Ecological drivers of Pleistocene Hominin and Faunal dispersal across Southeast Asia (EPHSEA 2022) workshop

ECOLOGICAL DRIVERS OF PLEISTOCENE HOMININ AND FAUNAL DISPERSAL ACROSS SOUTHEAST ASIA (EPHSEA 2022) WORKSHOP

2 – 4 NOVEMBER 2022, BANGKOK

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WORKSHOP OVERVIEW

Southeast Asia is critical for broad studies of human evolution because the region yields one of the highest diversities of Pleistocene hominin species. Although evolutionary trends and biogeographic affinities among Southeast Asian hominins have long been studied over the past decades, the growing fossil records from the region have complicated what was once a straightforward evolutionary story. Integrating multiple lines of evidence (faunal, chronological, genetic, and environmental information) challenges the traditional hypothesis of Pleistocene hominin and faunal dispersal patterns in Southeast Asia, and the timing and ecological influences on their settlement success. In particular, questions of how early hominins adapted to their surrounding environments and exploited available resources in the region, and how they dispersed into island Southeast Asia, remain hotly debated. The aim of this workshop was to bring together experts to examine the environmental conditions, ecological factors, and types of corridors that allowed Pleistocene hominins to cross biogeographic barriers. This workshop improved our understanding of the potential routes and timing of early hominin expansions and opportunities for admixture. The final output of the discussion by workshop participants will result in the evaluation of large-scale ecological and biogeographical schemes for the dispersal of Pleistocene hominins across Southeast Asia.

INTRODUCTION

A three-day workshop on the ecological drivers of Pleistocene hominin and faunal dispersal across Southeast Asia (EPHSEA 2022), organised by Kantapon Suraprasit (Chulalongkorn University, Thailand) and Julien Louys (Griffith University, Australia), was held at Mandarin Bangkok Hotel, Bangkok in Thailand for the first time in November 2022.

The study of human evolution has a long history in Southeast Asia. With the discovery of the first *Homo erectus* fossils in Java by Dubois in the closing decade of the 19th century, Southeast Asian palaeoanthropology was launched. But the region has an even deeper history in the story of human evolution, starting perhaps with Alfred Russel Wallace's collections and expeditions in the Malay Archipelago. It was in the islands and tropical forests of this region that evolution by natural selection was independently conceived. The faunal and environmental gradients across space in Southeast Asia were among Wallace's main observations for the impacts of natural selection. This workshop returned to these themes but examined faunal and environmental gradients across time. It was logical that this workshop took place in Thailand, at the intersection of the two great biogeographic zones of Southeast Asia: the northern Indochinese and southern Sundaic realms. Although the demarcation of these realms is not as sharp or easily defined as those observed by Wallace between Sunda – the southern parts of Southeast Asia – and Sahul – the continental landmass including New Guinea and Australia. Nevertheless, they form a critical part in the thinking of human and faunal distributions and migrations in the region. The concept that these have changed across time and space poses fascinating challenges for scholars, and diversified disciplinary backgrounds are required to understand interactions between habitats, environments, and the humans and animals that relied on them.

WORKSHOP SUMMARY

This workshop brought together 19 multidisciplinary scientists from 11 different countries (Australia, Indonesia, Malaysia, France, Germany, Denmark, the Netherlands, Spain, the United Kingdom, the United States, and Thailand) to share new and established techniques and data for addressing these themes (Figure 1). We sought to compare the fossil and archaeological records under the different spatial and temporal scales at which they sample the past and

determine where the commonalities and differences between these proxies lie.

Four main questions were discussed to evaluate ecological factors controlling the movements of Pleistocene hominins across Southeast Asia:

1) What are the characteristic Pleistocene faunas associated with hominins, how long did these faunas inhabit the region, and are the chronological frameworks in the fossil sites sound?

2) Did the savanna corridor exist along the trans-equatorial region of Southeast Asia? What was the boundary of savanna distribution during the Pleistocene, against the backdrop of humid tropical rainforests?

3) What differences in zoogeographical patterns existed between the Pleistocene and Holocene? Did the zoogeographical boundaries between Indochinese and Sundaic mammals shift?

4) Did the savanna ecosystem facilitate the dispersal of Pleistocene hominins? When did the hominin dispersal take a savanna corridor (or a coastal route and other pathways) into island Southeast Asia?

Our three-day event was divided into two sessions: a public seminar for the first day, and a closed group discussion for the second and third day. On the first day, 19 oral reports were presented and each attendee highlighted their specific geographical region or specialty, summarising the current level of knowledge in that area. For the second and third day of the workshop (3rd and 4th November 2022), closed group discussions examined the main questions indicated above (Figure 2).

PRESENTATIONS

The presentation topics included various research perspectives linked to faunal and multi-proxy evidence for the existence of a savanna corridor, geochronological frameworks and landscape simulations for the timing and potential route of early human dispersal across Southeast Asia, and applications of virtual imaging and palaeoproteomic techniques for the taxonomic classification of Pleistocene hominid fossils. The abstract book is available for download here: https://drive.google.com/drive/folders/1XgtqkkR6cteD6tBnjFniH6QiERN7PcI. The presentations were accessible to all interested academics and members of the public. The interdisciplinary workshop theme appealed to a wide range of Thai scientists, including archaeologists, biologists, geneticists, palaeontologists, and others, with a total of 40 external meeting participants attending this seminar (Fig. 3).

WORKSHOP OUTCOMES

Our workshop determined that, while definitive answers to these questions may come only sometime in the future, if at all, many of the underlying or longstanding assumptions used by researchers in this area are due for critical re-examination. This includes the concept and nature of the Sunda 'savanna corridor' (Heaney, 1991; Bird et al., 2005); the major biochronological schemes still in use in the region, especially the *Stegodon-Ailuropoda* Middle Pleistocene marker (Matthew and Granger, 1923; Colbert and Hooijer, 1953) but also those faunas used to distinguish the Sunda and Indochinese realms; and the diversity and nature of hominins recovered from the region. The workshop highlighted that a worldwide effort will be required to address the questions raised in our sessions, and more crucially, that these questions are of global importance. What could be more crucial to us as a species than attempting to comprehend our origins? Given the current dangers of climate change and biodiversity loss, such knowledge is essential for knowing where we could be heading in the future.

ACKNOWLEDGMENTS

The workshop was sponsored with funds from the Wenner-Gren Foundation (conference and workshop grant no. Gr. CONF-881 awarded to Kantapon Suraprasit and Julien Louys) and the Center of Excellence in Morphology of Earth Surface and Advanced Geohazards in Southeast Asia (MESA CE), Department of Geology, Faculty of Science, Chulalongkorn University (Bangkok, Thailand).

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Top - Figure 1: Participants at the EPHSEA 2022 workshop, Mandarin Bangkok Hotel in Thailand (Photo credit: K. Suraprasit)

Above - Figure 3: Lim Tze Tshen draws our attention to his interesting presentation during the 2nd day of workshop (conference day) (Photo credit: K. Suraprasit)

Left - Figure 2: Closed group discussions during the 3rd day of EPHSEA 2022 workshop (Photo credit: K. Suraprasit)