

Human History and the Orang Asli in Southeast Asia
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When I lived in a Temuan village, I heard some recent history, the hardships of the Japanese occupation period. A Temuan man also showed me a stone axe head but no deep history was recounted.

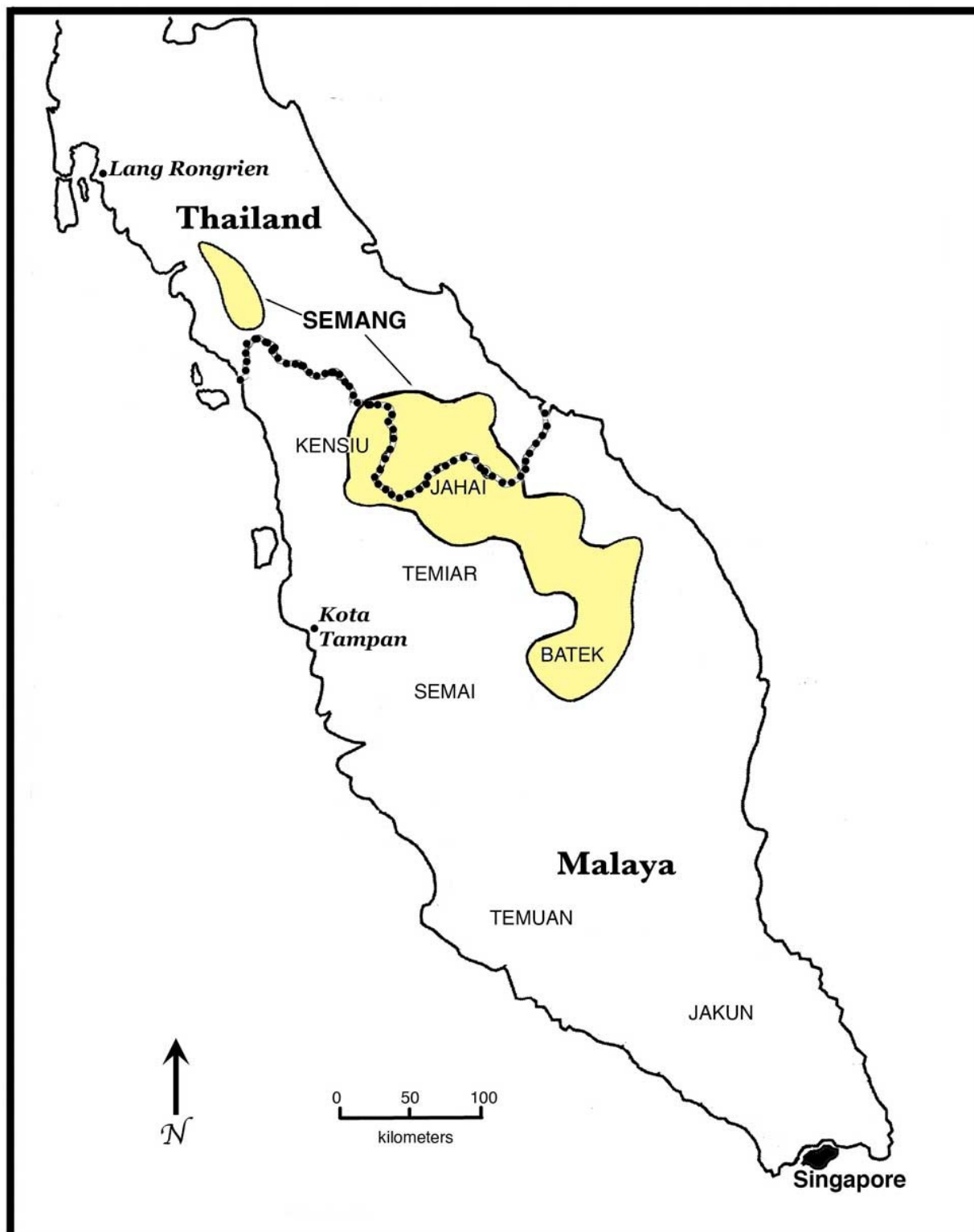
Introduction

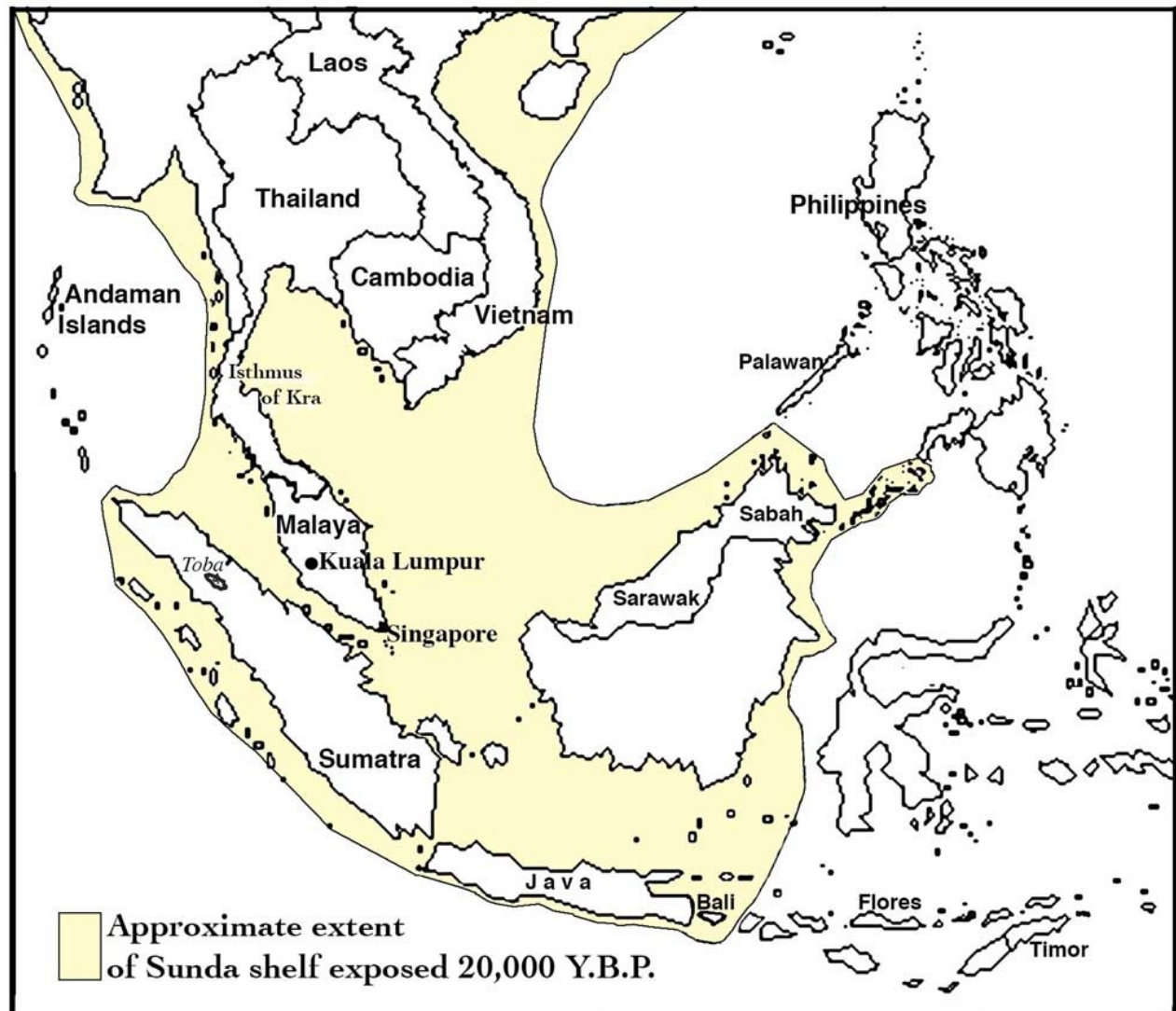
We look into the past to find our roots and to make sense of the world. For western Southeast Asia, two large patterns emerge in its history, both based on human ingenuity. One pattern is the interaction of people with the natural environment. The other involves cultural interactions. During thousands of years of human existence in the region, both types of interactions have changed—have evolved—and they continue to evolve. Nothing on earth is static. It is all in transit, all dynamic.

The pattern of interaction with the environment started with the needs of the first pioneers to find food and shelter. They also needed to avoid predators and parasites as best they could, learn the geography and ecology of their new homeland, and adapt their tool technologies in order to survive and thrive. The fact that the Asian mainland expanded during the ice-age centuries and later greatly contracted also had far-reaching consequences. This included human dispersals that put the pioneers' genetic signature on a wide swath of Southeast Asia when their descendants ventured north toward Indochina or east toward New Guinea and Australia.

Language developed in tandem with ecological and geographical knowledge, but language skills also evolved as social interactions became more complex over time, enabling people to cope in their local group and to cope with strangers. New information was acquired, remembered, and shared, even down many generations. Taking into account all these factors, the related themes of long-term cultural and ecological adaptation in Southeast Asia stand out as the foundation for understanding the people of the region today. With the help of history, the human world can become more meaningful for all of us. We can better see long-term effects.

In contrast, there is a short-term history of Malaya starting about 500 years ago when Sumatran colonists took over Malacca and converted to Islam, which had arrived via trade routes from the west. These Malays assumed religious superiority over the non-Islamic peoples, often enslaving them. This, minus the emphasis on slavery, is the reduced history of Malay folklore, television sagas, and Malaysian school books. To be sure, the Malacca story has bonded scattered peoples into a relationship that has produced a Malay government for the last fifty years in Malaya, ever since the British Empire collapsed. However, a broader and more credible way of understanding the past in western Southeast Asia emerges when indigenous people and their associated cultures, languages, DNA, and ecology are put in proper perspective. The indigenous Orang Asli of the Thai-Malaya Peninsula are the key to this understanding.





Many stories are possible about human history on the peninsula, but any reliable story must be congruent with the facts about the Orang Asli. In this view, the cultures and biology of western Southeast Asians derive importantly from pre-farming people of the peninsula, with a gradual transition from foraging to farming in many areas. Farming, then, was not a separate invention by newcomers but grew out of the pioneering way of making a living by foraging.¹

The earliest dated occupation of the Thai-Malay Peninsula by humans is between 75,000 and 40,000 years ago at Kota Tampan in northern Malaya, based on findings of stone tools. The next earliest date is minimally 43,000 years ago, based on stone-tool findings at the Lang Rongrien rockshelter in southern Thailand. Because the Niah Cave artifacts of Sarawak date to

¹ J. White. Emergence of cultural diversity in mainland Southeast Asia: a view from prehistory. In: Dynamics of Human Diversity, N. Enfield, ed. Pacific Linguistics, Canberra, 2011. Pp. 9-46. The idea that farmers swept into Southeast Asia from China or Taiwan has become popular among archeologists, but alternative ideas merit consideration and may be fruitful.

some 46,000 years ago and a similar age has been reported for the human occupation of Australia, it is quite likely that pioneers reached the peninsula before that time.

One hereditary marker of this pioneering group (their mitochondrial DNA, mtDNA) shows high diversity today in the Thai-Malay Peninsula and nearby areas. Moreover, the existence of ancient mtDNA lineages in Orang Asli on the peninsula suggests a longer human history there than to the east or the north. This basic genetic signature in Southeast Asia is also suggested by differential diversity in the majority of DNA (nuclear DNA) in Orang Asli.

People first arrived on the Thai-Malay Peninsula during the ice age when the ocean retreated and the continental, underwater shelf of western Southeast Asia became land. This Sunda shelf, called Sundaland, stretching east to Borneo and Bali, north toward Palawan in the Philippines, and on to Vietnam. The people who first settled Sundaland spread far and wide, initially in a surge or pulse that radiated northward and also to the land's edge to the east, first exploring, then colonizing. World prehistory also had other surges. A similar surge occurred in the Americas. Once people entered the American north, it took them only a few thousand years to reach the tip of South America on foot or by boat. That distance was more than five times the distance from Bangkok to Bali. By this measure, the Sundaland crossing may have taken less than a thousand years because the Asian pioneers had no mountains or deserts to cross before reaching the continental edge at Bali. Some traversed the lowlands of what is now the Java Sea. Splinter groups that headed north to Indochina, or northeast toward Palawan, could also travel through lowlands. It was a relatively easy pulse expansion and likely produced few dialect differences from start to finish of the (unknown) language spoken by the pioneers. This lively expansion was too rapid.

Once the major pulse ended, most of the now scattered Sundaland groups expanded closer to home, including the interior of the Thai-Malay Peninsula. For the next 20,000 or 30,000 years there was undoubtedly some convergence and divergence all over Sundaland by land and sea, as populations expanded and adapted to their local habitats.

After 15,000 years ago, the Sundaland area started to shrink to an amazing extent, gradually at first but at a faster pace later. By at least 8000 years ago, the sea had invaded much of Sundaland as the climate warmed and the ice age melted away, eventually shrinking Sundaland by half and producing the separate islands, such as Borneo, found on maps today. Some three million square kilometers of land was drowned. As a result, coastlines expanded and rivers gained shorter access to the sea. This inundation tended to isolate scattered groups, but isolation was far from complete. Voyages did take place on the shallow Sunda seas. In fact, Southeast Asia provides the earliest evidence of seafaring in the world, given that people reached the islands of eastern Indonesia, New Guinea, and also Australia by at least 45,000 years ago.²

As a result of population expansion and interconnections, by some 6000 or 7000 years ago western Southeast Asians may have been speaking related languages. As far as anyone knows, these related languages may well have been Austroasiatic, the oldest known language group centered in mainland Southeast Asia today. People to the north of the Austroasiatic area spoke languages now called Sino-Tibetan or Tai-Kadai and those to the east spoke New Guinea languages. Another group of languages called Austronesian arrived in Southeast Asia later, perhaps from Taiwan.

In general, the evidence suggests that the first people on the Thai-Malay Peninsula and its environs engendered the rich biological heritage of western Southeast Asians and were the

² One experimental bamboo raft modeled on ancient technology reached Australia from Timor in six days (R. G. Bedorarek. Crossing the Timor Sea by Middle Palaeolithic raft. *Anthropos* 95 (1): 37-47, 2000).

foundation for the region's cultural complexity. All this happened long before the region received speakers of any invading language, whether Austronesian or European.

In the 1970s in northern Selangor, Enah and I were at the town market where a vendor called her a Sakai. She didn't respond but I said, "Jangan chakap Sakai, chakap Orang Asli" (Don't say Sakai, say Orang Asli).

Background considerations

We need to consider how the history of the Thai-Malay Peninsula has been misconstrued before we can start to understand it. One might be bemused that any Malaysian today thinks Taiwan is a Malay island or that Malay is emblematic of the entire Austronesian language family. In addition, since the term "Mongoloid" has no precise scientific meaning, labeling the Temuan and Jakun Orang Asli groups in Malaya as Mongoloid and a related group, the Senoi, as non-Mongoloid prejudices their ancestry.³ Perhaps even worse, the colonial-era term "Australo-Melanesian" when applied to some inhabitants of the Philippines or Malaya prejudices the entire history of Southeast Asia, as does the unscientific term "Negrito." Other unwarranted terms are proto-Malay and deutero-Malay.⁴ This paper, for readers interested in the human experience in Southeast Asia, does not use such terms. In 1999 I wrote about mislabeling and other misconceptions about Orang Asli biology and prehistory.⁵ Little improvement has occurred since that time. It is something of a wonder that Malaysian publications are still infested with descriptions of Orang Asli as "wandering animals," "tree dwellers," and the like.⁶

The Orang Asli have a strong cultural system. British imperialists and Malay rajas may come and go but the Orang Asli maintain their collective identity. Malaysia today has a political system but not a cultural system. Moreover, narratives of Malaysia as a nation-state largely ignore pre-national realities and attendant identities. Autonomous ethnic groups do not fit conveniently into political ideologies. Because Malaysia is not burdened with much written history, unlike Europe, one narrative has it that Malayan history began 600 years ago in Malacca.⁷ The reality is somewhat different. While human history is short on a geologic time scale, it is relatively long in Southeast Asia. The Thai-Malay Peninsula was an important human homeland long before Thai or Malay speakers or nation-states emerged there, and this has social and cultural implications today. During the 400 or more centuries since the first people arrived on the peninsula, many biological and cultural upheavals occurred. The heyday of the Malacca Sultanate lasted only one of those 400 centuries, falling to the Portuguese in 1511 CE. The other 399 centuries were more important both for Malaya and its neighbors.

³ In medical genetics, the so-called mongoloid phenotype (appearance) has been relabeled Down's syndrome.

