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Filling a gap in the peopling of Mainland Southeast Asia: 100,000-year-old lithic evidence from Laang Spean Cave (Cambodia)

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Abstract

Mainland Southeast Asia preserves one of the most fragmentary archaeological records for the interval spanning the late Middle and early Late Pleistocene, limiting our understanding of the timing, diversity and technological behaviour of human populations occupying tropical Asia during a critical phase of human evolution. Here we report a securely dated lithic assemblage from Laang Spean Cave (Cambodia) documenting a human occupation at approximately 100 ka. The assemblage, recovered from a sealed archaeological horizon (SU18), comprises three cobble-based artefacts providing unequivocal evidence of human activities during Marine Isotope Stage 5. Its archaeological significance lies not in the number of lithic artefacts recovered but in the exceptional integrity of its depositional context, supported by detailed stratigraphic, sedimentological and independent luminescence dating. Comparison with contemporaneous archaeological records demonstrates that securely dated lithic assemblages of this age remain exceptionally rare in Mainland Southeast Asia. The Laang Spean assemblage further indicates that cobble-based technological systems persisted in tropical environments during the early Late Pleistocene. Although no taxonomic attribution is possible in the absence of associated human remains, these discoveries substantially narrow a major chronological gap in the regional archaeological record and provide new insights into human behavioural diversity around 100,000 years ago.

1. Introduction

Mainland Southeast Asia occupies a pivotal geographical position for investigating long-term hominin dispersals across tropical Asia during the Quaternary period. Acting as a corridor between East Asia and the Sunda Shelf, this region has witnessed successive waves of human occupation over the past 1.5 million years. Early hominin presence is well documented on Java Island and across parts of Wallacea, where archaeological evidence demonstrates occupations extending back to the Early Pleistocene ([1–6]). In contrast, the archaeological record from Mainland Southeast Asia remains comparatively sparse and begins only during the early Middle Pleistocene ([7–9]). These earliest mainland lithic assemblages, generally assigned to the Early Palaeolithic, are dominated by cobble-based technologies and document the initial establishment of hominin populations within tropical continental environments.

Despite recent advances, the archaeological record becomes remarkably fragmented during the interval spanning the late Middle and early Late Pleistocene (approximately 300–50 ka). Yet this period represents one of the most critical phases of human evolution in Asia, encompassing the probable coexistence of several hominin lineages – including *Homo erectus*, *Homo floresiensis*, *Homo luzonensis*, Denisovans or the new *Homo juluensis* and early *Homo sapiens* – as well as the dispersal of our own species across eastern Eurasia ([10–23]). Fossil evidence indicates that *Homo sapiens* reached Southeast Asia by at least 80 ka at Tam Pà Ling and Lida Ajer sites, while discoveries from southern China suggest an even earlier presence between approximately 120 and 80 ka despite the debates on the stratigraphic context of some of these human fossils ([18, 24–27]).

Although the fossil record documents an unexpectedly diverse hominin landscape during this interval, the archaeological evidence remains surprisingly limited. Securely dated lithic assemblages between 300 and 80 ka are exceptionally scarce throughout Mainland Southeast Asia. Only a handful of sites – including the Lenggong Valley (Malaysia), Ngeubhinh Mouxeu and Tam Pà Ling (Laos), and Nguom Rockshelter (Vietnam) – provide archaeological evidence spanning this poorly documented period ([17, 28–33]). Consequently, every new archaeological discovery has the potential to substantially improve our understanding of technological variability, behavioural adaptations and the tempo of human occupation across Southeast Asia.

Here we report a securely dated lithic assemblage recovered from Laang Spean Cave in northwestern Cambodia, documenting a human occupation at approximately 100 ka. Although comprising only three artefacts, the assemblage derives from a sealed archaeological horizon supported by robust stratigraphic and geochronological evidence. Beyond its technological significance, this discovery substantially narrows a major chronological gap in the archaeological record of Mainland Southeast Asia (MSEA) and provides new insights into the behavioural diversity of the human populations inhabiting tropical environments during Marine Isotope Stage 5 (MIS 5). In the absence of associated human remains, the biological identity of the toolmakers/knappers remains unknown. Nevertheless, these finds raise important questions concerning the technological capabilities and population diversity of the hominins occupying Mainland Southeast Asia during the early Late Pleistocene.

2. The Laang Spean Cave site

Site setting

Laang Spean Cave (12°53'30.5" N; 102°55'38.4" E) is located in northwestern Cambodia, approximately 40 km southwest of Battambang, within the *Phnom Teak Treang* limestone massif (Fig. 1). The cave forms part of a karstic network comprising around fifteen cavities, of which Laang Spean is by far the largest. Developed near the summit of the limestone hill at an elevation of approximately 150 m above sea level (*a.s.l.*), the cave extends over nearly 1,000 m² and is divided into three principal “chambers” (Fig. 1).

