noerwidi, 2003: 9-10). Blust's theory was supported by archaeologist, Peter Bellwood. Both have agreed about Austronesian migration phases, as follows: *first*; pre-historic farmer migration from China to Taiwan (5000-4000 BC), which not yet speak in Austronesian language. After long setlement, they begun to develop Austronesian Language. *Second*; migration from Taiwan to Philipine (4000-3000 BC), by that period they developing a language called Proto-Malayo-Polinesia. *Third*; migration from Philipine more to South and South-East area (3500 BC – before 2000 BC), to Kalimantan, Sulawesi and North-Maluku. *Fourth;* migration from Maluku to East and South (3000 or 2000 BC), reaching as far of Nusa Tenggara and North-Coast of West-Papua. By that time the Austronesian have occupied Kalimantan, parts of them migrating to Jawa and Sumatra. *Fifth*; migration from Papua to more western area (2500 BC) and Eastern area (2000 or 1500 BC) to Oceania. Austronesian from Jawa and Sumatra migrating to Malaysian-peninsula and Vietnam, which takes period around 500 BC, in near period parts of Austronesian from Kalimantan was also sailing as far as Madagascar (Tanudirdjo & Bagyo Prasetyo 2004: 82-84).

The strong influence of Austronesia in religion aspect, bring a strong impact which strengthen the local tradition survival. In this context, the entrance of Islamic culture, not altering the Austronesian Religion tradition which have deep-rooted. Understanding of the message of Islam could comelater. This pattern has led many authors to see conversion as an inappropirate term for the first steps toward Islamic faith. Pig-eating was a major obstacle to conversion in all the cases for which there is first-hand evidence (de Houtman 1601: 99; Reid 1995). A Moslem source at Hikayat Patani also made the point about the first patani ruler adopth Islam "he gave up worshipping idol and eating pork but a part from that he did not alter a single one of his Kafir habits (Reid 1995).

In Maluku region, same case was emerge at the Kampung Tua Kao site, North-halmahera. According to local spoken-tradition, in times, Islamic messenger from Baghdad (*Buqudad*-local term) named *Syekh Manyur*, in early phases, a local princess as a term asking the Syekh to eat-pork meat, if he wish to marry her and convert the local into Islam. That term was fulfilled (Handoko et al. 2014; Handoko et al in preparation). In Banda, settlement pattern shows the differences of religion-orientation in certain time-lapse, based by founding of swine-bones in several archaelogical excavation boxes (look for Lape 2000).

Later development shows that the entrance of religion influence, mostly Islam, not altering the affect of older traditional-religion. The deep-rooted of traditional-religion which brought by Austronesian-Speaker comes from a long process of the tradition. Reid (1995), for example, stating that when ancestors of the Polunesian struck out to the east of Indonesian Archipelago, they sailed off the edge of unknown world. For more than a thousand years before eighteenth century exploration of the Pacific, the Austronesian who remained in Southeast Asia were significant players in a series of interlocking trade-networks which stretched from eastern Indonesia to China and Japan in the North and to Portugal and Ireland in the West. We know this is not much from ambiguous geogtgraphical information of Ptolemy and his Chinese contemporaries as from the arrival of the products of eastern Indonesia in the markets of the world (Reid 1995). Maluku Islamic archaelogy shows the possibility of Polynesian early influence, which can also be studied from Ternate's sultan tombs and relatives, which according to Ambary (1998: 73), looks more ornamented, on it's tombstone and tomb, in fact, several places shows more developed ornament and spreaded to other areas. Ternate's tombstone, are rich of floral motives which is unique and termed as Polynesian Motives.

In other side, Austronesia Diaspore, bring the top-development of Southeast Asia civilization into more dynamic culture. In the development of relogional-influence context, can be shown, in worshiping highland as a sacred places, ancestor worship, secondary burial in vases or Sarcophage and belief of binary myth, contrast between mountain-sea, darkness-light, upper-lower, man-woman, winged-creatures, aquatic-creature and so on (Hall 1988: 9).

Clear fact that first region of Southeast Asia archipleago, which converted into Islam, was early traders of coastal area, proved that Islam is an interesting religion-system that fit to increase the trader quantity of Southeast Asia. Meanwhile, worshiping spirit, Islamic symbols are universally accepted and easy to adopt by trader's mobility (Reid 2011; Reid 1993: 151-159; Lape 2000, 2005). Insoll (1996) stated that it had an interesting side for agrocultural communities (farmer) which settled and still have their local beliefs of animism, beside the interest on mystical and ritual power (Insoll 1996: 90-92; Lape 2000).

Reid (1995) said the discontinuity represented by Islam in that period of rapid change was most obvious to outsiders in matters that bore on identity. There were, however, two areas in which Islam (and in different degrees, Christianity) represented an even more fundamental challenge to Austronesian values. Reid also said that Austronesian religion had understood the cosmos in terms of dualities in which both male and female elements were essential. Women had crucial ritual and religious roles, especially in mediating between humans and spirit. Islam and Catholic Christianity by contrast were carried by male religious specialist ministering to a deity identified as male. Spritually talented and ritually experienced women could not find a place in the new religion to match that which they had played in the old (Reid 1995: 337-338).

By that term, we can conclude that the effect of Austronesian-religio was disseminated and developed into living and permanent beliefs of local communitied. Local beliefs which mostly called as animism, in fact, cannot be annihilated completely. In this context, what happen was the contrary, the entrance of Islam was made easier by its compromised and accomodative nature to local-beliefs which was originated long before Islam came.

Austronesian Tradition and the development of Islamic Syncretism of Maluku

In Maluku region, the influence of pre-Islamic culture and religion probably closer to pre-historic and proto-historic culture. The presence of Islamic religion aspects clues which conserving the older megalithicum tradition and widely practiced in Austronesian world, probably affecting the emerge of Islamic syncretism practice in Maluku. This was, might be, the reason of why Maluku people converting Islam or Christianity, which in fact, assimilated with animism beliefs practice which developed back to the megalithicum period (Handoko 2012a).

Another convincing explanation is, the Islamic variant that developed in Indonesia was Islamic Sufism. This variant was more to regulate mental-forms instead of attitudes. The main purpose was soul transformation; freeing selves from lust and mortal-needs which blocking humanity to reach the form of an image of Allah and also, in time, united with Allah (Woodward 1999: 6). This sufistic Islam which brougth to Indonesian Archipleago were more accomodative in nature, syncretic with pre-Islamic local spiritual tradition and beliefs. Syncretic Islamic culture was an image of a *Genre* of religion which was more permissive to local culture element (Sutiyono 2010: 5). Islam was more open and compromised with local beliefs and spiritual tradition (Abdullah 2002). By that, the Islamic conversion practice of local people, was generally practicing Islamic doctrine, however, keeping local beliefs system alive (syncretic). According to Uneputty, before the main religions came such as Islam and Christianity, Maluku's Archipelago people, especialy Center-Maluku, was lived in a traditional beliefs concept with animism characteristic. The core of religion in Maluku was in ancestor-worship concept. The local perspective of Divine position and roles along with the position and roles of their ancestors-spirit in their daily life was also portrayed in their idioms of First and Second Gods, the "*Tete Nenek Moyang*" (Ancestors). It can be seen on their every custom rituals, first opened with pray and continued with customs ceremony. Besides, each substances in every rituals such as Promises, Bonds, Curses, Law and such, was also in this frame. Not only seen by guesses but also by their ancestor's spirit (Uneputty 1996). By that, it can be concluded that there was no contrary between local customs and religions, between ancestors spirit with God. Bothbeliefs was living in harmony within local socio-culture life (Suryanto 1998).

The essence of Maluku's people beliefs system, called as *Agama Nunusaku* (Bartels 1977: 316), was pre-Islamic and pre-Christian beliefs system based on ancestor-worship. After the conversion of Islam or Christian, both religion supportive still continuing most of their customs according to their local beliefs which was based on mystical beliefs of their ancestor in the past. In Islamic religion, however, these mystical beliefs was also linked with Islamic Sufism system (Handoko 2012b; Handoko 2013).

Ethnographic study by Bartels (2003) in Haruku Island, portraing that "the day before preparations are made and the whole village is cleansed. Each clan performs their own celebration in their *Rumah Pusaka*, as Moslem calls as *The Rumah Tua*—the original ancestral home of the clan. Members of all four generations of the clan united and continuity is symbolized by the bringing of food and of money by the grand-and great grandchildren. The ancestors are also called to attend and the families of clans related by marriage are also invited. This annual reunion of the whole extended family is to strengthen family ties, which is further symbolically expressed by all women going tgether to the river to wash rice. Every clan also brougth their own aloes wood incense, each having a distinct smell. The mixing of the scents also symbolizes unity while also being offering to the ancestors (Bartels 2003).

In Pelaw Village, Haruku Island, center-Maluku, other syncretic Islamic traditions that living still is the Death-ceremony by 7, 40, 100 and 1000 days after passed. Post-100 days, there is a tradition to moving the corpses "magically" according to their beliefs, based on their certain socio-stratum from soa or clan of Pelaw village. Tombs, which already in cemeteries, in day 100th, the corpses are believed to magically move to village, for certain clan, of higher stratum, were buried within mosque area (Handoko 2012b).

Austronesians adopted with particular enthusiasm the widepsread Moslem practice of returning at the third, seventh, fortieth and hudredth days after the burial, to feast at the grave (Martin 1604: 49; Gervaise 1701: 140-147; Raffles 1817 I: 327; Ali Haji 1866: 76 in Reid, 1995: 341). Arabic terms and prayers were adopted quickly even for purposes which had been closely associated with the spirits. Do'a became the standard term for an invocation or a blessing to ward off evil (Houtman 1603: 107, 165). Roh (plural of arwah or spirit) was accepted as a Moslem Equivalent of the Austronesians concept of *semangat* (soul-substance or spirit-Endicott 1970: 28-51), while potent graves were referred to Arabic words which reinterpreted their power in Islamic terms-Keramat (Sacred [grave]), berkat (spiritual power), and *Ziarah* (pilgrimagen-Houtman 1603: 250 in Reid 1995: 341).

Burial preparation, purification or sacred rituals, was the prove of the development of Sufism which creating the tradition of sacred-pilgrimmage. Henri Chambert Loir and

Claude Guillot (2010), stating that the successful practice of Sufism *tariqat*, after the emerge of syekh(s) emerging the worship of passed-Wali, which can be seen as pilgrimage phenomenon. As they said, when facing their *Wali*, the people seems to forgot their Islamic rituals in the mosques and found their older form of rites, the most odd of sacred approach. This condition still live as long as no political or religious power obstacles. The *Wali's* tombs is a place to reveal their free religious feeling and also a place to conserving old fashion rites.

In archaeological perspective, ancient mosque data of Haruku island of Pelaw village, Rohomoni and Kabaw have unique characteristic which only have one gate, that portrayed the sacrecity of a mother or woman. In symbolyc and philosophic conception of Pelaw, Rohomoni and Kabaw villages, a mother or a woman is a sacred figure, through them human born. This sacrecity of mother was symbolized by the birth of human through "Sacred gate" of a mother, which, in term, human born and will developed, begun with their entrance to the world from this "sacred gate" of mother (Handoko 2012b; Handoko 2013). Bartels (2003), stating that "since mosque is considered to symbolize Mother Earth, the single door represent the entrance to her womb into which people enter as a sperm and leave as human beings. Since the mosque stand for male-female union, divorce cannot peformed there. If someone would dare to do so, he would be punished not by Allah but bby the ancestor spirit. Two ancestor also guard the mosque at all times against devils and evil spirits.

Figure 1. Tiang Alif, as a symbol of ma'rifat and a symbol of men (phallus) in the mosques on the Island Haruku

Another data shown regarding the comprehension of *Tiang Alif*, as symbol of *Ma'rifat* and also a symbol of Man. This fact reminding us about the symbol of *Phallus* in the religious concept of megalithicum (Handoko 2013). Haris Sukendar (1981) stated that, *phallus symbol* (manhood) was a tradition which emerge from thousands of years, when megalithicum tradition still vastly practiced (Sukendar 1981: 85). By that statement, the symbol of *Tiang Alif*, in ancient mosque architectures, was a prove of the continuity of pre-historic culture within the concept of Islam of local people, including in Maluku which have a thick customs and traditions of ancestral-worshipment.

The accomodation between architectural pre-Islamic tradition with Islam were clealry visible in several mosques which in parts or as a whole, built from the remaining of Pre-Islamic culture (Wuisman JJ 2009). In fact, according to Hoop (1932) as quoted by Tjandrasasmitha (2009), the form of multi-layered building as shown in most of old mosque's rooftop in Indonesia, can be trace further back, to the multi-layer built of megalithicum of pre-historic period of Indonesia, which can be found all over (Hoop 1932 in Tjandrasasmita 2009: 240).

Besides, other data, especially in Rohomoni Mosque, shown the locating of tombs is associated with *dolmen* or *Batu meja*, which local people calls as *Haturesi*. In a glance, its only seen as natural small pile of stones, with a large square-stone in the midle, disguised dolmen. Elders, before entering the mosque, will stand encircling the *Haturesi* to enchanting pray and burning aloe wood essence which will be put on the top of the pile (Handoko 2012a).

Figure 2. Dolmen (Batu meja), which local people calls as Haturesi in Rohomoni Village, Haruku

At Wahai, a *stone adze* —a neolithicum handstool, were found and kept as a charm which believed to have a magical power. This ritual were performed by using a black sheet of fabric which can be weared as belt. Pak Ahmad, A qur'an teacher in Wahai, the one who kept the *charm* (*zimat)* belive that this neolithicum pickaxe have some kind of magical power, which can bring power or supranatural-power to the wearer. this custom were also found in Saparua island, where a

Figure 3. *Zimat* in form a stone adze, which is owned Mr. Ahmad, a teacher of Qur'an (*guru ngaji*) in Wahai, Central Maluku

Stone adze considered as a charm which was passed down by their ancestors. *Stone adze* as charm, as belief, was in hope for supranatural-power, which in turn, can mediate the living with their ancestors.

Megalithicum Traditions on Traditional Fortification Sites

Based by several studies, old villages or old countries of Ambon and Lease island, or in Seram Island, mostly located on a hilltop which hard to reach, these old settlement were located far behind of where they live nowadays. This statement was corresponding with Spriggs report (Mathew Spriggs 1990: 47-60), where, on the hilltop, of old settlement, the local communities building a stone-table as a medium of ceremonial practice according to their local beliefs. These beliefs, in fack, was rooted to their beliefs of ancestral spirits. Archaelogist, had described, that the dolmen, was an artifact which produced by megalithicum era which continued be used as ceremonial medium and functioned as long as the tradition still living. Heine Geldern, described that this tradition was living in a quite longer time period due to its existences which started back at neolithicum periode around 4500 BC. through time until it reach the present (Geldern 1945).

Studies on old settlement, which also a sites of traditional fortification were located on a hilltop, will mostly found dolmens, which sometimes associated with Islamic grave or tombs. These sites such as *Situs Negeri lama Elhau* of Siri Sori Islam, *Kapahaha Site* and *Wawani Site* as a traditional fortification site of Islamic era of Hitu Islamic Kingdom, *Amaiha Site* of *Negeri Iha*, where also had dolmen as findings, shows that there was an artifact from their ancestors used as ritual medium. The placement of *stonetable* in the center of settlement shows that this material culture was the main element of which building the characteristic of settlement pattern (Mansyur 2016). In the context of megalithicum cultural trace, Peter Bellwood (2000), using Nias people of Sumatra as a comparison, explain that the main thrust of the creation of megalithicum building was from culture with Austronesian characteristic, which strongly linked with social stratum that passed by generations from the ancestors. These megalithicum structures in many forms was created to strengthen a leader status, in living and in dead (Bellwood 2000). It can clearly seen at *Bukit Maiha* site where the name of *Batu-Meja* (stonetable) were linked with certain family name which have *Raja* (king or village head) as their status. Historical sources defined that the family or clan of *Latusopacualatu* was the clan of *Raja* when *Iha* conquest happen in the 17 century (Hitipieuw 1984). Nowadays, the clan name of *Sopacua* and *Iha* (corresponded with the two *Batu Meja* in the hilltop of Amaiha) have a high social status within *Negeri Ihamahu*, where it is said that the *Sopacua* act as the *Tua Negeri/Opu* (ritual or customs implementer) and the *Pati Iha* as the *Raja* (government) (Mansyur 2016).

Meanwhile, *Batu Meja* located in *Wawani* hilltop was acted as sacred marker of *Kaitetu* people, part of Hitu Kingdom in the past. This marker clearly used as medium of gathering to discuss the new settlement building in coastal area. In local past perspective, the decision to moved the village to new location must be negotiated in a sacred place. This rites were performed with hope that any decision made was the best decision and blessed by the ancestors. The location of the negotiation was also placed in a sacred place with hope that the people whose in the gathering will keep their decision that had been made. With that, the decision will have a legitimation from their ancestral (Mansyur 2016: 16).

For Maluku people, *batu meja* is a common tool or medium of rites, because most of villages of Maluku, such in Seram Island, Ambon Island, and Lease islands (Saparua, Nusa Laut and Haruku), Buru Island and southeast Maluku archipelago, knew the *Batu Meja*. By that fact, it will be true to say that the culture and religion of Maluku people's ancestor was identified as *Batu Meja culture*. Off all sites, most of these *Batu Meja* still functioned as ritual medium in present (Handoko 2009; Handoko and Salhuteru 2015).

Above archaelogical data shows that the tradition of dolmen in megalithic period was disseminated by Austronesian language user, and seems to survived until the first period of colonial era. Old settlement which also acted as Fortification of local people to fight the Portuguese and Dutch, provide evidence that the Austronesian tradition continued to survive as a medium to presenting power which beliefs can be achieved from ancestors as their roles of settlement guardians.

Conclusion

The effect of Austronesian Diaspore influence, which take places in the long process through far-journey, seems to left traces of valid evidences in form of archaeological data or ethnographical data, that these traditions continued to survived and practiced. In religion aspect, Austronesian tradition was also affecting the emerge of local strong beliefs and traditions. These Austronesian tradition, by local perspectives were developed and seen as ancestral traditions.

In the Islamic conversion practice, thes strong effect of Austronesian religion, within many aspects was differ to Islammic doctrine. However, in the long term, the period of great Islamic conversion, Islam developing compromised and accomodative nature, this was happen due to the deeply rooted of Austronesian culture with all its beliefs and local tradition system, which in the late development known as *customs* or *Adat*. What comes next was, Islamic presence was easly accepted due to its accomodative nature to earlier local ancestral worshipment.

The strong beliefs of local rituals, a religion passed by generations is the characteristic of Maluku culture. The entrance of Islam, by that, cannot altering this strong bonds. In the contrary, Islam was seen to be compromised and accomodative to these local beliefs. Both was viewed as the main factor of the vast development of Islamic syncrecity of Maluku. Etno and archaeological data of Moslem community, given that proof, also in early colonial period, it seems to survived, with dolmens findings in the old settlement sites of Moslem or Christian communities, which also act as traditional defensive system which commonly located in hilltop.

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GUA HARIMAU: RESEARCH PROGRESS

VERIFYING AUSTRONESIAN HYPOTHESIS FROM THE SKELETAL HUMAN REMAINS FROM GUA HARIMAU SITE IN SUMATERA

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Introduction

As generally well-known, Austronesian language speakers, based in Island Southeast Asia (ISEA) widely colonized the islands of the Indian Ocean and Oceania from Madagascar in the west to Easter Island in the east. A hypothesis on the origin of Austronesian languages and the process of their dispersal was initially proposed by linguists and has had an impact on the prehistoric archaeology of these regions. The overall dispersal of Austronesian speakers has been reconstructed by Blust (11996) and Bellwood (1997). Bellwood has attempted to verify this hypothesis on the homeland of Austronesian languages through archaeological findings in various chronological stages between 5,000 and 1,000 years ago (Bellwood 1997, 2004, 2005; Bellwood and Dizon 2005, 2008). His studies emphasize that the remote ancestors of Austronesian speakers originated in Southern China, and migrated to Taiwan associating with rice farming technology probably by 5,000 BC. His excavation work in Batan Islands locating between Taiwan and Luzon Island, found possible evidence for the initial dispersal out of Taiwan into the Philippines during Neolithic period (c. 4,500 BP) (Bellwood and Dizon 2005, 2008). A large number of prehistoric sites, discovered in Insular Southeast Asia, including Malaysia, Indonesia, Philippines, and Taiwan, from which we yielded a large number of antiquities, have proved that the Austronesian speakers further dispersed to the rest islands of Southeast Asia and the Pacific through Neolithic and later Metal age period, led researchers reconstructing the “Out of Taiwan” model (eg. Bellwood and Hung 2013).

On the one hand, for the same purpose, a large numbers of human remains have been exposed from prehistoric sites, despite importantly wealth to verify the model, quite few studies have challenged to address the issue of Austronesian migration, because of lack of well-preserved skeletons for the anthropological study. For instance, hereto the Niah Cave, well known as the very early Homo sapiens called ‘Deep skull’, produced the largest Neolithic mortuary site in Island Southeast Asia, from which more than a hundred skeletal individuals were unearthed (Harrison, 1967, 1975). Unfortunately, very poor condition in particular of cranial remains almost skeletons have hampered morphological analysis to challenge the hypothesis.

Though until the last century prehistoric human remains from region of Austronesian settlements was very limited like this case, the skeletal approach for addressing Austronesian hypothesis becomes possible with increased new discoveries of inhumation cemetery sites with better quantity and quality. The most representative is the cave site of Gua Harimau in southeastern Sumatra, which has been excavated by the research team conducted by Truman Simanjuntak since 2012. The excavation exposed several dozen skeletal individuals from the burials, dated in range from pre-Neolithic to Iron Age, which will be utilizable for comprehensive study including both the morphological and the DNA tests. Today the Gua Harimau series are the best samples in an argument of Austronesian hypothesis with the analysis using human skeletal remains.

This paper will address origin of this prehistoric hypothetical Austronesian speakers using human remains from the Gua Harimau site in Sumatra and for comparisons major pertinent archaeological skeletal materials. Those cranial affinities demonstrated will figure prominently in elucidating the population lineages of early and recent Southeast Asians, resolving aforementioned issue of genetic exchange by migratory processes along with prehistoric farming and language dispersals that have disputed in the “Out of Taiwan” theory.