⁴ See, for example, Wan Salleh and Zafarina Zainuddin. Aboriginal Taiwan: exploring Austronesian culture and genetic trail [sic] for mass tourism. *Journal of Tourism, Hospitality and Culinary Arts* 2 (3): 9-31, 2012; S. G. Tan. Genetic relationships among sixteen ethnic groups from Malaysia and Southeast Asia. In: *Genetic, Linguistic, and Archaeological Perspectives on Human Diversity in Southeast Asia*. Li Jin et al., eds. World Scientific, Singapore, 2011. Pp. 83-91; R. Blench. Was there an Austroasiatic presence in Island Southeast Asia prior to the Austronesian expansion? *Bulletin of the Indo-Pacific Prehistory Association* 30: 133-144, 2010; W. I. Hatin et al. Population genetic structure of peninsular Malaysian Malay sub-ethnic groups. *PLOS One* 6: e18312, 2011.

⁵ A. Baer. *Health, Disease and Survival*. COAC, Subang Jaya, Malaysia, 1999 (see pp. 7-10).

⁶ A. Baer. *Orang Asli in the research arena in Malaysia*.

<http://www.freemalysiatoday.com/category/opinion/2013/11/12/orang-asli-in-the-research-arena-in-Msia>

⁷ History written by Southeast Asians began about 1400 years ago.

To take a well-known example of a pet idea in recent history, British colonialists in Malaya considered themselves superior to the natives, the Malays. The Malays, in turn, were considered more civilized than the Orang Asli, the indigenous people. Europeans thought their “racial” superiority was a scientific fact but it was bio-politics.⁸ Today this attitude is an embarrassment to Europeans, but the consequences of their colonial prejudice are still evident.⁹ The fact is that there happens to be only one human race, *Homo sapiens*. There is no European race or Malay race. Over the past century we have come to realize that we are all related, all part of one shared humanity. We are all the same but all unique. And like any biological species, we interbreed.

While the last few thousand years in Southeast Asia have been described diligently by many writers, the earlier times have received less attention. The whole period in Southeast Asia, from before 40,000 years ago up to today, spans human existence in a vast tapestry of events. Since the Orang Asli are central to this story, it is well to put them in context first.

Some Orang Asli women have become leaders. A Semai woman started pre-schools teaching Semai and English. Another Semai woman became a lawyer. One woman became the “headman” of a Batek group, but no woman is recognized by the government as a headman.

The Orang Asli today

Writers on Southeast Asia today may refer to the Orang Asli as a footnote to their main interest, such as Malaysian politics or the destruction of the rainforest. Many such writers have never seen an Orang Asli or spoken to one.

The term Orang Asli means original people, or first people.¹⁰ Their ancestors may well be the first people not only of the Thai-Malay Peninsula but of Southeast Asia in general.¹¹ As the Kensiu Orang Asli put it, all of the peninsula would belong to the Orang Asli by any correct calculation (*Kalau kira betul semua tana meni*).¹²

Malaya and southern Thailand have many meanings for Orang Asli. Besides being the home of their ancestors, the area is the source of their physical survival and of their spiritual knowledge. But now their home, their world, is sick. The cool forest has been replaced by dangerous heat, by hot plantations, hot towns, and hot open-pit mining. Such hot places are fevers on the land, a fatal sickness of the whole world, they say.

Before this hot phase happened and before the advent of codified religions with their powerful officialdom, animism flourished. Orang Asli have long been animists. They are at one with nature. For example, animals are not to be laughed at, as they are intrinsic to nature. Given that stupendous thunder, lightning, high winds, and torrential rainstorms have long been seasonal hazards to rainforest survival, causing trees to crash and rivers to flood, the spiritual analog for some Orang Asli groups is a supernatural being, the thunder spirit, who wreaks havoc on people.

⁸ See S. K. Manickam. Common ground: race and the colonial universe in British Malaya. *Journal of Southeast Asian Studies* 40 (3): 593-610, 2009.

⁹ T. N. Harper. The politics of the forest in colonial Malaya. *Modern Asian Studies* 31 (1): 1-29, 1997.

¹⁰ At least two small groups listed by the Malaysian government as Orang Asli are not original to Malaya, being recent immigrants from Indonesia. The Orang Kanak came to Malaya from the Riau-Lingga islands in the nineteenth century and the Orang Kuala from Jambi Province in Sumatra somewhat earlier. Thailand has four small Orang Asli (Semang) groups in its four southern provinces.

¹¹ Orang Asli are not tribal; they have no totems or chiefs, bossy or otherwise.

¹² S. Nagata, personal communication, 2007.

This spirit also is associated with the coming of the bounteous fruit season and feasting that follows the storms. This animistic concept anchors storms inside the social system, making the destructive events of nature, in a sense, normal.

Today the Orang Asli are a diverse category of small, poor populations scattered around Malaya and southern Thailand. They have constant problems in terms of food sufficiency, health, and land rights. As such, they are seemingly far removed from any reconstituted history written by outsiders, yet in important ways their future prospects depend on recognizing their historical importance and humanity.

While they have no written language, most Orang Asli are multilingual. Orang Asli groups speak some 20 different languages, largely Aslian languages in the Mon-Khmer branch of the Austroasiatic family, but a few are Malayic languages in the Austronesian family. The Aslian languages are related to Mon and may have derived from a pre-Mon language in the northern part of the Thai-Malay Peninsula some 5,000 years ago. Prior to that linguistic histories have only blank pages.

Despite their broad geographic range, few Orang Asli live in the skyscraper city of Kuala Lumpur or in towns. By tradition, Orang Asli have subsistence economies based on mobile foraging (hunting and gathering) or swiddening (forest farming) combined with fishing and trade in forest products. City people may notice Orang Asli wearing “Western” clothes and riding motorbikes. They interpret these visible signs as defining Orang Asli culture, unaware of the underlying knowledge and beliefs of the Orang Asli they see. Notably, Orang Asli have shared values and communal life ways close to nature. They also deplore selfishness and injustice. By the 1960s, if not earlier, the Endau-River Orang Asli had learned to distrust outsiders: “The only thing they expect from an alien is whatever they can obtain by asking (minta), as a sort of revenge for past exploitation.”¹³ But differences do exist between groups.¹⁴

The northerly Orang Asli, sometimes called Semang by outsiders, are mainly foragers but other groups forage at times.¹⁵ One Semang group, the Batek, are more centrally located in Malaya. Most central and southerly Orang Asli groups are swiddeners to some extent but several are predominantly coastal fishers. Because of increased contact with newcomers since ancient times, Orang Asli have adapted to alien ways when they were forced on them or if they were advantageous. Metal tools and cooking pots became useful novelties early on. Today plastic pails and modern medicines are also accepted, without harm to their collective identity. In contrast, over the last few centuries outsiders have made increasing inroads into Orang Asli environments, compromising or negating Orang Asli traditional life ways. It is, after all, easier to steal land from the poor than the rich. In the past, Orang Asli groups simply retreated when encroachments occurred, but this is no longer possible in Malaya where the general population is growing and Orang Asli lack political power. They are stuck in a degraded and contracting life-support system because of lack of a conservation ethic for the environment by the government.¹⁶

A major problem for Orang Asli is that some Malaysians have long held peculiar views on them. A few have come to the view that Orang Asli are not human. A more sophisticated

¹³ N. M. Tachimoto. *The Orang Hulu*. COAC, Subang Jaya, 2001. The quote is from p. 91.

¹⁴ G. Benjamin. In the long term: three themes in Malayan cultural ecology. In: *Cultural Values and Human Ecology in Southeast Asia*. K. Hutterer et al., eds. University of Michigan Center for South and Southeast Asian Studies, Ann Arbor, 1985. Pp. 219-278.

¹⁵ The northern Orang Asli use the word *meni*, or a similar word, for themselves; they do not call themselves Semang.

¹⁶ For evidence of this ecological disaster, see J. Kathirithamby-Wells, *Nature and Nation: Forests and Development in Peninsular Malaysia*. University of Hawaii Press, Honolulu, 2005.

view is that they are human but they don't matter. A third is that they will soon be gone. "Gone" is a code-word that means they will become Muslims, second-class Muslims to be sure, but better than being of no-account at all. There's even a unit at the International Islamic University of Malaysia dedicated to help Orang Asli "realize the ways of Islam" and to "make Orang asli [sic] closer to the preacher (da'i)." ¹⁷ And the government pays Muslim missionaries RM 10,000 (US \$3,200) to marry Orang Asli women.¹⁸

Since the Orang Asli are a political inconvenience, a further statement is that Malays are the real indigenous people of Malaya, and the Orang Asli are just aboriginals. In this view, the character of Malaya is due to the Malays and thus to Islam. This is open to question.

This last negative statement was made in 2012 by an official in the Malaysian government department tasked with aiding the Orang Asli. He tried to "blow smoke" by saying that Malays were indigenous and the term "aboriginal" did not include "indigenous."¹⁹ By this way of thinking, the Norman French became indigenous in England after 1066 CE while the English were aboriginal there. Not surprisingly, the definition of aborigine is "an indigenous inhabitant, especially as contrasting with an invading or colonizing people." Neither the Norman colonists in Britain nor any Malay colonists in Malaya are indigenous by this definition.

The official making the egregious misstatement should have known better. He was himself an Orang Asli, a member of the Temiar subgroup from the state of Kelantan. He was immediately called "a disgrace to Orang Asli" by a well-known Orang Asli lawyer. The Temiar's assertion was based on today's governmental politics and policies, but the lawyer's retort was grounded in fact. To the Malaysian government, the first consideration is that Malays hold political power. To Orang Asli, the first consideration is that they occupied the country long before any Malays emerged there and developed factional politics.

Today, statements based on assumptions of Malay superiority over the numerous marginalized culture groups in all parts of Malaysia echo the British colonial view and support the grip on power enjoyed by the Malay-industrial elite. Scientific findings are easily ignored. While the genetic diversity in Malaysia, Thailand, and elsewhere in Southeast Asia is modest compared to the *cultural* diversity in the region, no cultural group in Malaysia today stems from a common ancestral pair dating to thousands of years ago. Rather, ancestors from different social groups are intertwined in Malaysian lineages and supply the gene diversity existing in every citizen. Although a person may insist on purifying his ancestral line by selectively pruning undesirable ancestors from the family tree, as some Malays do when Orang Asli ancestors obtrude, the result is not reality. In contrast, a Malay professor once comfortably informed me that her grandmother was an Orang Asli.

As many people know, the community of science continues to inform and surprise us about the real world. In this way, science explains how we humans got to the present era with increasing detail and richness, at the same time debunking prior claims of ethnic superiority. If we are open-minded, we can understand ourselves and our past with the help of the sciences. By

¹⁷ Abdul Ghafer Don et al. Da'wah through social services method [sic]: the experience of the Department of Da'wah and Leadership Studies, National University of Malaysia." *Advances in Natural and Applied Science* 6 (4): 545-548, 2012.

¹⁸ I. Tacey. Tropes of fear: the impact of globalization on Batek religious landscapes. *Religion* 4: 240-266, 2013.

¹⁹ COAC ["Orang Asli are NOT Indigenous Peoples, 30 March, 2012"]. In Facebook. Retrieved 2 April, 2012 from <http://www.facebook.com/pages/Center-for-Orang-Asli-Concerns/>.

the same token, if we are closed-minded, we will exist in delusion.²⁰ For example, instead of Orang Asli, sultans in Malacca-Johore have put Alexander the Great in their genealogies, calling him the herald of Islamic Asia.²¹

It is well to emphasize that, like most countries, Malaysia is not a natural human group. Far from it. It does not have one history, one religion, or one source of human DNA (except, like all people, for Africa). To address the issue of history within Southeast Asia in a modern way, new questions need to be asked by scientists and scholars in collaboration with Orang Asli communities. The first question is the full significance of Orang Asli in Malayan prehistory. Since this question is not a high priority in Malaysia, local studies on Orang Asli have contributed little to general answers about the human condition, although Malaysian contributions to international studies have been helpful. International teamwork has proved to be the most powerful method to foster studies on human history and other global questions. So far, this international science has provided only partial answers to basic questions about our human condition, but the insights are growing every year.

In short, we have only an outline for human life on the Thai-Malay Peninsula in the past. In my view, the key to this outline are the Orang Asli. Any plausible history of the region must relate to some hypothesis about them. This is no small task. One popular hypothesis is that Orang Asli have been on the peninsula continuously since 40,000 or even 75,000 years ago. Another is that some Orang Asli were the original pioneers but other Orang Asli came later. Both hypotheses imply that ancestors of today's Orang Asli were the first persistent inhabitants of the peninsula. Current scientific research supports this view.

In contrast, the leading center for archeological studies in Malaya recently managed to write about prehistory without once mentioning Orang Asli.²²

Orang Asli have wide regional social networks. Once, I was driving down a road and came upon old-man Sarip on his rickety bicycle heading the other way, some 25 miles from his (and my) home village.

Climate and geography since ancient times

Let us now have a look at the natural world these Asian pioneers found and how they coped with its challenges. Ice ages lasted from about 100,000 to 10,000 years ago outside of the tropics. During this period, the tropics provided refuges from the chill for plants, animals, and people.²³ The last ice age occurred in two phases, the first from about 57,000 to 28,000 years ago, followed by a short period of some relief, and then culminating in the last glacial period that

²⁰ Hood Salleh. Ethno-historical perspective and social change among the Orang Asli. *Jurnal Anthropoloji dan Socoloji* 4: 1-11, 1976.

²¹ A. Milner. *Malay Political Culture on the Eve of Colonial Rule*. University of Arizona Press, Tucson, 1982. But a reaction to ancient Greek religion may have generated Islam (W. McNeill. *Mythistory and Other Essays*. University of Chicago Press, 1986).

²² Mokhtar Saidin. *From Stone Age to Early Civilisation in Malaysia: Empowering Identity of Race*. Universiti Sains Malaysia, Penang, 2012.

²³ This seems to be a neglected aspect of Asian history. Genetic and archeological details about this scenario are sketchy. Alfred Wallace, for one, held this view. Perhaps as a result of this move of animals, African human foragers experienced more competition for food and therefore migrated equatorially eastward to less congested regions, such as Asia below the Himalayas. Some reached Southeast Asia.

waxed and waned between 27,000 and 10,000 years ago.²⁴ At the last glacial maximum (LGM) of 20,000 years ago, when sea levels were lowest, a savannah landscape may have existed in the Straits of Malacca, and the area around Batu Caves near Kuala Lumpur alternated wet and dry seasons.²⁵ The big thaw of the long ice age in higher latitudes followed the LGM.²⁶ From about 15,000 to 8000 years ago or even later, mangroves expanded along the retreating shorelines and estuaries of the Thai-Malay Peninsula as the glacial ice melted and the seas rose. In fact, at that time Southeast Asia had extensive mangrove shorelines, 40 percent of the world's mangrove forests. The dense mangrove sea-swamps were an effective barrier during those prehistoric times, blocking access by coastal intruders to inland Orang Asli areas, while coastal-adapted foragers and fishers were more exposed to outside influences. But there were advantages of living among mangroves, including the fact that mangrove timber makes excellent firewood.

Backing up a bit, some 40,000 years ago the Thai-Malay Peninsula was inhabited by few people. No one knows exactly what conditions were like there but that moment of geologic history was cooler than today. Because of ice age temperature fluctuations, the capricious climate changed fairly rapidly on the peninsula, perhaps even from one century to the next. During cooler centuries the average daytime temperature in the lowlands may have been just 21° C. (70° F.), as compared with 28° C. today, a tropical warming that has resulted from the global thaw that occurred after 20,000 years ago. At that time, and at earlier peaks of ice-age climate, the Asia mainland extended east to Bali on the broad Sunda continental shelf, so-called Sundaland.²⁷ At 40,000 years ago, for instance, the sea levels in Southeast Asia were at least 50 meters lower than they are today and parts of the shallow seabed of the shelf were dry land, straddling the equator, with patches of swamp and heath forest (kerangas), and with riverine gallery forests running out to the edge of the continental shelf. Savannah woodlands were more common than rainforest areas. These drier woodlands supported grazing animals such as elephant, deer, rhinoceros, seladang (buffalo), and banteng (cattle). Animals in the Sunda shelf heartland of Malaya, Sumatra, Borneo, and Java even today are more like each other than they are like animals outside the region.²⁸

Along with climate change, geography impacts history. When people arrived in western Sundaland, forests had patches of glades and fewer trees than today because of the cooler climate. Somewhat warmer and wetter centuries did occur, allowing more dense forests. People occupying a cave in a limestone outcrop at those times may have burned off the vegetation near

²⁴ J. R. Stewart and C. B. Stringer. Human evolution out of Africa: the role of refugia and climate change. *Science* 335: 1317-1321, 2012.

²⁵ R. Morley. A review of the Cenozoic palaeoclimate history of Southeast Asia. In: *Biotic Evolution and Environmental Change in Southeast Asia*. D. Gower et al., eds. Cambridge University Press, 2012. Pp. 79-114; C. Wurster et al. Forest contraction in north equatorial Southeast Asia during the last Glacial Maximum. *Proceedings of the National Academy of Sciences* 107: 15508-15511, 2010. Northern Borneo, however, had little rainforest at the LGM (S. Carolin et al. Varied response of Western Pacific hydrology to climate forcings over the last glacial period. *Science* 340: 1564-1566, 2013).