The archaeological significance of Laang Spean was first recognised during the pioneering excavations conducted by Roland and Cécile Mourer between 1965 and 1970 ([34]). Their investigations identified a long archaeological sequence through a series of test pits excavated across the three main chambers. Archaeological research resumed in 2009 under the Franco-Cambodian Prehistoric Mission (MPFC), focusing primarily on Chamber n°2, where approximately 80 m² have now been excavated (Fig. 1).

Current investigations have identified four major archaeological horizons ranging from Marine Isotope Stage (MIS) 5 to the Holocene ([35]). The earliest evidence of human occupation derives from the lowermost archaeological unit (SU18), excavated within a 4 m² deep test pit reaching approximately 5 m below the present-day cave floor. It is from this stratigraphic unit that the lithic assemblage presented here was recovered (Fig. 1).

Laang Spean Cave Sedimentary filling in geomorphological context: description and interpretation

The Laang Spean sedimentary sequence provides one of the longest and best-preserved archaeological records currently known in Mainland Southeast Asia. The cave – whose name derives from the Khmer words *Laang* ("cave") and *Spean* ("bridge"), referring to the natural rock bridge linking two openings left by a partial roof collapse – cross-cuts the summit of the *Phnom Teak Treang* massif, a karstic hill developed within the Permian marine limestone outcrops that characterise Battambang Province ([36]). Following Mark [37], such landforms, locally known as "phnom", are best described as tropical inselbergs of mixed morphology. The collapsed roof blocks divide the cave into three chambers (Fig. 1), and successive phases of sedimentation within it were only locally affected by these collapse events.

The cave's sedimentary infill reaches approximately 13 m in thickness, an exceptional accumulation for a tropical karstic setting that underlines the pivotal role played by such systems in preserving long sedimentary archives, some of which record major geological or palaeoenvironmental events of global significance (see Supplementary Information). Karstic activity at Laang Spean began very early in the depositional history of the infill: at the base of the sequence, a stalagmitic flowstone directly overlies the limestone bedrock, associated with a pisolitic facies, both being endokarstic formations unaffected by external conditions. U-Th isotopic dating of this basal speleothem establishes a chronological limit of approximately 400 ka for the onset of the sequence.

Above this basal karstic phase, the diversity of sedimentary facies reflects a corresponding diversity of depositional dynamics governed by changing environmental conditions through time. Chemical (speleothem) deposition briefly resumes with the clays of SU27 before ceasing, while SU 26 to 20 comprises fluviatile sediments linked to external inputs, attested by the presence of volcanic glass. Layers 19 and 18 – which directly underlie the archaeological horizon SU18 – form a thick, homogeneous and massive sedimentary unit lacking fluvial features; they are rich in small bones and phosphatic granules, indicating the former presence of a large bat colony within the cave, and mark the transition between fluvial deposition and sedimentation of external origin following a later roof collapse. Speleothem formation resumes briefly near the top of the sequence, shortly before this collapse, and the uppermost layer is cemented by iron oxides.

The stratigraphic sequence exposed within the main test pit records four principal archaeological occupations (Fig. 2). The upper deposits (SU7) contain a Neolithic cemetery with six burials dated to around 3 ka cal BP, whereas units SU11-9 document Hoabinhian occupations (the last regional hunter-gatherers) dated between approximately 13 and 5 ka cal BP. These are underlaid by SU12, a post-LGM "pre-Hoabinhian" occupation characterised by flake production/reduction from silicite nodules. The lowermost archaeological horizon, SU18 – which forms the focus of the present study and occupies the massive layers 19 – 18 described above – has been dated to 100 ± 5 ka using luminescence methods (OSL dating) (Fig. 2).

The cave itself experienced several later episodes of ceiling collapse, particularly near the southern entrance and between Chambers 2 and 3 (Fig. 1), thought to be associated with enhanced mechanical

weathering during the Last Glacial Maximum (LGM), when cooler and drier climatic conditions affected tropical environments of Southeast Asia ([38–40]). Importantly, these collapse events post-date the archaeological horizon investigated in this study and instead contributed to sealing the underlying deposits, including SU18.

Today, the karstic system of *Phnom Teak Treang* and Laang Spean Cave are entirely disconnected from the surrounding floodplain, which the cave overlooks by several dozen metres. This disconnection reflects a marked lowering of the water table linked to global sea-level fluctuations (glacio- and tectono-eustasy) within the broader context of regional Himalayan tectonics: erosion of the floodplain combined with tectonic uplift allowed the karstic system to become perched and the cave to dry out. The sedimentary infill of Laang Spean Cave is further sealed by wall-derived scree produced by mechanical weathering of the cave walls and by collapsed blocks.

The three lithic artefacts described here were recovered *in situ* from SU18 at a depth of approximately 5 m below the present cave surface. Their precise three-dimensional recording during excavation, together with the integrity of the sedimentary sequence and the absence of evidence for post-depositional disturbance, strongly supports the primary depositional context of the assemblage. Establishing the integrity of the archaeological context is fundamental for interpreting a small lithic assemblage such as that from SU18. The combined stratigraphic, sedimentological and chronological evidence presented above therefore provides the framework supporting the attribution of these artefacts to a human occupation around 100 ka.