Brief Description of Gua Harimau and the Materials

Gua Harimau in Sumatra

The cave site of Gua Harimau is located in Padang Bindu, Oku district at southeastern Sumatra in Indonesia. The cave, which formed several tens of meters above the present alluvial plain, opens towards the southeast. The width of the main entrance is about 30m and average horizontal depth is about 15m. Since 2012, the research team conducted by Truman Simanjuntak have widely excavated the floor of cave chamber and resulted in the discovery of 78 inhumation burials ranging from the pre-Neolithic to Iron Age (Figure 1). These skeletal remains, fortunately, are in good status of preservations, and were accurately dated using bone tissues. Current radiocarbon analysis at BATAN (Badan Tenaga N uklir Nasional) dates these unearthed human remains in range from c. 4,500 years BP to c.1,800 years BP (for instance, Burial 74 = c.4,500BP; tooth from Buri,al 53 = c.2,600years BP; Buiral 2, 4, 8, 13, 27, 56 = 2,196-1,786 years BP), in consistency with the periods from Paleolithic, through Neolithic, to early Metal Age. However, in the stratigraphic sequence, there is a difficulty encountered in differentiating Neolithic and Paleometallic burials, because the burial layer does not show clear distinction, except for gradual change of sand percentage, which steadily increased and the colour is increasingly lighter towards the upper layer. This condition suggests a continuity of cave occupation without any chronological interval, which is also supported by artefact and ecofact distribution that continues across the margin of both cultural layers. The Palaeometalic layer as a matter of course contains metal (bronze or iron) objects. The Neolithic burials were assigned by the potteries with paddle impress and incision techniques in various motifs. It is important to find corded-mark among the impressed motifs, indicating the most remarkable sign of the early Neolithic occupation. The Palaeolithic layer consists of flake tools made of various kinds of rock including obsidian, from which the evidence of the earliest occupation was given by charcoal sample dated to 15,949 ± 428 BP (BTN 12020) (Simanjuntak et al., in press). Unfortunately any human remain has been not detected from this earliest layer.

Although the Gua Harimau excavation project has been still under processing, considerable numbers of crania, which are utilizable for statistical craniometrics analysis, were already reconstructed by the excavation team. For the current morphometric analysis, adult male cranial series from this site were used to address the origin of this cave dwellers. As the cranial materials are from layers strategically wide range of date, the population sample were divided into two groups (Figure 2);

Figure 1. The cave site of Gua Harimau (left), Paleometal Age extend burial 19 and 20 (center),

Figure 2. The representative skulls from Gua Harimau (pre-Neolithic Individual 74and Paleometal Age Individual 48)

<u>Early Gua Harimau:</u>

This group includes the Individual 53 (unknown posture c.2700BP) Individual 74(flexed position 4,500BP), and Individual 79 (flexed position, unknown date but strategically older than Individual 74).

<u>Later Gua Harimau:</u>

This group consists of the individuals buried at extended posture belonging to Paleometal Culture dated from c.1780-1950BP (Individual 12 Individual 19 Individual 20 Individual 23(c.1840BP), Individual 48 Individual 59 Individual 60).

Other Comparative Population Samples

For comparison with the Gua Harimau samples, we use well-preserved crania of male individuals from a total of seventy-four prehistoric and historic/modern samples from Northeast and Southeast Asia, and Oceania. The dataset includes samples from the late Pleistocene, early to mid-Holocene, Neolithic (defined as farming populations, see discussion in Oxenham and Matsumura, 2011), Bronze and Iron Age through to proto-Historic, Historic and modern samples. Space precludes a review of each sample in the dataset, however, the references in Table 1 provides details on the majority of samples used here.

The historic/modern samples are from a wider area of eastern Asia including India and the Siberia, as well as near Oceania (Australia and New Guinea). The mean values of cranio- metric data of each population sample are used for the statistical analyses. A part of comparative data from the modern samples are cited from the else papers (Ishida 1990,1996, 1997, Hanihara 1993, 2000, Howells 1989).

Methods of Cranio-Metric Analysis

The cranial data set selected included a subset of 16 measurements (Martin's method number: M1, M8, 9, M17, M43 (1), M43c, M45, M46b, M46c, M48, M51, M52, M54, M55, M57, M57a), as these were the most commonly available measurements among the comparative samples. The cranio-metric affinities of the comparative samples are assessed using Q-mode correlation coefficients (Sneath and Sokal 1973), on the basis of above 16 cranial measurements. The comparative archaeological cranial series are listed in Table, a total of 83 population (partially individual) samples, including both archaeological and modern specimens from East/SEA and the Pacific. To aid interpretation of any phenotypic affinities between the samples, Neighbor Net Split tree diagrams were generated using the software package "Splits Tree Version 4.0" provided by Huson and Bryant (2006), applied to the distance (1-r) matrix of Q-mode correlation coefficients (r).

Table 1. Comparative population samples for cranial data analysis.

Sample	Locality	Period	Remarks
★ **Pleistocene and early Holocene *Samples***			
Liujinag	China	Late Pleistocene	Individual, Site in Guangxi Prov.
Dalongtan	China	Early Holocene (c. 8,000 BP)	Site in Guangxi Prov.
Zengpiyan	China	Early Holocene (c. 8,000 BP)	Site in Guangxi Prov. (IACAS et al., 2003.)
Qihee	China	Early Holocene (c. 9,500 BP)	Site in Fujian Prov.
Lang Gao	Vietnam	Hoabinhian	Averages of two individuals (nos. 17 and 19), Site in Hoa Binh Prov (Nguyen, 2007)
Lang Bon	Vietnam	Hoabinhian (c. 7,000 BP)	Individual, Site in Thanh Hoa Prov. (Nguyen, 2007)
Mai Da Dieu	Vietnam	Hoabinhian (c. 7,000 BP)	Individual, Site in Thanh Hoa Prov. (Nguyen, 2007)
Mai Da Nuoc	Vietnam	Hoabinhian (c. 8,000 BP)	Individual, in Thanh Hoa Prov. (Nguyen, 1986, 2007)
Hoabinhian (average)	Vietnam	Hoabinhian (c.1,1000-8,000 BP)	6 specimens including fragmental remains from above 4 sites and 1 from Mai Da Dieu site in Thanh Hoa Prov. (Nguyen, 2007)
Bac Son	Vietnam	Early Holocene (c. 8,000-7,000 BP)	Sites of Pho Binh Gia, Cua Gi, Lang Cuom, and Dong Thuoc in Lan Son Prov. (Mansuy and Colani, 1925)
Con Co Ngua	Vietnam	Da But Culture (c. 6,000 BP)	Site in Thanh Hoa Prov.
Gua Cha	Malaysia	Hoabinhian (c.8,000-6,000 BP)	Individual No. H12, Site in Kelantan Prov. (Sieveking, 1954)
Early Gua Harimau	Indonesia	Iron Age (c. 700 BC-AD200)	Site in Sumatra Island (the excavater Truman Simanjuntak)
◆ ***Neolithic Samples***			
Man Bac	Vietnam	Late Neolithic (c. 3,800-3,500 BP)	Site in Ninh Binh Prov. (Ngueyn, 2001; 20Oxenham et al., 2011)
An Son	Vietnam	Late Neolithic (c.3,800 BP)	Site in Long An Prov. (Nishimura and Dung, 2002; Nguyen, 2006; Bellwood et al., 2013)
Ban Chiang	Thailand	Neolithic-Bronze Age (c. 4,100-2,300 BP)	Site in Udon Thani Prov. (Gorman and Charoenwongsa, 1976; Pietrusewsky and Douglas, 2002)
Non Nok Tha	Thailand	Neolithic-Bronze Age (c. 3,500-2,500 BP)	Site in Khon Kaen Prov. (Bayard, 1971)
Khok Phanom Di	Thailand	Late Neolithic (c. 3,800-3,500 BP)	Site in Chonburi province (Higham and Thosarat, 1993;
Weidun	China	Neolithic (c.7,000-5,000 BP, Majiabang Culture)	Sites in Jiangsu Prov. Central China
Jomon	Japan	Neolithic (c. 5,000-2,300 BP)	Over almost the entire Japanese archipelago
Jiahu	China	Neolithic (c. 9,000 BP)	Site in Henan Prov. (HPIAC, 1989, 1998)
Xipo	China	Neolithic (c. 5,300 BP, Yangshao Culture)	Site in Henan Prov. (IACAS and HPIAC, 2010)
Gaomiao	China		He 2006a,b
Baligan	China	Neolithic (c. 6,000-5,000 BP, Yangshao Culture)	Site in Henan Prov. (ATPU, 1989; Zhan and Hung, 2008)
Xitong	China	Neolithic (c. 5,000-4,000 BP)	Site in Fujian Prov.
Tanshinshan	China	Neolithic (c. 5,000-4,000 BP)	Site in Fujian Prov.
● ***Bronze - Iron Age Samples***			
Anyang	China	Yin (Shan) Period (c. 1,500-1,027 BC)	Site in Henan Prov. (IHIA and CASS, 1982)
Ban Non Wat	Thailand	Bronze-Iron Age (c. 3,100-1,400 BP)	Site in Nakhon Ratchasima Prov. Higham and Kijngam, 2009, 2010, 2012a, 2012b
Noen U Loke	Thailand	Bronze-Iron Age (c. 3,100-1,400 BP)	Site in Nakhon Ratchasima Prov. Higham Kijngam and Talbot 2008
Giong Ca Vo	Vietnam	Iron Age (c. 300-0 BC)	Site in Ho Chi Minh City (Dang and Vu, 1997; Dang et al., 1998)
Rach Rung	Vietnam	Bronze Age (c. 2,800 BP)	Site in Moc Hoa District, Long An Prov (The and Cong, 2001)
Hoa Diem	Vietnam	Iron Age (Hoa Diem 2=c. 150 BC; Hoa Diem 1 =c. AD 100-300)	Site of Hoa Diem in Khanh Hoa Prov. (Yamagata et al., 2013)
Late Gua Harimau	Indonesia	Iron Age (c. 700 BC-AD200)	Site in Sumatra Island (the excavater Truman Simanjuntak)
Yayoi	Japan	Yayoi Period (c. 800 BC - AD 300)	Sites of Doigahama, Nakanohama, Kanenokuma and others in Northern Kyushu and Yamaguchi Districts, W Japan
Jiangnan	China	Eastern Zhou - Former Han Periods (770 BC-AD 8)	Sites in Jiangnan Province along Lower Basin of Yangtze Rive (Nakahashi and Li, 2002)
Jundushan	China	Spring and Autumn Period (c. 500 BC)	Site in Yanqing Prefecture near Beijing (BCRI, 2007)

Results

Figures 3 presents the results of the Net Split analysis, applied to the distances of the Q-mode correlation coefficients based on 16 cranial measurements. Essentially, this unrooted network tree exhibits a straightforward dichotomization of the comparative group set into into two major clusters: (1) Northeast and East Asians, and several sets of Southeast Asians ranging from Neolithic to modern times, occupy the upper left of the tree. The present-day Southeast Asians are scattered adjacent to this cluster. (2) Australo–Melanesians,Veda of Sri Lanka, Nicobarese and early Holocene Southeast Asians, including Hoabinhian and Mesolithic, morphologically far distant from Northeast and East Asians form another major separate tree cluster on the lower right side.

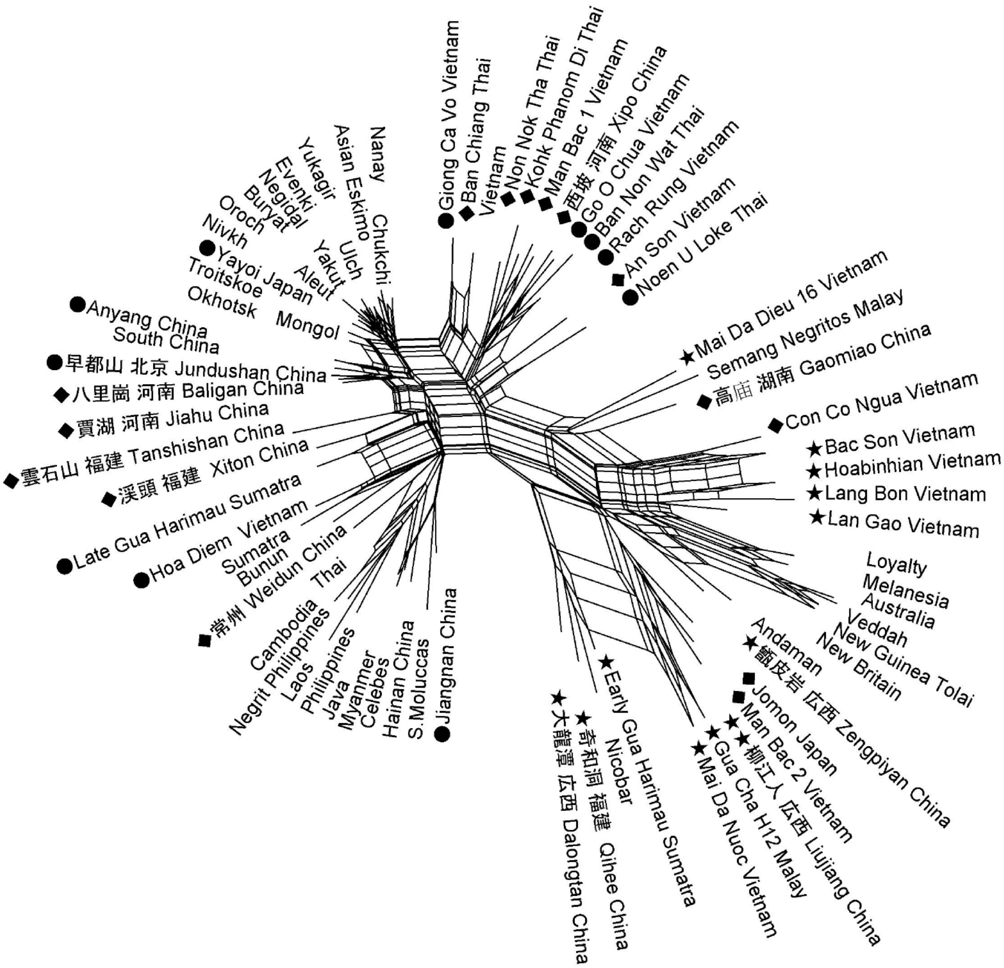

Figure 3. A neighbour net splits tree generated from Q-mode correlation coefficients matrix, based on the 16 cranial measurements data sets

With respect to language family among Southeast Asians, current Austronesian speakers and hypothetically their ancestral groups in mainland Southeast Asia, including Neolithic and Bronze/Iron Age farmers, are very closely connected with Northeast Asians. On the other hand, present-day Island Southeast Asian samples represented by Austronesian speakers form specific cluster faintly separated from the mainland groups except Cambodia and Myanmar. It is noteworthy that the Neolithic Southern Chinese samples represented by Tanshishan and Xiton from Fuzhou Province are tightly clustered with the Austronesian speakers.

The Philippine Negritos, despite possessing phenotypically different features from surrounding people (small body size and dark skin color), do not show remarkable dissimilarity to the non-Negrito Philippines in terms of craniometric profiles.

When noting the currently focal prehistoric people in debate to Austronesian hypothesis, quite interestingly, the Gua Harimau in Sumatra represent close affinity to the Taiwan Formosa (Bunun), Sumatra, and the Moluccas Islands, Philippines and Celebes Island.

Interestingly, the Iron Age Hoa Diem in central Vietnam shows the close affinity to the contemporary Gua Harimau, while another Vietnamese sample, including the Neolithic Man Bac and An Son and the Metal Age Dong Son and Giong Ca Vo more resemble to the mainland people rather than to the Island Austronesian groups.

Discussion

Pre-Austronesian Indigenous

Before we dispute the dispersal of Austronesian people in Southeast Asia, in concept of “Out of Taiwan” model, to understand early indigenous settlers is as a matter of course crucial to the debates over the peopling of the region. Hereto the earliest accepted period of anatomical modern human’s occupation is provided by the materials from the cave sites of Tam Pa Ling in Laos (Demeter 2012 et al. ,2012), Niah in Malaysia (Brothwell 1960; Kennedy 1977), Tabon in Philippines (Macintosh, 1978); ranging from 47,000 to 30,000 years BP. Among these, the Niah and the Tabon series were excavated from current settlements of Austronesian speakers, regarded as pre-dispersal indigenous. Unfortunately due to the limitation of preservation, these particular human remains relates to less than ideal preservation, veiling genealogical relationships to current populations due to the incompleteness preservation, missing complete cranial data sets for current this study. Whilst, several sets of nearly complete skeletons from Hoabinhian sites are crucial specimens to resolve this problem, although the dating more modern and the region later occupied by non-Austronesian. The Hoabinhian widely spread over the mainland of Southeast Asia during the late Pleistocene and early Holocene (c.23, 000-8, 000BP)(Trevor and Brothwell 1962, Tan, 1980; Yi eta l., 2008, White, 2011). Among those regions where the Hoabinhian sites were distributed, Indochina region including Malay Peninsula seems to have been the central location and home to numerous cave sites along the limestone mountainous back bone of the country. Hitherto several complete or nearly perfect skulls of Hoabinhian are utilizable for craniometrics study, all of which were uncovered from the cave sites in Vietnam and Malaysia (for instance, Lang Gao, Lang Bon, Pho Binh Gia, Lang Cuom, Cua Gi excavated by Colani (1927a,b, 1939) and Mansuy and Colani (1925), and Mai Da Nuoc, Mai Da Dieu by Cuong 1986; Gua Cha at central Malay Peninsula (H12 is complete Hoabinhian cranium, Sieveking 1954, Trevor and Brothwell, 1962). These Hoabinhian skeletal assemblage is key in which addressing the fundamental issue of the peopling of Southeast Asia. As shown in Figure 3, all the available Hoabinhian specimens were consistently defined as having a close Australo-Melanesian affinity in terms of their cranio-metrically expressed morphology. The materials used here are male complete crania, to avoid confounding robustness of statistical comparisons, nevertheless a nearly complete female skull, as well as important but incomplete skulls, have been unearthed from other sites (eg. Hang Cho, Gua Gunung Runtuh, and Moh Khiew). As given the analyses elsewhere (Matsumura, 2006; Matsumura 2008b, Matsumura et al., 2011), cranial and dental studies of these individuals demonstrated remarkable similarities to Australian and/or Melanesian samples, suggesting close biological ties. The network tree diagram further demonstrated some Pleistocene and early Holocene samples from China (Liujiang and Zenpinag from Guangxi, Qihee from Fuzhou) are akin to the Hoabinhian indigenous. Beside the cranial traits characterizing the such early indigenous in the region were for instance in northern Vietnam, retained through the subsequent pre-Neolithic ceramic using Da But Culture (c.6,500 – 4,500 years BP) clearly suggesting that such pre-agricultural foraging communities are likely direct lineal descendants of Hoabinhian foragers.

The earliest well dated anatomical modern human in the region occur in Southeast Asia, modelling their initial colonization via India rather than north and inland through Siberia. Moreover, these first colonists shared a common ancestry with the earliest settlers of continental Sahul. Indeed, there is a long history of scholarship suggesting morphological similarities, with implied genetic relatedness, between Australian Aborigines and Melanesians and pre-Neolithic incomplete samples in Southeast Asia (e.g. Tabon in Philippines; and Niah, Gua Cha, Guar Kepha and Gua Kerbau in Malaysia), particularly with respect to dolichocrany with protruding glabellae, massive jaws with relatively large teeth, alveolar prognathism, and long slender limbs. The current analysis of a more extensive cranial dataset finds further support for close affinities between early Southeast Asians, including Hoabinhian samples, and Australian and Melanesian groups, as well as the Andaman and Nicobar Indians. These observed close biological ties linking Sahul, early mainland Southeast Asia and Eastern India led us believe that the first colonizers of anatomical modern human in this region migrated southern rim of Eurasia and dispersed late Pleistocene Sundaland, including current island Southeast Asia. The pre-Austronesian indigenous may, in turn, share a common ancestry with early Hoabinhian in mainland Southeast Asia and present-day Australian Aboriginal and Melanesian people. To whom, in fact as depicted in Figure 3, the pre-Neolithic sample of Gua Harimau (Early Gua Harimau) skeletons shows the close affinity to these early colonizers of southern Eurasia and Sahul region, which will be regarded as a member of first layer in “Tow layer” model.

Austronesian Dispersal

Quite interestingly, as shown in Figure 3, cranio-metric analysis demonstrated the very tight linkage between the Iron Age sample from Gua Harimau from Sumatra and the peoples of Taiwan (Bunun), Sumatra, and the Moluccas Islands, Philippines and Celebes Island. This close population linkage provides an extensive evidence for interaction with contemporaneous communities among Insular Southeast Asia, revealing vigorous human movement crossing over South China Sea. Interestingly the contemporary Iron Age jur burial group of Hoa Diem from central Vietnam also neighbourly branched with this population assemblage. The large mortuary site at Hoa Diem, located in Khanh Hoa Province in central Vietnam is remarkable in terms of presumably ancestry of Chamic people in central Vietnam. The excavation of this site conducted by Mariko Yamagata and Bui Chin Honag (Yamagata et al., 2013) since 2007 produced large numbers of inhumation jar burials associated with funeral pottery vessels that are strikingly similar to those from the Kalanay Cave in Philippines, revealing Iron Age trade network crossing over South China Sea. Their cranial affinities among the Austronesian speakers including their remote antiquities of Gua Harimau and Hoa Diem suggest possible biological maritime interaction by Austronesian speakers across the South China Sea.

In global aspect across Southeast Asia, the pre-modern dispersion of the Austroasiatic on the mainland and Austronesian through Island Southeast Asia and the Pacific has been specifically linked with the expansion of people with agricultural society during the Neolithic period and early Iron Age on the back of expanding food-producing peoples during the Neolithic (Renfrew, 1987, 1989, 1992; Bellwood et al., 1992; Hudson, 1994, 1999, 2003; Blust, 1996a, b; Glover and Higham, 1996; Higham, 1998, 2001,2013; Bellwood and Renfrew, 2003; Diamond and Bellwood, 2003; Bellwood, 2005, 2013; Sagart, 2008). Linguistic data indicate that Southern China and Taiwan provided the ultimate sources of many of the existing language families of Southeast Asia, while archaeology places the origins of Neolithic farming societies in the Yangzi River Basin during the early Holocene (Crawford and Chen, 1998; Chen, 1999; Zhang and Hung 2010, 2013), prior to subsequent expansion from southern China into Southeast and eastern Asia (Bellwood, 2005; Lu, 2006). The hypothetical large mass population movement driven on the second wave in the concept of 'two layer' model, describes the population history of Southeast Asia, where initially people akin to Austraro-Melanseian occupied and later underwent replaced by or admixed with the immigrants from the north genealogically linked to Northeast Asians.

On the other hand, among the studies of genetic data, there are thus two controversial theories in dispute of "Out of Taiwan" model. Cox and colleagues (2010, 2013) have found a significant genetic cline across Island Southeast Asia and the Pacific, traced back to incoming populations from mainland Asia. They concluded that the phenotypic gradient likely reflects mixing of major two ancestral source populations; one descended from the initial occupants of the region akin to current Melanesian, and the other related to Asian immigrants since the Neolithic period.

Against such study supportive to mass population movement in the scenario "Out of Taiwan" model, however some other genetic researchers, reject large scale demographic movement during the Neolithic, alternatively advocating local evolutionary paragraphs with findings of common genetic heritage derived from the late Pleistocene colonisation of Sundaland (eg. Hill et al, 2007, Soares et al., 2015). As for the Austronesian expansion into mainland Southeast Asia, further, a mtDNA analysis of Austronesian speaking Cham in central Vietnam has argued that cultural link was a more important factor than genetic connection (Peng et al. 2010). Moreover, other DNA studies have advocated that Southeast Asia was a major geographic source of East Asian populations, within which the roots of all present-day East Eurasians were historically united via a single primary wave of entry to the region (e.g. Capelli et al. 2001; HUGO Pan-Asian SNP Consortium 2009).