²⁶ As the sea crept inland on the Sunda Shelf, it created low-lying bays and lakes which relentlessly grew larger. Perhaps in parallel, Orang Asli folklore features upwelling of water from holes in the ground, causing the people to flee from the inundation.

²⁷ H. Vons. Maps of Pleistocene sea levels in Southeast Asia. *Journal of Biogeography* 27: 1153-1164, 2000. Sundaland corresponds to the area west of the "Wallace line," named after Alfred Wallace, the noted evolutionist and biogeographer of Southeast Asia. The animals west of the line are all related to Asia, while many animals to the east are related to New Guinea and Australia.

²⁸ N. Sodhi and B. Brook. *Southeast Asian Biodiversity in Crisis*. Cambridge University Press, 2006.

the cave mouth to create a sky-lit neighborhood.²⁹ Such forest-fringe areas are ecological transition zones, ecotones rich in edible tubers and vegetables. During the cooler periods, such resource-rich ecotones were more common throughout the Thai-Malay Peninsula. They were the preferred foraging sites for human groups.

If pioneering people arrived from the west by sea, their landfall may have been the west side of southern Thailand. They would have seen lowlands stretching southward along what is now the Malacca Straits and uplands to the southeast that run down to what is now Singapore Island. The granite mountains and limestone outcrops of the uplands were less eroded than is the case today. They were only gradually explored and made habitable by the pioneers, but once limestone rock shelters and caves were discovered, people used them to keep out of the wind and rain or even to nap in the heat of the day.

About 24,000 years ago the very last ice age started cooling the Thai-Malay Peninsula to its lowest temperature for the people living there. Sundaland reached its greatest extent at 20,000 years ago, after which time there was a fairly steady warming trend, which stabilized at about 6000 years ago. It was an enormous change. At 20,000 years ago the west coast of the peninsula had been rainforest and the east coast had been drier, with open diptocarp forests.³⁰ The same was true for much of Sundaland then. But by 8000 years ago, the Straits became fully open, from the Andaman Sea to Singapore, separating Malaya from Sumatra.³¹ This maximized the western coastline of Malaya, although the eastern side had already become sea shore by 11,000 years ago. Assuming that it was easier to move along the coasts than through the mountainous interior, the coasts may have become favored travel routes by that time.

As the Thai-Malay Peninsula became constricted by the sea, the onset of strong monsoon conditions caused the expansion of floodplains and river deltas.³² This rise of sea level was likely accentuated by El Nino fluctuations of drought and torrential rain every ten years or so, due to changes in oceanic circulation that influenced the inundated Sunda shelf.³³ The low tidal rises on the peninsular shores combined with high river- water volume and siltation to produce lowland freshwater swamps ecologically different from the coastal mangrove swamps. They provided a new set of resources for human exploitation. Mangrove shell middens of earlier times became part of the inland swamp areas, explaining why middens in the region, most numerous in eastern Sumatra, are now inland on the coastal plains.

The sea of the former Sundaland has the highest marine biodiversity in the world. Coastal areas and estuaries were certainly exploited wherever they were accessible. They provided intertidal marine resources for shore dwellers. In addition, offshore resources would have been attractive. They include sea turtles, marine mammals such as dugong, and deep-water fish. Southeast Asian seas are rich in marine resources because of shallow depths, weak tides,

²⁹ Lightning during dry periods, as well as accidental or deliberate human actions, can burn a tropical area. If left to regrow, it is easily invaded by grasses and tuberous plants that attract wild cattle and other prey for hunters.

³⁰ E. Meijaard. Mammals of southeast Asian islands and their late Pleistocene environments. *Journal of Biogeography* 39: 1245-1257, 2003. For a contrary, theoretical approach, see C. Cannon et al. The current refugial rainforests of Sundaland are unrepresentative of their biogeographic past and highly vulnerable to disturbance. *Proceedings of the National Academy of Sciences* 106 (27): 11188-11193, 2009.

³¹ Curiously, a Besisi Orang Asli said that at one time long ago the western plain of Malaya was a strait "as far inland as Ulu Klang" but the Malacca Straits of today were then dry land (W. Skeat and C. Blagden. *Pagan Races of the Malay Peninsula*. Vol. 2. Macmillan, London, 1906. P. 319).

³² M. Geyh et al. Sea level change during the late Pleistocene and Holocene in the Straits of Malacca. *Nature* 278: 441-443, 1979.

³³ While that rise was gradual, the impending rise in sea level in the twenty-first century will be catastrophic, especially for atolls, coastal megacities, and the Nile delta.

and warmth. Marine life is also enriched by the neighboring Indian and Pacific Oceans. Moreover, materials for sea travel were readily available for making dugout canoes or wide-diameter bamboo rafts.

While many desirable foods were harvested as the opportunity arose in the peninsula's "patchy" environment, most of them could not be relied on for daily meals—being rare, seasonal, or widely dispersed. Other modest resources were more reliable. For coastal people there was shellfish. Clam beds do not move, require no special equipment to harvest, and even small children can exploit them. Plants have similar properties. In the interior, tubers such as taro (an aroid) and yams, bamboo shoots, bananas, palm starch and the like were good "fall-back" foods. Taro, for one, thrives in fresh-water swamps and floodplains. Plant residues on stone tools at Niah cave in Sarawak show that aroids, yams, and sago-palm pith were part of the diet there going back 28,000 years, and possibly as much as 40,000 years ago.³⁴

Information on the environment during the earliest human occupation of the Thai-Malay Peninsula is sparse, largely based on ice-age studies of temperate or polar zones. Better information for the peninsula is available for the last 25,000 years. Findings from shallow lake-bottom mud cores are the main source of information because deep lakes are rare on the peninsula. Cores at Nong Thalee Song Hong Lake in southern Thailand show that grasses were common there 25,000 to 15,000 years ago and some burning also occurred, whether due to natural events or human interference is not known. Thereafter forests advanced as the environment warmed. In the woodlands or forests at that time, heavy stone tools, as opposed to flake tools, would have been useful to bark-strip trees or fell them for land clearing, a supposition in line with the fact that the lake cores contained burnt wood. They also contained remains of rice grains by 4000 years ago.³⁵ Bark stripping tree trunks was feasible because lowland tropical trees have much thinner bark than that, for instance, of conifers.

Cores from another southern Thai lake suggest that at 17,500 years ago the forest was park-like, rather than dense, and from roughly 8000 to 6000 years ago swamp forest was the dominant type, coinciding with a rise in southwest monsoon weather from the Indian Ocean.³⁶ This period was followed by a drier forest, until about 3300 years ago. Forest clearing by means of burning began approximately 5100 years ago at this site. Trang Lake, another south Thailand site, had a similar history, with some grassland around the lake about 18,500 years ago, some burning nearby by 10,000 years ago and much burning by 3300 years ago.³⁷ The burning may have been to clear arable plots for planting crops.³⁸ By about 1500 years ago, in this view, the local environment had become a human-managed habitat.

In general, before the Holocene geologic era that began some 10,000 years ago, cooler temperatures were common in Southeast Asia. At about 23,000 years ago, for instance, this has

³⁴ H. Barton. The case for rainforest foragers: the starch record at Niah Cave, Sarawak. *Asian Perspectives* 44 (1): 56-72, 2005.

³⁵ L. Kealhofer. Looking into the gap, land use and the tropical forest in south Thailand. *Asian Perspectives* 42 (1): 72-95, 2003. Biomass burning occurred near Niah Cave during the time of the earliest human evidence there (C. Hunt et al. A 50,000 year record of late Pleistocene tropical vegetation and human impact in lowland Borneo. *Quaternary Science Reviews* 37: 61-80, 2012).

³⁶ J. White et al. Vegetation changes from the Late Pleistocene through the Holocene for three areas of archeological significance in Thailand. *Quaternary International* 113: 111-132, 2004.

³⁷ B. Maloney. A 22,000 year old record of past environmental change from Trang, South Thailand. *Bulletin of the Asia-Pacific Prehistory Association* 17: 54-55, 1998.

³⁸ While early people in Australia are known to have burned areas to create grasslands for hunting kangaroos and other marsupials, no one has suggested clearings were likewise created on the Thai-Malay Peninsula solely for hunting game animals.

been shown by the types of plant pollen found in cores from the Nee Soon swamp in Singapore.³⁹ The cores also showed that by the mid-Holocene enough burning was occurring to suggest that people there were farmers. These data suggest that the people were increasingly manipulating nature. It was becoming a cultural landscape, but nature in its many ways was also influencing human society. Taking all this into account, the loss of parkland to forests and swamps plus the shrinking of Sundaland after the ice age may have produced a shortage of foraged food, especially large game, and motivated people to take up some farming activities.⁴⁰

In all, past climates relate to the geography of the Thai-Malay Peninsula and much of Southeast Asia. It is easy to forget that the peninsular landscape of recent centuries is mainly the result of changes during the last 10,000 years. Before that, lowland plains were once extensive in Sundaland, but after the sea engulfed the land, the shrunk landscape at first was largely forested uplands until river discharges recreated plains and swamps.⁴¹ This shrinkage was surely a time of great change on the ground. For inland people, land and resources became less available, a situation that ecologists call “habitat contraction.” This accelerated innovation. People were increasingly managing the landscape and its resources to their own benefit. Although foragers had smaller territories, they worked them more intensively than before and had to rely on fewer favorable campsites. All this suggests village formation at base camps was imminent with more planting of food crops in fertile areas. That is, some groups were becoming farmers.

Orang Asli often go visiting in far-away places. People in my Temuan village left for a week or month and then returned. Others arrived from elsewhere to stay a week or to stay a lifetime. Orang Asli have “itchy feet;” they are intrepid travelers.

The pioneers and human ecology

Before *Homo sapiens* invaded Southeast Asia, many plants and animals living in the vicinity of the Malacca Straits were killed when the Toba super-volcano erupted on Sumatra some 74,000 years ago. And it erupted again and again. Ash fell across the Indian Ocean on westerly winds. It fell across the Straits to Malacca and over northern Sumatra. It blanketed the land and suffocated marine life in shallow waters. It befouled the skies and the darkness cooled the entire earth, some say for centuries. Few living things survived on the barren land in the heart of Malaya or Sumatra but plant life slowly re-appeared. Birds and other animals followed the plants, and then people arrived. Whether the first people arrived by a land route from the west or by voyaging across the Indian Ocean is unknown, but both types of travel are considered

³⁹ J. Taylor et al. Late Quaternary peat formation and vegetation dynamics in a lowland tropical swamp: Nee Soon, Singapore. *Palaeogeography, Palaeoclimatology, Palaeoecology* 171: 269-287, 2001.

⁴⁰ The transition from foraging to farming took only a short 4000 years in some parts of the world (H. Schutkowski. *Human Ecology*. Springer, Berlin, 2006).

⁴¹ One area on the west coast of Borneo recently grew seaward 10 km. in only three centuries, indicating the rapid growth of alluvial coastlines during the last 10,000 years of monsoon climate. Malaya itself has seen coasts extend outward at the rate of 3 m. to 16 m. annually during the historical era (S. Allen. History, archaeology, and the question of foreign control in early historic-period peninsular Malaysia. *International Journal of Historical Archaeology* 2 (4): 261-289, 1998).

possible. As a Besis Orang Asli legend states: “We came from a land at the edge of the sky...beyond Siam, at a distance of more than a man’s lifetime.”⁴²

There were voices in Sundaland forests and savannahs in early times. We do not know the languages spoken in Southeast Asia 40,000 years ago or even 10,000 years ago, but it took language skills for any early group to sustain itself there. People often communicate important facts about the present by gestures and facial expressions, but spoken language also encompasses the past and the future. Splinter groups naturally evolved their own dialects, but neighboring groups communicated through “mix and match,” accelerating the rate of language change and becoming more complex over time. Besides language, life on the Thai-Malay Peninsula entailed a kit of useful tools and also group cooperation, part of their “culture kit.” In fact, human foragers everywhere tend to be group (social) foragers. In the Sundaland environment, mutual-aid strategies within groups were undoubtedly reinforced as new challenges emerged. There was no such thing as rich versus poor.

Looking more closely at this pioneering group, on the one hand demographers have estimated that it needed only five fertile women and men to have generated a viable population. On the other hand, it is clear that very small populations are vulnerable to extinction through accidents and that strong inbreeding can weaken such a group. Moreover, given the genetic diversity known to exist in Orang Asli, the pioneering group probably had far more than ten adults. In any case, the limiting factor is the number of fertile women, not men. Whatever the size of the pioneering population, the people were opportunistic foragers, and like all human foragers they were mobile, flexible, and characterized by kinship and equality in their social organization. They were also resilient.

After the pioneers arrived at the peninsula, some of their descendents continued eastward on Sundaland toward Borneo and Java, exploiting pristine food resources as they traveled. That is, they ate their way through the bounty of the new landscapes that they encountered as they moved on.⁴³ These colonizers of Sundaland not only had an adequate tool kit for journeying, they had group cohesion and opportunistic foraging behavior that moved them from one habitat to the next. It was easy to move on even in primary rainforest areas. As one later-day forest traveler noted, “...great tree trunks with enormous buttress roots soar away into the green canopy far above. Contrary to popular belief, the canopy is so dense that very little grows below...”⁴⁴

As the population on the peninsula grew, the food-rich and most accessible patches became filled. Expanding groups that stayed on the peninsula fanned out to poorer patches, the cooler hills above the lowland forests. This foot-travel dispersal within Malaya and beyond took less time than one might think. It could take only about 1000 years to relocate in leisurely fashion from, say, Kedah to Singapore, a distance of over 700 kilometers, based on a widely

⁴² W. Skeat and C. Blagden. *Pagan Races of the Malay Peninsula*. Vol. 2. MacMillan, London, 1906. P. 316. A Besis Orang Asli told an Englishman, “You know that this is the Pulo Besar or Great Island that belongs to us, and not to the Malays, who have intruded into our country” (J. Logan. The superstitions of the Mintira. *Journal of the Indian Archipelago and East Asia* 1: 307-331, 1847; quote on p. 326).

⁴³ The populations of India and China have ballooned over the past century, but it is seldom mentioned that population growth could also be dramatic in ancient times. A group of 1000 people could double in 500 years with a growth rate of less than 3 percent per generation. The population growth rate was probably higher for pioneers on the peninsula, perhaps as high as the recent rate of the Semai subgroup of Orang Asli, 0.007 (0.7%) per year, or about 16% per average generation time of 20 years (A. Fix. *Origin of genetic diversity among Malaysian Orang Asli*. In: *Dynamics of Human Diversity*, N. Enfield, ed., Pacific Linguistics, Canberra, 2011. Pp. 277-291).

⁴⁴ P. Williams-Hunt. *An Introduction to the Malayan Aborigines*. Government Press, Kuala Lumpur, 1952, p. 7.

accepted slow-dispersal rate of 0.7 kilometers per year. But the pioneers may well have moved on at a faster rate, such as 4 kilometers per year, reaching Singapore in just 180 years and thus completing their take-over of Malaya in seven or eight generations.

The peninsula was a prize worth taking, being rich in biodiversity. The number of different plants and animals is enormous, with mammals alone reaching over 200 species. Among the peninsula's distinctions are fish that walk on land, lizards and squirrels that fly, mammals covered with scales, and poisonous trees.

Much of the usable biodiversity is widely scattered about, requiring time to find resources and requiring a spatial knowledge of the terrain. This is an important consideration in food provisioning for human groups. However, salty, warm springs were exceptions to this scatter; they produced salt licks that were magnets for game animals. And in "the fruit season" there was a feast for everyone, including forest birds like the noisy hornbills.⁴⁵ Now, as in the past, congregating at feast times has affirmed group identity and solidarity, not only for the Orang Asli but for many other human groups.

Nevertheless, the main survival problem for tropical foragers is getting food on a daily basis. More time was spent on procuring food than any other task. Baring natural disasters, epidemics, or social strife there was little reason to store foodstuffs. The first people, the Batek Orang Asli say, learned to dig tubers and cook them over a red flower used as fire "until true fire was obtained from a supernatural being in the form of a sambhur deer."⁴⁶ In any case, whatever food was obtained was quickly shared within the local group.

Foragers may often have gone hungry, but being mobile they were not prone to famine. On the peninsula, nature provides a mixed diet mainly of game, aquatic animals, tubers, insect grubs, fruits, nuts, and vegetables such as ferns (over ten species), palm cabbage, petai beans, and bamboo shoots. Even some blossoms can be eaten, while others can be used for personal adornment. Protein comes mainly from game, turtles, fish, and shell-food, with both birds and turtles providing eggs. Sugar comes from fruits, sugarcane, sugar palm, and honey, and more complex carbohydrates come from nuts, sago palms, and tubers.⁴⁷ The Batek to this day forage for more than 20 species of tubers.