The chronological context

Prior to this study, the chronological framework rested on several lines of evidence: the chrono-cultural attribution of certain archaeological levels and assemblages, the sequence documenting successive occupations attributed to the pre-Hoabinhian, Hoabinhian and Neolithic periods; five radiocarbon ages published in the 1990s ([34]) corresponding to Holocene occupations; and four further radiocarbon ages (three on charcoal, one on bone) published in 2016 ([41]). In addition, three OSL ages (single-grain quartz dating, grain size 180–212 µm) were measured prior to the present study ([41]), with ages calculated using the Minimum Age Model (MAM; [42]).

These combined results suggested a possible early occupation older than 71 ± 6 ka, a further pre-Hoabinhian occupation older than 26 ± 3 ka, a Hoabinhian occupation around 11 ± 1 ka, and Neolithic occupations between approximately 3.5 and 6.1 cal ka BP. Notably, the radiocarbon and OSL ages obtained for levels 11a and 11b1 ([41]) are consistent and statistically equivalent within uncertainties.

We present here new dating results obtained through U-Th analysis of two speleothem samples collected in square B25 and of a stalagmitic flowstone situated at the base of the test-pit sequence, together with luminescence dating of five sediment samples collected in the test pit from units 22, 18, 15, 13 and 12 (Fig. 2). Two U-Th ages obtained from the lower and upper parts of a single speleothem in square B25 are internally coherent: the lower part yielded an age of 64.0 ± 5.1 ka and the upper part an

age of 10.4 ± 0.8 ka. These results provide a *terminus post quem* for the Hoabinhian occupations and agree well with the chronostratigraphy established from the test pit. The three sampled portions of the basal stalagmitic flowstone yielded ages of 253 (+ 35/−25) ka, 378 (+ NC/−72) ka and 460 (+ NC/−126) ka.

This study also enabled the dating of five new sediment samples by OSL on quartz. For these samples, the characteristics of the quartz grains and the distribution of equivalent doses (see Supplementary Information) allowed direct ages – rather than terminus post quem estimates – to be obtained using the Average Dose Model. These new ages are consistent with previous results and usefully refine the chronostratigraphic framework of the site's human occupations: the five OSL ages indicate a last exposure to light of the dated quartz grains of 175 ± 9 ka (SU22), 100 ± 5 ka (SU18), 60 ± 3 ka (SU15), 47 ± 2 ka (SU13) and 21 ± 1 ka (SU12). All chronological results are internally consistent, and together confirm that the layer (SU18) bearing the cobble tools is approximately 100,000 years old.

Taphonomic integrity of SU18

The integrity of SU18 is supported by several independent lines of evidence. The lithic artefacts were recovered *in situ* within a well-defined sedimentary unit at approximately 5 m below the present cave floor and were individually recorded in three dimensions during excavation. Sedimentological observations indicate no evidence of major post-depositional disturbance, large-scale bioturbation or sediment mixing within the archaeological horizon. The artefacts display limited surface alteration, consisting mainly of light patination, manganese oxide deposits and local calcite crusts consistent with prolonged burial in a karstic environment rather than secondary transport. Their spatial distribution, combined with the stratigraphic continuity of SU18 and the overlying sealed deposits, strongly supports the interpretation that the assemblage represents a primary archaeological context dating to approximately 100 ka. Consequently, the archaeological significance of the Laang Spean assemblage lies not in the number of artefacts recovered but in the exceptional reliability of their depositional and chronological context.

4. The stone artefacts

The lowermost archaeological unit (SU18) yielded three lithic artefacts recovered from a depth of approximately 5 m below the present cave floor. Together, these artefacts provide unequivocal evidence of human occupation at Laang Spean Cave around 100 ka (Figs. 3–5). Two artefacts were manufactured from silicified limestone cobbles and one from quartzitic sandstone. Both raw materials are locally available within the alluvial deposits of the *Steung Thvak River*, a tributary of the *Steung Sangker* located approximately 5 km from the cave.

All three artefacts exhibit limited post-depositional surface alteration. The quartzitic sandstone implement displays a light patina, whereas one silicified limestone artefact bears localized calcite encrustations, both consistent with prolonged burial within the cave deposits rather than post-depositional transport.

The assemblage documents three complementary aspects of lithic technical behaviour: tool manufacture/shaping, core reduction, and percussive/crushing activities, suggesting that several stages of the operational sequence were carried out within or in the immediate vicinity of the cave. Although the assemblage comprises only three artefacts, it captures three complementary technological activities: shaping of heavy-duty tools, flake production, and percussive behaviour. This diversity provides valuable insights into the technological repertoire of the human group occupying Laang Spean during MIS 5.

Heavy-duty unifacial tool (core-tool)

The first artefact (Fig. 3) is a large quartzitic sandstone cobble measuring 132 × 144 × 102 mm for a weight of 1,450 g. The implement was shaped through two principal reduction phases initiated from a naturally flat cortical surface. Flake removals are short, predominantly unidirectional and locally convergent, with the latest scars terminating in hinge fractures. These removals created a robust semi-abrupt working/cutting edge (approximately 70–80°) opposite a cortical back preserving much of the original cobble morphology.