Against such studies frequently based on the materials from modern populations, as a consequence the archaeological human remains at Gua Harimau site in Sumatra provide more virtual evidence of the existence of genealogically two distinct occupants and their replacement from pre-Neolithic to Paleometalic periods. Our cranial metric analysis performed using materials from in Sumatra very clearly support two layers model, pre-Neolithic occupants akin to Austro-Melanesians and later underwent replacement by new comers with the close cranial affinity to present day Austroneasian speakers including Taiwan aborigines, who substantially possess Northeast Asia features in a certain extent. Further important result in our craiometric study is that the Neolithic Southern Chinese samples represented by Tanshishan and Xiton from Fuzhou Province have the close affinities to the Austronesian speakers and the Gua Harimau, supporting the archaeological theory that their remote homeland was somewhere in Southern China .

The archaeological, linguistic and now cranial data is clear, the origins of modern Southeast Asian populations are to be found in a complex interplay between local indigenous populations with extremely deep historical roots and large scale movements of new migrants, ultimately originating from amongst the first agricultural populations of what is now central China.

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DETERMINATION OF GENETIC CHARACTERISTICS OF ANCIENT SKELETAL REMAINS EXCAVATED FROM THE GUA HARIMAU SITE IN SUMATRA

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Introduction

Advances in molecular biology over recent years have made it possible to closely analyse the evolutionary trails that are embedded in human DNA. Contemporary studies are underway that will enable our understanding of the history of group formation by examining the structures of genes and how they have changed overtime, based on DNA analysis of archaeological human remains. Thanks to the advances in the techniques of DNA analysis, research on the origins of the people of the ISEA that previously relied on morphological studies of archaeological artefacts and human remains has similarly improved (e.g. Hill et al. 2007; Soares et al. 2008; Lipson et al. 2014).

The origin of the population of the ISEA remains controversial, despite the multidisciplinary research approach that has been deployed to address this question. Underpinning these approaches, the OT hypothesis (e.g. Bellwood 1997) has played a key role in our understanding of the origin of Austronesian languages and the processes underlying their dispersal. The concept of this model is the archaeological and linguistically based "migration" scenario that suggests that the first modern human colonizers of late Pleistocene South East Asia underwent later substantial genetic admixture with, or replacement by, new immigrants associated with the spread of agriculture from the Neolithic period onwards. In conflict with this model, a number of genetic studies have attempted to address the question of a putative Austronesian expansion, a hypothesis that existing mtDNA data have been both used to support (Pierson et al. 2006) and contradict (Oppenheimer et al. 2001). However, until now, a number of works in the field of aDNA analysis have challenged the scenario of Austronesian migration because of the almost complete absence of well-preserved archaeological human remains.

Recently, excavations at the Gua Harimau site in Sumatra have unearthed high quality human remains in large amounts. Indeed, due to its geographical position, the island of Sumatra is thought to play an important role as a migration route from Taiwan and southern China to other ISEA. Therefore, the aims of this research were to characterize the genetic composition of the ancient Gua Harimau population and to address their genetic relationships with other populations of the ISEA. This is the first systematic study on the genetic structure of the population of ancient Sumatra.

Materials and methods

Archaeological sites

In this analysis, we utilize human skeletal remains excavated from the Gua Harimau cave site at Padang Bindu, in the Oku district of southeastern Sumatra, Indonesia. Since 2012, a research team led by Truman Simanjuntak has comprehensively excavated the floor of this cave chamber and unearthed 78 buried corpses (inhumations) that range in age from the pre-Neolithic to Iron Age. Current radiocarbon dates generated by *Badan Tenaga Nuklir Nasional* place these human remains in the range c. 4,500 years BP to c. 1,800 years BP, consistent with the Palaeolithic, Neolithic, and early Metal Age periods.

Archaeological specimens

Tooth enamel forms a natural barrier to exogenous DNA contamination, and DNA recovered from teeth appears to lack most inhibitors of the enzymatic amplification of aDNA (Woodward et al. 1994). In addition, because recent research reveals that the temporal bone is a good region from which to analyse aDNA (Gamba et al. 2014), tooth and temporal bone samples were used in this analysis. In total, twenty well-preserved tooth and temporal bone samples were selected for DNA analysis. A list of all samples used in this study is presented in Table 1.

Table 1. Sample used for DNA extraction and the result of the DNA analysis

No.	Code	Sample	Date(B.P.)	Haplogroup by APLP	Haplogroup by NGS
1	No.2	Maxilla, Right, M2	2,196-1,786	N.D.	-
2	No.3	Mandible, Right, M1	-	N.D.	-
3	No.4	Maxilla, Right, M1	2,196-1,786	not B4,5	E1a1
4	No.8	Mandible, Right, M2	2,196-1,786	N.D.	-
5	No.8	Maxilla, Right, M3	2,196-1,786	N.D.	-
6	No.9	Mandible, Right, M2	-	N.D.	-
7	No.10	Maxilla, Right, M1	-	N.D.	-
8	No.11	Maxilla, Right, M3	-	N.D.	-
9	No.12	Mandible. Left, M3	1,780-1,950	N.D.	-
10	No.14	Mandible, Left, C	-	M7	-
11	No.19	Maxilla, Right, M3	1,780-1,950	N.D.	-

No.	Code	Sample	Date(B.P.)	Haplogroup by APLP	Haplogroup by NGS
12	No.21	Mandible, Left, M2	-	N.D.	-
13	No.23	Mandible, Right, M2	1840	not N	-
14	No.24	Mandible, Right, M2	-	N.D.	-
15	No.26	Temporal bone, Left	-	R	R*
16	No.27	Mandible. Right, M3	2,196-1,786	N	-
17	No.36	Maxilla, Right, M3	-	N.D.	-
18	No.39	Maxilla, Right, M3	-	N.D.	-
19	No.60	Mandible, Right, M2	-	non M, B4c	B4c1b2a2
20	No.74	Maxilla, Left, M3	4,500	N.D.	-
21	No.79	Maxilla, Right, M2	4,500	N.D.	-

N.D. indicates 'Not Determined'

"-" indicates undone the experiments

Current radiocarbon analysis at BATAN (Badan Tenaga N uklir Nasional) dates

Authentication methods and DNA extraction

DNA analyses were performed at the National Museum of Nature and Science, Tokyo, Japan, and at Yamanashi University, which are dedicated to aDNA analysis. We employed standard precautions to avoid contamination, including the separation of pre- and post-PCR experimental areas, the use of disposable lab ware and filter-plugged pipette tips, treatment with DNA contamination removal solution (DNA Away; Molecular Bio Products, San Diego, CA, USA), UV irradiation of equipment and benches, negative extraction, and PCR controls (Shinoda et al. 2006).

First, exact replicas of teeth were prepared for additional morphological study. To prevent contamination from post-excavation handling, teeth and temporal bone samples were rinsed with DNA-decontamination agents and then washed thoroughly with distilled water before drying. Next, tooth samples were encased in silicone rubber (Provil novo Heraeus Kulzer GmbH, Hanau, Germany). The tip of the root of each tooth was removed via a horizontal cut using a cutting disk, and the dentin around the cavities and dental pulp were powdered and removed through the root tip using a dental drill as described by Gilbert et al. (2003).

Powdered samples were then decalcified using 0.5 M EDTA (pH 8.0) at room temperature overnight, before the EDTA buffer was replaced by a fresh buffer and samples were decalcified for a further 48 hours. Decalcified samples were lysed in 500 µl of Fast Lyse (Genetic ID, Fairfield, IA, U.S.A.) with 30 µl of 20 mg/ml Proteinase K at 60°C for four hours.

DNA was extracted from lysate using a FAST ID DNA Extraction Kit (Genetic ID) in accordance with the technical manual (Adachi et al. 2009).

Data analysis and genotyping of mtDNA

MtDNA SNPs were detected using the amplified product length polymorphism (APLP) method (Umetsu et al., 2001, 2005). This method has been applied in aDNA analyses and has yielded convincing results (Adachi et al., 2004; Shinoda et al., 2006). In this study, 26 SNPs in the coding region and a 9-bp pair repeat variation in the non-coding cytochrome oxidase II/tRNALys intergenic region were analyzed using the multiplex APLP method and the primer sets described by Adachi et al. (2011). Polymorphic sites examined in this study are known to cover most haplogroup-defining mutations found in east and Southeast Asian mtDNAs. The constitution of the PCR reaction mixture, thermal conditions, and method for separating and detecting PCR products are the same as described by Adachi et al. (2009).

In addition to APLP analysis, next generation sequencing (NGS) technology and the mtDNA capture method were applied to determine the whole mtDNA genome. To do this, the protocol of Shinoda et al. (2016) was used for library preparation, and 8 µl of DNA extracts were used in each library. Polyethylene glycol (PEG) and short adapter were used in most of the libraries (Table 2), and five DNA libraries were prepared in total. We used barcode of TreSeq DNA LT Set A (Illumina) for indexing.

Table 2. Results of the NGS analysis

	Gua Harimau 4	**Gua Harimau 26**		**Gua Harimau 60**	
Amount of input DNA for library preparation (ul)	8	8	8	8	8
Read length of sequence	75 bases, PE	75 bases, PE	75 bases, PE	150 bases, PE	75 bases, PE
Total reads (R1 + R2)	1,366,288	5,325,420	4,998,102	174,288	1,584,720
Filtering					
Merging R1 and R2	524,057	1,771,240	1,683,544	38,389	425,884
Hits to hg19 (%)	26,965	1,051,301	892,829	18,534	101,970
Remove cross contamination	23,956	997,801	834,786	16,218	89,505
>3 duplicate reads	19,801	519,912	425,424	11,398	84,842
>=35bp	19,593	519,725	425,334	11,398	84,763

	Gua Harimau 4	Gua Harimau 26		Gua Harimau 60	
Mapped to mitochondrial genome	16,379	382,903	337,067	10,416	76,467
Remapped to rCRS with flag 0 and 16	19,491	419,171	367,790	11,354	84,392
PickingBases (--use-n, --ignore-strand)	719	16,199	16,578	1,659	3,422
Merged duplicate reads	19,491 (719)	419,171 (16,199)	367,788 (16,576)	11,354 (1,659)	84,392 (3,422)
>=mapq20	**719**	**16,199**	**16,577**	**1,659**	**3,420**
Depth of mitochondrial DNA	**2.40**	**146.00**		**21.10**	
Haplogroups	E1a1	R*		B4c1b2a2	

In general, the percentage of endogenous human aDNA contained in extract solutions were quite small, just a few percent or much smaller in most cases, with other DNAs mainly derived from bacteria (Green et al. 2010; Fu et al. 2013; Kanzawa-Kiriyama et al. 2016). To efficiently investigate endogenous human mtDNA, we enriched these extracts using the method presented by Maricic et al. (2010). Then, enriched libraries were sequenced using either one or two lanes on the Illumina MiSeq (MiSeq Reagent Kit 150 or 300 Cycles) using a paired-end run with 76 or 151 cycles.

Raw sequence reads were processed using the protocol of Shinoda et al. (2016). Thus, after trimming adapter sequences and other bases of low quality (minimum base quality score 30) from the 3’ end of raw sequence reads, full length sequences were reconstructed by merging paired-end reads under the prerequisite that forward and reverse reads overlap at least 11 bp. Using this approach, merged reads were mapped to the human reference genome (hg19; http://genome.ucsc.edu/) using the BWA-0.7.8 aln option (Li and Durbin 2009), while cross contaminants among samples sequenced on the same sequence run were removed using the process outlined by Kanzawa-Kiriyama et al. (2016).

After filtering using length filter 35, reads mapped to the NUMT or mitochondrial genome were rescued, and remapped based on the human mitochondrial genome (the revised Cambridge reference sequence: rCRS, Andrews et al. 1999) with the same mapping criteria but using hg19 (human reference genome). PCR duplicates were removed using the Picking Bases software (Kanzawa-Kiriyama et al. 2016) implementing the use-n and ignore-strand option and then filtering those with mapping quality 20.

To ensure the accurate mapping of endogenous human DNA, five bases from each sequence reading terminus were trimmed to minimize the effect of C to T misincorporation. Following this, in order to estimate contamination, length distribution of the mapped reads, and the degree of C to T misincorporation in the reading termini were investigated, both of which are characteristic to aDNA. For example, because endogenous mtDNA reading frames have specific SNPs and contaminants that are not characteristic to aDNA, the ratio of reads that mismatch to specific SNPs among total reads were considered, and enabled calculation of contamination frequency.

Results and discussion

There are many advantages of using mtDNA in aDNA analyses. In the first place, because it is present in high copy numbers in mammalian cells, mtDNA can easily be detected even in highly degraded samples, such as the ancient ones that form the basis of this study. However, hot and humid conditions are generally unfavorable to the preservation of DNA in human skeletal remains, limiting possibilities for finding well-preserved DNA in subtropical regions such as the Gua Harimau site. Thus, although APLP analysis was applied to the identification of mtDNA haplogroups, due to the poor quality of the mtDNA extracted from this ancient material, it was not possible to clarify these sequences into specific haplogroups for most samples (Table 1).

Among the twenty individuals considered in this study, an mtDNA haplogroup was successfully assigned for just six samples on the basis of APLP analysis. Thus, in order to determine mtDNA haplogroups more precisely from this highly fragmented DNA, we used a next generation sequencer (Illumina, MiSeq system) and the mtDNA capture method to address three tentative assigned sequences (Nos. 4, 26, and 60). We prepared libraries for each DNA extract, and then sequenced captured mtDNA libraries. In this approach, the lengths of mtDNA fragments were very short, and C to T and G to A misincorporations were observed all samples (Figure 1), characteristic to aDNA. Thus, it is clear that extracted solutions contained authentic human DNA. Misincorporation frequencies close to first and last few bases of the reading frames were between 20% and 45%, so we expect that many fragments were endogenous human mtDNA.

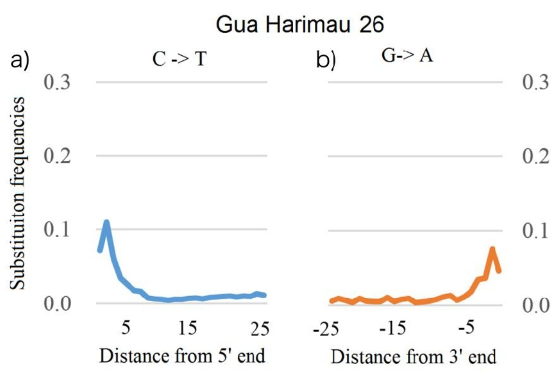

Figure 1. DNA damage patterns for Gua Harimau on the basis of sample No. 26: a) Frequencies of C to T, and; b) G to A transitions per sample at positions 1 to 25, from the 5’ and 3’ ends, respectively

Sequences Nos. 26 and 60 completely sequenced the mtDNA genome at 146-fold and 21.1-fold coverage, respectively. In contrast, however, because of the poor quality of the DNA in sample No. 4, only a 2.4-fold coverage was achieved (Table 2). On the basis of diagnostic site changes, the haplogoup of each ancient mtDNA sequence are E1a1*(No. 4), R* (No. 26), and B4c1b2a2 (No. 60), respectively.

Results show that haplogroup B is one of the most common in the ISEA, and that it comprises two main clades, B4 and B5. The majority of these B lineages in the ISEA fall within haplogroup B4, while B5 is relatively rare. Breaking this down, the bulk of the haplogroup B4 lineage in the ISEA is B4a and its major branch B4a1 includes so-called "Polynesian motif." Haplogroup B4a1 represents an Austronesian signature because of its distribution. Recent analysis using mtDNA date indicates the dispersals of haplogroup B4a1 was triggered by postglacial flooding in the late-Pleistocene or early-Holocene epoch (Hill et al. 2007). However, at least lineages of haplogroup B consist chiefly of a second wave of dispersal, proto-Austronesian–speaking population.

The ancestral types of haplogroups B4b, B4c, and B5b were found in south Chinese populations, suggesting an origin in the mainland and dispersal to ISEA. The B4c haplogroup was found in ancient Negrito hair samples (Ricaut et al. 2006), probably indicating a diffusion from the mainland.

Among haplogroup B4, the subhaplogroup of Gua Harimau individuals (No. 60) was classified into B4c1b2a2 by mtDNA whole sequence analysis. Haplogroup B4c are found to have an age between 32,000 and 25,000 years ago (ya), while subhaplogroup B4c1 originated 27,000 to 24,000 years ago, B4c1b2 is dated to 16,000 to 14,000 ya (Derenko et al. 2012), and the origin of B4c1b2a2 is dated to the Neolithic period. According to the DNA database (DNA Data Base in Japan), haplogroup B4c1b2a is found in south China (Liaoning and Zhejimang provinces), in aboriginal Taiwanese, Philippine and Indonesian regions. Thus, because of this demographic distribution, subhaplogroup B4c1b2a appears to be the group associated with Austronesian expansion that spread from the Neolithic period, probably associated with agriculture.

Results of previous studies (e.g. Hill et al. 2007) show that the most common indigenous haplogroup in the ISEA is haplogroup E. This group is common among aboriginal Taiwanese but is almost absent in China and in the Pacific region, while prevalent outside China among the Austronesian-speaking group. Haplogroup E has been studied as a potential marker of early Holocene population expansion stemming from within the ISEA (Hill et al. 2007; Soares et al. 2008).

There are two major subclade E1 and E2 are present. Of these, haplogroup E1 comprises two additional subclades, E1a and E1b, the former almost entirely restricted to Taiwan and the ISEA, while the latter is found predominantly on the ISWA but is absent in

Taiwan. Haplogroup E dates to over 25,000 ya while lineages within haplogroup E have dates ranging from 6,000 to 16,000 ya. Based on its demographic distribution and time depth, it is clear that ancestral type of haplogroup E had spread out prior to the supposed Austronesian expansion from China or Taiwan. Thus, this haplogroup probably evolved within the descendants of the first settler of Sundaland. Spatial frequency distribution and diversity suggest that this haplogroup arose on the ISEA, while some of its subclades spread subsequently to Taiwan (Soares et al. 2008).

As the coverage ratio of mtDNA sequences for the Gua Harimau sample No. 4 is low, it is difficult to classify this acute subhaplogoup. Nevertheless, these sequences were classified into E1a1 on the tentative basis of diagnostic coding sites changes. The greater diversity of haplogroup E in ISEA compared with Taiwan is consistent with expansion of lineages from the south (Hill et al. 2007; Soares et al. 2008). However, E1a1a has a lower diversity in the Philippine population and in Sulawesi than among Taiwanese aborigines, despite making up a larger proportion of these populations (Soares et al. 2008). Thus, although haplogroup E may be a marker of postglacial expansion, clades within this haplogroup, such as E1a1 possibly reflect the impact of later population events (Tabbada et al. 2010). The most plausible explanation for this observation may be that the diffusion of the haplogroup E1a1 in the Gua Harimau might have occurred after the Neolithic expansion.

The major branch of haplogroup R in the ISEA is B and R9. However, unclassified haplogroup R* found in Gua Harimau No. 26 sample appear unrelated to any lineages found in the world, which is new basal R haplogroup and do indeed represent indigenous haplogroup in ISEA. Table 3 shows the complete genome substitutions of this sample. This specimen has the diagnostic polymorphisms of macrohaplogroup N (rCRS positions at 8701, 9540, 10398, 10873, and 15301), macrohaplogroup R (rCRS positions at 12705 and 16223), and seventeen specific nucleotides changes. There are several rare ancient haplogroups within macrohaplogroup N and its subhaplogroup R in the ISEA. This haplogroup also conforms to this case.

Table 3. Mitochondrial DNA haplotypes and haplogroups

Individual	Coverage	Haplotype	Haplogroup
No.26	146	A73G, **C150T**, **A189G**, A263G, **T450C**, A750G, A1438G, A2706G, **A3397G**, **G3483A**, **C3600A**, A4769G, **A5484G**, **C6164T**, C7028T, **A7271G**, A8860G, **T9833C**, **G9966A**, **C10777T**, **G11150A**, G11719A, **T14178C**, **T14311C**, C14766T, A15326G, **A15766G**, **T16304C**, T16519C	R*

All polymorphic sites are numbered according to the revised Cambridge reference sequence (Andrews et al. 1999). Specific nucleotide changes in this specimen are emphasized by bold italic type.

It seems likely that this haplogroup can be traced back to the original inhabitants of the ISEA, who would have colonized the area around the Paleolithic period. This is based on evidence from the persistence of mtDNA from the earliest settlers in this area. Indeed, numbers of the Gua Harimau inhabitants can trace their maternal ancestry back to the first anatomically modern settlers of ISEA.

Our mtDNA data suggest a complex genetic history on Sumatra Island. Owing to the small sample size, it is difficult to verify the genetic characteristics by statistical methods, although it is noteworthy that Gua Harimau gene pool consist of Austronesian (B4c and E1a) and putative indigenous peoples (R*). On this basis, it has been suggested that the Gua Harimau people did not come from the indigenous population only, but rather that over the course of a long history stretching back to the Palaeolithic period. Subsequent migration process of South East Asia acquired unique genetic characteristics that continue to the modern ISEA population. This evidence is also consistent with the two layer model drawn from archaeological and linguistic evidences that first modern human colonizers of late Pleistocene South East Asia later underwent substantial genetic admixture with, or replacement by, the new immigrants probably associated with the spread of agriculture from the Neolithic period onwards.

The number of samples for which DNA haplogroups could be determined was small in the present analysis, so unfortunately, the results presented here provide minimal insight. Nevertheless, establishment of genetic characteristics in the Gua Harimau cave may provide us with extremely valuable information regarding human migration and population dynamics in the Sumatra Islands. The preliminary experiment presented here proves that sufficient amounts of DNA are retained in some human skeleton samples, even though analytical efficiency may be poor. As a result, we believe it is worthwhile to continue these experiments to obtain more detailed data on the human skeletal remains from the Gua Harimau site. Insights on the population history of the ISEA could also be obtained by comparing aDNA data collected from Paleolithic and Neolithic sites.

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PREHISTORIC BURIAL OF GUA HARIMAU: SOCIO-CULTURAL COMPLEXITY OF AUSTRONESIAN SOCIETY

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Introduction

Human remains provide direct evidence of human existence, especially in aspects of their lifestyle including diet, disease and illness, age-at-death, and/or injuries suffered during their lifetime (Parker Pearson 2005: 3). Human remains data are often relate directly to behavior of burying the dead as an embodiment to the belief in the existence of the hereafter. This influenced the development of treatments towards the deceased in order to be ready continuing their lives in the hereafter. In consequence, burial contexts become the archaeological source of such treatments of the dead. The concept of burying the deceased includes notions on disposal of dead bodies in an assigned and particular location, which would not interfere with other living human being. During its development, treatments of the dead involving procedures of preparation of the dead within a ritual ceremony to its final disposal may also occur. The concept of burying the deceased will then become the basis of funerary tradition with various ways of caring for the dead, such as inhumation, cremation, preservation, and/or exposure. Inhumation is the most found case in archaeology and is considered the most visible of all (Grant, *et al*. 2002: 152-153; O'Dea 1985: 3; Sprague 1968: 480).