Needed fats and oils are rarer, found mainly in wild pigs, pythons, marrow, coconuts, and durian-like fruits.⁴⁸ Essential minerals such as calcium, iron, and iodine may also have been limited in inland areas, but calcium, iodine, and salt, in particular, were adequate in marine foods. And yet, the pioneer foragers who stayed on the peninsula could never expand their population beyond a few thousand people without some inclusion of managed landscapes, including proto-agriculture. They may have done this early on, such as by creating fruit groves at favorite camp sites simply by discarding durian and other fruit seeds there that rooted and grew into trees by the time their children grew up.⁴⁹ They may also have put growing tips of yams back in the ground after harvesting the tubers, creating in time a yam garden. Indeed, tubers and fruiting trees are thought to be the first cultivated plants in Southeast Asia.

The foragers learned the growth habits of edible plants. And, as has been shown for other foragers of the world, they propagated useful plants on their own initiative.⁵⁰ Bamboo roots

⁴⁵ The fruits broadly include petai pods and edible nuts.

⁴⁶ K. M. Endicott and K. L. Endicott. *The Headman was a Woman*. COAC, Subang Jaya, 2012, p. 166.

⁴⁷ R. Dentan. Potential food sources for foragers in the Malaysian rainforest. *Bijdragen Tot de Taal-, Land-, en Volkenkunde* 147: 420-444, 1989.

⁴⁸ Fats are needed to metabolize vitamins A, D, E, and K.

⁴⁹ This is one example of what is called "itinerant agriculture."

⁵⁰ That is, without needing any contact with settled farming villages to "learn" how to propagate plants..

(rhizomes) can be transplanted to produce new clumps for many uses. Banana and taro cuttings also can be transplanted. And, as already mentioned, the people likely created open areas in the forest by fire, promoting a luxuriant growth of gingers, ferns, bamboo, and other edible plants. As a bonus, such areas attract deer and other plant-eating game, such as banteng cattle and buffalo (seladang). The people may have increasingly managed the land as time went on, including coppicing sago palms to form groves, always leaving a few stems to survive while harvesting others to obtain sago starch. And at the margins of Sundaland, the rich maritime resources of warm seas could be exploited.

Notably, coastal and inland survival strategies were quite different. While coastal zones and estuaries are productive of both calories and protein, most resources in inland forests are dispersed and mainly available to adult foragers and hunters. A little proto-farming may have been a big help inland.

Outside of predatory palm-oil plantations, today the two main types of farming in Malaya are swiddening and rice paddies. One advantage of rain-fed swiddening over paddy farming is that swiddens contain wild and cultivated biodiversity for food, medicine, shelter, and landscape stability.⁵¹ This ecosystem requires little work to keep in going. Since swidden farms have a variety of crops, there is less competition for nutrients than in monoculture. Swiddens spread the risk of crop failures, maintain selective breeding of successful crops, and provide a varied diet. Field preparation involves a burn-off of vegetation, which kills crop parasites. It also leaves slash and charred logs on the land. The fire ash acts as mineral fertilizer and reduces soil acidity and the logs minimize hill erosion. Harvesting crops at different times also minimizes erosion because there is no bare-earth phase. Different growth cycles minimize pest epidemics. Deforestation and monoculture make none of these contributions to the local ecology; they maximize soil erosion, runoff, landslides, and river siltation. And rice paddies release enormous amounts of methane gas into the atmosphere. In industrialized countries, a farming trend today is toward no-tillage (no plowing), inter-planting of crops, and the use of perennials in order to lessen soil erosion and to conserve soil moisture and nutrients. This trend is toward age-old swiddening.

We are told that the whole planet had only some five million people 8000 years ago, most of them in Africa and Eurasia near the equator.⁵² Also, demographers estimate that few people can live off the land and seashore if they are strictly mobile foragers restricted to one area, that is, if they are not pioneers.⁵³ Restricted forager groups are said to survive and increase slowly if they depend only on nature for food. But early foragers on the Thai-Malay Peninsula could either increase their food-producing activities or emigrate to a new land. They could also move on if faced with quarrels in their natal group.

As food-increasing activities became more common on the peninsula, stay-at-home foraging groups had a better chance of survival and growth, leading to some crowding. This population increase was a major factor in environmental modification and still is today. By 8,000 years ago, when the seas reached their maximum extent, the population may have reached

⁵¹ A well-known cautionary tale is the potato monoculture in nineteenth century Ireland producing famine during the blight epidemic because of the lack of alternative food sources.

⁵² A. Keinan and A. Clark. Recent explosive human population growth has resulted in an excess of rare genetic variants. *Science* 336: 740-743, 2012.

⁵³ J. Bocquet-Appel. When the world's population took off: the springboard of the Neolithic demographic transition. *Science* 333: 560-561, 2011.

5,000 or even 10,000.⁵⁴ But it could not increase much more without a major commitment to fishing or farming. At that time the peninsula was practically an island, facilitating both on-shore and off-shore fishing.⁵⁵ Swidden farming or horticultural settlements appeared on the peninsula sometime between 10,000 and perhaps 3000 years ago, according to some studies. Did mobile foragers then become settled farmers or did immigrant farmers provide the impetus for greater population increase? Genetic studies suggest that there were minor invasions of farming peoples, with whom the foragers intermingled. But there is another way to look at this. Indigenous foragers may have long been engaging in some farming activities by selecting healthy stock to plant, although this need not have been a continuous process. For example, they may have planted taro on swampy riversides and bamboo on hillsides. Foraging and simple farming are interchangeable activities. And like foragers, early swiddeners had no livestock to look after; they had no farm animals. But they may have had family dogs.⁵⁶

Another advantage of (un-irrigated) swidden farming is that it takes less work than banded-field paddy farming takes to produce a bushel of rice. In one study in Borneo, paddy farming took about twice as much work as swiddening to produce the same amount of rice.⁵⁷

Since foraging came before swiddening in the distant past, many people have asked: Why did humans decide to take up farming? A good question. The answer might seem obvious today, but there were drawbacks. It was not because of a lighter workload. Flatland farming requires more work hours than hill swiddening and it, in turn, requires more hours than foraging. Some people who have studied the relentless increase in the human population have suggested that foraging limited the chance of families to have a large number of surviving offspring. In this view, foragers had limited biological fitness, as it is called, compared to the fitness of any kind of farmers, with farming leading to the global over-population we see today. The argument here is that living communally with greater and more predictable food resources at hand led to more security for protecting and feeding children and reproductive females.

While it is true that wet-rice farming both requires more work and gives a greater crop yield than incipient agriculture, the advantage of swiddening over foraging is less clear, especially since tropical swiddeners are usually part-time foragers. In one survey, farming was found to produce, on average, one more child per mother than foraging does, but most of the societies studied were not in the wet tropics. This survey therefore is probably not relevant to Southeast Asia.

Alternatively, early foragers seem to have had enough time over some 30,000 years to saturate the ecosystem of the Thai-Malay Peninsula, producing so many descendents that resources became limited. Swiddening was then started to provide enough food supplies for the people, as I suggested earlier. In this view, foragers eventually became farmers because of population pressure in their limited environment, not because they were motivated to have even more children in the comforts of village life. Because no evidence exists on this question one

⁵⁴ Some demographers estimate that rainforest foragers have a density of about 10 per 100 sq. km., but the estimate for the Aka foragers of Africa is higher, 20 per 100 sq. km. (L. Cavalli-Sforza and W. Bodmer. *The Genetics of Human Populations*. Freeman, San Francisco, 1971). Since the Thai-Malay Peninsula today has over 100,000 sq. km. of lowlands (below 1.5 km. in altitude), it could have supported 10,000 foragers 8000 years ago, and even more when it was larger during the ice age.

⁵⁵ Already by 42,000 years ago, people on the island of Timor were sea-fishing for tuna (S. O'Connor et al. Pelagic fishing at 42,000 years before present and the maritime skills of modern humans. *Science* 324: 1117-1121, 2011).

⁵⁶ Family chickens may have come later.

⁵⁷ P. Boomgaard. *Southeast Asia*. ABC Clio, Santa Barbara, CA, 2007. Rice farming also involves the need for storage whereas foragers rely on tubers storing themselves in the ground and clams self-stored on the seashore.

way or the other for peninsular history, it is well to keep both points of view in mind. In either case, the context to remember is that plausible explanations of the advent of farming on the peninsula must incorporate pre-farming realities. Farming did not arise in a vacuum.

Lest we forget, both early foragers and swiddeners managed their environment but did not destroy it. Shifting cultivators clear a patch of forest but allow regrowth during the fallow years. The destroyers of the environment are paddy fields, giant plantations, large dams, roads, cities, and toxic waste—almost all the inventions of recent centuries. And to sustain their environment, foragers and swiddeners need only a modest tool kit.

Village people built me a Temuan house, mostly of bamboo, rattan, and thatch. They used a metal hatchet but no nails. The hearth was a box of sand with three stones positioned to hold a kettle or pot above the cooking fire.

The tool kit

For long over a million years, the human line has been using rocks as tools. The pioneers in Southeast Asia undoubtedly arrived there with a learned tradition for using such tools. Tools are a cultural resource that improve the human ability to interact with the natural environment and that enhance the social environment as well. In a sense, language is a basic human tool. More conventionally, tools include weapons such as spears, instruments (needles, digging sticks), and facilities (fish weirs and traps).⁵⁸ Archeologists have found rocks that functioned as tools, in caves and other sites on the Thai-Malay Peninsula. Tools that were less durable than rocks were undoubtedly also used by the pioneers and their successors, but let us look at the rock category first.

At Kota Tampan in the Lenggong Valley in Perak, quartz cobble tools, sharpened on one side, are reported to have been manufactured on an ancient lakeshore and at nearby sites, starting more than 70,000 years ago.⁵⁹ The Bukit Bunuh site, also in the Lenggong Valley, dates to about 40,000 years ago. It was an open-air area where cobbles were worked on rock anvils with hammerstones to produce tools, including flake tools.⁶⁰ Notably, above Lenggong are numerous salt licks which attract game animals.⁶¹ In ancient times Lenggong may have been a convenient place to produce cobble tools for hunting at the upstream salt licks.

People, apes, and monkeys have all used hammerstones to crack open edible nuts or hard-shell food such as oysters. The food source is smashed on a flat stone, an anvil. But only people excel at making many other forms of rock tools. At Lang Rongrien, a cave near the west coast of southern Thailand, the earliest stone tools were small, sharp rock flakes. Later tools

⁵⁸ R. Torrence. Hunter-gatherer technology. In: Hunter-Gatherers. C. Panter-Brick et al., eds. Cambridge University Press, 2001. Pp. 73-88.

⁵⁹ Zuraina Majid. The Tampanian problem resolved: archaeological evidence of a late Pleistocene lithic workshop. *Modern Quaternary Research in Southeast Asia* 11: 71-96, 1990; H. D. Collings. Pleistocene sites in the Malay Peninsula. *Nature* 1426 (3595): 75-76, 1938; S. Oppenheimer. A single southern exist of modern humans from Africa: Before or after Toba? *Quaternary International* 258: 88-99, 2012. Cobble tools have been found under the meters-thick ash layer of 74,000 years ago.

⁶⁰ M. Saidin. Bukit Bunuh, Lenggong, Malaysia: New evidence of late Pleistocene culture in Malaysia and Southeast Asia. In: *Uncovering Southeast Asia's Past*. E. Bacus et al., eds. National University of Singapore Press, 2006. Pp. 60-64. In contrast to Malaya, Sumatran prehistory has been little studied. It seems to have no known human sites dating more than 10,000 years ago.

⁶¹ G. Davison et al. The Malaysian Heritage and Scientific Expedition to Belum: Temengor Forest Reserve. *Malaysian Nature Journal* 48: 133-146, 1995.

were made from large river cobbles usually knapped on both sides, called bifacials; many of them had heavily worn edges. Findings at Lang Rongrien have been dated from more than 43,000 up to 12,000 years ago.⁶² Multi-purpose cobble tools were used widely on the peninsula and nearby areas, in some places 5000 years ago or even more recently. They were easy to make and hand-sized. They were also easy to carry anywhere. Bifacial heavy-duty tools seem to have been preferred on the east side of the peninsula and unifacial ones on the west side.⁶³

Beside rocks, animal bones have been found near hearth sites at Lang Rongrien. They testify that large game such as deer and elephant were butchered there, but smaller animals were more commonly caught, including tortoises. The deer was a species known to live in open environments and rather dry forests.⁶⁴

Moh Khiew is another early human site in southern Thailand close to the coast, with its lowest excavated cave level dated to perhaps 25,000 years ago. This level had both unifacial and bifacial stone tools, some of them likely used for hunting game. Other tools showed by microwear analysis that they were used to work wood, or perhaps bamboo, although bamboo was not considered in the site report.⁶⁵ Both large and small animals were hunted at the site, based on bones found in the cave—from wild water buffalo, wild pig, tapir, and primates, down to squirrels. Even bones of otter and sun bear were found. Later cultural levels in the cave showed evidence of a wide range of hunted animals but also evidence of marine mollusks as a food source. Between 6000 and 4000 years ago, people using the cave still made cobble and flake tools but also had polished stone adzes and axes and bone tools. Pottery fragments were also found in this top-most excavation layer.

Inland from Moh Khiew is Sakai Cave. Findings there go back no more than 9000 years. The animals hunted were small, and stone tools were not ground smooth at that time. In the upper levels of the excavation, polished adzes, pottery, and shell beads were found, but bone tools were found at all occupation layers at this site.

Sometime after the height of the last ice age, perhaps 10,000 years ago, the rock tool kit on the peninsula began to include “sumatraliths,” which are elongated unifacial cobbles, but flakes, hammerstones, and bifacials also still occur in the so-called “Hoabinhian” tool assemblage.⁶⁶ These tools have been found at Lang Rongrien, Moh Khiew, and at cave sites in central Malaya. The Gua Cha rockshelter in interior Kelantan, dating from 10,000 to 3000 years ago, contained bones of monkey, gibbon, pig, deer, sun bear, cattle, squirrel, fruit bats, rats, and even rhinoceros. Carbonized rice occurred at Gua Cha about 2200 years ago but not earlier.⁶⁷

⁶² D. Anderson. *Lang Rongrien Rockshelter*. University of Pennsylvania Museum, Philadelphia, 1980.

⁶³ D. Bulbeck. Biological and cultural evolution in the population and culture history of *Homo sapiens* in Malaya. In: *Dynamics of Human Diversity*. N. Enfield, ed. Pacific Linguistics, Canberra, 2011. Pp. 207-285; archeologists say that such cobble tools will show “gloss” if they have been used to work wood or bamboo. Newly knapped cobbles can be tested for production of gloss by using them to cut bamboo canes and comparing them with ancient cobble tools, as an exercise in experimental archeology. Also, if an ancient pebble tool was used to peel or chop tubers, it can retain starch granules observable under a microscope.

⁶⁴ K. Mudar and D. Anderson. New evidence for Southeast Asian Pleistocene foraging economies: Faunal remains from the early levels of Lang Rongrien. *Asian Perspectives* 46 (2): 298-334, 2007. See also D. Anderson. The use of caves in Peninsular Thailand. *Asian Perspectives* 44 (1): 137-153, 2005.

⁶⁵ S. Pookajorn. Human activities and environmental changes during the late Pleistocene to middle Holocene in southern Thailand and Southeast Asia. In: *Humans at the End of the Ice Age*. L. G. Strauss et al., eds. Plenum, New York, 1996. Pp. 201-213.

⁶⁶ Were the longer sumatraliths more useful than rounded cobble tools for shaping the interior of wooden canoes?

⁶⁷ Adi Taha. Gua Cha and the archaeology of the Orang Asli. *Bulletin of the Indo-Pacific Prehistory Association* 11: 363-372, 1991.