From a techno-structural perspective, this artefact is interpreted as a heavy-duty unifacial tool (*rabot*/plane). Because the shaping process simultaneously generated detached flakes that may themselves have served as cutting implements, in this case, the piece may also be regarded as a “core-tool”.

Core

The second artefact (Fig. 4) is a silicified limestone cobble measuring 116 × 114 × 78 mm and weighing 890 g. It exhibits three successive reduction phases composed of short centripetal to convergent flaking sequences affecting only one area/part of the original cobble morphology.

A notable technological feature is that each reduction phase was initiated from a previously detached flake scar rather than from a cortical surface. The resulting exploitation surface displays a predominantly plano-convex configuration. This artefact is therefore interpreted as a core designed for the production of relatively short flakes with convergent and oval cutting edges (Fig. 4).

Anvil

The third artefact (Fig. 5) is a large silicified limestone cobble measuring 245 × 162 × 86 mm and weighing 2,155 g, making it the largest object within the assemblage.

Two categories of anthropogenic modification can be recognised. First, limited unipolar and bipolar removals were produced at both extremities of the cobble, modifying its overall morphology. Second, multiple areas of percussion damage are preserved on the artefact, including crushed zones, impact scars and a well-developed central depression formed on a naturally flat surface. These features are consistent with repeated percussive/crushing activities ([43]).

Taken together, these characteristics support the interpretation of the artefact as an anvil used during pounding or bipolar percussion activities.

5. Discussion

A secure archaeological record for a poorly documented period

The archaeological significance of the Laang Spean assemblage lies not in the number of artefacts recovered but in the exceptional integrity of their depositional context. The three lithic artefacts originate from a sealed archaeological horizon (SU18) excavated under controlled conditions and independently constrained by stratigraphic, sedimentological and luminescence dating ([35, 41]). Together, these datasets provide robust evidence for a human occupation around 100 ka, making Laang Spean cave one of the very few securely dated archaeological sites documenting this chronological interval in MSEA.

Small archaeological assemblages are often regarded with caution because of the possibility of post-depositional reworking or accidental accumulation. At Laang Spean, however, the integrity of the sedimentary sequence, the three-dimensional recording of each artefact, and the absence of evidence for significant sediment mixing strongly support a primary archaeological context. Consequently, the assemblage provides reliable evidence for human activities during MIS 5 despite its limited size.

Filling a major chronological gap in Mainland Southeast Asia

Although archaeological evidence documents hominin occupations before approximately 300 ka and becomes increasingly abundant after about 80–50 ka, the intervening period remains one of the least documented intervals in Southeast Asian prehistory. This gap is particularly striking because it coincides with profound demographic and evolutionary changes, including the persistence of archaic populations, the emergence of *Homo sapiens* within the region, and the probable coexistence of multiple hominin lineages.

Compared with the relatively rich fossil record, securely dated archaeological assemblages from this period remain exceptionally scarce. Only a handful of sites – including some of the localities from the Lenggong Valley, Ngeubhinh Mouxeu, Nguom Rockshelter, Song Terus, Liang Bua, Talepu, and Leang Bulu Bettue – provide evidence broadly comparable in age, yet they differ substantially in depositional context, chronology and technological composition ([29, 31–33, 44–52]). Within this fragmented archaeological landscape, the Laang Spean assemblage represents one of the few securely dated records documenting human occupation around 100 ka in Mainland Southeast Asia.

Persistence of cobble-based technical systems

Although comprising only three artefacts, the Laang Spean assemblage records several complementary technological behaviours, including heavy-duty tool shaping, flake production and percussive activities. Together, these activities indicate that local cobbles constituted the principal raw material exploited by the occupants of the cave.

Comparable cobble-based technological systems have been reported from several Middle Pleistocene open-air sites across Mainland Southeast Asia, including eastern Cambodia, northern Thailand and Central Vietnam ([9, 53–55]). However, securely dated cave assemblages documenting similar technological behaviours during MIS 5 remain exceptionally uncommon ([52]). The Laang Spean assemblage therefore suggests that cobble-based reduction strategies persisted well into the early Late Pleistocene despite the increasing technological diversity observed elsewhere in Southeast Asia.

Given the very limited size of the assemblage, no cultural or technical tradition can be inferred. Nevertheless, these lithic artefacts demonstrate that exploitation of locally available cobbles remained an integral component of the technological repertoire of human populations occupying tropical environments during MIS 5.

Beyond MSEA, the Laang Spean assemblage also finds technological parallels in several insular contexts. Throughout the Philippine archipelago, exploitation of locally available cobbles is documented from the Middle Pleistocene butchery site of Kalinga (dating back to 709 ka) and several Pleistocene localities of the Cagayan Valley ([5, 6]). Similar technological behaviours have also been reported from Flores and Sulawesi, where simple cobble-based reduction systems persisted despite considerable chronological, environmental and taxonomic diversity ([46, 49, 52, 56]). Rather than reflecting a shared technological tradition, these similarities most likely represent recurrent adaptive responses to the widespread availability of cobble raw materials in tropical environments.