Gua Harimau is located in the village of Padang Bindu, sub-district of Semidang Aji, district of Baturaja, South Sumatera. The cave belongs to the same karstic cave complex of Gua Putri, a local tourist destination in Baturaja. The first exploration in the area was done in 1995, yielding information on Palaeolithic artefacts along the banks of Ogan River. Following this finding, archaeological researches in this area have been conducted since 2001 to this day. Numerous caves were found in Padang Bindu and archaeological researches have been conducted in the caves of Pondok Selabe-1, Karang Beringin, Pandan, Karang Sialang, and Putri. Gua Harimau is a cave with a large entrance facing southeast. The cave is approximately measured at 43 x 32 meters, with roof height of 12-17 meters. It is considered as idyllic to be inhabited, as the inner chamber is dry, has enough light from the outside, and has good air circulation (see Prasetyo *et al*., in Simanjuntak 2004). The cave floor is enourmous and slightly sloped towards the southeast.

The 2010 excavation in Gua Harimau first revealed fragments of human skeletons and further excavation seasons managed to yield many human skeletal remains within burial contexts. Other findings presented from each excavation vary from stone tools, faunal remains, pottery sherds, and panels of rock art. The minimum number of individual (MNI) of skeletal remains found in Gua Harimau is 81 individuals within at least 31 burial features (LPA 2015). Skeletal remains on this site are generally found between the depths of 50-120 cm in almost all excavation boxes (Fig. 1). Human skeletal remains found in Gua Harimau offer a great deal of potential and significant information about paleodemography of the society, as well as a handful information on past behaviors, social structures, belief systems, health, and lifestyles. A recording system based on burial features was applied to simplify the effort in identifying each individual with their respective burial context.

Studies in understanding funerary customs and behaviour through human remains and burial data have also been done in Gua Niah, Khok Phanom Di, and Man Bac (Oxenham, *et al*. 2011). Researches done on these sites employ extensive methods and approaches in understanding funerary practices in their respective sites. Niah Cave became the focus of several intense and active archaeological researches during the 1950s and 1960s. Researches of funerary practices in Niah Cave managed to define burial types according to the variation on human remains deposition processes. In conclusion, there are seven burial types practiced on this cave, which are flexed, seated, mutilated, extended, multiple, cremation, and burnt burials. In addition, isotopic research was done in attempt to reconstruct paleodietary patterns from skeletal remains found in Niah Cave (Harrison 1967: 131-133; Krigbaum 2005). Khok Phanom Di, in Thailand, is a hunter-gatherer site occupied between ca. 2000-1500 BC. It has been subjected to archaeological research since 1984 and yielded numerous inhumation burials. Researches on this site tried to reconstruct and understand the complexity of its past society from burial data, which concluded there are seven Mortuary Phases (MP) consisting of 154 burials. The changes in mortuary practices and isotopic research on dental remains have shown the integration between inland agriculture with coastal hunter-gatherer societies on this site (Bentley, et al. 2007; Higham 1989; 2002; Tayles 1999). Man Bac is a Neolithic site located in northern Vietnam. It has been excavated since 1999 by Vietnam Institute of Archaeology and Ninh Binh Museum and yielded numerous burial features. Extensive researches on this site produce information on demographic profile, morphometrics, paleo-dietary patterns and health, as well as DNA analysis (Oxenham, *et al.* 2011).

Gua Harimau, with its fascinating findings of burial data, seems to hold potentials in obtaining similar information as other archaeological sites mentioned above. As a beginning, this paper aims to describe and explain prehistoric human burials found in Gua Harimau (South Sumatera), in order to obtain information in understanding socio-cultural complexity of its past society.

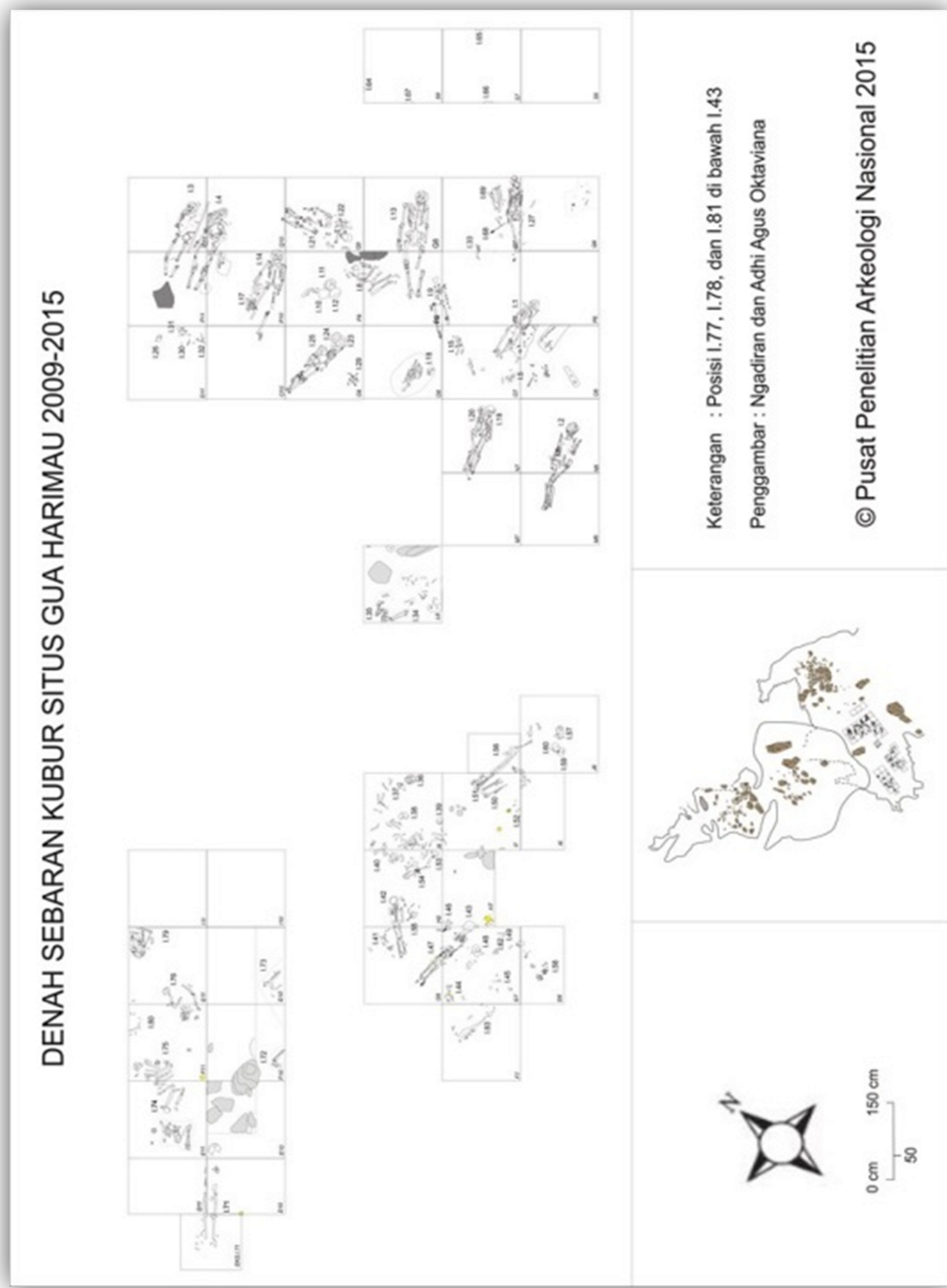

Figure 1. Site plan and distribution of burials of Gua Harimau
(source: Puslit Arkenas)

Methods

With the existence of human skeletal remains in an archaeological context, osteological analyses usually become a part of the research. Information on cultural behaviour, such as lifestyles and occupations, may be extracted from examining human skeletal remains (White, *et al.* 2012: 1). Recordings of these remains are considerably important to support the interpretation in an archaeological research. In dealing with skeletal remains found in Gua Harimau, osteological preliminary analyses were conducted on the field and in the laboratory using methods of sex determination, age-at-death estimation, as well as employing macroscopic observation to record skeletal preservation and pathological lesions.

Within an archaeological excavation, skeletal elements may be found in different state of preservation, which might have been caused by these taphonomical processes, including human modifications such as funerary practices, removal from their contexts, the excavation activity, or even the storage techniques applied to the skeletal remains collection (Bello & Andrews 2006: 1). The implementation of taphonomy in archaeology concerns with the issues on how to determine plants, animals, or human remains accumulate and preserve differentially within its archaeological contexts. In some issues, it is even important to determine whether the changes occur within the context are associated with human activities. By understanding the reasons of taphonomical transformation, one is expected to explain the phenomenon occurred to the human remains as archaeological evidence after time of death and to explain how these factors will affect the interpretation in an archaeological context.

Determining the sex of an individual in archaeological context is often possible by examining particular skeletal elements. Determination of sex on individuals found in Gua Harimau employed methods by observing skull morphologies (nuchal crest, mastoid process, supraorbital margin, supraorbital ridge, and mental eminence) and observing the morphology of greater sciatic notch (see Walker in Buikstra & Ubelaker 1994).

Information of age-at-death is at most useful to illustrate the demography of a burial site or a cemetery. In order to have a smaller age-range, several methods were employed in estimating age-at-death on each skeletal remain found in Gua Harimau.

Estimation of age-at-death can be conducted using either dental and/or skeletal remains. Referred methods used on dental materials are Broca scale (1879) and/or tooth-wear (attrition) patterns by Lovejoy (1985). On the other hand, estimation of age-at-death using skeletal materials can refer to methods, such as cranial suture closure by Meindl & Lovejoy (1985) and epiphyseal closure (fusion stage) by Buikstra & Ubelaker (1994). Analyses on infant remains can refer to methods by Schaefer, Black, & Scheuer (2009).

Macroscopic observation has been the only tool employed to examine pathological lesions in human skeletal remains of Gua Harimau. Results from observations are recorded and literature reviews are used to obtain information on similar lesions.

Burial customs are one of the most important aspect in interpreting past behaviours (Alekshin, *et al*. 1983). The behaviour of burying the deceased will provide researchers with potential information about funerary practices, rituals, and its social context (Parker Pearson 2005: 5). In understanding this, the study of funerary archaeology puts analyses of human remains into their respective archaeological context in order to understand the life and death in the past. Funerary archaeology studies include the analysis of burial features, grave structures, burial goods, burial system, body positions, burial orientations, and burial types. Inhumation is the most common burial form found in archaeological context, followed by cremation and mummification (preservation burial). Field recording, measuring, and observation methods were applied to analyse aspects of funerary archaeology in Gua Harimau. Results from these methods are detailed descriptions of each assigned burial features (LPA, 2014).

Osteoarchaeology of Human Remains from Gua Harimau

Skeletal preservation

Assessing skeletal preservation is important before taking the steps of determining sexual dimorphism and estimating age-at-death on an individual. If skeletal elements needed are not present, these analyses may not be conducted at all; therefore, one will not be able to obtain important information regarding the skeletal remain in question. The excavated skeletal remains from archaeological sites may vary in condition of bone preservation from very poorly to a very well preserved bone (Henderson 1987: 43). Transformation of archaeological data might be affected by factors such as the size of the bones, burial depth, climates of the site in question, as well as the soil condition in which the burials occur (see Grant, et al. 2001: 115). Human remains found in Gua Harimau present various degree of preservation depending on location of burials, soil conditions, and post-excavation treatments. In general, skeletal remains found in this cave are fairly preserved. There are a number of skeletal remains found with good preservation as well. Nevertheless, skeletal remains located on the eastern part of the cave show poorer degree preservation if compared to those found on the western part of the cave, even though the soil condition on this side of the cave is wetter and more humid than soil condition on the eastern side of the cave. The effort of maintaining skeletal preservation from each excavation seasons had met challenges from disturbances from rodent activities. Rats were found shifting the positions of some bones in several individuals and some other decided to make a nest on top of the iliac blade of INDIVIDU 24 (LPA, 2013).

Estimation of age-at-death and sex determination

The estimation of age in osteoarchaeology refers to an approximation of skeletal or biological age-at-death, based on patterns of growth and development or degenerative changes in the skeleton. It also involves observation on morphological features of the skeletal elements while comparing the information with recorded data of recent population (Ubelaker 1989: 63). During a course of a lifetime, human bones experience chronological changes, involving appearance of skeletal elements and loss of dental elements during infancy through teen-age, as well as the forming and fusion of epiphyses (White & Folkens 2005: 363). Human remains in Gua Harimau can be divided into several age and sex groups. Poor preservation condition of skeletal remains found in Gua Harimau often becomes the source of difficulties in determining sex and estimating age-at-death of each individual. Therefore, approximation was made to the closest result possible. There are 54 individuals (67%) identified as adults, 17 (21%) individuals identified as juveniles, 4 individuals (5%) identified as infants, and 6 individuals (7%) with unknown age-at-death (Fig. 2). Information on the sexual dimorphism of an individual is especially important in determining patterns within a society as a part of demographic aspect. Through further interpretation, determining sex of an individual may provide researchers with more information on its gender roles in society. Poor preservation on skeletal elements necessary for each method had limited the effort on determining sexual dimorphism from this skeletal remains collection. Closest estimation made when possible and "unknown" status is given to remains where sex determination deemed to be impossible. There are 18 individuals (22%) identified as males, 16 (20%) individuals identified as females, and as much as 47 individuals (58%) of unknown sex determination (Fig. 2).

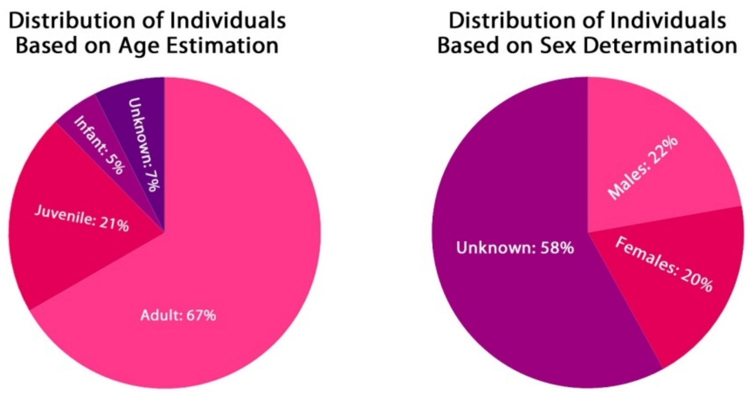

Figure 2. Distributions of Individuals based on age estimation (left) and sex determination (right) obtained from field *recordings*

Skeletal and Dental Pathology

Marked with lesions of subchondral eburnation, sclerosis, and presence of osteophytes (Ortner 2003: 545), osteoarthritis is commonly found within the skeletal remains collection from Gua Harimau in various degree of severity. Most of these lesions are found in *lumbar vertebrae, femorae*, metacarpals, and *phalanges*. Figure 3 shows an example of osteoarthritis in the lumbar vertebrae of INDIVIDU 27 and INDIVIDU 68 with osteophytes growth along the lateral border of its vertebral body. Occurrence of osteoarthritis may relate to the age and sex of an individual, as well as one's mechanical pressure of the body (Epstein 1989; Bridges 1992; White & Folkens 2005: 325).

Figure 3. Osteoarthritis on lumbar vertebrae of INDIVIDU 27 (right) and INDIVIDU 68 (left) (Source: Puslit Arkenas)

Traces of dental pathology are also found in the skeletal remains collection from Gua Harimau. Teeth, as the hardest element of the body, often appear in archaeological excavation. Results of preliminary analysis on dental pathology in Gua Harimau show evidence of caries and calculus presented in various degree of severity. Dental caries is a common pathological condition found in past population, caused by an infection that destroys dental structure, crown, and roots due to fermentation of sucrose by *Lactobacillus acidophilus* and *Streptococcus mutans* (Hillson 1986: 287; Pindborg 1970: 256; RobertsManchester 2005: 65).

Figure 4. Healed fracture on the right femur of INDIVIDU 13
(source: Puslit Arkenas)

There are at least 17 individuals from Gua Harimau suffered from caries during their lifetime (LPA, 2012b). Dental caries found on individuals from Gua Harimau may indicate their dietary patterns rely on food sources rich with carbohydrates. An observation made on the degree of dental attrition among skeletal remains on this site also shows the possibility of the consumption of meat, fruits, grains, beans, and tubers (LPA, 2012b). An interesting evidence of healed fracture was found on the skeletal remains of INDIVIDU 13, particularly on the midshaft of the right femur (Fig. 4).

A suspected pathological lesion appears on the surface of the skull of INDIVIDU 43, INDIVIDU 49, and INDIVIDU 57 (Fig. 5). The lesion shows corrosion of bone surface and resulting in various sizes of perforation. An almost similar lesion shows characteristics of an individual suffering from tuberculosis or treponemal disease, such as leper or syphilis. An in-depth and detailed future studies are needed to determine whether such disease indeed existed within the society of Gua Harimau.

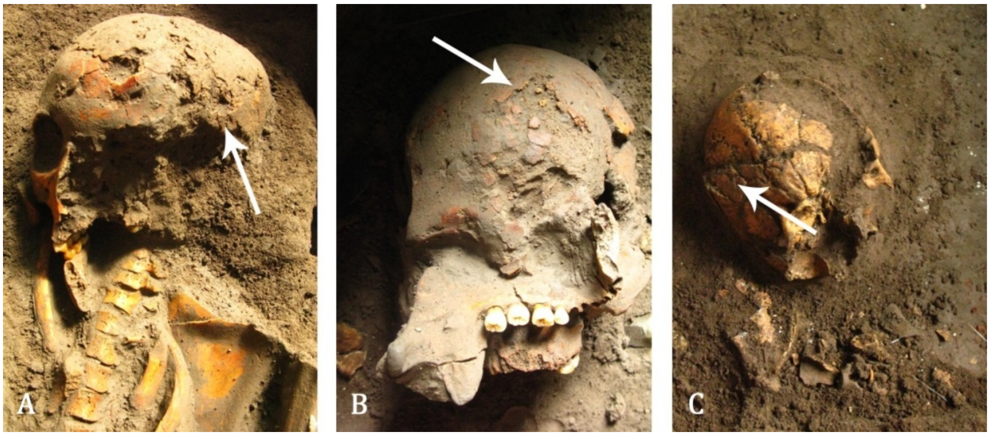

Figure 5. Possible pathological lesions on INDIVIDU 43 (left), INDIVIDU 49 (middle), and INDIVIDU 57 (right) (source: Puslit Arkenas)

Funerary Archaeology of Gua Harimau

Burial Systems

Soejono (1977) had written an extensive account regarding prehistoric burial systems in Indonesia and categorized it into primary, secondary, and mixed burial systems. Primary burial occur when corpse is interred directly to the ground and in some cases, this type of interment may involve the usage of burial container. Common body positions in primary burials are supine, prone, or flexed. Primary burials are recognizeable when skeletal remains found in their correct anatomical positon. Secondary burial occur when corpse is interred temporarily; meaning, corpses may be buried primarily at first only to be disinterred and undergo some sort of funerary rituals to its final resting place. Similar to primary burial, this type of interment may also involve the usage of burial container. Secondary burials can be significantly identified when skeletal remains were found not in their correct anatomical position, incomplete, or commingled. Meanwhile, the definition of mixed burial system refers to a mixture of primary and secondary burials.

Gua Harimau is an excellent archaeological site as it represents all burial systems referred by Soejono (1977). There are at least 20 individuals found within primary burial context (Fig. 6); 19 individuals with supine body position and 1 individual buried in flexed body position. In addition, there are at least 26 individuals buried secondarily on this site. Secondary burials in Gua Harimau commonly consist of long bones, such as *humerus, radius, ulna, femur, tibia,* and *fibula*. Furthermore, mixed burial system present on this site is represented by five individuals in primary burial context buried together with 12 individuals in seconday burial context.

Figure 6. Burial types in Gua Harimau; primary-single burial (left), primary-double burial (middle), and mixed-collective burial (right) (source: Puslit Arkenas)

Based on the number of individuals found within one context, Gua Harimau presents three types of burial features, which are single, double, and collective burials. All single burials in Gua Harimau are found in primary burial context with east-northeast orientation. Several individuals found in these single burials are placed in supine position, although there are individuals who were found in single burials with flexed position. This difference shows there are two burial traditions practiced in this site. There are at least seven burial features identified as double burials, which include 14 individuals. All individuals were buried in supine position, except for INDIVIDU 17 who was buried secondarily within the same feature as INDIVIDU 14. The orientation of these double burials is generally similar to the single burials; that is east-northeast, with head located on the east. Nevertheless, one feature of double burial consisting of INDIVIDU 21 and INDIVIDU 22 shows a different south-north orientation with their heads located on the south. Furthermore, there are nine burial features identified as collective burials, consisting of 27 individuals. These burial features seem to have a main individual occupying the grave with primary burial system and usually is accompanied with skeletal elements from other individuals, such as fragments of *cranium, mandible, scapula, coxae,* etc.

Burials in Gua Harimau present two types of body positions or body arrangements visible in burial context i.e. extended and flexed (Fig. 7). A significant difference between body positioning shows two types of burial practices on this site.

Figure 7. Types of body positions in burials of Gua Harimau (source: Puslit Arkenas)

Burial goods

Prehistoric burials usually involve items placed within the grave by mourners or relatives of the deceased as tokens of affection. In some cases, items are placed within the grave because it belonged to the deceased and considered as taboo to be kept. Offerings of food or other organic materials could also be placed within the grave and most of the times these materials do not survive. Nevertheless, the absence of burial goods does not mean there was no belief in afterlife. Items may not survive the taphonomy of the burial or it may suggest another form of belief in an afterlife, which does not include identification through particular items to be included as burial goods. In other cases, personal status may be identified based on the content of burial goods (Grant, *et al*. 2001: 154; 243).

Burial goods are not commonly found in Gua Harimau and when present, it consists of potteries, mollusc shells, and items made from metal. There are at least three bronze bracelets found within burial context in Gua Harimau. Potteries in forms of *buli-buli* (a small round vessel) and pots were found within burial features of several skeletal remains. Several skeletal remains were also found with pieces of mollusc shells placed on their sides or on top of their limbs. Metal items are also found in burial context. The first bracelet was found associated with INDIVIDU 63 during the effort of exposing its lower limbs. The second bracelet was found associated with INDIVIDU 52, and the third bracelet was found attached to the left upper arm of INDIVIDU 43 (Fig. 8). The second and third bracelets are adorned with triangular motifs (*tumpal*).