The last rock-based tool kit is called Neolithic and dates to perhaps 5000 years ago. All that need be said about it is that it includes ground stone tools and pottery and may be associated with early agriculture.⁶⁸ Rocks have also long been used for other purposes. To name a few, quartz crystals have been used in healing and natural rock walls have been used as surfaces for artwork.⁶⁹ Utilitarian uses include cooking stones in fire pits and stones to build weirs to trap fish in shallow pools upstream. In fact, unmodified rocks have many uses that are “invisible” to archeologists. Some archeologists have written that the Sunda area had a monotonous technology because of its simple stone tools, but they did not consider the scope of bamboo in tool kits. Looking beyond rocks, the total tool kit of foragers and swidden farmers is known to be virtually the same in Southeast Asia, largely based on bamboo and rattan.⁷⁰

Let us consider for a moment the requirements of a reliable tool kit for living in a tropical forest. At the least, it must ensure food and shelter.⁷¹ It should also provide fire for cooking, protection from dangerous animals, and night-time warmth, and it should facilitate water travel. Fortunately, Southeast Asia has an abundance of materials other than rocks that can be used as tools, from porcupine quills for punching holes to giant bamboo used to make rafts or water-carrying tubes for household use. Food can also be roasted, boiled, or stewed in green bamboo tubes.⁷² Some writers have called the early human history of Southeast Asia a “bamboo age” based on a tool kit of bamboo items, in contrast to the later metal age. One observer noted that bamboo is indispensable to the Temiar for house building, household utensils, vessels, tools, weapons, fences, baskets, water-channeling pipes, rafts, musical instruments, and ornaments.⁷³

Bamboo can be considered an optimal technology for many desired outcomes. It is easy to harvest. Like small trees, bamboos can be bark-ringed by a cobble tool and then snapped off. The same technique was used in early times at Lang Rongrien on deer antlers, ring and then snap. After harvesting a bamboo clump, the stumps can be burned to stimulate the growth of new shoots. When a bamboo stem (culm) is smashed with a rock, splinters are produced that are sharp-edged and useful as knives or dart shafts.⁷⁴ Such splinters were long used to cut the umbilical cord at birth. Today inventive people even make bicycle frames out of bamboo because it’s as strong as steel as well as being a sustainable resource. Moreover, bamboo is still in use today in Asia as a hand tool, as a food source (edible shoots), and to make ladders, sleeping platforms, and other facilities. Old stories of people being created inside bamboo stems and being freed with outside help dramatize the importance of bamboo to many people in Southeast Asia.

⁶⁸ Chip-edged cobbles won’t work well for making ladles, paddles, or dugout canoes. Why ground-edged stone tools, which are laborious to manufacture and repair, were added to toolkits is uncertain, however.

⁶⁹ N. H. Tan and S. Chia. ‘New’ rock art from Gua Tambun, Perak, Malaysia. *Rock Art Research* 27 (1): 9-18, 2010; J. Matthews. Rock paintings near Ipoh. *Malaya in History* 5 (2): 22-25, 1959; M. Saidin and P. Tacon. The recent rock drawings of the Lenggong Valley. *Antiquity* 85 (328): 459-475, 2011.

⁷⁰ Bamboo bridges and other bamboo technologies in Borneo are described in A. R. Wallace. *The Malay Archipelago*. Macmillan, London, 1869, pp. 59-61.

⁷¹ Early shelters were not only the caves visited by archeologists, they included lean-tos and tree houses.

⁷² While clay cooking pots have been dated in China to about 20,000 years ago, pottery shows up on the peninsula only during the last 4000 years or so, perhaps because bamboo cooking tubes not only were serviceable but also because pottery is fragile and heavy to carry around.

⁷³ H. D. Noone. Report on the settlements and welfare of the Ple-Senoi of the Perak-Kelantan watershed. *Journal of the Federated Malay States Museums* 9 (pt. 4): 1-85, 1936.

⁷⁴ J. West and J. Louys. Differentiating bamboo from stone tool cut marks in the zooarchaeological record. *Journal of Archaeological Science* 34 (4): 512-518, 2007.

Malaya has over 30 native species of bamboo. They range in size from pencil-thin creepers to stems as large as a young tree trunk. A conspicuous use of bamboo on the peninsula is the blowpipe, emblematic of Orang Asli tool kits today.⁷⁵ It has a strong outer tube and a thin inner one. The thin bamboo comes from a species that grows only in the highlands of Malaya; it has an internode length of about eight feet, which provides a smooth bore for blowpipe darts.

Likewise, bamboo “stampers” are used by Orang Asli as percussion instruments during singing fests. Bamboo flutes and zithers are also popular. Both blowpipes and stampers were important developments, one for physical survival and the other for cultural cohesion. Once invented, they probably spread rapidly among forager groups.⁷⁶ Other bamboo tools included snares, fish traps, fish spears, and scaffolding on trees to reach bees’ nests to harvest honey. Some spring traps for game have a wooden shaft and a bamboo blade.⁷⁷ Fire is made by friction devices of wood or bamboo and twine. All such items can be made from materials readily at hand; no repair van or moving van is needed.

Bamboo has also been used by Orang Asli as a noise maker to scare off harmful animals, by placing a bamboo tube on a fulcrum in a stream. As the canted vessel fills up, it falls over onto a well-positioned rock, making a resounding “clonk,” and then tips backward to fill up again. To make a “scare” against birds visiting a swidden of ripening crops, bamboo tubes are used in something like a wind-chime on a post. Also, music can be made by wind organs or windmills positioned high in the trees. Another use of bamboo, akin to the action in blowpipes, is to provide tubing for piston-driven air compression, such as in the aeration of metallic materials in fire pits to purify iron or copper or aeration of kilns to produce pottery. Several accounts suggest that such air-compression technology is ancient on the peninsula, as well as elsewhere in Southeast Asia.⁷⁸ Bamboo piston bellows are still being used by Orang Asli.⁷⁹ And there is now experimental confirmation that simple flaked cobbles can be used to make complex bamboo tools.⁸⁰ In short, bamboo technology has many uses, the raw material is plentiful and portable, and it does not require sophisticated processes to make tools. Rattan has many of the same attributes.

Climbing palms (rattans) have various uses.⁸¹ For example, because they have thorns on their stems, when built into conical animal or fish traps, the thorns impale the prey inside the trap. Orang Asli and others have used such traps, and the technique may be ancient in Southeast

⁷⁵ A Semai-type blowpipe is measured as five forearms long, from the elbow to the tip of the fingers. (This measurement is the same as the ancient Greek cubit.) The preferred bamboo tubing for blowpipes comes from a species with internodes up to 2 meters long, about equal to five forearms in length. Women’s blowpipes were generally less than 1.5 meters long, as were those made for children. See also K. M. Endicott. Negrito blowpipe construction on the Lebir River, Kelantan. *Federation Museums Journal* 14: 1-36, 1969.

⁷⁶ R. D. Noone. Notes on the trade in blowpipes and blowpipe bamboo in north Malaya. *Federation Museums Journal* I and II: 1-18, 1954.

⁷⁷ I. Evans. Notes on the Sakai of the Kerbu River. *Journal of the Federated Malay States Museums* 7: 75-89, 1916. Other hunting devices include pit traps and bird liming.

⁷⁸ In the late 1800s the bellows for a Jakun iron forge used a hollow wooden cylinder (H. Lake and H. Kelsall. A journey on the Sembrong River from Kuala Indau to Batu Pahat. *Journal of the Straits Branch of the Royal Asiatic Society* 26: 1-23, 1894.

⁷⁹ One Semai fire piston is described in C. Wells. *North of Singapore*. R. McBride, New York, 1940, p. 219. Fire saws have also been used by Orang Asli, using rattan-friction on soft wood.

⁸⁰ Ofer Bar-Yusof et al. Were bamboo tools made in prehistoric Southeast Asia: An experimental view from South China. *Quaternary International* 269: 9-21, 2012.

⁸¹ W. Ave. Small-scale utilization of rattans by a Semai community in West Malaysia. *Economic Botany* 42 (1): 105-119, 1988.

Asia and out to Melanesia.⁸² Thorny rattans are also used as fish hooks and as rasps or graters.⁸³ Some rattans are used as rope. One species of rattan has crystals of resin in its fruit. The resin, called dragon's blood, was and is used by Orang Asli but was once sold as a red dye and as a medicine.⁸⁴ Other resins were also part of the Orang Asli tool kit. Their versatile uses included glues for hafting projectile points to spears and arrows and crafting blowpipes and their darts. Resins are also used as incense and as boat caulk and hull sealant.

It is well documented that northern Orang Asli once used bows and arrows but later switched to blowpipes. Both types of projectiles, arrows and pipe darts, have a longer effective range than hand-held spears. Today, as in some prehistoric times, the northern half of the peninsula is somewhat drier than the south. As a result, forests are less dense in the north. Bows are more useful in open forests while blowpipes are superior in dense forests where visibility is poor and many prey animals are high above one's head.⁸⁵ In the distant past of the ice ages, however, open forests were common on the peninsula, giving an advantage to bows in many places.⁸⁶ Some bows were made from split bamboo and were up to two meters long, according to some reports. Others were made from tree saplings, such as *langsap*, a section being cut off and split lengthwise. A split half was then shaved to make it the correct thinness for easy bending and notches added to the ends. The meter-long arrows, at least in some cases, had two or three short-clipped hornbill feathers, which "whistled" in flight, disorienting and dazing game such as wild boar.⁸⁷ Bows were in use by Orang Asli as late as the 1950s but are not used today.

At first glance, making a bamboo blowpipe seems a more demanding task than making a bifacial cobble tool. The knapper must knock off flakes from the cobble in careful order and correct positions. This can take about 30 decision steps. Likewise, about 30 steps lead to the manufacture of a blowpipe and quiver full of poisoned darts. The main difference is that the knapper can sit in one place to work while the blowpiper must go hither and yon to obtain materials, but the mental work might be the same in the two cases. Blowpipe making is not as difficult as one might imagine, if only one has the right materials. In this view, blowpipes could have been made as early as cobble tools, or even as early as a set of bow and arrows.

However, blowpipes, as a closed-forest adaptation, were perhaps more advantageous recently, particularly in the last, wetter 10,000 years. The technology likely spread quickly from the Thai-Malay Peninsula with its long-jointed bamboo to areas of Southeast Asia where blowpipes were made laboriously by reaming out wood because the proper bamboo species was

⁸² H. Balfour. Thorn lined traps and their distribution. *Man*, No. 21, March, 1925, pp. 33-37. More recently, Semelai Orang Asli were known to have 19 kinds of traps, including deadfalls, pitfalls, and snares, as well as thorn-lined fish traps (R. Gianno. *Culture and Resin Technology*. Connecticut Academy of Arts and Sciences, New Haven, 1990).

⁸³ The interiors of bamboo blowpipe tubes were smoothed by pulling a thorny rattan through their length (I. Evans. *The Negritos of Malaya*. Cambridge University Press, 1937).

⁸⁴ K. Morris. Forest products for market: rattan and the Semaq Beri of Ulu Tembeling. *Akademika* 48: 93-112, 1996.

⁸⁵ The light blowpipe darts can travel in a straight line for at least 25 meters, an aid in aiming at partially hidden animals high above the ground. Arrows can travel just as far but are heavier and have an arc trajectory, a disadvantage compared to darts in a rainforest (H. Zahorka. Blowpipe dart poison in Borneo and the secret of its production. *Borneo Research Bulletin* 37: 223-232, 2006). Some twined bowstrings may not stay taut in a wet forest, but bowstrings made of twisted terap bark fibers used by Orang Asli even strengthen when wet. Likewise, anchor lines are made with terap ropes.

⁸⁶ Nineteenth century bows were two meters long and made of bamboo; the arrows had iron heads (N. Mikluho-Maclay. *Ethnological excursions in the Malay Peninsula*. *Journal of the Straits Branch of the Royal Asiatic Society* 2: 205-221, 1878).

⁸⁷ P. Schebesta. The bow and arrow of the Semang. *Man*, nos. 53-54: 88-89, 1926.

lacking. Nevertheless, the question remains as to which came first, bows or pipes. Early blowpipes have long disintegrated, as have bows and arrow shafts, but archeologists have looked for stone arrowheads and spear points on the Peninsula. They have not found recognizable arrowheads, except for possibly two at Mon Khiew, but have found possible spear points, more accurately described as bifacial, slightly tapered axe-like heads. Bone arrow tips have, however, been found at the Kelantan rockshelter called Gua Cha and the pointy cobble flakes at Lang Rongrien could have served as arrow tips.⁸⁸ In more recent times, one Orang Asli group made arrow tips from sharpened forearm bones of siamang.⁸⁹

A possible cross-over technology between bows and pipes is the use of bertam palm-frond midribs as arrow and dart shafts. And, as in blowpipe darts, arrow tips coated with a naturally occurring poison from the sap of the ipoh tree that causes cardiac arrest would be effective hunting devices on small animals and even on larger game.⁹⁰ Notches on poisoned blowpipe darts, as well as on arrow tips, are designed to break off once they embed in a prey animal, even when the shaft is dislodged, a technological improvement over un-notched tips.⁹¹ Besides midribs or splinters, arrows could have also been made from straight tree branchlets with fire-hardened, sharp tips.⁹² Wooden spear tips can also be fire-hardened.

Other tool kit items of early times undoubtedly included twine, made from rattan or by rubbing strands of inner tree bark on one's thigh. Twine may have been used as bowstrings and, well, twine in general. Resins also were readily available, for use as torch materials and as a source of incense, among other applications.⁹³ Coconut shells can serve as ladles. Pounded derris root became useful for stunning fish in fish drives in pools or behind a weir on small streams. And bark cloth could be made from the stripped inner bark of certain trees; it makes a useful loincloth, even a blanket. Finally, human shelters of bamboo, peeled bark, rattans, palm leaves, and poles provide a habitat for tropical people to live in harmony with nature, unlike cubicles in an office tower nowadays.

Mobile foragers had many uses for nature's resources. Consider, for instance, how they might carry things, such as infants and bulky foodstuffs when they moved camp some distance. Bark cloth, where available, was generally flimsy. But when several layers are folded together, they can and have been used for infant slings by Orang Asli, as early photographs show. Carrying part of a butchered game animal by hand is possible but a container of some sort is preferable. Such items could be made into a bundle covered with banana leaves and secured by knotted rattan or twine. It is also possible that there were quickly-made bark baskets held together with resin and twine or rattan, but the archeological record has not reported any, so far. Bark canoes, also made by Orang Asli until recently, are more easily constructed than dugouts

⁸⁸ D. Anderson. Cave archaeology in Southeast Asia. *Geoarchaeology* 12: 607-628, 1997. The fact that tall-tree prey such as gibbons have been found in prehistoric cave deposits does not prove that blowpipes were used at those times. Arrows can also bring down arboreal animals, especially when they are tipped with ipoh poison.

⁸⁹ S. Howell. *Society and Cosmos*. University of Chicago Press, 1984.

⁹⁰ African foragers were using poisoned arrows 40,000 years ago (M. Balter. Ice age tools hint at 40,000 years of Bushman culture. *Science* 337: 512, 2012). Orang Asli blowpipe darts are often tipped with a mixture of ipoh and of strychnine, obtained from a vine (B. Kopp et al. Analysis of some Malaysian dart poisons. *Journal of Ethnopharmacology* 36: 57-62, 1992).

⁹¹ Batek Orang Asli char the tips of their blowpipe darts to make them easy to be broken off in a prey animal, rather than notching them.

⁹² Hard wooden arrow tips, two inches long, were coated with poison and were detachable; they could bring down large game, even rhinoceros (L. Wray. Ipoh poison of the Malay Peninsula. *Journal of the Anthropological Institute of Great Britain and Ireland* 21: 476-481, 1892).

⁹³ Fossil resins and gums have been found in Pahang, Perak, and Kedah but have not been analyzed.

for river travel.⁹⁴ Notably, the tool kit of swidden farmers who also fish and hunt need not be different from that of mobile foragers. A dibble stick for planting seeds in a swidden is like a stick used to dig yams out of the ground. A half coconut shell is a food ladle and also a canoe bailer.

Much has yet to be learned about early tools and technology on the Thai-Malay Peninsula. Scanning electron microscopic studies have shown that cut marks made on bone by cobble tools differ from those made by bamboo knives. The knives leave a distinctive residue on the bone, but such studies are rare in Southeast Asia. Ancient Asians in arid or cold regions may have favored stone tool kits but those in tropical forests areas had less need for stone tools because they had bamboo. While students at one university in California call their Archeology Department “Stones and Bones” because of its focus on these items, such a department in Southeast Asia might well focus on the “bamboo and rattan age,” if more attention could be paid to perishable items of local tool kits.⁹⁵

Eventually metals were added to Southeast Asian tool kits, but dates are uncertain. Bronze items show up in coastal sites in central Thailand at least 4000 years ago. Bronze and iron appeared on the Thai-Malay Peninsula 1000 to 3000 years ago, at different times in different places.⁹⁶ Long before that time, however, “have tool kit, will travel” was a hallmark of peninsular people.

On Tasik (lake) Chini, I saw two young Jakun women harvesting water-lily stalks for food by leaning sideways in their tippy dugout. Not a drop of water spilled into the canoe.

Travel by water

Over much of the globe land travel has long been by foot or by horses or other beasts that can carry people and goods. Because pack animals are rare in Southeast Asia, land travel has mainly been by foot, but water travel can be faster. We may never know if the pioneers to Southeast Asia simply walked there, rafted there in some makeshift way, or deliberately paddled toward the rising sun.

Today many Orang Asli are adept at river travel, both by raft and canoe, from the source to the river mouth.⁹⁷ They know their world by the rivers they have traveled. “From the source to the river mouth” also is part of the spiritual concepts of the Temiar group of Orang Asli. In addition, some Orang Asli groups today are coastal sailors.