Who occupied Laang Spean around 100ka?

The biological identity of the toolmakers remains unresolved. Around 100 ka, Southeast Asia was occupied by a remarkable diversity of hominin populations, including late *Homo erectus*, early *Homo sapiens*, Denisovans and several endemic insular lineages ([10, 12, 17, 21–24, 57–59]).

Fossil evidence indicates that *Homo sapiens* dispersed into southern China and later into Southeast Asia during this period, making our species one possible candidate for the production of the Laang Spean assemblage.

However, no human remains have been recovered from SU18, and the lithic assemblage itself provides no diagnostic features allowing taxonomic attribution. Any attempt to associate these artefacts with a particular hominin species would therefore remain speculative. Rather than documenting a specific biological lineage, the archaeological evidence presented here simply demonstrates the presence of humans occupying western Cambodia around 100 ka.

6. Conclusions

Laang Spean Cave provides one of the oldest securely dated archaeological occupations currently documented in Cambodia and one of the few archaeological records spanning the poorly documented interval around 100 ka in Mainland Southeast Asia. Beyond the technical characteristics of the lithic

assemblage itself, the significance of this discovery lies in the exceptional reliability of its stratigraphic and chronological context.

The three artefacts demonstrate that cobble-based technological systems remained part of the behavioural repertoire of human populations inhabiting tropical environments in Southeast Asia during MIS 5. These artefacts are also more similar to those contemporary industries in eastern and South China than in southwest China and South Asia ([60–62]).

Although the assemblage cannot be assigned to any particular hominin species, it substantially improves the archaeological record for a critical period of regional prehistory and narrows one of the major chronological gaps in our understanding of the peopling of Mainland Southeast Asia.

Future excavations at Laang Spean and the discovery of additional archaeological material or associated human remains will be essential for clarifying both the behavioural variability and the biological/anthropological identity of the populations that occupied MSEA during the early Late Pleistocene.

Declarations

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Authors contributions

J.G. wrote the manuscript with H.F., C.L., and S.P.; J.G. conducted technological and morpho-structural (3D) analysis of the lithic artefacts with H.F., A.P.B. and Y.Z.; A.P.B. conducted 3D scan acquisition and diacritical schemes; S.P. conducted geological and sedimentological analysis; C.L., M.R., C.F. and E.P.B., dated the site; H.F. and H.S. led the research project at Laang Spean and raised funding; H.F., H.S., and N.K., were the core team of the yearly excavation of the Laang Spean Cave site; H.F. and H.S. conceptualized the Laang Spean research project.

Data availability

All data supporting the findings of this study are available within the article and its Supplementary Information (SI). Raw luminescence (OSL) data, including single-grain equivalent dose distributions, radial plots and Minimum/Average Age Model outputs, together with the U-Th isotopic dating results (activity ratios and age calculations) for the speleothem samples, are provided in the Supplementary

Information. The lithic artefacts described in this study are curated at the Ministry of Culture and Fine Arts in Phnom Penh and are available for consultation upon reasonable request to the corresponding author, in accordance with Cambodian Cultural Heritage legislation.

Additional Information

Declaration of competing interest

The authors declare no competing interests.