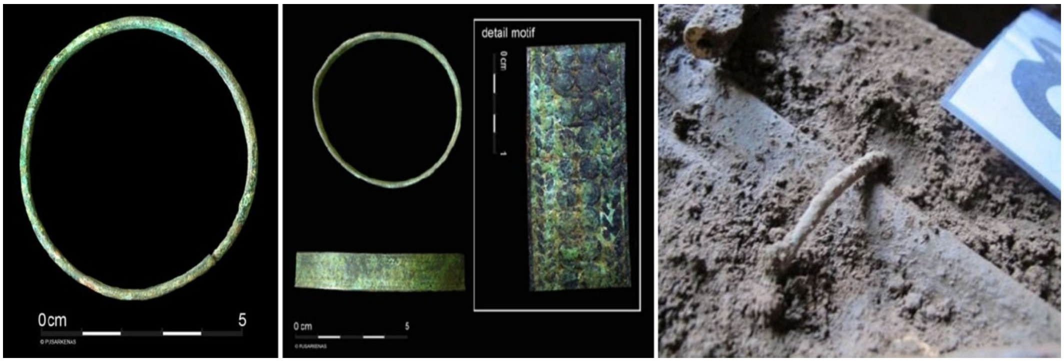

Figure 8. Metal burial goods found in Gua Harimau; (left) a bracelet found with INDIVIDU 63, (middle) a bracelet found in association with INDIVIDU 52, and (right) in-situ photograph of a bracelet found with INDIVIDU 43 (source: Puslit Arkenas)

Two socketed axes (Fig. 9, left) were found within the burial feature of INDIVIDU 10, INDIVIDU 11, and INDIVIDU 12. Items similar to these socketed axes are commonly found in prehistoric burials, such as in Gilimanuk, and they were assumed to have ritualistic value (Soejono, 2008). A fragment of blade was found lying next to the humerus of INDIVIDU 12 (Fig. 8, middle). It measured 7.5 x 1.3 x 0.2 cm and based on its proximity with the skeletal remains, it was thought as a burial good. Another metal item found within burial context is a spatula made of iron, also found within the proximity of INDIVIDU 12 together with the blade fragment (Fig. 9, right).

Figure 9. Other burial goods made of bronze and iron found in Gua Harimau; Socketed axes (left), blade fragment (middle), and spatula fragment (right) (source: Puslit Arkenas)

Socio-Cultural Complexity of Gua Harimau Society

Cemetery organization does not appear to have been applied in the distribution of age and sex among burials in Gua Harimau. Individuals seem to have been buried in random and available location, regardless of their age or sex. There is no specific area or location, which relates to social status as well. Representation of age-at-death and sexual dimorphism among the remains from Gua Harimau seem to vary without specific pattern. The large number of unassigned sex determination clearly caused by poor preservation or lack of skeletal elements needed to be analysed.

Human bones also record pathological lesions of diseases and illness suffered by an individual during their lifetime. Palaeopathology can contribute to understanding diseases and illnesses suffered by individuals found in a particular site. Apart from providing information of health history, diet, cause of death, and lifestyles, dental and skeletal pathology studies can also help in distinguishing social statuses of people. Macroscopic observation can be used in detecting alterations of skeletal elements in forms of pathological lesions. Nevertheless, sole application of macroscopic observation may lead to limitation on pathological identification and classification. Hence, macroscopic observation must be accompanied with microscopic and in-depth researches. Traces of pathology in the skeletal remains from Gua Harimau present on both dental and skeletal elements. In general, common pathological lesions found within the collection are dental caries, bruxism, osteoarthritis, possible treponemal disease, and bone trauma.

Bones can occasionally break due to abnormal stresses or suffer from weak pathological condition. The process of healing generally begins immediately after fracturing occurs. The successful rate of fracture healing depends on treatments on re-aligning the bones, reduction of movement at the site of fracture, health condition of an individual, as well as their diet and age during recovery phase (White & Folkens 2005: 48, 314). Therefore, the case of healed fracture as seen on INDIVIDU 13 shows cultural implication that at some point, people in this society has the knowledge of caring for the wounded. Nevertheless, the details of medical assistance given to this individual in treating the broken bones are still unknown.

Surface corrosion and perforation suffered by INDIVIDU 43, INDIVIDU 49, and INDIVIDU 57 may or may not signify the presence of tuberculosis or treponemal disease among this community. The spreading of treponemal disease may not only originate from contacts between individuals. It can also be caused by improper cooking of meals (e.g. meat). Treponemal disease lesions can be found in bones such as skull, sternum, vertebrae, and limb bones. Skull is the common location where this type of lesion may appear (Sorrel & Sorrel-Dejerine 1932: 78 in Ortner 2003: 247). It is difficult to determine whether other skeletal elements showing similar lesions, especially on INDIVIDU 49 and INDIVIDU 57, due to the lack of bones present from each of their remains.

Another distinct Austronesian custom noted within the society in Gua Harimau is traces of betel chewing found on dental remains. The origins of the betel chewing habit in Southeast Asia dates back to 13000 BP (Zumbroich 2008: 96). A surviving tradition, betel leaves are often used as stimulant, antiseptic, and breath-freshener. Betel stains on dental remains are commonly used to identify practices of betel chewing (Pietrusewsky & Toomay Douglas 2002). Dental remains presenting evidence of betel chewing can also be found in burial sites from Duyong Cave (Palawan, Philippines), Bohol (Philippines), and Beinan (Taiwan) (Zumbroich 2008: 99-100). Traces of betel chewing are also found among dental remains from Gua Harimau. There are at least 13 individuals (for example, see Figure 10) presenting various degree of staining on their teeth. It might indicate that people buried in Gua Harimau practiced betel chewing for

Figure 10. Dental remains of INDIVIDU 21 showing example of dental staining possibly caused by betel chewing and dental caries (source: Puslit Arkenas)

its social implication to inter-personal relationships, health advantages, or even as a part of their belief's ritual ceremony (see Rooney 1993).

The funerary archaeology of Gua Harimau is indubitably fascinating with various burial systems presented within one archaeological site. In understanding the belief system existed within the society in Gua Harimau, it is important to notice the details on burial systems, burial types, body arrangements, and burial orientation of each feature found. An interesting case to be highlighted among burial systems found in Gua Harimau is the case of collective burials. In this context, more than one individual were found buried within one context, which brings to a question of their respective times of death. Due to the poor preservation of skeletal remains, it is unfortunate that analysis to determine causes and times of death appear to be impossible, even though it would be useful in determining the chronology of interment on cases of collective burials. An assumption was made to interpret these collective burials, which involves possible kinship or relationship between individuals buried within one context. Genealogy relationship among skeletal remains found in Gua Harimau may provide evidence on their kinship and shed lights on its relation to the practice of multiple burials. This assumption is based on examples such as burials of INDIVIDU 43, a young female who was buried with an infant on top of her torso (recorded as INDIVIDU 47). This infant remains is assumed to have been her offspring who died not too long after she passed away or perhaps both of them died at the same time.

Burial orientation is also important in deciphering funerary customs in Gua Harimau. Observations noted that most individuals were buried with their heads to the east, which might relate to the belief that it is the direction of sunrise. Placing burials according to astronomical objects (e.g. sun, moon, planets, and stars) is known as celestial orientation (Rose, 1922). In Austronesian belief system, east is perceived as the beginning of life. It can be loosely interpreted that by placing the dead eastwards relate to the hope that the soul may find a new beginning of life in the hereafter. The slight difference of orientation among burials in Gua Harimau may be related to position of sunrise whenever a funeral occurred.

Two distinct body arrangements or body positions were found in Gua Harimau, which may indicate two different funerary customs being practiced. If the assumption that these distinctive body arrangements points to the usage of Gua Harimau by two different socities, it is also interesting to find out if they lived side-by-side as neighbours or one society precedes the other.

Conclusions

Based on skeletal morphology and characteristics of burial system, it is assumed that there are two distinct populations who have lived, occupied, and make-use of Gua Harimau. Several burial practices analysed in Gua Harimau also indicate that people who were buried in this cave adhere to Austronesian beliefs, such as burying with ochres, accompanying the dead with burial goods (potteries, mollusc shells), arranging their deads with extended position in primary burials, and placing their deads eastwards.

Comparing notes with researches done in Gunung Sewu, other prehistoric caves in East Java, and taking into account other Mongoloid remains found in caves along the island of Sumatera, it is also important to understand if Gua Harimau was solely used as burial place (cemetery) or did it has other function to the society in and around the site.

The complexity of burials found in Gua Harimau extends from materials of skeletal remains to the interpretation of funerary customs occurred in the past. The idyllic goals that can be applied to such magnificent site are to reconstruct complete mortality profile as well as to interpret aspects of funerary customs properly. Various interesting research topics and possibilities must be able to help in achieving these goals as a part of the objectives of archaeological research. In general, observations and preliminary research done to Gua Harimau skeletal remains still require further in-depth studies, which would help validate, verify, or deny assumptions and hypothesis made. Aspects of palaeopathology, palaeodemography, and funerary archaeology must be revisited and dissected meticulously to obtain complete information about the society buried in Gua Harimau. In conclusion, Gua Harimau holds potentials in understanding past societies, as well as in contributing data related to Austronesian dispersal in the archipelago.

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CONTINUITY ON RAINFOREST FORAGING DURING THE COURSE OF NEOLITHIC PERIOD IN SUMATERA: EVIDENCES, ARTIFACTS AND ITS CHRONOLOGY

M. Ruly Fauzi and Truman Simanjuntak

Introduction

Tropical rainforest is known as reservoir of various plants and animals. It also known as the only place with the highest degree of biodiversity in the world. Hence it preserve huge amount of biotic resources that may have been used by human since prehistory. Recently the development of agriculture since have resulted severe deforestation due to the growth on land-use for cultivation. This condition might have been started since the beginning of Neolithic period. However, not every archaeological evidences came from Neolithic period provide us clues related with agronomic subsistence. This condition was clearly shown in several cave sites in Sumatera, such as Harimau Cave and Silabe 1 Cave at Padangbindu (South Sumatera). Potsherds as one of the best indicators from Neolithic culture appeared on the upper layer of those sites (Simanjuntak, 2015; Simanjuntak and Forestier, 2004). At some degree, it was quite convincing that the using of cave as natural shelter—whether it is settled or temporary—has continued through times across different periods of civilization. Following that thought, associated lithic remains have lead us into sort of discussion about homogeneity on the type of tools being used and its debitage method. Furthermore, additional information came from the rest of animal consumption by cave dwellers confirmed the similarity between Neolithic and Preneolithic subsistence.

Perishable objects related with agriculture in the Island of Southeast Asia (ISEA) are mostly vanished, normally caused by severe warm and humid condition within equatorial zone. It is often that we have desperately used relatively more durable materials such as stone-adze to infer the existences of agriculture subsistence rather than the product itself. However, remains of possibly domesticated rice-grain have been reported from several Austronesian sites in ISEA. Rice-husk with completely carbonized grain that being used as temper for pottery from Gua Sireh (Sarawak) has been dated to 3850±260 BP (uncalibrated). It leaved us questions about the origins of rice-cultivation and the pottery itself (Datan and Bellwood 1991: 391–393). They also stated about the important number of freshwater shellfish found with addition of pig (domesticated?), monkey, deer, lizard, turtle and snake, but no further description on traces of consumption. The remains of wild taxa simply demonstrate the existences of hunting-foraging activity among the group of Austronesian who have introduced Neolithic culture ca. 4000 BP in Borneo and Sumatera. A similar condition also appeared in Gua Harimau. Neolithic culture in this cave represented by numerous fragments of pottery that can be traced up to Paleometalic layer. *Cord-marked* pottery is quite abundant in this cave. Correspond to Bellwood (1997, 2007) the remains of a specific early Austronesian peoples with strong appearance of cord-marked pottery are restricted in Sumatera and Borneo.

The Problems of Neolithic Layer from Cave Sites

Although the appearance of Neolithic peoples is strongly related with the development of agriculture in an open-air site, their traces were often to be found in cave and rock shelter sites. This condition certainly have brought us into a further discussion about the relation between caves and Neolithic peoples because cave habitation in Indonesia commonly related with the Preneolithic hunters and foragers. Archaeological investigation and Ethnographical observation from previous decades provide us much information to be use on discussing the problematic of Neolithic layer from cave and rock shelter. This phenomena are also discussed or at least briefly mentioned in some literatures (*e.g.* Bronson and Asmar 1975; Datan and Bellwood 1991; Guillaud 2006; Sather 2006). In addition, discussion of an existing hunter and gatherer tribes (*e.g.* the *Punan* peoples of *Dayak*) until late 20th century (Harrison 1949; Hoffman 1985) may be used as comparison to understand this phenomenon. Hence, it is interesting to discuss foraging activities occurred within the early Austronesian peoples in ISEA because the availability of sites and comparable study.

Most of the scholars have agreed that beside the languages, Austronesian Speakers also brought 'Neolithic package' during the time of their expansion (Bellwood 2007, 1997, 1985). This cultural package consist of tools related with the knowledge on agriculture, animal domestication, maritime exploration and its resource exploitation. Based on archaeological remains, they have introduced specified decorated pottery and stone adzes which gave a huge impact on the development of stone tool technology and settlement pattern. The earliest time of their arrival in the Indonesian Archipelagos was predicted *ca*. 4000 BP, based on a single dating result which is associated with red-slipped potsherds at Leang Tuwo Mane'e in the Talaud Island, eastern Indonesia (Bellwood 2007: 224). In Sulawesi, an open-air site known as Karama River Valley, Neolithic culture was started to appeared *ca*. 3500-3000 BP (Hakim 2014: 73).

Towards the south of Sulawesi, earliest evidence on the arrival of Neolithic culture are likely to be younger. A quite new result came from a remote open-air site called Pain-Hakka in Eastern Flores which contains fragments of red-slipped pottery with anthropomorphic ornaments associated with human burials and several stone adzes yielded age *ca*. 2700-2500 BP (personal communication with J.C. Gallipaud in Simanjuntak et al. 2012: 80). Framed by the classical theory of 'Out of Taiwan' we can roughly conclude that the dispersion of Neolithic in the Insular of SEA until it reached the coastal area of Sumatera cannot be older (at least slightly younger) than those radiocarbon dating results came from the eastern part of Indonesian Archipelagos.

Recently there are more adequate numbers of radiocarbon dating results available from Neolithic sites, whether derived from an open-air or cave sites (see Spriggs, 1989) especially in the western part on Indonesia. Considerably important dating result have come out from Bukit Arat which is located in the Highland of Jambi (Sumatra). Thermoluminescene dating applied on seven potsherds have time-framed the Neolithic occupation on this site, started from 1400 BC up to 900 BC. These dates have confirmed the earliest date for any ceramic (pottery) assemblage recovered from an archaeological site in Sumatera (Bonatz 2012: 43). In comparison with dating result from Sulawesi and East Flores (roughly about 1500-500 BC) those dating result seems contemporaneous. The best question can be addressed will be 'is there any alternative migration route for the Neolithic occupation in Sumatera?' Spriggs (2011) have pointed a possibility of major input on the spreading of Neolithic culture by Austro-Asiatic speaking groups, down through the Malay Peninsula towards Sumatera and Borneo (see also Guillaud, 2006; Simanjuntak and Forestier, 2004 for further discussion).

Rainforest and the Arrival of Modern Human in Sumatra

The Rainforest in Sumatera

Faunal records could be used as proxy for reconstructing Palaeoenvironmental and landscape condition. Unfortunately, unlike biostratigraphy in Java which have been established and rapidly show its progress, Sumatera is still remains unclear. It is lack of studies related with Pleistocene environment since there are only few good records yet available. The only well-known faunal unit in Sumatra came from Dubois Collection which he collected in caves at Padang Highlands between 1887 and 1890. Two specimen of *Homo sapiens* tooth came from the same deposit. However, Dubois collection from Sumatera is convincingly younger than any faunal remains found in Java except for the Wajak Fauna. At the first time it was claimed belong to the Holocene (Hooijer 1947) which Dubois could not be more agree. But lately there is an opinion that Dubois fauna collection from Sumatran Cave sites belong to the Upper-Pleistocene or similar with Punung Fauna, older than Wajak (Javanese recent) Fauna (see van den Bergh et al. 2001; Vos 1995).

Fossil records from Sumatran caves contain important information regarding the existence of rainforest. Significant number of *Pongo* (and *Symphalangus*) pointed to relatively warm and humid climate (Vos 1983) which consequently allowed the expansion of evergreen rainforest. The absence of typical taxa from dryer biotope such as *Stegodon trigonocephalus*, *Hippopotamus*, and *Axis* supplementary support this opinion since there are no remains from these taxa has ever been reported in Sumatera. Moreover, the Punung breccia deposit contain similar composition on its taxa representatives (Badoux 1959; Westaway et al. 2007). Thus these faunal unit more likely belong to the same period. Punung fauna was already dated indirectly on its matrix and associated flowstone through luminescence and uranium-series dating which yielded minimum age *ca*. 118±3 up to 128 ± 15 kyr (Westaway et al. 2007: 714–715). Meanwhile direct dating by amino-acid racemization on faunal assemblage from Lida Ayer (Padang Highlands) yielded age *ca*. 60-70 kyr (Vos et al. 2007). Those two dating result showed the appearance of rainforest in Sumatera and Java at least during the Upper-Pleistocene. Even though, stable-isotope study demonstrated the climate during the *Last Glacial Maximum* (LGM; *ca*. 23-19 kyr) became dryer as an impact of major glaciation, some area in the ISEA are still covered by forest including some part of Sumatera (Wurster et al. 2010).

Human Arrival and Earliest Foragers in Sumatera

Discussing the history of human occupation in Sumatera has always been fascinating since there are lack of discussion and data-set available or published. There are no direct evidences of *Homo erectus* existence yet available from Sumatera. However, large number of *core-tool* and *large flake-tool* showing rudimentary flaking technique actually exist at some sites along the old riverbanks such as River Saling, Kikim, Ogan, Air Tawar, and Semuhun (Forestier 2007a, 2007b; Forestier et al. 2006; Soejono 1993). Those implements might be correlate with the earliest hunter and gatherer peoples of Sumatera. The earliest evidence on prehistoric subsistence in Sumatera also showed intensive exploitation on marine resources (*e.g.* mollusk and fish). Shell midden composed by abundant numbers of consumed marine mollusk together with several unifacially shaped pebble-tool at Sukajadi (near Medan, North Sumatera) yielded an uncalibrated radiocarbon date *ca*. 7.340 ± 360 BP (Bronson and Glover 1984). This kind of feature has been related with *Hoabinhian* cultural complex which is widely distributed on the western part of Sundaland, covering Vietnam, Thailand, and the eastern coast of Sumatera (Forestier 2007a; Heekeren 1972; Soejono 1993).

Clearest evidence of early hunter and gatherer tradition in Sumatera mainly came from cave deposits. *Homo sapiens* or frequently being mentioned as '*Anatomically Modern Humans*' (AMH's) in Sumatera was firstly being recorded from a breccia deposit at Lida Ayer cave. It was reported for the first time by D.A. Hoijer who look at faunal assemblage in Dubois collection which he collected in Padang Highlands on 1888. Two specimens (Dub. Col. number 11471 and 11472) were identified as right-maxillary first incisors and left-maxillary second molar that belongs to *Homo sapiens* (Hooijer, 1948). Associated faunal remain from Lida Ajer has been dated by amino-acid racemization which yielded age *ca*. 80 kyr meanwhile similar materials from neighboring cave called Djambu Cave yielded age *ca*. 60-70 kyr (Skelton and Vos, in prep. in Vos 1995: 254).

Key information from that earliest evidence of *AMH* in ISEA are its chronology and associated faunal remains. The appearance of taxa which is typical of Southeast Asian rainforest such as *Pongo pygmaeus* (orang-utan), *Hylobates syndactylus* (siamang), *Helarctos malayanus* (Malayan sun-bear) and *Elephas maximus* (Asian elephant) within the same collection demonstrated the existence of a tropical and humid environment (Storm et al. 2005; Vos 1995; Westaway et al. 2007). Hence, tropical rainforest probably the most favorable environment for early *Homo sapiens* during their first settlement in Indonesian Archipelago. As a matter of fact, several existing small groups of indigenous tribes in Sumatra, Malayan Peninsula, and Kalimantan in fact dealing with similar environment until present-day. Thus, availability of resources as implication of excessive biodiversity in the rainforest must be taken into account while explaining the early modern human settlement in the Insular SEA.

Harimau Cave in Padangbindu provides us obviously rigid evidences of Pre-Austronesian population who inhabited Sumatera at least since 5000 BP. AMS date from a small fragments of charcoal collected in a matrix of a flexed positioned burial of human (Individual 74) which is strongly represent anatomy of *Australomelanesid* affinities resulted age ca. 4840 ± 8 calBP. Meanwhile ^{14}C dating on deepest cultural layer in this cave where the flakes made of obsidian and other siliceous rock embedded with several vertebrate remains and natural river pebble possibly used as *ground-tool* have yielded ages ranged from 7102±59 calBP up to 14825±336 calBP. These results are extremely important since there are quite limited references about the Preneolithic layers available from Sumatera.

Discussion

Pottery from Cave Sites

The expansion of Neolithic culture in ISEA is well-marked by the appearance of pottery. There are major differences between characteristic of pottery from the west (comprising Sumatera and Borneo) and eastern part on ISEA. Somehow, Neolithic cave sites in Borneo and Sumatera give a weak signal on the appearance of red-slipped pottery. They are sometimes present but not dominate the whole assemblage. It is different with the eastern ISEA where red-slipped pottery is very common. Appearance of red-slipped pottery in eastern ISEA have been strongly related with “Austronesian out of Taiwan” occurred ca. 4000 BP (Anderson 2005 in ; O’Connor 2015: 22).

Pottery from Harimau Cave show various decorations, as follows: cord-marked, incised, impressed, polished, and red-slipped. Thus, all element of decorative pottery neither from west and east of ISEA were present in this cave. It demonstrate admixture of cultural entities from west and eastern ISEA which before have been described by several researcher (Bellwood 1987, 1985; Hakim 2014; Spriggs 1989). Hereby, it is important to emphasize that we agree with the idea on possible influx of Neolithic culture from the Mainland SEA. Cord-marked pottery more likely to be the representative of this possible movement. However, due to intensive using of the cave floor for burial, it was difficult to make differentiation between Paleometalic and Neolithic pottery in Gua Harimau. More specific study is needed to achieve that purpose. If we look at carefully on the size of complete pottery vessels from the caves, their size are actually small. Most of pottery vessels unearthed from Harimau Cave showing a typical form locally called '*buli-buli*' means a small vessel with capacity *ca*. 500 ml and globular base. This type of vessel cannot represent a settled life, hence it is more likely related with mobile container or symbolic goods used in burial practices.

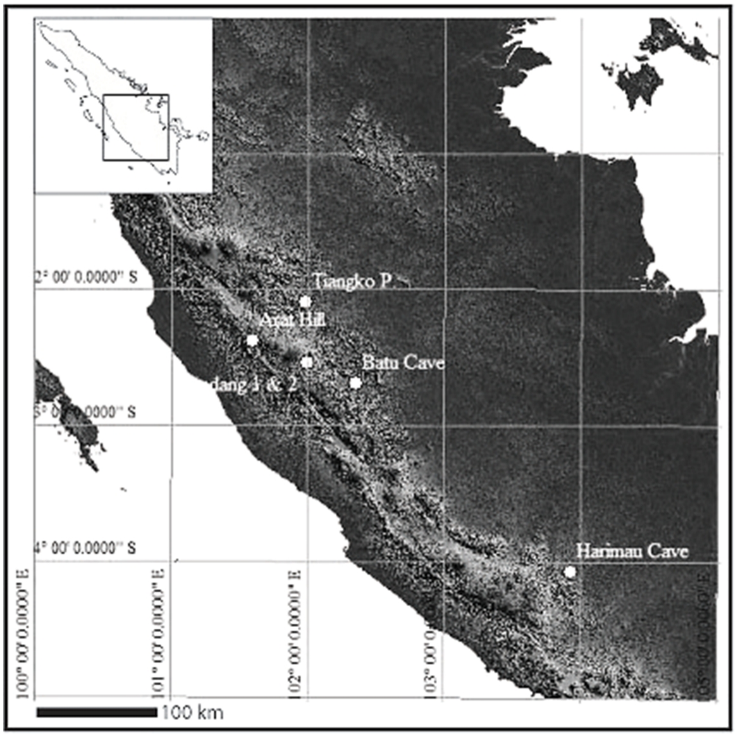

Figure 1. Map showing several archaeological sites mentioned in the text

From Preneolithic through Neolithic: A Homogeneity of Lithic Technology?