Making a dugout canoe requires obtaining a suitable log to be scooped out. Forest trees can crash due to lightning strikes or wind or old age. After losing their branches over time, these downed trees end up as naked logs on land or as floating logs in rivers or lakes. Floaters make good canoes for obvious reasons. They can then be used as the raw material for canoe

⁹⁴ B. I. Kiew. The making of an Orang Asli bark boat. *Malaysian Naturalist* 42 (4): 3-4, 1989; G. Davison. Orang Asli rafts. *Malaysian Naturalist* 42 (4): 20-21, 1989.

⁹⁵ Bamboo stems, some burnt, were found in caves in Thailand dating to 10,000 or more years ago (D. E. Yen. Hoabinhian horticulture? The evidence and the questions for northwest Thailand. In: Sunda and Sahul. J. Allen et al., eds. Academic Press, London, 1997. Pp. 567-599). However, bamboo and other grasses have small pollen grains that are difficult to identify so that pollen studies have provided little firm evidence of farming or of other uses of plants in early times.

⁹⁶ Imported six-inch nails were then quickly forged by Orang Asli into arrowheads or fish-spear tridents.

⁹⁷ G. Davison. The manufacture and terminology of Temiar bamboo rafts. *Journal of the Malaysian Branch of the Royal Asiatic Society* 62 (1):67-104, 1989.

construction, thereby skipping the arduous step of chopping down a large tree. The bole is then split open with wedges using a mallet and then hollowed out.

At 40,000 years ago people living on the Thai-Malay Peninsula had access to the sea only in the western area above the Isthmus of Kra because the Sundaland subcontinent extended far away to the east in Indonesia. They did have easy access to rivers and a few lakes or swamps, where bamboo rafts or canoes could be used, either poled or oared, just as Orang Asli use them today.⁹⁸ Large Orang Asli rafts can be twelve bamboo-stems wide and two-layered, all lashed together. Some are over 20 feet long with sweeps at each end.

Once the Malacca Straits opened around 8000 years ago, the stage was set for coastal enclaves to venture into long-distance sailing that evolved into contact between Africa, India, and East Asia. Such ventures involved trade and some population movements. Favorable sites on the Thai-Malay Peninsula became petty commercial centers exploiting their riverine hinterlands. The availability of sea transport for trade goods expedited the growth of the coastal enclaves, and a few of them became towns about 2000 years ago.

With the sea rise on Sundaland, the east-west monsoon winds favored travel east toward New Guinea in one season and west toward the mainland in the next. East-west travel would have been faster with sails than without them. Before cloth became available for sails, woven matting was likely used and before that, sails were perhaps made of other materials, such as bark. In any case, basketry and woven mats were already in use in the region at least 1000 years ago.

When the climate warmed some 15,000 to 8000 years ago, the peninsula gained shoreline on both sides, offering more usage of the sea. But even before that, at 42,000 years ago, some Southeast Asians were deep-sea fishers, as the dated bones of tuna and shark and bone fishhooks attest on the island of Timor. It may be that early Southeast Asians with access to the sea had ventured on it during all of their time in the region, whether for fishing or for colonizing. These early seafarers may have started from the Thai-Malay Peninsula or from its offshoots in Borneo or Java. But today Orang Asli are not open-ocean mariners although a few are coastal fishers and foragers. Other Orang Asli were shore dwellers in the ancient past, as coastal shell middens attest.

Austroasiatic language analysis does not help much in understanding early seafaring since the oldest Austroasiatic root word for boat does not go back to proto-Austroasiatic times.⁹⁹ That is, the boat word is not old enough to speak to events more than about 6000 years ago, although there was plenty of water for boating. However, the Nicobar Islands northwest of Sumatra were colonized from the Thai-Malay Peninsula by seafarers speaking an Austroasiatic language related to Mon, perhaps 5000 years ago.

The western Southeast Asian seas include the Malacca Straits, Java Sea, Gulf of Thailand, Sulu Sea, and the South China Sea. One might suggest that because they are shallow and distances between land masses are not great, these seas were fairly well traveled in antiquity, forming a maritime area as important as the Mediterranean was to Europe. If so, what was the early technology involved?¹⁰⁰ Driftwood logs? Bark catamarans? Sailing rafts with pandanus-mat sails and an oar for a rudder? Outrigger sailing canoes? No-sail, multi-oared boats? Bone fishhooks and rattan fish lines? Archeology has so far provided few clues, and what is known

⁹⁸ Jakun Orang Asli made bark canoes in historical times but no longer do so.

⁹⁹ G. Diffloth. Austroasiatic word histories: boat, husked rice and taro. In: Dynamics of Human Diversity. N. Enfield, ed. Pacific Linguistics, Canberra, 2011. Pp. 295-313.

¹⁰⁰ Watercraft, including bamboo rafts, are discussed in J. Birdsell. The recalibration of a paradigm for the first peopling of Australia. In: Sunda and Sahul. J. Allen et al., eds. Academic, London, 1977. Pp. 113-167.

raises more questions than providing answers. Firm evidence of early health conditions are also in short supply.

Dr. Allen Lewis from the Orang Asli hospital at Gombak came to my Temuan village several times. On one visit Hikang confided in him that he had a serious problem. They retired to a secluded place where Al Lewis discovered Hikang had yaws. A shot of penicillin in the buttocks did the trick. Al Lewis said, "I hope he's not the one in a thousand that is allergic to penicillin."

Health of the ancestors

Whether migrating or staying in place, a foraging lifestyle has been the most adaptable and successful one the human species has ever known, lasting for untold thousands of years. Our foraging ancestors shaped the biological and cultural strengths of people living today. Many scholars have written about the question of early human health and survival, including Ivan Polunin, who studied these issues in Orang Asli after World War II.¹⁰¹

Disease-causing organisms are more common in the tropics than in cold regions. The health of Southeast Asians today derives in large part from the fact that early foragers survived many diseases based on their inherited or acquired immunity to infections. The survivors produced descendents genetically and physiologically resistant to disease. They learned how to cope culturally with ill health, and they discovered many medicinal plants. Recently, for example, it was found that 237 medicinal plants were in use in just one village in Borneo, most of them from primary forest rather than logged-over sites.¹⁰² Among Semai Orang Asli, medicinal plants are used to treat coughs, wounds, toothaches, headaches, boils, malaria, stomachaches, and diarrhea.¹⁰³ The Semai use more than 37 native plants as medicines.¹⁰⁴

Besides herbal medicines and therapeutic group sympathy during illnesses, the mobility of foraging cultures worked to minimize exposure to pathogens. Short stays in one locality before moving on minimized the spread of malaria and some intestinal parasites.¹⁰⁵ Moreover, short stays kept the environment healthy, that is, sustainable. The small size and dispersion of forager groups meant that measles, flu, polio, or small pox could not spread from one group to another; but foragers were more prone to snake bites, hunting accidents, and attacks from tigers, giant crocodiles, and other predators. Those in ever-wet forests also probably suffered from skin diseases such as tinea. Childhood mortality among foragers may have been high, but those surviving to age 15 had a fair chance of achieving reproductive success and living to age 50.¹⁰⁶ Living to age 40 was even more likely.

¹⁰¹ I. Polunin. Health and disease in contemporary primitive societies. In: Diseases of Antiquity. D. Brothwell and N. Sandison, eds. Charles Thomas, Springfield, Illinois, 1967. Pp. 69-97; I. Polunin. Some characteristics of tribal peoples. Ciba Foundation Symposium 49: 5-20, 1977.

¹⁰² I. Caniago and S. Siebert. Medicinal plant knowledge and conservation in Kalimantan. Economic Botany 52: 229-250, 1998.

¹⁰³ H-F. Lim. Orang Asli, Forest and Development. Forest Research Institute Malaysia, Kepong, 1997.

¹⁰⁴ C. Nicholas, T. Chopil, and T. Sabak. Orang Asli Women and the Forest. COAC, Subang Jaya, Malaysia, 2003.

¹⁰⁵ M. N. Cohen. Health and the Rise of Civilization. Yale University Press, New Haven, 1989; N. Owen. Introduction. In: Death and Disease in Southeast Asia. Oxford University Press, Singapore, 1987. Pp. 3-30.

¹⁰⁶ R. Pennington. Hunter-gatherer demography. In: Hunter-gatherers: an interdisciplinary perspective. C. Panter-Brick et al., eds. Cambridge University Press, 2001. Pp. 170-204.

A recent study reported that half of the Orang Asli school-age children at Betau in Pahang state were anemic.¹⁰⁷ Their diet is affected by being poor in a cash economy and by loss of hunting, fishing, foraging, and swiddening resources to outsiders. While children are now vaccinated against measles, health cannot be achieved without good nutrition.

Food must be adequate to ensure energy for growth and work, to counteract parasites and predators, to maintain body temperature, and to reproduce. In the Thai-Malay Peninsula, this adequacy was the situation for early foragers for much of prehistory. The foragers had no freezing winters or scorching summers to deal with. Besides adults contributing to the food supply, children could also help. They could collect clams and turtle eggs. They could also catch frogs and climb small trees to obtain bird's eggs or nuts or to pick fruits such as *langsats* and *duku*. While this wholesome food of the foragers was likely high in fiber and low in fats and carbohydrates, it was also adequate in micronutrients (except for salt and iodine inland). But seasonal shortages of fruit, wild boar, and other resources could lead to periods of nutritional stress.

When the managed landscapes of foragers became more intensively used for producing food, such as in swidden horticulture with plots of mixed plants, the resulting open glades favored the *Anopheles* mosquito vector of malaria. Swiddeners in semi-settled villages were also more prone to illnesses of congestion than mobile foragers were, including dysentery and typhoid. But epidemic diseases were still rare, according to one view. Another view is that farming with people crowded into villages fostered epidemics of diseases derived from domestic animals, but farmers developed genetic resistance or body immunity to them over time while forager groups did not develop these advantages; therefore foragers suffered greater death rates.¹⁰⁸ This is a plausible scenario for some early farming areas but may not apply to the Thai-Malay Peninsula. There, without horses, sheep, or the like, domestic animals were rare, except for dogs. Jungle fowl were certainly domesticated in Southeast Asia and may provide another exception. While "bird flu" is now known to be a problem, a few chickens in early swidden settlements may not have been. If such was the case, early farmers did not indirectly decimate foragers in the region via "domestic" epidemics.

In any event, the hardy state of affairs for early inhabitants of the Thai-Malay Peninsula changed as foreigners began to filter in and stay. On the one hand, foreigners augmented food variety, bringing in plants such as chilies, maize, pineapples, sweet potatoes, and cassava from the Americas. On the other hand, as in such invasions world-wide, the foreigners had a fatal impact. Measles, smallpox, influenza, tuberculosis, and sexually-transmitted diseases then killed far and wide.¹⁰⁹ As a result, indigenous groups were at times fragmented, destabilized, and demoralized.¹¹⁰ If a stricken forager or swiddening group survived at all, it went through a "bottleneck," a severe decrease in population size that could take generations to rebuild.

Foreigners brought new diseases to the Thai-Malay Peninsula long before they brought in health improvements.¹¹¹ These improvements happened only in recent generations. Health

¹⁰⁷ M. T. Al-Maktari et al. Effects of vitamin A supplementation on iron status indices and iron deficiency anaemia. *Nutrients* 6 (1): 190-206, 2014.

¹⁰⁸ J. Diamond and P. Bellwood. Farmers and their languages: the first expansions. *Science* 300: 597-603, 2003.

¹⁰⁹ Likewise, it took only a few European exploration ships to spread syphilis throughout Polynesia in the 18th century.

¹¹⁰ A. G. Gomes. Orang Asli demography. *Federation Museums Journal* 24: 75-92, 1978.

¹¹¹ Outsiders brought smallpox to the Philippines as early as 300 CE, evidently from Indochina, but when it first reached the Thai-Malay Peninsula is not known.

improvements brought longer lifespans, it is true, but it is also true that some outsiders brought swords, slave-raiding, and then guns and an attitude of superiority based on their beliefs, not on their genes.

The Temuan asked me why I wanted to collect blood samples. I said that it was to look for malarial parasites and treat infections. This was half true. I never figured out how to explain that the samples would also be used to study genes. The gene concept was too foreign.

DNA, genes, and survival

Human genes are composed of a chemical called deoxyribose nucleic acid (DNA). Genes are recipes for basic parts in the body, mainly proteins and nucleic acids. Geneticists tell us that the whole human race, while far from a clone, is remarkably similar in its genes.¹¹² Nevertheless, each of us has several million genetic variants, mostly trivial, that make us unique. Although people differ genetically, most of these differences are found within cultural groups, not between them. On a worldwide scale, common genetic variants such as the ABO blood groups do not differ much among cultural groups. For instance, skin color in the Orang Asli Semai and Temuan varies from dark to light in both groups.¹¹³ Likewise, hair form varies within and between Orang Asli groups, from tight curls to wavy to straight.¹¹⁴ Stature also is not an identifying trait for these groups since most Orang Asli are rather short. Adult male Semang foragers, for instance, vary in height from 143 to 168 centimeters (4 feet 9 inches to 5 feet 7 inches).¹¹⁵

In most cases, variable traits do not identify to which cultural group an Orang Asli individual belongs. More broadly, two Semai may differ genetically more from each other than either of them differs from a Jakun, but most of these differences are hidden beneath the skin. This implies that our self-identification with a group is based on our culture, not on our genes. The scientific facts about our genes do not support the “racial” prejudices of the British or of anyone else.

Our biological heritage is encoded in the long DNA molecules on the chromosomes in our body cells. Although we lack written records of ancient people on the Thai-Malay Peninsula, we have records of them written in the DNA of today’s citizens.¹¹⁶ Unlike our cultural heritage of language and attitudes, our DNA is passed on little changed from parent to child, providing a glimpse of our human history.

¹¹² K. Owen and M-C. King. Genomic views of human history. *Science* 286: 451-453, 1999.

¹¹³ K. C. Ang et al. Skin color variation in Orang Asli tribes of Peninsular Malaysia. *PLOS One* 7 (8): e42752, 2012.

¹¹⁴ A. Fix. Foragers, farmers, and traders in the Malayan peninsula: origins of cultural and biological diversity. In: *Forager-traders in Southeast Asia*. K. Morrison and L. Junker, eds. University of Cambridge Press, 2002. Pp. 185-202.

¹¹⁵ Some Orang Asli adults in southern Thailand have a low level of insulin-like growth factor in their bloodstream. Adolescents there show no increase in this factor and do not experience a spurt in height at this age (T. Ishida et al. Preliminary report on the short stature of Southeast Asian forest dwellers, the Manni of South Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health* 29 (1): 62-65, 1998). Other Orang Asli groups, as well as other Southeast Asians who are short, were not studied. In contrast, the short Baka foragers of Cameroon have a normal level of insulin-like growth factor (A. Froment. Evolutionary biology of hunter-gatherers. In: *Hunter-Gatherers*, C. Panter-Brick et al., eds. Cambridge University Press, 2001. Pp. 239-266).

¹¹⁶ The scientific world view can differ from that of indigenous groups. See J. Reardon and K. TallBear. Your DNA is *our* DNA. *Current Anthropology* 53 (S5), April, 2012. DOI: 10.1086/662629.

DNA occurs in different places in our body cells. Most of it is on the chromosomes in the cell nucleus. The autosomes are the chromosomes that come in sets of two, one set inherited from each parent. A smaller amount of DNA is on the sex chromosomes. Females have two X chromosomes while males have one X and one Y. The Y determines maleness and the study of its DNA reveals the ancestral lineage of men. Since X chromosomes occur in both sexes, they do not reveal female lineages, but mtDNA does. It is the minute DNA found in mitochondria (mt), the many small capsules in cells that produce chemical energy from the food we eat. MtDNA traces “the daughters of time” down through the ages. It is passed along only by mothers because it does not occur in a father’s sperm cells.

Years ago I wrote that “while genetics can help clarify ambiguities about Orang Asli prehistory, it has not yet had much success.”¹¹⁷ The situation is much improved now, but a few words of caution are still in order. Several problems are noteworthy about DNA studies on Southeast Asians. One problem is that most genetic work has been based on snippets of mtDNA, not the whole mtDNA molecule, let alone all the DNA molecules in the cell nucleus. This means that conclusions based on mtDNA studies are insecure to an unknown extent. Two people who share very similar mtDNA snippets are assumed to derive from a common ancestor at time X, with the difference between them being due to changes in their DNA over the ages (mutations). The calculated time X, however, assumes mutations occur at a constant rate, which may not be true, and therefore time X is debatable. It remains to be seen whether the mtDNA time X for the settling of Southeast Asia is 75,000 or 40,000 years ago.¹¹⁸

Another problem with studies on the DNA of Southeast Asians is that they may not be based on random sampling and may include people of all ages, even children and adults within a family. In addition, the studies rarely consider all the relevant human groups. Researchers in urban settings may not know which rural groups are key to their analysis and interpretation.¹¹⁹ More often, DNA samples from relevant groups are not available for study because of government regulations or the remoteness of a group from a scientific laboratory. As a result, published studies “forage” opportunistically for data, which is often incomplete in terms of their research goals. A case in point is a recent study that ties the Iban of Borneo prehistorically to mainland Southeast Asian peoples.