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Figures

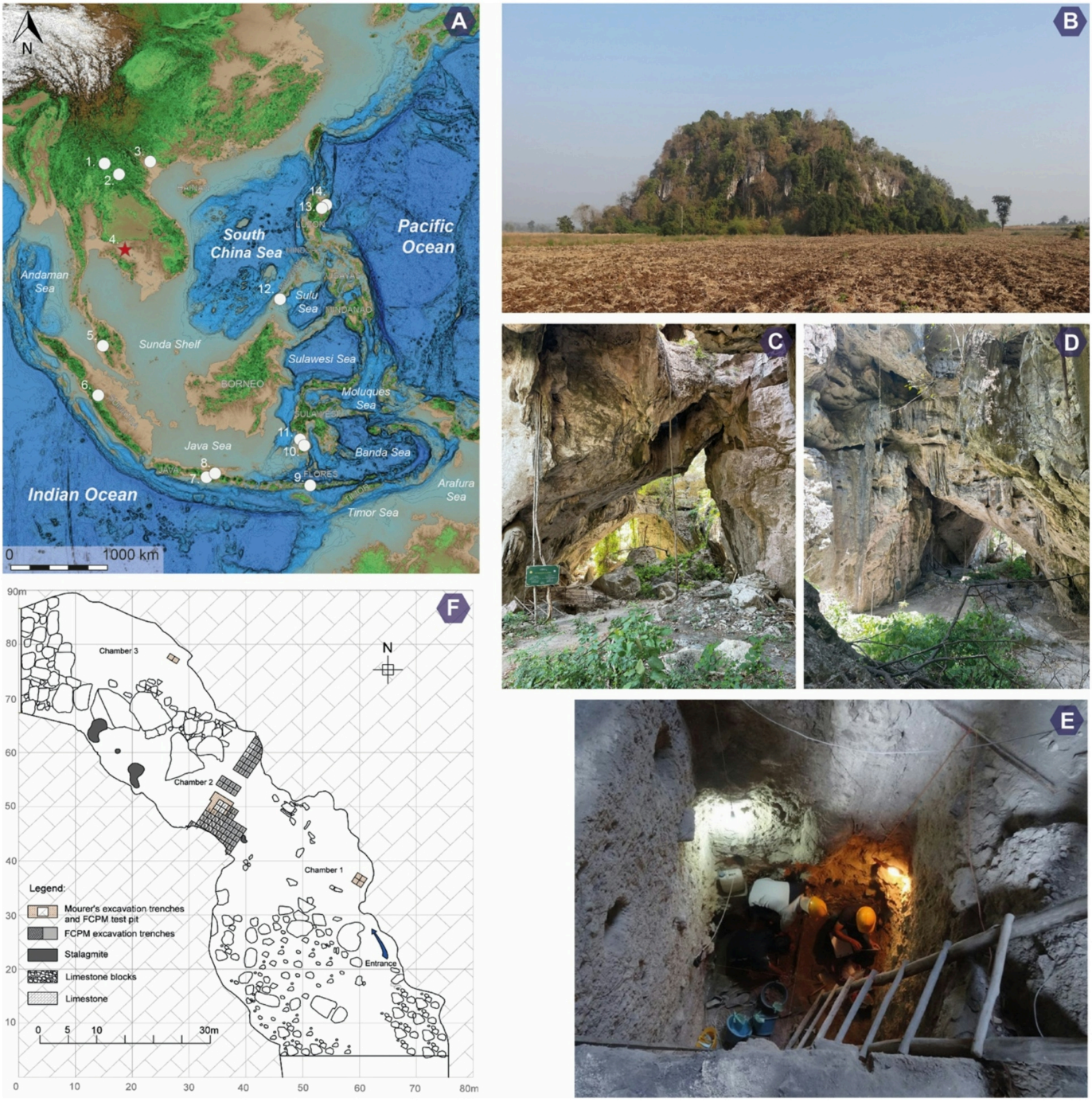


Figure 1

Location and general view of Laang Spean Cave (Cambodia) (**A**) Location of the archaeological sites discussed in the text. 1, Ngeubhinh Mouxeu; 2, Tam Pà Ling; 3, Nguom; 4, Laang Spean; 5, Lenggong Valley; 6, Lida Ajer; 7, Song Terus; 8, Ngandong; 9, Liang Bua; 10, Talepu; 11, Leang Bulu Bettue; 12, Tabon; 13, Cagayan Valley; 14, Callao. (**B**) View of Phnom Teak Treang, the limestone hill containing Laang Spean Cave. (**C**) View from Chamber 1. (**D**) View from Chamber 3. (**E**) General view of the

excavation trench during the 2019 field season. (**F**) Plan of Laang Spean Cave showing the three main chambers and the excavated areas.