The diaspora of Austronesian-Speakers evidently corresponds to the genetic admixture in the ISEA (Xu et al. 2012) as well as present cultural diversity in Indonesian Archipelago (Bellwood 2007; Simanjuntak 2015). Those condition actually reflect a socio-cultural interaction might be occurred between two different populations, Austronesian and

Pre-Austronesian. Their encounter with pre-existed population must involve a complex interaction, comprising 'cultural exchanged' and environmental adaptation. In Sumatera, this condition was reflected by the embedded Neolithic implements in some of cave sites such in Harimau Cave and Pondok Silabe Cave. In those cave sites, an admixture of potsherds with simply detached flake-tools are very common. The same condition appeared also in an open site on the Highland of Jambi called Bukit Arat where abundant number of obsidian flake-tools embedded with potsherds yielded quite early date for the Neolithic occupation (see Bonatz, 2012). In case of cave sites, there are no significant variances occurred within the assemblage flake-tools from Preneolithic and Neolithic. This is mean that no major impact on knapping technology, except for the polished adzes (see also Forestier 2007b; Forestier et al. 2006; Simanjuntak and Forestier 2004).

The reason of homogeneity in lithic production between Preneolithic and Neolithic must be look both from the technological and social-economy. In fact, there are some differences between flakes implements from Preneolithic and Neolithic based on its morphology. In Harimau cave, the appearance of slightly elongated flakes made from obsidian was quite often to be found on the uppermost layer. Meanwhile in the lower layers, it becomes very rare and gradually replaced by other silicified rocks (chert, jasper, fossilized wood). However, the homogeneity represented by the absence of typical tools which can be used as a clue on determining specified industry. Nevertheless, it is on the contrary if we look at the method on extracting flakes from its core. The uppermost layer which is less than 60 cm thick from the surface revealed indication on technological strategy have been used during the course of Neolithic Period. There are indication on intentional using of natural form provided by river cobbles. Ellipsoidal pebble might be intentionally handpicked (or naturally sorted) on the river because it's transversal and longitudinal convexity. Furthermore, these convexity are important to make elongated products (Inizan et al., 1999). Consecutively, unipolar debitage applied on a single platform, resulting a parallel ridge that can be used as guidance for the subsequent flake (see **figure 2**). At a glance, this strategy quite similar with debitage *laminaire*. Since there are no '*lame a crete*' or '*rejuvenation core-tablet*' have been found in this cave, there is no way to explain laminaire method in order to describe the appearance of blade-like flakes in Gua Harimau.

Figure 2. Typical obsidian core with single striking platform and unipolar direction which can produce series of small blade-like implements in Harimau Cave

On technological point of view, the appearance of shaped-tool derived from large flake or single core as blank represent an archaic form of tool. However, this type of tool did appear on upper layer such as a chopper came from square F7 layer 8 about 40 cm below the surface just before burial I.72 and I.73 uncovered. This chopper show a rudimentary technique of flaking applied on a cobblestone which then partially covered by ochre (intentional?). Stone adze as a typical Neolithic implements was never been found, except a specimen of stone tools which incorrectly identified as a point/projectile on 2010, probably caused by a wrong orientation being taken. This artifact is actually a fragment of '*planken*' which have been shaped almost rectangular. Unfortunately it was broken in oblique direction almost along its longitudinal axis. This single breakage is easily identified even through a photograph (see figure 3). The surface of breakage on lateral view show no additional shaping beside a single smooth surface with undulation resulted from accidental breakage. Meanwhile on the other lateral side which is clearly more intentionally shaped, series of removals resulted from a knapping are observable. This is mean that the Neolithic culture did appear in Harimau Cave not only by potsherd but also from plank. Furthermore, Neolithic adze with completely polished surface was reported found from the surface of Gua Batu in Musi Rawas Utara (Prasetyo 2014).

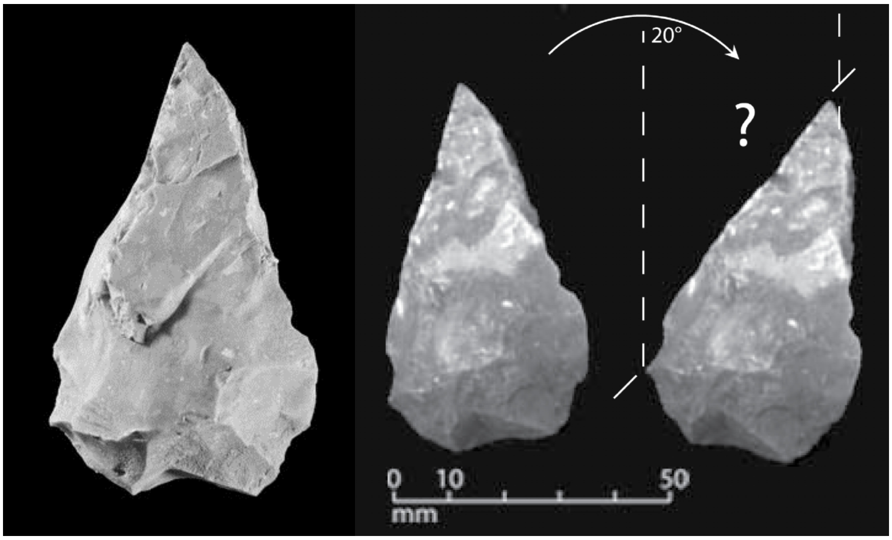

Figure 3. A probably misinterpreted tool from Harimau Cave which is actually a broken *planken* (unpolished adze) (photograph: Puslitbang Arkenas & R. Sumakyu/NGI)

Human Burials and Dating Results

There are significant differences on burial practices between the Preneolithic and its later period. From morphology and general stature showed by the skeleton—especially dentition and craniofacial—we could determine at a glance that there are two group of different peoples buried in this cave (see also Simanjuntak 2015). Skull with strong protuberance on its supraorbital and maxilla as well as slightly larger dentition reflected Austromelanesian affinities. Human burials from Preneolithic period clearly show flexed position, meanwhile burials from younger period are mostly found in extended-supine position.

Burials came from younger period seems related to the Neolithic and Paleometalic period. Radiocarbon dating through AMS was performed directly on a fragment of maxilla with two intact human teeth (M3&M2 sup.) belongs to I.11 skeleton. It yielded date 2477 ± 25 years BP (2588 ± 88 calBP) and it was found to be associated with a bronze socket-axe (Soejono Type I socket-axe). Based on this finding, we could generate a conclusion for all dating results derived directly from the skeletal remains (see Simanjuntak 2015 for a complete list of radiocarbon dating results). Regarding the appearance of Pre-Austronesian burial dated back to 4840±8 calBP, we could bracketed the timing of Neolithic habitation in Harimau cave roughly ca. 4000-3000 BP. These dates came up with a conclusion that chronology of Neolithic period in Sumatra is comparable with the eastern part of Indonesia. The other radiometric dating are yet still in progress for the other burials. However the other dating result came from an open-air Neolithic site called Bukit Arat seems coherent with our previously proposed range of period for Neolithic period in Harimau cave which is ca. 3400-

2900 BP (see figure 4). Furthermore, Neolithic layer in this cave obviously similar to Pondok Silabe 1 cave which contains obsidian flake tools and potsherds with cord-marked decoration (Guillaud, 2006; Simanjuntak and Forestier, 2004).

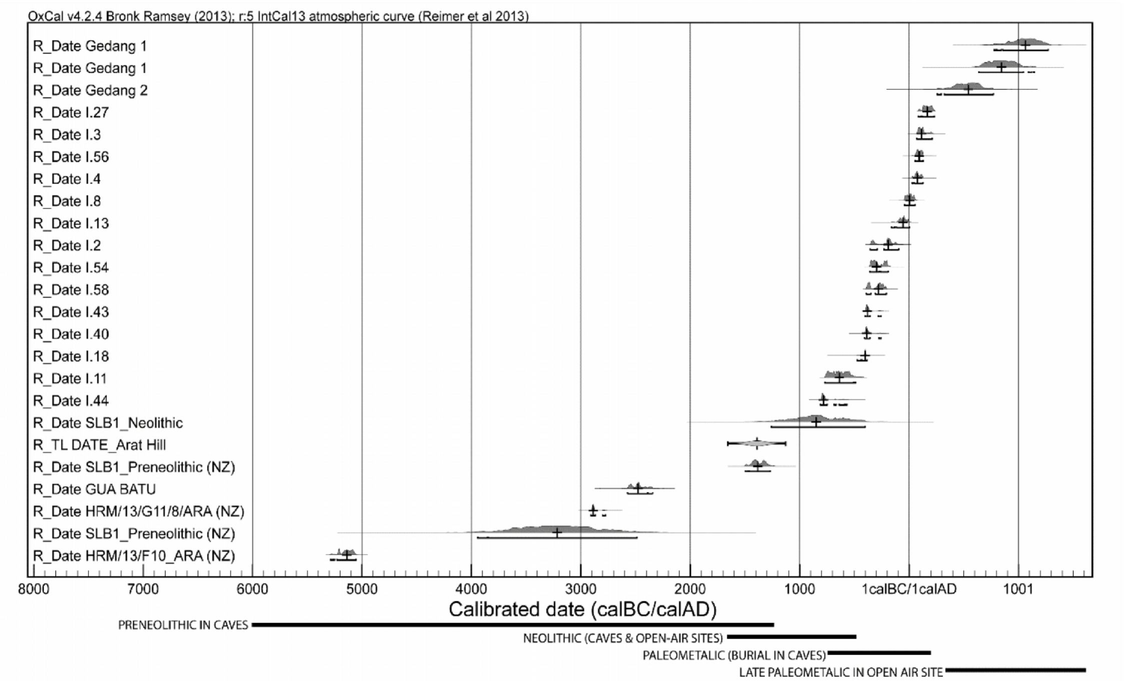

Figure 4. Series of radiocarbon dates taken from Harimau Cave in Baturaja (Fauzi et al., 2015; Simanjuntak, 2015), Batu Cave in North Musi Rawas (Sigit Prasetyo pers. comm.), Silabe 1 in Baturaja (Guillaud, 2006), Gedang 1 and 2 in Kerinci (Fauzi and Budisantosa, Inprep.), and Thermoluminescence on potsherd from Bukit Arat in Kerinci (Bonatz, 2012)

Up to now most of skeletons directly being dated in Harimau Cave came from Paleometalic Period, except for burial with flexed position which belongs to Preneolithic Period. However, the absence of metal objects in some burials might be used as indicator for the existence of Neolithic burials in this cave.

Conclusion

Rainforest in Sumatera have been raised and developed during the time of human arrival in ISEA. The continuity of its existence even survived through the LGM period based on stable carbon isotopic study (Wurster et al., 2010). By the time of rainforest existence in Sumatera during Upper-Pleistocene, human teeth have already appeared together with *Pongo* and *Symphalangus* in classic collection of Dubois (Hooijer 1948; van den Bergh et al.

2001; Vos 1983) and additionally from Punung (Java) (Badoux 1959; Storm et al. 2005; Westaway et al. 2007). This is means that the appearance of human in Sumatera and partially Java also characterized by the emergence of rainforest as an impact of relatively warm humid climate. Thus from their appearance, interaction between human and rainforest in Sumatera must have developed a specified and intimate relation due to a long history of rainforest existence in this area. Rainforest must have shaped the culture in this region so profound crossing multiple periods of civilization.

During the course of second millennium BC, the influence of Neolithic began to appear in Sumatera. It appears both on the open-air site (such as Bukit Arat and probably surrounding Kerinci Lake according to Heekeren) and cavern (e.g. Gua Harimau and Gua Silabe 1). From its chronological appearance it seems that both Late-Preneolithic and Early-Neolithic occurred simultaneously. This might be an answer to question we previously addressed to the appearance of potsherds in the cave. Interaction between Neolithic people and Preneolithic people must have an impact. We believe that some pottery came from cave sites in Sumatera did belong to the Neolithic peoples. On technological point of view, its associated lithic implements are quite similar with what we have found in the Preneolithic layer. Hence, technological interpretation of lithic remains from Neolithic layer and Preneolithic layer are quite difficult to distinguish because it seem homogeneous. We argued that this homogeneity might be derived from the continuity on foraging activity, including hunting the animals and foraging the forest.

Debitage on obsidian can be found in almost every prehistoric sites, especially in West Sumatera and Jambi. This activity not only continue from Preneolithic until the Neolithic period, it even through the Paleometalic period in several place in Kerinci Highland. Cautious exploitation on obsidian resources resulting a tendency on producing elongated flakes through unipolar and unidirectional debitage by using the natural transversal and longitudinal convexity. Up to now, the earliest cultural layer with appearance of pottery in Sumatera came from an open site called Bukit Arat (Bonatz 2012). The habitation in this hilly area might be related with the development of agriculture in Sumatera. At the same time foraging in the forest was still running. Even now foraging practices have survived in several indigenous tribes in ISEA such as Punan in Borneo. As conclusion, foraging in the rainforest can be linked not only with the early foragers during Preneolithic but also with newly immigrant that have introduced Neolithic culture. Thus, the simplest form of adaptation in the rainforest was manifested by foraging activity by the early Neolithic peoples.

Indeed there is archaeological evidence of early Austronesian in Gua Harimau that can be related with Neolithic culture. Radiocarbon dating consecutively applied on each layer gave us evidence of Neolithic appearance in this caves (Simanjuntak 2015). Although the habitation during Neolithic plausibly more oriented on open-air settlement site as a result of agricultural subsistence, caves were still used as a place for certain activities. Caves might be used as seasonally camp or during temporary foraging activity in the forest. Thus their remains are limited by number, isolated, and sometimes not too significant regarding its form or tool-type. However, their appearance cannot be neglected because the mystery of interaction between indigenous, environment, and early Austronesian migrant are still on its development and strongly need more adequate data-set.

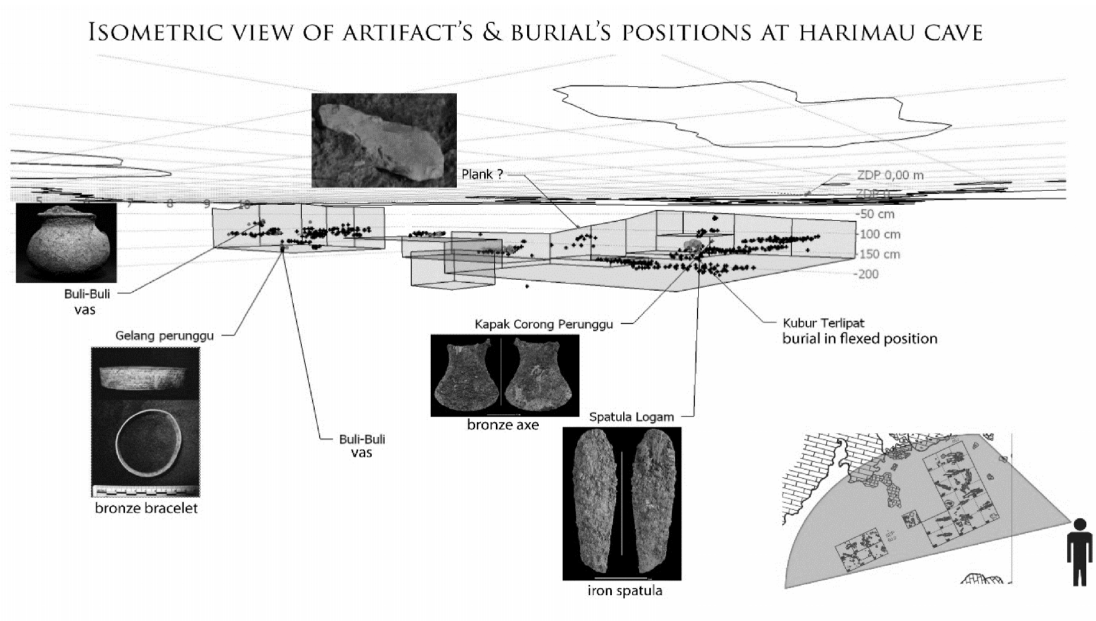

Figure 5. Burials and its context at Harimau Cave shows the appearance of *plank*, small pottery-jar, bangle, socket-axe, and spatula

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COMPARATIVE ANALYSIS OF NON-FIGURATIVE ROCK ART AT GUA HARIMAU SITE WITHIN THE SCOPE OF THE INDONESIAN ARCHIPELAGO

Adhi Agus Oktaviana and Pindi Setiawan

Introduction

Basically, in archaeology, rock art is understood as an artistic creation on the surface, which shows the human creative activity from the past. As a creation, rock art could be understood as a picture series of drawing, painting or engraving works, and lay on rock surface such as a wall, ceiling or speleoterm. The surface could be in the cave, at the cliff, or at the stone boulder. Rock art also could understand as a part of creation of perception landscape. Rock art creation always be in a spatial manner, the picture is not stand alone creation for (their) perception landscape. How the artist chose the place, picked out the picture theme, thought in which technique they should used, they may also have a special treatments how to make and using a pigment (oker, chitosan, charcoal), and may also they though about at when and concerning from where the people should observe the picture.

Hence, one of the important course of rock art is the image study: what is the object, the color, the pigment, the technique and the spatial. The non-figurative images in Gua Harimau made by painting technique are dominant, and looks like different with another site. The images in Gua Harimau are depicting non-figurative images. Lay on the cave wall and ceiling. Study of non-figuratif was extending explanation to evidence an practicing some animism or ancestor worship likes spiral, zigzag, parallel lines, finger fluting, and crosshatch (Anati 2004; Oktaviana, Setiawan, and Saptomo 2016; Von Petzinger 2016). As mention before, hand stencil is not drawn here. In Indonsian Archipelagoes, there are several sites without handstencil, like Liang Kain Hitam, Niah, Sarawak and Gua Tambun, Peninsula Malaysia (Tan 2014), several sites at Muna, and a sites with only charcoal drawing. Why hand stencils are not found on those site are another interesting question.

Reseach at a glance

The famous rock art in the world for several decade mostly in European karstic region, likes Altamira cave, El Castilo, Lascaux, and so on (Anati 2004; Von Petzinger 2016). But in recent years the publication of rock art research in Indonesia has been increased for this several years on international journal. Island South East Asia (ISEA) rock art including Indonesia became trending topic such as the earlies rock art dating around 40 kya until 17 kya in Maros regions, South Sulawesi. These dating shown Maros rock art is as old as

European rock art. This publication implies to human colonization in ISEA also have a same the development of creativity, not just in European rock art (Aubert et al. 2014).

The example of the oldest surviving rock art likes hand stencil and natural depiction of animal in ISEA and China might be belongs to pre-Austronesia, and even maybe pre-Austromelanesid people. Study on general rock art in ISEA is part of pre-Austronesian and Austronesian culture by Hidalgo to contribute the summary of rock art research (Tan 2014), the distribution of hand stencil with and without narrowed finger in Southern part of Sulawesi (Oktaviana et al. 2016), and new rock art site in Kupang (O’Connor et al. 2015). Its differ from art creation after the Austronesian culture came, such as boats images, human figure, and geometris images (Taçon et al. 2014).

Figure 1. Distribution of rock art in Island Southeast Asia (after Oktaviana, 2016)

The distribution rock art in Indonesia ussualy found in karstic environment. In the west and middle part mostly found at cave and rock shelter, some situated surround by rain forest, palm estate, ricefield, traditional farm and also surround by modern and industry activity. Rock art in Sangkulirang-Mangkalihat region, which is located at the karstic nountain surround by rain-forest, already known as 12-9 kya dating (Setiawan 2010; Fage, Chazine, and Setiawan 2010; Chazine 2005; Plagnes et al. 2003); Maros-Pangkep regions, Matarombeo regions, and Muna Islands regions, Southeastern Sulawesi (Fage 2014; Oktaviana et al. 2016; Permana 2014; Kosasih 1995); Padang Bindu region, South Sumatera

(Oktaviana, Setiawan, and Saptomo 2016); Sarolangun regions, Jambi (Fauzi, M. Ruly et al. 2015).

Rock art site in the east part, rock art mostly found on coastal cliff, cave in the little island, shelter. There are several sites lied on the hill, in the inland of Papua. Rock art site in the east part, ussulay surround by exotic coast, such as Misool islands (Chazine 2011; Sulistyarto et al. 2014; Oktaviana 2015), Berau Gulf, Kaimana, Triton (Arifin and Delanghe 2004; Gonthier et al. 2013), Dunwahan, Kei island (Ballard 1988; Ririmasse 2007).

Gua Harimau is a cave rock art site, surround by local farming and nowadays with palm estate also. This shows western part feature of Indonesian rock art. Gua Harimau rock art shows a non-figurative, and apparenly connect with a complex economic behaviour (looks Ananti, 1996), and theorecally came from Autronesian culture. Despite the intentional collaboration research from Indonesian Archaelogy Reseach Centre (Puslit Arkenas) and IRD, France to search prehistoric settlement in South Sumatera in the Padang Bindu karstic region started from 2001. But rock art reseach just started in 2009 in Gua Harimau. Firstly reported by Wahyu Saptomo in 2009, and its became the first rock painting reported found in Sumatra Island. Then, in 2010, Pindi Setiawan made description study of Gua Harimau rock art, and then some motif found in 2014 by Adhi Agus Oktaviana. Around 51 images describing with dominant non-figuratif red hematit, drawing using hand and tool brush on the eastern and western part of the cave. The images condition during the six year research commonly degradate to more lichen and exvoliation on the light zone (Oktaviana, Setiawan, and Saptomo 2016). Rock art study in Gua Harimau recently published on Simanjuntak (ed.) 2016 “Harimau Cave: and the Long Journey of OKU Civilization.

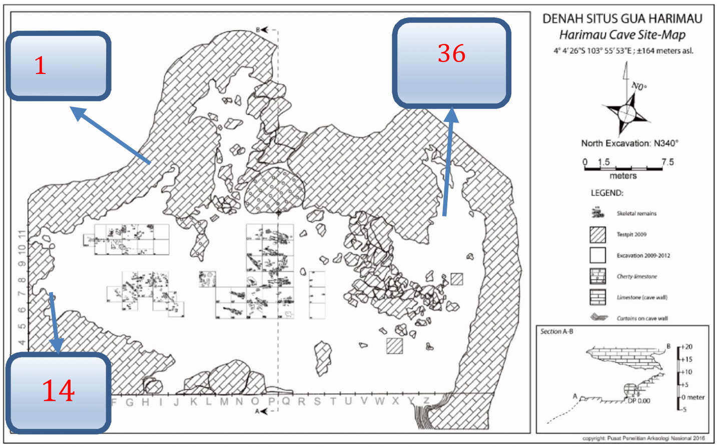

Figure 2. Map of Gua Harimau (source Puslit Arkenas, 2016)

Gua Harimau is a cave at Padang Bindu village, with coordinate 4°4’26,5” S and 103°55’52,0” E, ±164 m height from sea level and a chamber is 20 m above the river plateau.