Using new DNA information on the Iban and comparative data from other laboratories, researchers were able to establish their finding of a shared ancient ancestry between Iban and mainland people, including Orang Asli groups, despite the fact that the Iban today live in Borneo and speak a Malayic Austronesian language, not an Austroasiatic language as the Vietnamese, Khmer, or most Orang Asli do.¹²⁰ But most of the comparative data the researchers took from other studies were ill-defined, labeled generically as “Indonesian,” “Negrito,” or “Orang Asli,” for example. This suggests that while DNA studies can produce valuable information on

¹¹⁷ A. Baer. The genetic history of the Orang Asli: uniting patchwork data. *Bulletin of the Indo-Pacific Prehistory Association* 19: 3-10, 2000.

¹¹⁸ Moreover, analyses suggest that the genomic DNA “clock” of human history may run rather slowly, making expansion out of Africa earlier than previously thought (A. Gibbons. Turning back the clock: slowing the pace of prehistory. *Science* 338: 189-191, 2012).

¹¹⁹ In Borneo, indigenous groups have long been called Dayaks, a generic term. If a research team limits their DNA study to people who say their ancestry is “Dayak” three generations back, this does not define their ethnic identity. The grandparents of the group studied may have lived hundreds of miles apart and spoken mutually unintelligible languages.

¹²⁰ T. Simonson et al. Ancestry of the Iban is predominantly Southeast Asian: genetic evidence from autosomal, mitochondrial, and Y chromosomes. *PLOS One* 6 (1): e16338, 2011; A. Baer. Iban DNA. *Borneo Research Bulletin* 42: 317-319, 2011.

Southeast Asian prehistory, they cannot yet provide balanced and pin-point surveys on the region. Better-defined and more comprehensive results await the future.

While genome sequencing (a read-out of all the DNA) has not yet become a common analytic tool for Southeast Asia prehistory, Southeast Asians have routinely been found to be an anciently related group by numerous studies, to no one's surprise. The interesting findings are in the details. For Southeast Asia, and for the Thai-Malay Peninsula in particular, most human DNA studies so far have been on mtDNA. Few studies have looked at Orang Asli DNA, and few have used the robust sample sizes needed to achieve reliable results. No study has looked at the DNA from all systems (autosomal, X, Y, and mtDNA) as separate factors in human history for any group of Orang Asli, let alone all their 20 or so cultural groups. The closest to this ideal are two "whole-genome" studies, meaning nuclear DNA. While they are a vast improvement on mtDNA studies, they analyze pieces of DNA rather haphazardly among the chromosomes. Even the whole-genome studies so far have analyzed only a few percent of the human genetic code. Such an analysis might cover over 300,000 DNA "letters" (nucleotides) but identify few functioning genes. Moreover, the best whole-genome study so far has reported on the DNA of only three Orang Asli groups, Jehai, Kensiu, and Temuan, the first two being northern Semang groups and the Temuan representing more southerly Orang Asli. To study more Orang Asli groups using large samples would be quite expensive and time-consuming, but another reason this kind of work has not yet been done is the competing interest of geneticists in questions about human prehistory elsewhere in the world, from Europe to Australia.

The situation for Y-DNA is the poorest for the Thai-Malay Peninsula people. One study assayed "Orang Asli" without specifying the subgroup examined.¹²¹ Another group studied 12 "Malaysians" without providing further information about them.¹²² A third group studied 32 "Malaysians."¹²³ A mtDNA and Y-DNA study of Malays versus 15 Jehai and 18 Kensiu Orang Asli did not analyze the degree of relationship among these groups.¹²⁴

Despite the incompleteness to date of DNA studies on people of the Thai-Malay Peninsula, better evidence for the initial human occupation of Southeast Asia comes not from digging up old bones or stones but from DNA. While all people around the world have ancestry that can be traced back to Africa, eastern Asia appears to have become the home of early people leaving Africa, possibly traveling by a southern route through or around India. Published reports are full of possibilities. One mtDNA analysis suggests that ancestors of Orang Asli and their kindred were in Southeast Asia perhaps 60,000 years ago, including the ancestors of the Jehai and Temuan.¹²⁵ Other work suggests Orang Asli were in Southeast Asia 30,000 to 50,000 years ago but that Semang, Andamanese, Philippine "Negritos," Melanesians, and aboriginal Australians are dissimilar in their mtDNA, possibly indicating Southeast Asia had multiple

¹²¹ Yuehai Ke et al. African origin of modern humans in East Asia: A tale of 12,000 Y chromosomes. *Science* 292: 151-152, 2001.

¹²² A. Tajima et al. Three major lineages of Asian Y chromosomes: implications for the peopling of east and southeast Asia. *Human Genetics* 111: 80-88, 2002.

¹²³ T. Karafet et al. Balinese Y-chromosome perspective on the peopling of Indonesia. *Human Biology* 77 (1): 93-114, 2005.

¹²⁴ B. Bekaert et al. A comparison of mtDNA and Y chromosome diversity in Malay populations. *International Congress Series* 1288: 252-255, 2006.

¹²⁵ C. Hill et al. A mitochondrial stratigraphy for Island Southeast Asia. *American Journal of Human Genetics* 80: 29-43, 2007; a further study discussed the Batek, Mendriq, Jehai, Temiar, Semai, Temuan, and Jakun Orang Asli: S. Oppenheimer. MtDNA variation and southward Holocene human dispersals within mainland Southeast Asia. In: *Dynamics of Human Diversity*. N. Enfield, ed. Pacific Linguistics, Canberra, 2011. Pp. 81-108.

founder events.¹²⁶ Another broad study, one that analyzed 50,000 polymorphic (variable) sites on nuclear DNA, suggests a “one wave” view of the peopling of Southeast Asia, with pioneering Southeast Asians then colonizing Northeast Asia, based on the finding that Southeast Asia has more human genetic diversity in single nucleotide polymorphisms (SNPs) than the Northeast.¹²⁷

A further report suggests that on the way to eastern Asia, or upon reaching it, the early travelers split up. The interpretation in this report is that the group that reached Southeast Asia contained the ancestors of the Jehai and perhaps other Orang Asli of today but also the Onge of the Andaman Islands.¹²⁸ Some people from this group went on to populate New Guinea and Australia, while the rest stayed in Southeast Asia. According to this report, a second early group also reached Southeast Asia and at some point interbred with ancestors of the Jehai but not with the ancestors of the Onge, who by that time were isolated off the mainland. This is a “two-wave” view of the peopling of Southeast Asia.¹²⁹

All too clearly, DNA studies have not yet produced a consensus view on the settling of Southeast Asia in general or the Thai-Malay Peninsula in particular. While some ancestors of today’s Orang Asli were probably the first colonizers in the area, other ancestors may have colonized later. It is also possible that all Orang Asli groups have ancestors among the first colonizers. Moreover, the fact that a small, human-like group lived on the Indonesian island of Flores from about 60,000 to 18,000 years ago has not been factored into the history of *Homo sapiens* in Southeast Asia.¹³⁰ No one knows if the Flores “hobbits” interbred with early humans and, if so, how important that might have been. It is known, however, that all non-African people do have a small amount of Neanderthal ancestry (2 percent).

This brings us to the topic of ancient DNA. In other parts of the world DNA from ancient bones or teeth has helped clarify human history. However, the wet tropics do not preserve DNA well. Southeast Asia does have some fossil human bones but only one preliminary report has surfaced as to the DNA makeup of such once-living people. It provides no critical evidence on the subject because only small samples were used and many current Orang Asli groups were not studied.¹³¹ We can only hope that information in this area will appear in the near future. It may even be possible to date fossil bones by studying sequences in their DNA.

Unquestionably, DNA is only part of the story of the first arrivals in Southeast Asia. Adaptation to the tropical environment was achieved largely by means of cultural flexibility much more than by means of genetic inheritance. From this standpoint, the observation that cultures change much more quickly than genes change explains why there is much more cultural variation than genetic variation in the human race. Neither is static, however. Both DNA and culture are continually evolving.

¹²⁶ T. Jinam et al. Evolutionary history of continental Southeast Asia. *Molecular Biology and Evolution* doi:10.1093/molbev/mss/69, July 2012.

¹²⁷ HUGO Pan-Asian SNP Consortium. Mapping human genetic diversity in Asia. *Science* 326: 1541-1545, 2009; see also M. Stoneking and F. Delfin. The human genetic history of East Asia. *Current Biology* 20: R188-R193, 2010.

¹²⁸ An earlier study on mtDNA found no affinity between the Onge and Southeast Asians or Indians, suggesting that the Onge were isolated from the start of their history (K. Thangaraj et al. Unique origin of Andaman islanders. *Journal of Human Genetics* 51 (9): 800-804, 2006).

¹²⁹ D. Reich et al. Denisovan admixture and the first modern human dispersals into Southeast Asia and Oceania. *American Journal of Human Genetics* 89: 1-13, 2011.

¹³⁰ A. Cooper and C. Stringer. Did the Denisovans cross Wallace’s line? *Science* 342: 321-323, 2013.

¹³¹ H. Otta et al. Genetic study of the Paleolithic and Neolithic Southeast Asians. *Human Biology* 73 (2): 225-231, 2001.

Still, important genetic variation does exist, including variation for survival in the Thai-Malay Peninsula. When a growing population is thinly spread over the land, small offshoots of it will differ both in their DNA and in their known genes. Offshoots fission in different directions but may reunite at a later time. This fission-fusion pattern is known for Orang Asli. Through this process, a new gene trait can spread haphazardly throughout a large area if it favors survival and reproduction. For Orang Asli in particular, the process accounts for the high percentage of people who have the blood protein called hemoglobin E, certain enzyme defects called G6PD deficiencies, and the red cell oddity called ovalocytosis, or SAO.¹³² To some extent, all of these traits confer some resistance to malaria, which has raged on the peninsula and elsewhere in the tropics for thousands of years. These anti-malaria traits have provided the Orang Asli with a selective advantage over peoples who do not have them. Europeans generally lack these traits, as do groups living at high elevations where the malaria vectors, *Anopheles* mosquitoes, do not thrive. Most other groups on the peninsula, including Malays, have a low frequency of anti-malaria genes unless they interbred with the Orang Asli or came from an area also long-threatened by malaria.

So far, DNA studies have provided far less information about biological selection than have studies on “classical” genes, but there is great potential for future DNA studies to contribute information on continuing gene evolution.¹³³ With an average of over 1500 genes on every human chromosome, much remains to be learned. The question of language evolution is also relevant here.

Questions have arisen about the disconnect between current languages and genetic history. For example, the Chams of Indochina are like their Austroasiatic-speaking Cambodian neighbors in their DNA, even though the Chams speak an Austronesian language today¹³⁴ By the same token, Temuan DNA is like that of the DNA of northern Aslian (Austroasiatic) speakers, the Jehai and Kensiu, although the Temuan now speak a Malayic (Austronesian) language. Indeed, several scholars have suggested that the Temuan spoke an Aslian language in the past. For both the Chams and the Temuan, the DNA findings suggest that these groups were in place long before their present-day languages arrived.

Another consideration is that early Austroasiatic languages related to Mon-Khmer may have spread, via Orang Asli and their cousins, to Sumatra and Borneo prior to 6,000 years ago in coastal areas such as Aceh in Sumatra and the Kapuas River Basin in western Borneo. People in these two areas later, then, switched to Austronesian languages, as did the Temuan and some other Orang Asli.

In short, DNA and related studies have not yet produced a clear vista of human history on the Thai-Malay Peninsula. Some Orang Asli ancestors may or may not have colonized long after the pioneers arrived.

¹³² A. Baer. Health, Disease, and Survival. COAC, Subang Jaya, 1999. Out of 103 Semang recently tested 47 percent were reported to be G6PD deficient, an oddly high number that requires verification (Farahnaz Amini and Endom Ismail. 3'-UTR variations and G6PD deficiency. *Journal of Human Genetics* 58: 189-194, 2013).

¹³³ As with other Southeast Asians, the Temiar, Jehai, and Kensiu Orang Asli have been found to have variants in their immune-system genes (called HLA) that may confer resistance to malaria: T. Jinam et al. Molecular analysis of HLA class I and class II genes in four indigenous Malaysian populations. *Tissue Antigens* 75: 151-158, 2010.

¹³⁴ M-S. Peng et al. Tracing the Austronesian footprint in Mainland Southeast Asia: a perspective from mitochondrial DNA. *Molecular Biology and Evolution* 27: 2714-2730, 2010.

Temuan “plant” their dead. I was asked if Americans plant or burn their dead. I said that they plant them, not knowing how to explain cremation without India-style funeral pyres.

Archeology and human fossils

Early humans around the world left behind their bones, rock tools, hearths, food debris, and sometimes rock art and other durable artifacts, all of which have interested archeologists.¹³⁵ Studies on ancient and modern crania among the Orang Asli have suggested a local-evolution view of human occupation of the Thai-Malay Peninsula, rather than a two-wave theory, but the fossil crania studied do not date to 40,000 years ago, at most 25,000 years ago.¹³⁶ Early human remains at Gua Cha in Kelantan state have robust crania, as do those from the mid-Holocene shell middens at Guar Kepah near the Malacca Straits. By the time of the early metal age in Malaya, perhaps 2000 years ago, burials at Kuala Selinsing had more gracile crania. Today’s Semang (northern Orang Asli) and Senoi (Semai or Temiar, central Orang Asli) both have gracile crania.

The ancient crania that have been studied were part of human burials. Some human burials were in open-air locations that may have been cemeteries, as the word is understood today. In contrast, Batek Orang Asli have traditionally “buried” corpses in hut-like structures in tall trees, out of the reach of tigers.

Cemeteries are typically made by sedentary groups inside their territory and are part of their living culture. But the occurrence of peninsular burials in caves suggests that foragers might have used caves simply as convenient places to inter the dead when the group happened to sojourn there. Foragers may have visited the same cave over the generations, thus accumulating a cemetery look-alike for future archeologists to find.¹³⁷ To Orang Asli groups, burials are of people still alive on another plane in a many-layered world. They are both ancestors and real beings, something usually outside the ken of archeologists.

The Thai-Malay Peninsula has few ancient human bones. The earliest known *Homo sapiens* fossils on the peninsula date to quite late in its occupation by people. The Kota Tampan open-air site has no human fossils. Lang Rongrien cave have fossil burials only in the upper excavation layers; they are associated with pottery. In fact, the earliest human fossils in Southeast Asia come from Laos and the Philippines, dated to about 47,000 years ago, closely followed by the “deep skull” found at Niah Cave in Sarawak.¹³⁸ Moh Khiew Cave and Sakai Cave in Krabi Province, Thailand, are reported to have burials dated between 25,000 and 6500 years ago.¹³⁹

A number of later human fossils exist in Malaya at “Hoabinhian” (pre-Neolithic), Neolithic, and metal-age sites. Those at the Gua Cha rockshelter in Kelantan suggest that the Semang and Senoi Orang Asli of today are descendents of the Gua Cha remains.¹⁴⁰ Moreover,

¹³⁵ For Malaysia, see N. H. Tan and S. Chia. Current research on rock art at Gua Tamban, Perak, Malaysia. *Bulletin of the Indo-Pacific Prehistory Association* 31: 93-109, 2011.

¹³⁶ D. Bulbeck. Reduced dental wear, dental reduction and craniofacial gracilization in the Malay Peninsula Neolithic. *Bulletin of the Indo-Pacific Prehistory Association* 17: 28, 1998.

¹³⁷ P. Rowley-Conwy. Time, change and the archaeology of hunter-gatherers. In: *Hunter-Gatherers*, C. Panter-Brick et al., eds. Cambridge University Press, 2001. Pp. 39-72.

¹³⁸ On Laos, see F. Demeter et al. Anatomical modern humans in Southeast Asia. *Proceedings of the National Academy of Sciences* 109 (36): 14375-14380, 2012.

¹³⁹ H. Matsumura and S. Pookajorn. A morphometric analysis of the Late Pleistocene human skeleton from the Moh Khiew Cave in Thailand. *Journal of Comparative Human Biology* 56 (2): 83-118, 2005.

¹⁴⁰ Adi Taha. Gua Cha and the archaeology of the Orang Asli. *Bulletin of the Indo-Pacific Prehistory Association* 11: 363-374, 1991.

Aslian languages, which may have started in the Neolithic period, appear to be spatially linked to first millennium CE archeological sites in Malaya.¹⁴¹ Granite slab graves dated to 1600-2000 years ago have been found in the Bernam Valley of Perak state and elsewhere in Malaya. Whether they contained males or females, adults or children, leaders or lovers, is not known. The skeletons have long dissolved away but the graves had glass and stone beads, pottery, and socketed iron tools.¹⁴² In addition, no fossil bones have been reported from the well-known Bujang Valley sites in Kedah.¹⁴³

When visiting a Temiar village in Kelantan, a Malay man said that the headman there was his friend and slapped him jovially on the back. The headman didn't say a word.