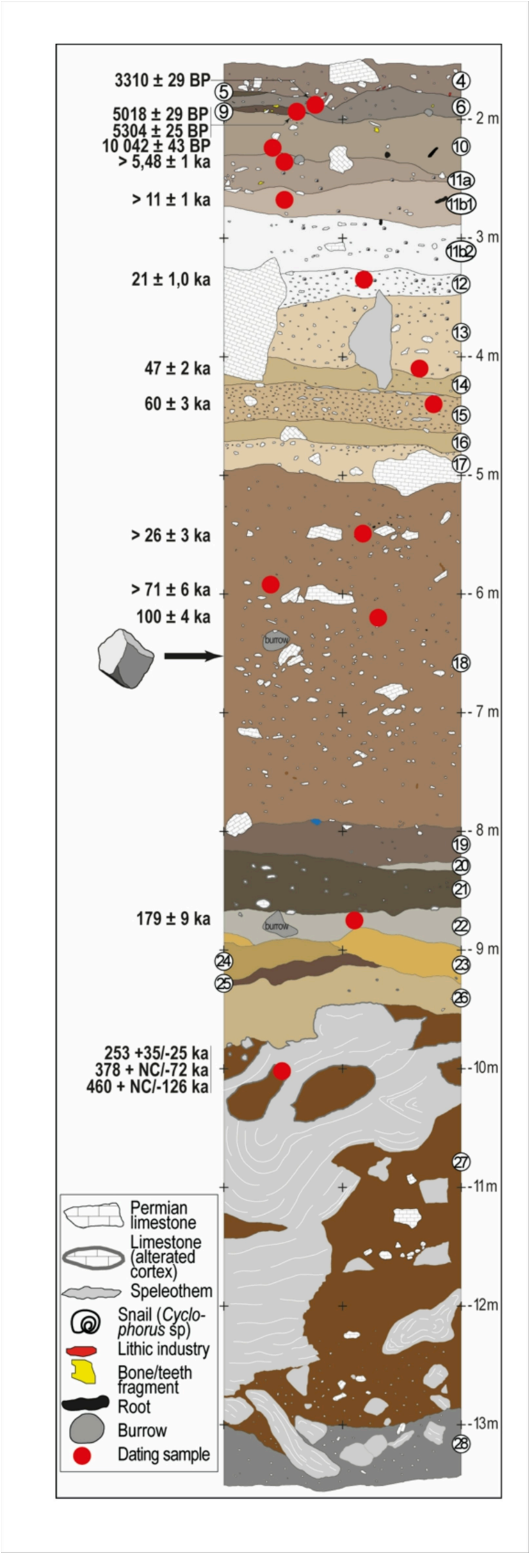


Figure 2

NNE-SSW Pit stratigraphic section (squares F & E 30/31). On the Permian limestone substrate are karstic sediments with clays and speleothems (layers under 26). A thin sandy-silt fluviatile sequence is

following (26-20) before a thick silty coarse sandy organic and phosphatic deposits (19-18). In the middle part of this were found the lithic tools (black arrow). Above (from layer 17), infilling is less organic and siltier. Cave roof collapsed before layer 13. The cave is open-aired with terrestrial gastropods richness. Around 10 ka Hoabinhian then Neolithic people occupied Laang Spean Cave, they let many remains witnessed of their activities, sediments are brown, contain more organic matter (11b1-5). All dating samples are located by red spots.