The chamber is 1,376 m^2 (43 x 32 m) with facing to the southeast (N 133°) and the cave exposing by to sun rises with a slope of 40°. The geological formation of the cave are limestones which is forming aged early to middle Miocene. The cultural context of Gua Harimau have different sequence human occupation from preneolithic to paleometalic period with 81 human burial and archaeological remains. The lowermost cultural layer at Gua Harimau show that the chronology by the late pleistocene about 15 kya. Those facts, put Gua Harimau as an extraordinary prehistoric cave site in west part of Indonesia.

Method

In this study, the primary data taken by observation on several rock art sites in Indonesia. Six year observing in Gua Harimau from 2011 until 2016, then other observation sites from Maros-Pangkep, South Sulawesi; Muna Islands, Southeast Sulawesi; Sangkulirang-Mangkalihat, East Borneo; and Raja Ampat regions (Oktaviana 2015). The secondary data are from the publication which including the non-figuratif rock art images such as publication (Yondri 1996; Ririmasse 2007; Ballard 1988; Arifin and Delanghe 2004).

The development of digital recording methods has increased by using the latest technology and application of software such as DStretch which has allowed the recognition of motifs which were not visible to the eye (Oktaviana 2015). The method of rock art recording at Gua Harimau included determining the orientation, identification and placement of the paintings. The heights of the individual stencils on the cave walls (height above floor) were measured using laser distance meter while the photography was performed using a 10-MP digital camera with and without IFRAO scale. The photographs were processed using ImageJ application with plug-in DStrech (Harman 2005; Le Quellec, Duquesnoy, and Defrasne 2015; Oktaviana 2015). The next steps include storing of processed file in folders per panel, and database compilation with Microsoft Excel 2010. The rock art database contains information on the site's name and the panel within the site, the depicted objects, painting technique, colour, photo numbers, height from cave floor, position (wall or roof), and condition of the painting.

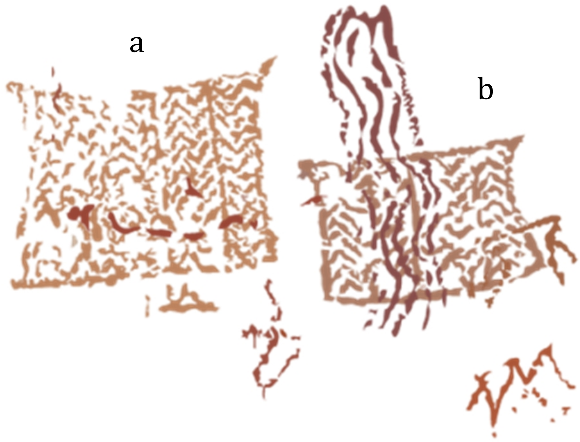

Figure 3. Jala Tumpal=ideograph (a) and Garis Lengkung Sejajar=psycograph (b).

Discussion

Rock art at Gua Harimau was identified by Pindi Setiawan and Adhi Agus Oktaviana from 2010 until 2016, at Wahyu Galery (east side) found 36 images, dark red and dark brown, Brush with finger and pointy stick. Type: dot (1), lines (23), and outline (12), all clasified as non-figuratif, and drew at wall and ceiling. One of exception in Wahyu Galey, there is one panel only could not seen from main chamber, it only seen through a little foyer very close to the panel. At West Galery found 15 images, dark red and dark brown. Brush with fingers. Type lines (15), all clasified as non-figuratif, and drew at wall (11) and stalactite (4).

Figure 4. Geometric images in Wahyu Gallery, eastern part of Gua Harimau.

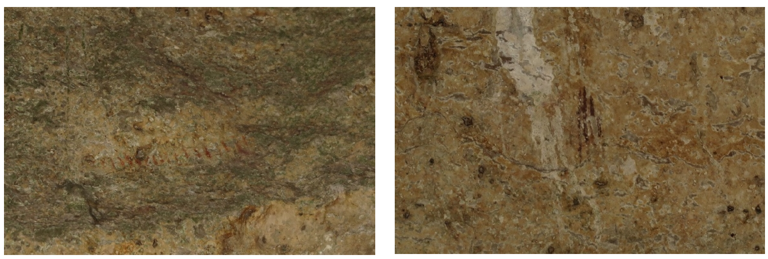

Figure 5. Geometric images in West Gallery, western part of Gua Harimau.

In general there are two motif design at Gua Harimau, one is a bulk composition of chevron, and its become net lookslike, called *jala tumpal*. All the *jala tumpal* images looks apparent creating as calculating design. But, the other type is a pararel curved line, and its look more as spontanous creating images, called *Garis Lengkung Sejajar (GLS)*. As those looks like, the calculating non-figuratif images classified as ideographic, and spontanious images as psycographic. *Jala tumpal* mosly appeared with *GLS* on the top, and this composition found repeated at the other panel.

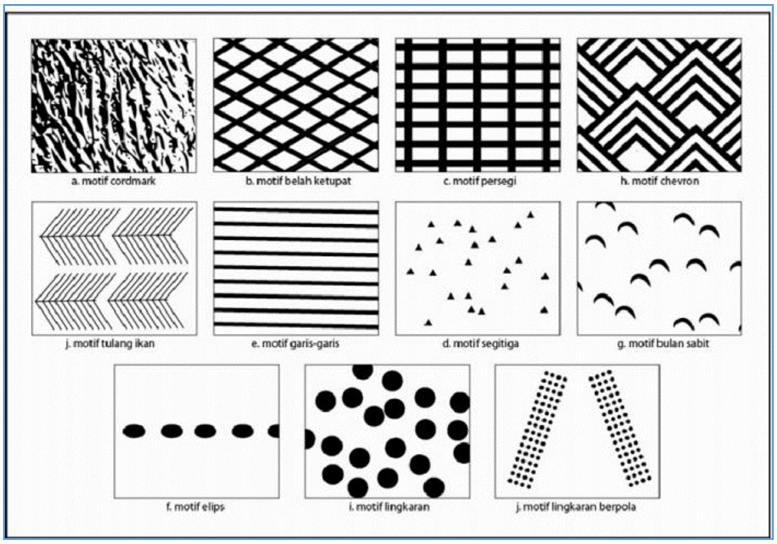

Figure 6. Pottery motif design (Source: Mirza Ansyory dalam Simanjuntak (ed) 2016)

The other non-figuratif images shown create by carefully calculating design, as fish bone, circular and regular sequence short line. These motif also could found at pottery. Both at cave wall and pottery, the motif seems made by carefuly calculating. But the second type, a psycographic could not found at pottery. It is looks like make directly during one event, as a certain process, spontanious (see Anati 1997; Setiawan 2010). To understand rock art in Gua Harimau, need to be compared with the other rock art site in Indonesia. A comparison will be just on non-figurative images pictures. The comparison consists of three variables: shape, color, and technique. The aim is to understand the position of Gua Harimau upon the mapping of Indonesian Rock Art.

Sites	Tipe of landscape				Technique	Color	Images				
	Cave	Rock Shelter	Cliff	Boulder			Human Figure	Hand stencil	Fish	Boats	Geometric
Gua Harimau, South Sumatera	√	-	-	-	painting	red	-	-	-	-	√
Sarolangun, Jambi	√	-	-	-	painting	black	√	-	-	-	√
Batu Cap, West Kalimantan	-	-	-	√	painting	red	√	-	-	√	√
Liang Kaung, West Kalimantan	-	√	-	-	painting	black	√	-	-	-	√
East Borneo (±50 sites)	√	√	-	√	stencil, painting	red, black, white	√	√	√	√	√
Liang Kain Hitam, Niah, Borneo	√	-	-	√	painting	red	√	-	-	√	√
South Sulawesi (±100 sites)	√	√	-	√	stencil, painting	red, black	√	√	√	√	√
South East Sulawesi (±30 sites)	√	√	√	√	stencil, painting	red, black, white	√	√	√	√	√
Watu Sikka, East Seram	-	-	√	-	stencil, painting	red	√	√	√	√	√
Sawai, Seleman Bay, East Seram	-	-	√	-	stencil, painting	red, white	√	√	√	-	√
Berau Gulf Region, West Papua (±50 sites)	√	√	√	-	stencil, painting	red, white	√	√	√	√	√
Kaimana regions, West Papua (±24 sites)	√	√	√	-	stencil, painting	red, black, white	√	√	√	√	√
Misool regions, West Papua (±60 sites)	√	√	√	-	stencil, painting	red, black, white	√	√	√	√	√
Kei Islands, South East Maluku	-	-	√	-	stencil, painting	red, orange, yellow, black	√	√	√	√	√
Kupang, East Nusa Tenggara	-	-	√	-	stencil, painting	red, orange, yellow,	√	√	-	√	√

In western part ISEA, rock art at Gua Tambun shown that half of the total is geometric images (Tan and Chia 2011), and some images like parallel lines and finger traces similar with Gua Harimau rock art. Nonetheless, mostly the nonfigurative images like geometric are found in every karstic region in eastern part Indonesia. Several images like concentric circle and zigzag in Gua Harimau looks like in rock art at Kei Island and Eastern Indonesia. Ballard assumed that images from rock art at Kei Island similar with the images at boats, weapen, pottery and etc and also interpreted those images with the *lantaar*, as symbol for company or family (Ballard 1988). Tichelman mentioned about geometric images in MacCluer (Berau) gulf as “rajah” motif likes in Seram, made by man and women. Geometric images such as spiral also associated hand stencil as processing to rites, other images interpreted like fertility or reproduction and sexual symbol (Arifin 1992: 131-135).

Conclusion

Gua Harimau shown only geometric images, with two type ideograph and psycograph, The ideograph is created by carefully calculating design, and psycograph is a spontaneous design. This fact assumed there were two event in creating a process of rock art images, first they prepare an important image (*Jala tumpal*), then during one certain event, they add a *GLS* as new image on top *Jala Tumpal*.

In the result of the comparison, Gua Harimau shows the western part type of Indonesian rock art. Gua Harimau rock art shows a non-figurative, and apparently connect with a complex economic behavior and theoretically came from Autronesian culture. The color shown red nuance, but especially in west gallery the pigment became greener, because of weathering and lichen (see also (Taçon and Chippindale 1998; Arifin 1997; Arifin 1992)

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METAL ARTIFACTS ANALYSIS FROM *GUA HARIMAU*, SOUTH SUMATERA, INDONESIA

Harry Octavianus Sofian, Thomas Oliver Pryce, Truman Simanjuntak, and François Sémah

Introduction

Archaeometallurgy is a sub discipline of archaeology concerned with the production and consumption of metals, from the source, technique, metal production and distribution, to understand human activities from the past (Historical Metallurgy Society 2008). Like many other practical elements of archaeological study, archaeometallurgy was borrowed from material science; this discipline is to study microstructure and composition of metal object.

In the history of metallurgy, bronze is the first alloy that human used that came from combining copper (Cu) and tin (Sn); together with leaded copper, which is a combination of copper (Cu) and lead (Pb); arsenical copper, which is a combination of copper (Cu) and arsenic (As); and leaded bronze, which is a combination of copper (Cu), lead (Pb), and arsenic (As). By combining copper with other metals the melting range of the resultant alloy will be reduced. Producing metal object is not an easy task, because it needs a multiple complicated steps, knowledge about metal, furnace, and fire control (Scott 1991; Haryono 2001).

The development of metallurgy has occurred since 11^{th}-10^{th} BCE in Southeast Asia; during agricultural and hunting activities, distribution of bronze artifacts increased by imported materials along the southern Chinese border (A.T.N. Bennett 1989; Thomas Oliver Pryce 2014; Joyce C. White et al. 2014). This import activity seems to be in line with more increased agriculture activities in the Mainland Southeast Asia during the 2^{nd} millennium BCE. The migrating farmers from north (now Taiwan) to south Mainland Southeast Asia, called Austronesian language speakers, brought their language and cultures; domesticated rice, millet, pigs, and cattle and mixed together with the indigenous-hunter gatherers in a period of rapid population growth (Donohue and Denham 2010; Higham 2014).

In Indonesia, archaeometallurgy research began to attract attention since H.R. van Heekeren, a Dutch prehistorian, published his book "The Bronze-Iron Age of Indonesia" in 1958. This book compiles bronze and iron artifacts discovered in Indonesia from excavations and museum collections. Heekeren argued that the bronze drums he analyzed have the same motifs with bronze drums of Đông Sơn style form Vietnam (Heekeren 1958). Since then, almost all of the metal artifacts found in Indonesia were always connected with the Đông Sơn culture. New research by Ambra Calò about bronze drum distribution in Island Southeast Asia from Vietnam between 3^{rd} -5^{th} century CE reveals that the drums did not touch the Mainland Southeast Asia, but were directly exchanged by the sea before they were distributed across Mainland Southeast Asia during the 2nd century BC to 2nd century CE (Calò 2009).

One of the *insitu* sites of metals in Indonesia is *Gua Harimau,* which was discovered in 2008 by a team from *Pusat Penelitian Arkeologi Nasional*. *Gua Harimau* is located at Padang Bindu village, sub district of Semidang Aji, Ogan Komering Ulu District (OKU), South Sumatera Province, about 35 km from Baturaja, the district capital. By the local people, *Gua Harimau* is also known as Karang Sialang (bees' nest *cave*), but more popular as *Gua Harimau* because in the past time this cave was often visited by tigers.

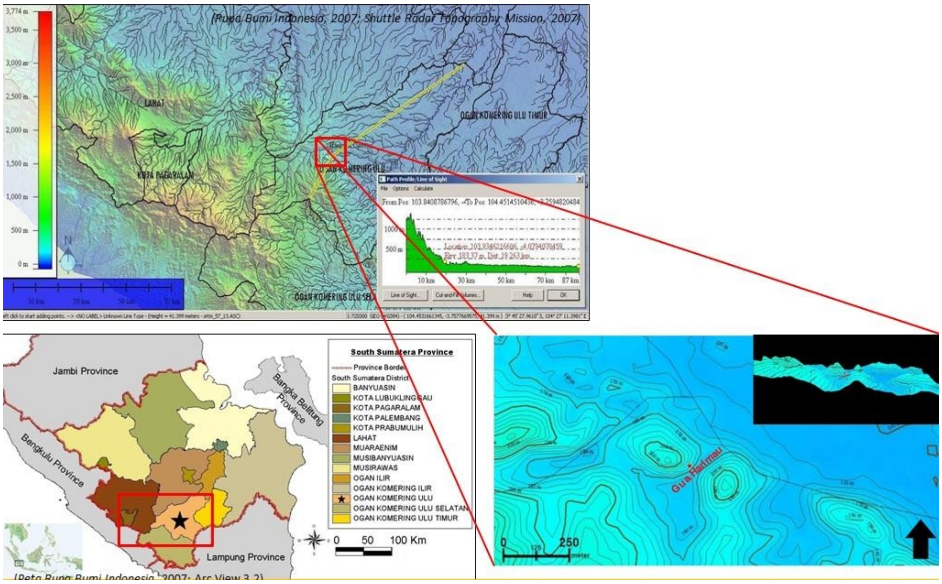

Figure 1. Gua Harimau map
(Source: Peta Rupa Bumi Indonesia; 2007)

Gua Harimau excavation began in 2009 and is still on-going; for excavation history in great detail, see the archaeological report by *Pusat Penelitian Arkeologi Nasional* (Puslit Arkenas). Materials used in *Gua Harimau* to make lithic artifacts consist of obsidian, andesite, basalt, limestone, chert, jasper, fossilised wood with a domination of limestone and chert. Ceramics are mainly pottery, but there are also porcelain; most of the pottery is fragmentary, only 5 jars are intact. Pottery also functions as the burial gift because some were found with the Individual number 50 (I50). Based on the shape, it is known that there are at least three types of pottery, i.e. jugs, bowls and jars, while based on the technique, there are two techniques, i.e. paddle-anvil (*tatap pelandas*) with coil techniques and swivel wheels (*roda putar*). Ecofacts were found in *Gua Harimau* in forms of a total of 32 species of fauna that represents the level of taxa both general and specific. In taxonomy, *Gua Harimau* fauna consists of two groups of phylum: *Mollusca*, and *Chordata*. The fauna of Phylum *Mollusca* were identified as two types consisting of *Gastropoda* class. While the *Chordata* consists of classes *Actinopterygii, Aves, Amphibia, Reptiles,* and *Mammals* (Oktaviana and Simanjuntak 2012; Simanjuntak, Oktaviana, and Prastiningtyas 2013; Agus Oktaviana et al. 2014).

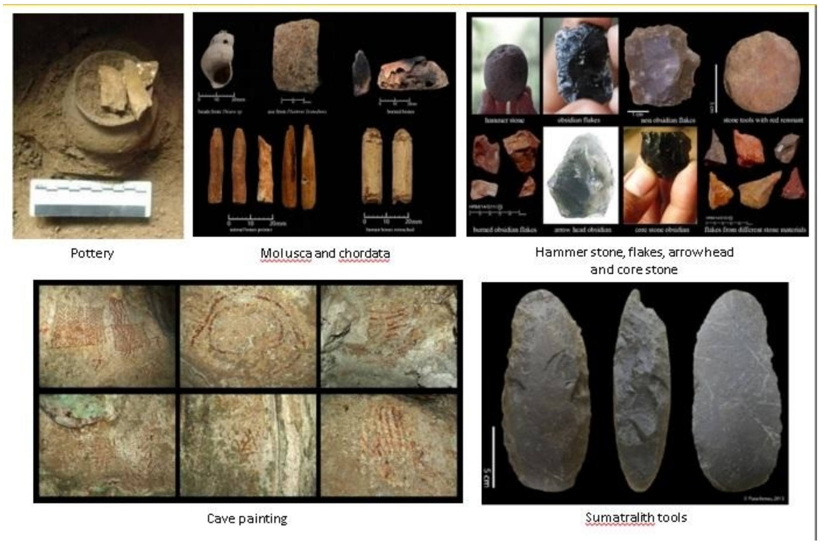

Figure 2. Artifacts and ecofacts from Gua Harimau
(source: Oktaviana et al. 2012; Oktaviana and Simanjuntak 2012;
Simanjuntak, Oktaviana, and Prastiningtyas 2013)

Until the 2014 excavation, only 12 metal objects were found. Not all the metals were found *insitu,* the bronze axes found in 2011 are without context from the sieving. The metals were associated with the burials number I.10, I.11, I.12, I.50 and I.63. The metal artifacts from 2009 excavation are missing from the collection. Only the artifacts from 2010, 2011, 2012a, 2012b and 2014 (11 metal objects, which are 3 iron objects and 8 bronze objects) that are the focus of this research. Iron objects was found at O9 and P9 excavation boxes from the spit 2 (20-40 cm from datum point); they are new artifacts, found on the first layer of stratigraphy unit. Only iron from P9 is associated with the burials from individuals I10, I11, I12. The iron artifacts are very corrosive during the time they were found. Bronze artifacts associated with burials from individuals no. I10, I11, I12 are socketed bronze axe P9, bronze bangle with motif associated with burials from individual no. I50, bronze bangle without motif associated with burials from individuals no. I43 and I63. Burial gifts are not only made of metal artifacts but also mollusk shells, pottery, *Macaca* sp. bones, and hematites (Oktaviana and Simanjuntak 2012; Agus Oktaviana et al. 2014).

Figure 3. Metal artifacts from excavation 2009 – 2014
(Tim Penelitian Padang Bindu 2009; Azis et al. 2011; Oktaviana and Simanjuntak 2012; Simanjuntak, Oktaviana, and Prastiningtyas 2013; Agus Oktaviana et al. 2014)

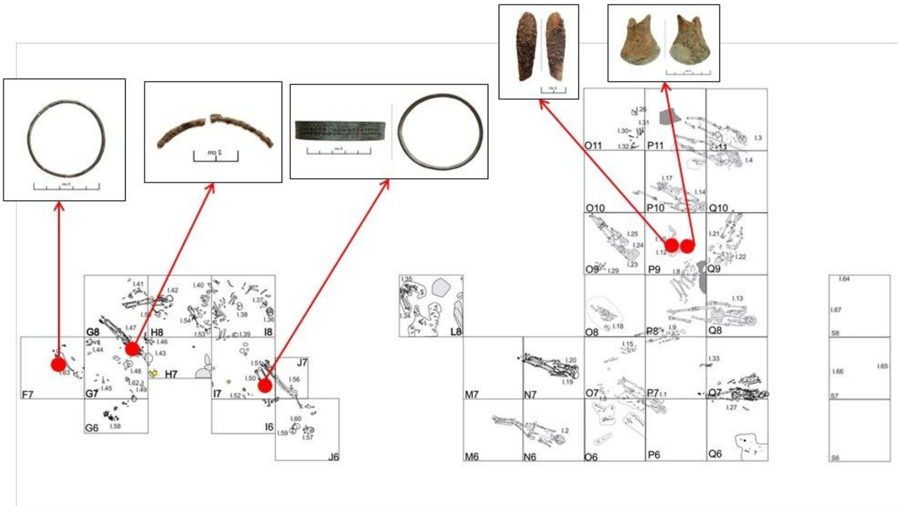

Figure 4. Burial gift associated with metal artifacts
(source: Tim Penelitian Padang Bindu 2009; Oktaviana and Simanjuntak 2012; Simanjuntak, Oktaviana, and Prastiningtyas 2013; Agus Oktaviana et al. 2014)

Source for dating is from the soil, sediment at excavation number S6 and S8, and for the bones dating samples are taken from I13, I27, I3, I56, I58, I44, I40, I4, I8, and I2. The place for dating is the laboratory of the *Pusat Aplikasi Teknologi Isotop dan Radiasi (PATIR), Badan*

Tenaga Atom Nasional (BATAN) - Indonesia. The dating result is from I.43 date 385 ± 9 BCE. The oldest dating from *Gua Harimau* 741 ± 56 BCE and the newest dating 110 ± 23 CE, which means that the occupation at *Gua Harimau* occurred for a long time period (Oktaviana and Simanjuntak 2012).

Table 1. Direct bone carbon dating results (source: Oktaviana and Simanjuntak 2012)

No samples	Type	From	Deep		Analysis Result			Notes
			Zmin	Zmax	14C years BP	Calendric Age Cal BP cal BP	Calendric Age calAD/calBC	
BTN12001	Bone	I.13	150	158	2.048 ± 20	2.014 ± 30	64 ± 30 BC	
BTN12002	Bone	I.27	138	151.6	1.852 ± 20	1.786 ± 36	164 ± 36 AD	
BTN12003	Bone	I.3	105	117.5	1.880 ± 20	1.840 ± 23	110 ± 23 AD	
BTN12004	Bone	I.56	~	82	1.910 ± 20	1.860 ± 21	90 ± 21 AD	
BTN12005	Bone	I.58	~	100	2.250 ± 25	2.261 ± 64	311 ± 64 BC	Burial gift molusca
BTN12006	Bone	I.44	82.7	84.4	2.575 ± 30	2.691 ± 56	741 ± 56 BC	
BTN12007	Bone	I.40	85.5	108.7	2.305 ± 25	2.339 ± 9	389 ± 9 BC	
BTN12008	Bone	I.4	107	121.4	1.925 ± 20	1.872 ± 24	78 ± 24 AD	
BTN12009	Bone	I.8	85.5	108.7	1.995 ± 20	1.951 ± 28	1 ± 28 BC	
BTN12010	Bone	I.2	40	49.5	2.150 ± 25	2.196 ± 84	246 ± 84 BC	
BTN13022	Bone	I.43	325	525	2.290±20	2335 ± 9	385 ± 9 BC	Burial gift Bronze Bangle
BTN13023	Bone	I.54	74	80	2.190±20	2230 ± 63	280 ± 63 BC	

Discussion

Methods used in studying metal artifacts from Gua Harimau on this research are metallography, XRF (X-ray fluorescence), motif and style artifacts analysis.