The coming of the Malays and others

A noted archeologist wrote, "I am still surprised at how often 'waves' of Vedoids, Proto-Malays, and Deutero-Malays, together with their cultural idiosyncrasies, are reported without question in modern books on the history and peoples of the region."¹⁴⁴ Scholars of the history of Southeast Asia find no evidence for this hoary tale.

Some of the people whose descendents called themselves Malays were likely Orang Asli while others migrated to the peninsula in recent centuries. Before Islam arrived, the pre-Malays wore loincloths and everyone went topless, ate pork, and kept dogs. Everyone kept dogs because, as recent studies have shown, dogs increase hunting success besides acting as policemen at the gate, and thus increase the survival of dog keepers.¹⁴⁵ Islam, the desert religion invading the wet tropics, changed much of daily life, dropping pork and dogs, and its converts assumed a collective Malay identity in a sultanate system.

The earlier the date of the arrival of the various pre-Malays, the less likely it is that they spoke Malay or spoke any language in common. Their early settlements likely consisted of small groups separated geographically and quite isolated from each other. If most came from eastern Sumatra, as many people suggest, some may have first settled by the Muar River in Malaya, others by the Selangor River, and still others at other estuaries. Other groups came from Java, Sulawesi, and dozens of other places. Each group would develop a local character and local adaptations based on the particular challenges to survival in their new surroundings. As a result of encountering new animals that some foreigners had never seen, such as a dawn-whooping siamang, local names would be adopted from indigenous neighbors or new names would be created. The Austroasiatic names for bamboo rats and for crabs, for instance, are loan words into Malay. But local names might differ between distant settlements because languages evolve through culture, even though language ability itself is "wired" in our genes.

I suspect that it was only when coastal or riverine communities came to have more regular interactions, based largely on trade, that a common language could flourish. These

¹⁴¹ D. Bulbeck. Origins of civilization in West Malaysia and the Orang Asli. *Jurnal Arkeologi Malaysia* 11: 95-99, 1998.

¹⁴² Leong Sau Heng. The chronology of the Bernam Valley cist graves in Peninsular Malaysia. *Bulletin of the Asia-Pacific Prehistory Association* 19: 65-72, 2000.

¹⁴³ S. Allen. In support of trade: coastal site location and environmental transformation in early historical-period Malaysia and Thailand. *Bulletin of the Indo-Pacific Prehistory Association* 20: 62-78, 2000.

¹⁴⁴ P. Bellwood. *Prehistory of the Indo-Malaysian Archipelago*. University of Hawaii Press, Honolulu, 1997. P. 128.

¹⁴⁵ P. Shipman. Do the eyes have it? *American Scientist* 100: 198-201, 2012. However, the antiquity of domestic dogs in Southeast Asia may be only 6000 years, according to some reports.

interacting people who settled along the coasts and rivers, but not inside the forest, came to be called Malays, and they spoke Malay, an Austronesian language that originated in Sumatra.¹⁴⁶ Before that time, the pre-Malays spoke some sort of early Malayo-Polynesian, according to linguists. The time of this pre-Malay language phase was after 5000 years ago, although perhaps before 1000 years ago, based on educated guesses. Notably, the educated guesses for the initiation of the Aslian languages of the Orang Asli are earlier than those for the initiation of Malay, in part because Aslian languages are in the Austroasiatic language group, which is more ancient in southeastern Asia. “Malayness” seems to have solidified only 600 to 700 years ago, about the time of the establishment of Malacca as the main Malay trading port.¹⁴⁷ In fact, Malacca itself was largely populated by immigrants from Sumatra.¹⁴⁸ When Christopher Columbus was crossing the Atlantic and Polynesians were exploring the Pacific, Sumatrans were still crossing the Straits to Malacca. The first Malay writing (albeit in Arabic script) on the peninsula occurs on the “Trengganu stone,” dated to the fourteenth century CE, earlier writing having been in Indian scripts.

During the past 1000 years or so, with the rise of petty states in the region, rich and powerful people often required their “subjects” to perform free work for them on a part-time basis. Many of these powerful people also caught or bought slaves. Slavery became a cultural disease.

Slaves had many uses, from serving as an indication of one’s wealth to being concubines. The Sultan of Aceh in the early 1600s had 3000 women in his palace, although he produced only one or two sons.¹⁴⁹ Slaves were part of the spoils of the sultan’s sporadic marauding across the sea to Malaya. Other slaves did hard labor in trading ports, but slaves could also be sold, a very profitable form of trade in the region. Pattani in southern Thailand, for example, imported slaves from Borneo, but Malacca was the hub for much slave trading. Since the favorite victims of slavery on the Thai-Malay Peninsula were Orang Asli, in this way, if no other, Orang Asli DNA moved out to other Southeast Asian groups.

Whenever Malay identity emerged on the Thai-Malay Peninsula, it is clear that a trickle of Chinese, Indians, Arabs, and people from other parts of Southeast Asia arrived on the peninsula over the centuries, each with their own ideas about the meaning of life. When Europeans arrived, their naturalists wanted scientific expeditions, their politicians and merchants wanted lucrative trade, and missionaries wanted to convert the heathen to Christianity. The British colonial period in Malaya also brought in many Indians and Chinese, largely to further British commercial enterprises. In the meantime Thais arrived, perhaps only a thousand years ago. For a while they controlled the peninsula down into the middle of Malaya, but after the British Empire became a local powerhouse two centuries ago, the Thais lost control of their southern outposts. As a result, today the northern border area of Malaya with Thailand contains a mixture of Thais, Malays, Chinese, and Orang Asli.

Over recent centuries the Thai-Malayan Peninsula became inextricably multicultural. Human DNA on the peninsula is also inextricably mixed together and has been for thousands of

¹⁴⁶ A. Adelaar. Where does Malay come from? *Bijdragen tot de Taal-, Land- en Volkenkunde* 160: 1-30, 2004. Others suggest it originated in Borneo, after 1500 years ago (J. T. Collins, ed. *Borneo and the Homeland of the Malays*. Dewan Bahasa dan Pustaka, Kuala Lumpur, 2006).

¹⁴⁷ This was long after trading villages farther north flourished with non-Malay inhabitants (see next section).

¹⁴⁸ V. Hooker. *A Short History of Malaysia*. Allen & Unwin, Sydney, 2003.

¹⁴⁹ A. Reid. *Southeast Asia in the Age of Commerce*, vol. 1. Yale University Press, New Haven, 1988. P. 133.

years. Notably, it is still entwined with the DNA of the first pioneers to Southeast Asia dating to 40,000 or more years ago.

Going downstream with Temuan villagers, we spent a day in a coastal swamp. The Temuan cut midribs from nipah palms to use as fishing poles and “dabble” fished. One caught a crayfish. They collected rattan on a nearby hillock and blowpiped a leaf monkey which they skinned, gutted, broiled, and ate. They were “right at home.”

Kuala Selinsing and Kedah, the metal age

As the sea rose after the last ice age, the coasts of Sumatra, Borneo, and Indochina became accessible to peninsular people by boat. Over the centuries coastal enclaves increased in activity and in long-distance interactions more than inland areas did, in part because of the greater availability on the coasts of diverse ecosystems (land-sea ecotones and the bounty of the open sea). It was also easier to go from the west to the east coast of Malaya by boat than to trek overland, although at the Isthmus of Kra, higher up the peninsula, such a “portage” was relatively easy.¹⁵⁰

As favorably situated coastal settlements prospered, nurtured by regional trade during the last few millennia, they attracted the attention of many seafarers from the west, such as India, and from the north, such as China. These traders preferentially bartered for light-weight, compact items that would be profitable elsewhere and would not deteriorate on long ocean voyages, largely forest products.

Indian artifacts such as beads and bronze objects appeared in Southeast Asia about 2300 years ago, some 1,000 generations ago¹⁵¹ While Malaya was rich in tin in easily mined alluvial deposits, India was poor in tin. Indians obtained tin for making bronze, but also resins, camphor, and benzoin from the Thai-Malay Peninsula. In fact, Ptolemy, in the Roman territory of Alexandria, Egypt, drew a map of Malaya about 150 CE based on navigators’ information that named ports on both coasts of Malaya.¹⁵² By the time Marco Polo arrived in the Malacca Straits in the late 13th century and the Cheng Ho expeditions arrived in the 15th century, long-distance trade was booming. Exotic products collected by Orang Asli and other Southeast Asians poured into an acquisitive China.

Early-historic Malaya had no “empires” or any city-state to rival Angkor Wat in Cambodia. But before the Roman Empire started, the village of Kuala Selinsing rose at Pulau Kelumpang on the west coast of Malaya. It was occupied from 2000 years ago up to 500 CE. Archeologists have found burials inside canoes along with other burials there, some with beads, pottery, stone ornaments, and food, including rice.¹⁵³ The trading site contained Chinese and Mideast glazed wares about 1000 years ago, proving trade was widespread by that time. The villagers were likely Mon speakers. Houses were built on piles in an estuary, with debris found by archeologists in the mudflats below them, such as the shells of edible mollusks, coconut shells, bottle gourds, areca (betel) nuts, pig bones, split bamboo mats, rice husks, and a rice

¹⁵⁰ The isthmus is only 35 miles wide (about 50 km.).

¹⁵¹ B. Bellina and I. Glover. The archaeology of early contact with India and the Mediterranean world from the fourth century BC to the fourth century AD. In: Southeast Asia, from Prehistory to History, I. Glover and P. Bellwood, Eds. Routledge, London, 2004. Pp. 68-88.

¹⁵² S. Allen. History, archaeology and the question of foreign control in early historic-period Peninsular Malaysia. International Journal of Historical Archaeology 2 (4):261-289, 1998.

¹⁵³ Pottery first appeared on the peninsula sometime after 4000 years ago.

mortar made of wood. Besides trade, people in the village did deep-sea fishing, and they used iron tools.¹⁵⁴

Later, several coastal trading villages on the peninsula were in the Bujang Valley of Kedah, near a 1200-meter mountain called Gunong Jerai. This mountain is embedded in Semang cosmology. The Bujang area flourished from perhaps 300 CE up to about 1600 CE, when it was eclipsed by the emergence of Malacca as a major port. Kataha was one such site, probably with Orang Asli and Mon residents, but not Malays.¹⁵⁵ In Buddhist Sanskrit, it was called Raktamrti Bka or in Chinese, Chich-Ch'a or Jiecha.¹⁵⁶ Many Orang Asli stories of history start with a sea, or a great water, and some Semang say they originated near Gunong Jerai on the Kedah coast. But no Semang live there now. The Kensiu Semang now call Gunong Jerai Batu Telian (taboo rock, or fear rock).¹⁵⁷

Bukit Batu Pahat in the Bujang Valley had a Buddhist Tantric shrine about 400-500 CE. Semang Orang Asli lived nearby at the time, if not in the village itself. As late as the 1820s, many Semang were still living "upon or near the base of the mountain Jerai" some along the Yen River.¹⁵⁸ A Kedah swamp name in the mid-1880s bears this out. An Englishman wrote, "We crossed the swamp [Kubong Semang], which was named after the aborigines (for the Malays are interlopers like the English), it being the place where they assembled...to feast on the Tampui fruit...but this was only once a year."¹⁵⁹ There is good reason to think that the feasters may have been Kensiu, an Orang Asli group that still lives in Kedah. This conjunction is but one indication that Orang Asli were part of the regional trading network that flourished long before much history was written.

The peninsular coasts acquired new technologies and new religious ideas from foreigners, Buddhism and Hinduism and later Islam. Buddhism arrived on the peninsula via the appearance of people speaking the Mon language over a thousand years ago. The Mons were followed by Thai-speaking people infiltrating from the north and Malays infiltrating the Thai-Malaya border area from the south.

Seafarers were part of the Bujang Valley life. Indeed, some foreigners probably lived there for months at a time, waiting to "catch" the westerly monsoon winds back toward India or to catch the easterlies to the Spice Islands of Indonesia, sailing via Singapore, southern Borneo, and Buton to the Moluccas. Cloves from the Spice Islands, for example, reached Mesopotamia by 3700 years ago, far earlier than archeological evidence might suggest. Kedah was well situated to be a center for long-distance trade. Boats crossing from India would see Gunong

¹⁵⁴ Nik Hassan Shuhaimi and Abdul Rahman. Recent research at Kuala Selinsing. *Bulletin of the Indo-Pacific Prehistory Association* 11: 141-152, 1991.

¹⁵⁵ D. Bulbeck. Indigenous tradition and exogenous influences in the early history of peninsular Malaysia. In: *Southeast Asia: from Prehistory to History*, I. Glover and P. Bellwood, eds. Routledge, London, 2004. Pp. 314-336. Other archeologists state that Malays lived in the Kedah enclaves. In this regard, it is known that Kedah and other coastal enclaves were victimized by raiders for loot and slaves, long before the Portuguese captured Malacca in 1511. Moreover, Achinese raids on Malaya in 1618-1619 caused a major population decline there. And in 1614 some kind of plague killed two-thirds of the Kedah population (A. Reid. *Southeast Asia in the Age of Commerce, 1450-1689*, vol. 1. Yale University Press, New Haven, 1988).

¹⁵⁶ P. Manguin. The archaeology of early maritime polities in Southeast Asia. In: *Southeast Asia from Prehistory to History*, I. Glover and P. Bellwood, eds. Routledge, London, 2004. Pp. 294-313.

¹⁵⁷ S. Nagata, personal communication, 7 October, 2013).

¹⁵⁸ J. Anderson. *Political and Commercial Considerations Relative to the Malayan Peninsula and the British Settlements in the Straits of Malacca*, 1824. Reprinted as vol. 35, pt. 14, *Malaysian Branch of the Royal Asiatic Society*, 1989. P. 166.

¹⁵⁹ J. T. Thomson. *Glimpses into Life in Malayan Lands*. Oxford University Press, Singapore, 1991. Originally published 1864. P. 125.

Jerai as a landmark guiding them to the Bujang villages nearby. At some point, a fire was even kept burning on the mountain to act as a beacon for ships. Orang Asli would have been necessary to make the Bujang trading site viable. Only Orang Asli with their encyclopedic knowledge of the ecosystem could supply exotic and other goods from the hinterland, including luxury items such as elephant tusks and tree products such as camphor.

It seems clear that when diasporic settlers or foreign traders arrived on the peninsular coasts, Orang Asli became part of the world economy. While the forest and coasts provided them with everything they wanted, the Orang Asli could provide many natural resources the traders wanted, including tin ore. The Orang Asli ate turtles and their eggs but had no use for turtle shells, which traders coveted. Likewise for hornbill meat, but the casques were inedible and available for foreign trade. They ate honey and bee grubs but did not use beeswax, a tradable item for those who used candlelight. Orang Asli also ate rhinoceros meat, but they had no use for the stubby horn, much prized in China to be used by carvers and as a medicine.¹⁶⁰ Elephant tusks were likewise “useless” except for trade, as were the bezoar concretions found in some animal abdomens. The Orang Asli did use rattans, resins, and scented woods but there was enough available for trading. It was an ecological market.

The end of the story

We can never know enough about history, but knowledge is not the same as understanding. Understanding is more important. We can understand the history of the Thai-Malay Peninsula on a human scale.

In a wayang shadow play, figures that move into the foreground are glimpsed briefly. The people of prehistory are like that. We can almost see a family gathered around a flickering fire in a rock shelter, cooking their food in bamboo tubes. Then they fade away and people appear in a dappled forest, feasting on durian fruits. Later, people are seen foraging in a fallow swidden plot. Others are rafting down a river. But we cannot glimpse most events of the past, cannot even reconstruct them in our minds. All we can be sure of is that early foragers, hill farmers, coastal fishers, and traders adapted to new situations that arose over time. We can be sure that these situations arose because of changes in climate, geography, food sources, technologies, and languages.

In many ways, much has changed between the time when the first people arrived in western Southeast Asia and the time that written records began. Prehistory faded away during the last 1000 years on the Thai-Malay Peninsula. The rest seems to be history, including myths enshrined in school books, Wikipedia, religious tracts, and national ideologies.¹⁶¹ At the least, it is appropriate for the Orang Asli to have the last word. They know that much has changed over the millennia. Orang Asli say they used to be taller. They have been getting shorter for a very long time. Eventually they will be as small as a hair on one’s head or a millet seed or a grain of rice. When this happens, this world will end and a new one will begin.

¹⁶⁰ In the British colonial period, a Temuan Orang Asli verse stated “...I...shoot the Rhinoceros. The bullet has hit him. The Rhinoceros has fallen. See that [you] quarter the Rhinoceros, And give to eat a little to everyone; But sell the horn to the Chinese foreigners” (W. Skeat and C. Blagden. *Pagan Races of the Malay Peninsula*. Vol. 2; Macmillan, London, 1906. Pp. 147-148.)

¹⁶¹ Fanciful tales can be found in the *Malay Annals* (*Sejarah Melayu*), written in the sixteenth century CE.