Metallography Analysis

Metallography is a scientific discipline to study and determine ancient metal materials with microscopic technique to get information about composition, micro-structural components, corrosion, and manufacuring technique. The microscopic examination of ancient metal structure may be done over a wide range scale of magnification level, from low magnification microscope using a light microscope (~20×) to high magnification microscope with an electron microscope (SEM). Metallography is an essential technique to answering questions about potential cultural source using similar working techniques (Scott 2014; Voort 2004). Metallography is a destructive analysis, meaning we must cut a little part of the metal artifacts for analysis. Before analyzing metal artifacts under microscope, several steps should be followed and applied like cutting the metals artifacts, make preparation for metal samples, make resin samples, polishing and lastly analyzing the metals samples under microscope.

From all the results of metallography analysis, generally metals from Gua Harimau can be divided into two based on information from the remnant structures into two: casting and working techniques. Casting is the operation of pouring metal into a mold and allowing it to solidify; the mold materials are stone, ceramics, clay, etc. Dendrite growth happened by slowly solidifying a molten alloy from casting production techniques; it is possible to form a tree-like dendritic structure, which initially grow as primary arms and depending upon the cooling rate, composition and agitation, a secondary arm grow outward from the primary arm, and tertiary arm grow outward from the secondary arms. In working technique, the metal is hammered at low temperatures to make it hardened and stronger. Annealing twin boundaries occur when two crystals mirror each other, and it occurs due to work-formed after releasing work-hardened stresses in the microstructure (Jones, 2001).

From the analysis result, 64% of bronze and iron artifacts from *Gua Harimau* were made using casting technique, 18% were made using working techniques and the rest 18% cannot be identified which techniques were used. Cutting sample places at the artifacts is the most important part. The artifact no. 2, a bronze axe, shows that the remnant information is due working technique, but the other socketed bronze axes (artifacts no. 1 and 11) show that the remnants are due to casting. It is also reveals that the socketed bronze axe no. 2, was made with casting technique as well as working technique to make a sharp edge.

Table 2. Bronze and iron technic production

No	Type Artifacts	Remnant	Information
1	Socketed bronze axe	casting	P9, spit 6, 2010
2	Socketed bronze axe	working	without context (sieve), 2010
3	Iron	casting	O9 at spit 2, 2011
4	Iron	unidentified	P9 at spit 4, 2011
5	Iron	unidentified	Q6 at spit 2, 2011
6	Bronze fragment	working	P6 at spit 3, 2011.
7	Bronze fragment	casting	Q7 at spit 7, 2011
8	Bangle with motif	casting	I7 at spit 2, 2012a
9	Bangle without motif	casting	F7 at spit 7, 2012b
10	Fragment bangle	casting	H5 at spit 5, 2012b
11	Socketed bronze axe	casting	P9 at spit 10, 2014

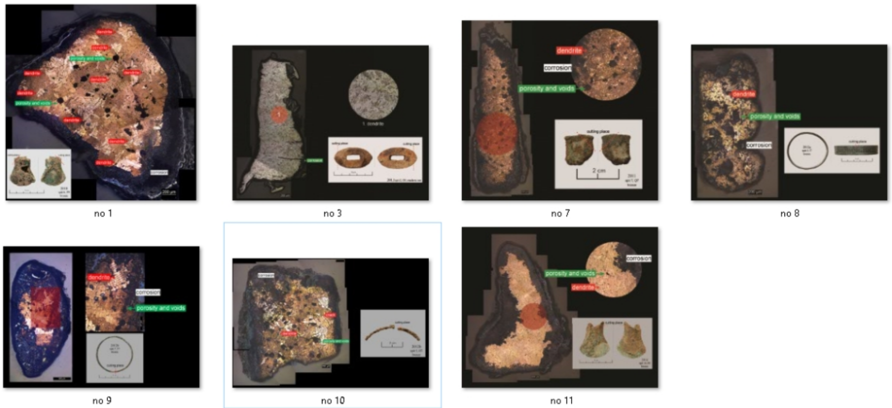

Figure 5. Metal artifacts using casting technique

Figure 6. Metal artifacts using working technique

Figure 7. Metal artifacts which cannot be identified

XRF (X-Ray Fluorescence)

XRF method of study is used in the industry and laboratory, while in archaeology XRF was first used for analysis in 1960 by Edward Hall in his paper in the journal of archaeometry. Since that time, XRF has been widely used to help analyze archaeological metals, glass, and ceramics in geoarchaeology. XRF has many advantages: non-destructive, samples can be examined with minimal preparation for qualitative data quality, only takes a short time for analysis (from seconds to minutes, depending on the mass) depending on the data quality, easy to use because the modern instrument is run under computer control and software, and cost-effective because it does not need more sample preparation treatment (Pollard et al. 2006; Shackley 2011). The analyses were carried out in the LAPA (*Laboratoire Archéomatériaux et Prévision de l'Altération*) laboratory of the CEA (*Commissariat à l'énergie atomique et aux énergies alternative*). The instrument used for XRF analysis was a Thermo Scientific NITON XL3t setting with a 3mm spot size for 60 seconds using an accelerating voltage of 35 kV, a current of 10 micro amperes and a power of 350 W.

XRF analysis gives way to understanding the composition of the artifacts. From the analysis, copper (Cu) is the main materials with different additive materials to make metal alloy, which are tin (Sn), lead (Pb) and silver (Ag). Lead (Pb) and silver (Ag) are not a significant composition to the bronze artifacts; they were probably accidentally added. Artifact no. 8, bangle with motif, show that lead (Pb) was deliberately used as additive besides tin (Sn).

Table 3. Metal composition from Gua Harimau

No	Artifacts No	Copper (Cu)	Tin (Sn)	Lead (Pb)
1	1. Socketed bronze axe	●	●	
2	2. Socketed bronze axe	●	●	
3	6. Bronze fragment	●	●	
4	7. Bronze fragment	●	●	
5	8. Bangle with motif	●	●	●
6	9. Bangle without motif	●	●	
7	10. Bangle fragment without motif	●	●	
8	11. Socketed bronze axe	●	●	

Morpho-Stylistic Analysis

Typology in archaeology is the basic unit of classification of artifacts because of the large sets of the materials studied in archaeology, and it gives the general identification of the type. Artifact types come in all shapes and varieties. There are four ways to analyze types of artifact: functional types to answer questions of function from the artifacts, decorative types to answer questions about decoration aspects of the artifacts, morphological types to answer questions about the shape-related characteristics of the artifacts, and chronological types (historical or temporal types) for measuring the age of the artifacts (O'Brien and Lyman 1999)**.** The bronze artifacts from *Gua Harimau* can be divided into:

<u>Socketed bronze axe</u>

The socketed bronze axes found are 3 pieces. These axes were probably not used as ordinary tools, but <u>for</u> ceremonial purpose as burial gifts. From the morpho-sylistic view, the socketed bronze axes from *Gua Harimau* are of different type from socketed bronze axes from Gilimanuk in Indonesia, Ban Chiang in Thailand and Prohear in Cambodia but similar to the socketed bronze axe from Samon valley in Myanmar.

Figure 8. Socketed bronze axes form from different sites and country

The socketed bronze axe no. 1 shows remnant inside the bronze socket, probably it used biological material as its handle, but this need further analysis to prove the assumption. Also I can see remnant from the casting production at the top edge of bronze axes, probably because during solidification the metal liquid was getting harden outside or around the mold.

Figure 9. Remnant inside the socketed bronze axe (left), remnant of casting (right)

Bangles

There are 3 bangles from the *Gua Harimau*, one of them has motif and the other two are without motifs. From morpho-stylistic analysis, the motif from the *Gua Harimau* is very common in Mainland Southeast Asia and Island Southeast Asia; this motif is frequently found at the other metal artifacts. Compared to motifs on the Bronze Kettledrum (Nekara) from Java, collection of Quai Branly Museum in Paris, the motifs on the Nekara handle and body have a similar motif with the bangle from *Gua Harimau*. This motif is also found on the pottery ornament and cave painting from *Gua Harimau*.

Figure 10. Bangles from Gua Harimau

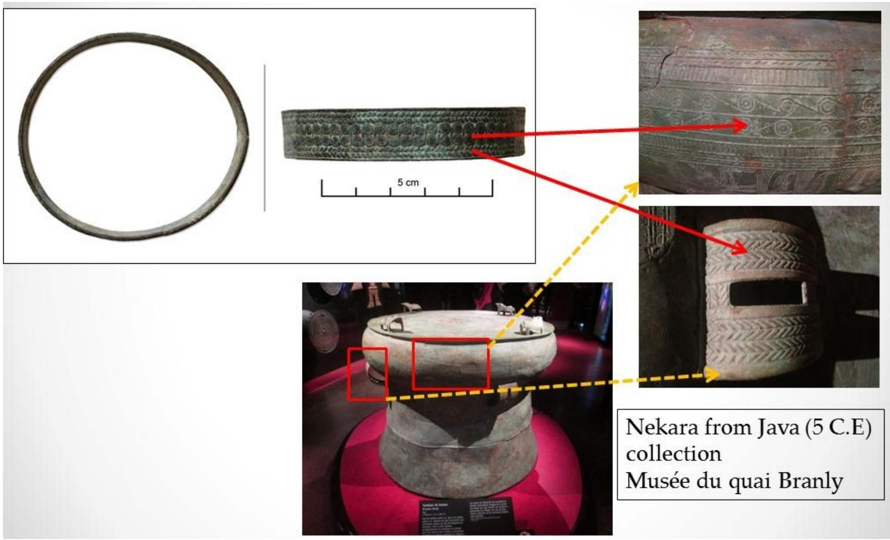

Figure 11. Bangle with motif from Gua Harimau and Nekara from Musee du quai Branly collection

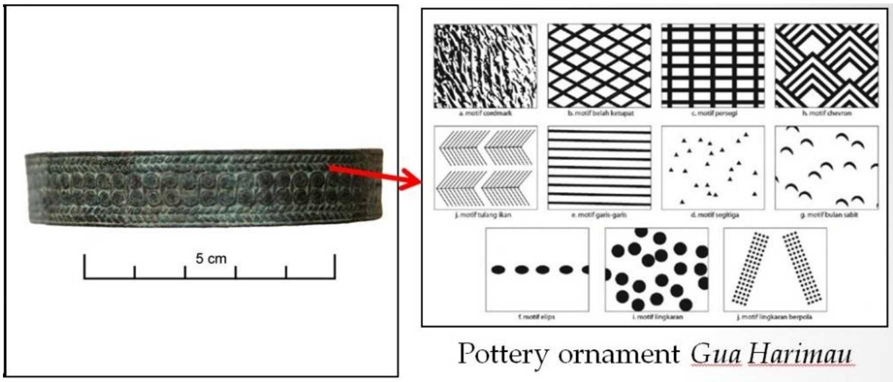

Figure 12. Bronze bangle motif and pottery ornament

Mr. Agustijanto's private collection from Musi River has the same motif with bangle from *Gua Harimau.* The bangle from Agustijanto's collection was made from bronze (*personal conversation with Agustijanto, 15 July 2015*). Musi River is the main river that flows to the sea, it is connected with Ogan River and Aek Haman River in the headwaters, where *Gua Harimau* is located.

Figure 13. Bangle from Agustijanto collection from Musi River
(Photo on the left: with permission from Agustijanto)

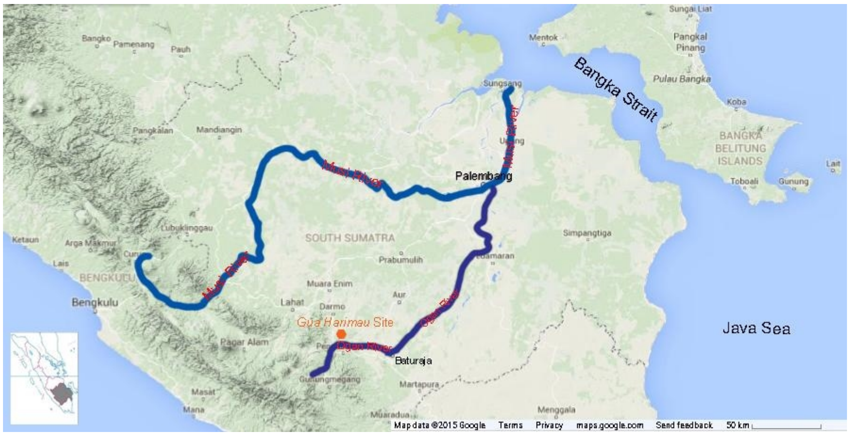

Figure 14. Location of Gua Harimau compared with Musi River and Ogan River
(Googlemaps.com with modification)

Unidentified

The iron (?) and bronze fragments cannot be identified with morpho-stylistic analysis.

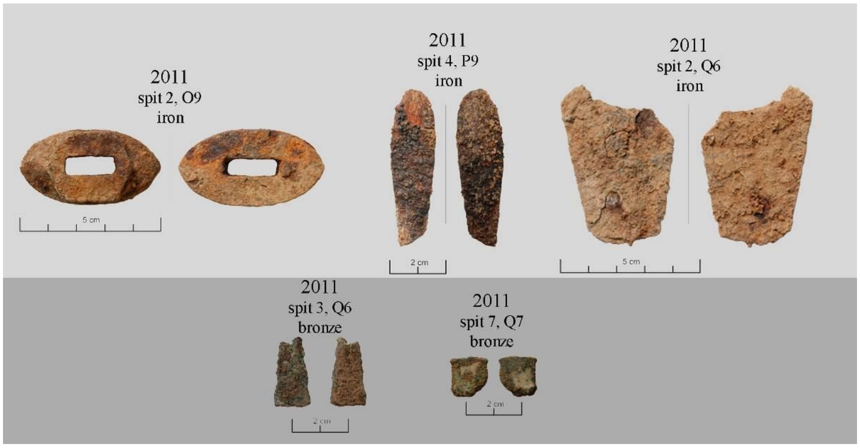

Figure 15. Fragments of iron (?) and bronze artifacts

Conclusion

This paper focuses on the study ancient metal artifacts from *Gua Harimau,* using metallography, XRF and morpho-stylistic analyses. Although not many metal artifacts are discovered from this site, there is evidence that the *Gua Harimau* inhabitants have already known metal products. There is no evidence of mold, furnace or crucible from Gua Harimau site, probably the metal artifacts were obtained from exchange.

The first analysis I use is metallography. From this analysis is shown that there are two techniques used to make metal artifacts, namely casting and working. These techniques are common in the Bronze - Iron Age. Casting technique dominated the *Gua Harimau* artifacts. One artifact (socketed bronze axe no. 2) indicates two techniques of metal productions, which are casting and working, others indicated only one technique metal production. Metallography analysis has a limit; from 11 artifacts, I did not see two-remnant structure on these artifacts under microscope.

XRF analysis gives a way to understand the composition of the artifacts. From the analysis, copper (Cu) is the main materials with different additive materials to make metal alloy, tin (Sn), lead (Pb) and silver (Ag). Leads (Pb) and silver (Ag) not give important composition to the bronze artifacts, it was probably accidentally added. Artifact no. 8, bangle with motif show the lead (Pb) looks deliberate as additive besides tin (Sn).

Metals artifacts from the *Gua Harimau* show that alloy of copper (Cu) + tin (Sn) is dominant. In Southeast Asia alloy for copper (Cu) + tin (Sn) is common because there are tin (Sn) resources in MSEA. It is different with bronze alloy from Europe and Mediterranian which do not have tin (Sn) resources, thus the bronze production is dominated by copper (Cu) + Arsenic (As).

The morpho-stylistic analysis gives the information that the bronze artifacts were used in the burial ceremony as burial gifts. The socketed bronze axes from *Gua Harimau* are different with form the socketed bronze axes from Gilimanuk (Indonesia), Prohear (Cambodia) and Ban Ciang (Thailand), but the socketed bronze axes form from Samon valley in Myanmar show similarity.

The socketed bronze axe no. 1 shows remnants inside the socket; probably it used biological material as a handle. Also there is a remnant of the casting production at the top edge of bronze axes, because the metal liquid hardens outside or around the mold. The burial gifts for the *Gua Harimau* inhabitant were not based on gender, as shown from 5 burials' metal burial gifts: individuals 2, 10, 11, 12 are males and individual 43 is a female.

The bangle motif from the *Gua Harimau site* is very common in Southeast Asia. This motif is found in different artifacts like *nekara* (kettledrums), pottery and bangle. It looks like the bangle motif is trending at that time. One bangle that has a similar motif with Gua Harimau bangle is a bangle from Agustijanto collection, which was discovered at Musi River.

Musi River is the biggest river in South Sumatra. It has 9 branches, one of which is Ogan River, which has the headwaters at Aek Haman River near *Gua Harimau*.

The metals study at *Gua Harimau* site is hoped to enrich the knowledge about the ancient technology, culture, economy, society and belief through metals analysis. This research to complete previous research, which metals artifacts not yet analyses from the 2009 – 2014 excavation. This study is also hope to enrich the study archaeometallury in Indonesia. For the future this research can be continued into the larger scope of research, to build database for ancient metallography and composition for metal artifacts. Later, material culture analysis can be carried out to understand ancient metalworking techniques, ancient people, and culture.

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EPILOGUE

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The current study on Austronesian language speakers have reached its highest state of development, thanks to the collaborative works among researchers and many expertise that have been involved. In retrospect to almost 50 years ago, an idea of a vast single language family that could occupy almost a half globe since prehistoric period at the first time probably quite exaggerated. However it is the fact that occurred ca. 4500 up to just a couple hundreds of years ago. It happened in an incredibly large area from Easter Island on the east and Madagascar in the west (Blust 1984; Bellwood 1997). Those early Austronesian speakers with their background of knowledge on maritime exploration and domestication of plants and animals were successfully inhabit a wide variety of geographical landscape. They feasibly occupied a 'niche' available in a highly diverse environment, started from a swampy and coastal area in the lowland up to the hilly karstic area at the interior of several island. Sort of important question can be addressed to their origins, migration route, chronology, cultural interaction, economic and technological strategy, etc. These questions have been discussed and some progressive results generated during the International Symposium of Austronesian Diaspora, held in Nusa Dua, Bali from 18th to 23rd of July 2016.

A holistic overview on the history and the progress of Austronesian in this book have already described by Peter Bellwood. There is no need to repeat his explanation which became the 'backbone' of this book. However it should be emphasized that since it begin with linguistic and a classic archaeological perspective, the progress on Austronesian study has made its leap by involving several scientific works, such as residue analysis, mineralogy, physical-anthropology, and molecular biology. We should grateful on the development of radiocarbon dating techniques (especially to AMS method) which provide reliable result with only small amount of organic samples required. It is quite recent since the discovery of Harimau Cave that provide us an example of incredibly intensive habitation by *Austromelanesian* population with Preneolithic culture which is later replaced by *Mongoloid* population from Neolithic and Paleometalic culture (Simanjuntak et al. 2015). Behavior and material culture as reflection of human adaptation during the past should be took into account when describing a highly diverse artifacts from Austronesian sites. Similarity amongst artifacts seems vague from Neolithic Period, but in certain site this condition reflects a continuous interaction among different groups. The needed of an exotic resources, such as obsidian (Bellwood and Koon 1989) and jade/nephrite feasibly became the main reason for this. But is it that simple? Interaction between coastal and interior land have also occurred during Neolithic and Paleometalic. This is shown by body ornaments (or burial goods) made of seashell found in Neolithic sites in karstic area, such as Harimau Cave, Niah Cave, and Kain Hitam Cave (Bujeng and Chia 2012; Ansyori and Awe 2016).

Nowadays, we are not only face with cultural interaction, but also genetic interaction between groups of peoples. Genetic evidences extracted from recent population in some part of Indonesia have shown a multiple sources of genome both, from *Austromelanesian* and *Mongoloid* that could be trace back up to Neolithic Period (see Karafet et al. 2010; Xu et al. 2012). Koesbardiati and her colleagues have built a model of ancient movements which she described as 'Swinging-like' movements during the course of Preneolithic until Neolithic and Paleometalic, especially in the eastern part on Indonesia. It is also interesting that this result is also supported by series of datasets from anthropometric, epigenetics, genetics, and dental modification practices. Readdressing question about the origins among different groups of Austronesian speakers also need other perspectives. A new review on linguistic study related with Neolithic population also raised during the symposium. R. Blench proposed too look at Proto-Malayopolinesian as a network of related subgroups. It can never fully reconstitute a unitary PMP such being thought before because no such entity existed (look at Blench's article for further explanation). Not only linguistic-based explanation available for reconstructing the origins of ethnic group in Austronesian language family. Folklore, legend, ritual, and ancient political hierarchy could be took into account, such being described in Marzali's article. Our understanding on existing language groups and ethnicity in the Southeast Asian Archipelago is extremely important because ancient oral tradition and cultural practices have been 'crystalized' in those indigenous group. The traditional woven container and weaving clothes amongst the natives in Indonesia is an indicator of how ancient Austronesian peoples living during the past.

Recent results of archaeological works by the National Center for Archaeology and several international colleagues at Harimau Cave have provided us important information related with human habitation during Preneolithic, Neolithic, and Paleometalic Period. Collaborative works among senior and junior researcher in this site have produced sort of explanation about technological strategy and beliefs during those successive periods of occupation. Several flexed-burial have been identified belong to *Austromelanesian* population meanwhile extended burial in supine position have been identified as *Mongoloid* population (look at the article from Hirofumi Matsumura et al. for further information). Their position are separated just a few centimeters in vertical order. In this cave a direct example of cultural characteristic among Austronesian speakers and its differences with the former inhabitant of Harimau Cave was clearly demonstrated by artifacts embedded in a thick cave deposit. With a range of radiocarbon dating results from about 4000 up to 2500 years BP, we could bracket the Neolithic phase in this cave at those age (see the article of Fauzi and Simanjuntak for further information). Meanwhile the Preneolithic phase in the cave is span more than ten thousand years ago with appearance of burials at ca. 4800 years BP (Simanjuntak et al. 2015). The position of Harimau Cave in the western part of Indonesia with these range of radiocarbon dating result have brought us into a new discussion about the possibility of another migration route during Neolithic period, not only from Formosa to the the northern area of Sulawesi but also from the costal mainland to Sumatera and then spread out to the east (see also Simanjuntak 2015; Simanjuntak and Forestier 2004). At the meantime, Austronesian expansion also occurred from the east to the western part of Indonesia. This might be an alternative solution on explaining the domination of pottery with Lapita culture affinities on the east of Indonesia and Pacific which is quite different with the common appearance of cord-mark pottery in the western part of Indonesia.

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