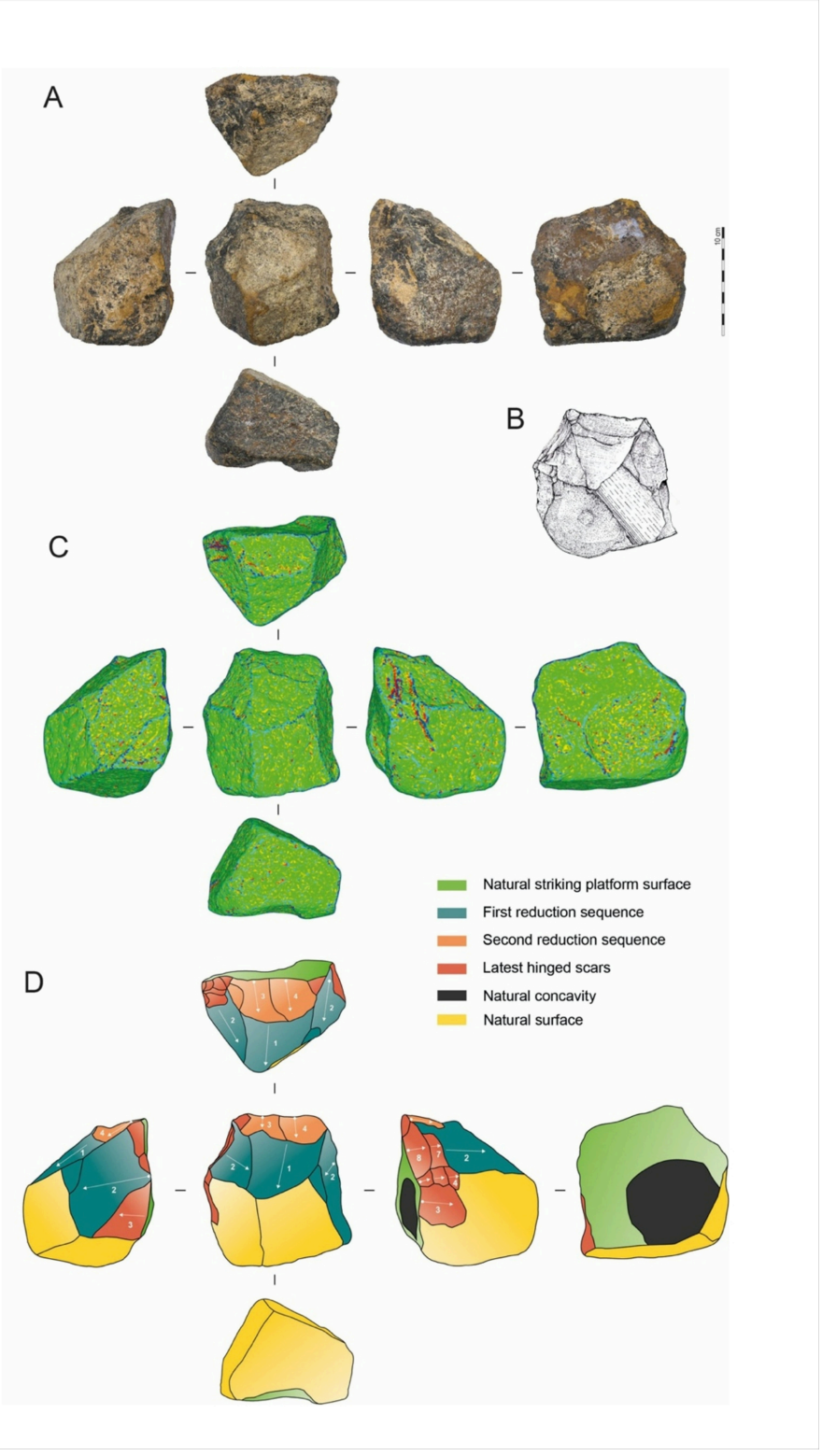


Figure 3

Heavy-duty unifacial tool (core-tool). (**A**) Photograph of artefact LS16 E32 n°6. (**B**) Drawing of the principal face. (**C**) Three-dimensional and topographic models of artefact LS16 E32 n°6. (**D**) Diacritical and structural analysis of artefact LS16 E32 n°6.

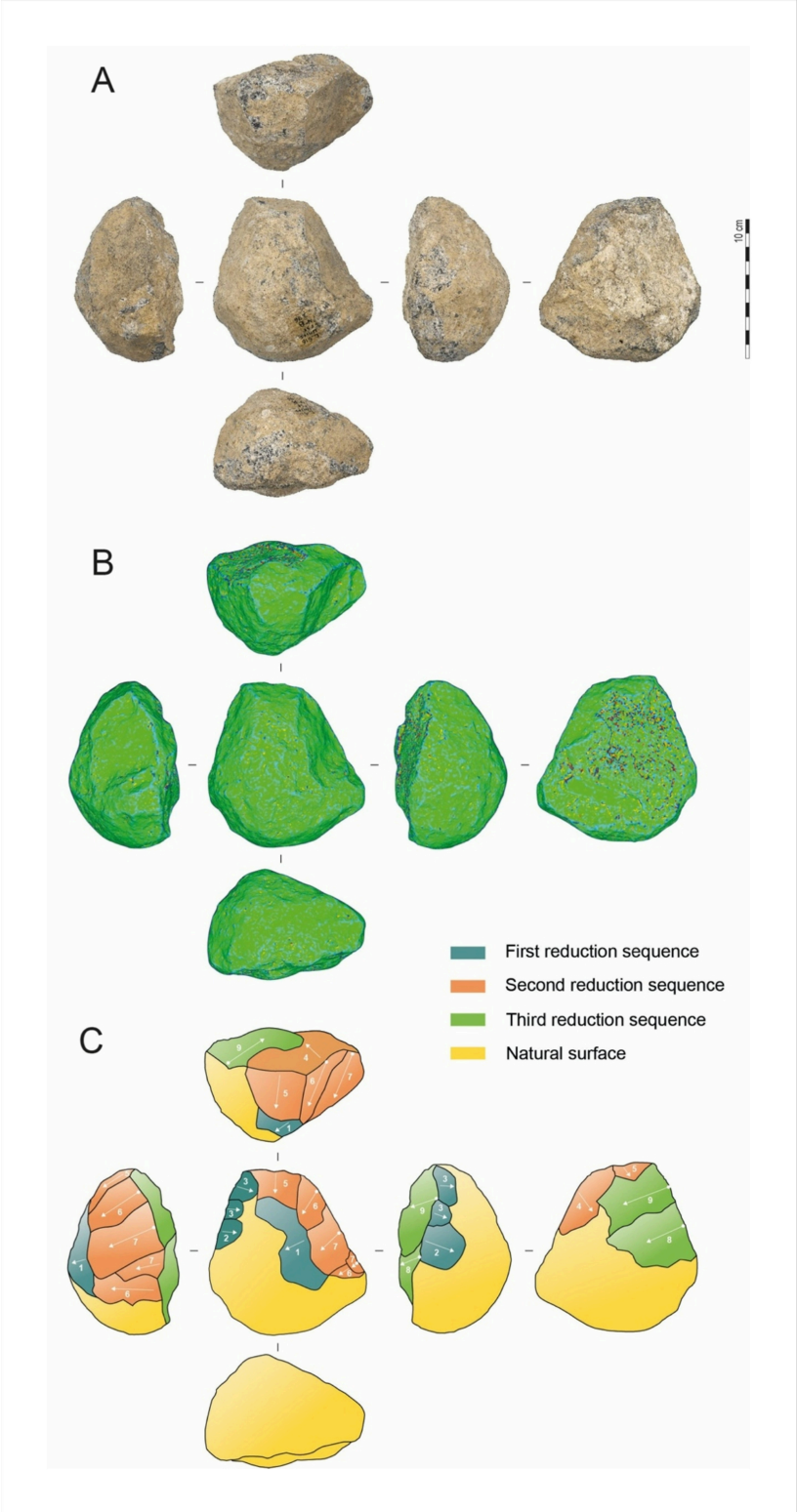


Figure 4

Core (**A**) Photograph of artefact LS16 F31 n°8. (**B**) Three-dimensional and topographic models of artefact LS16 F31 n°8. (**C**) Diacritical and structural analysis of artefact LS16 F31 n°8.

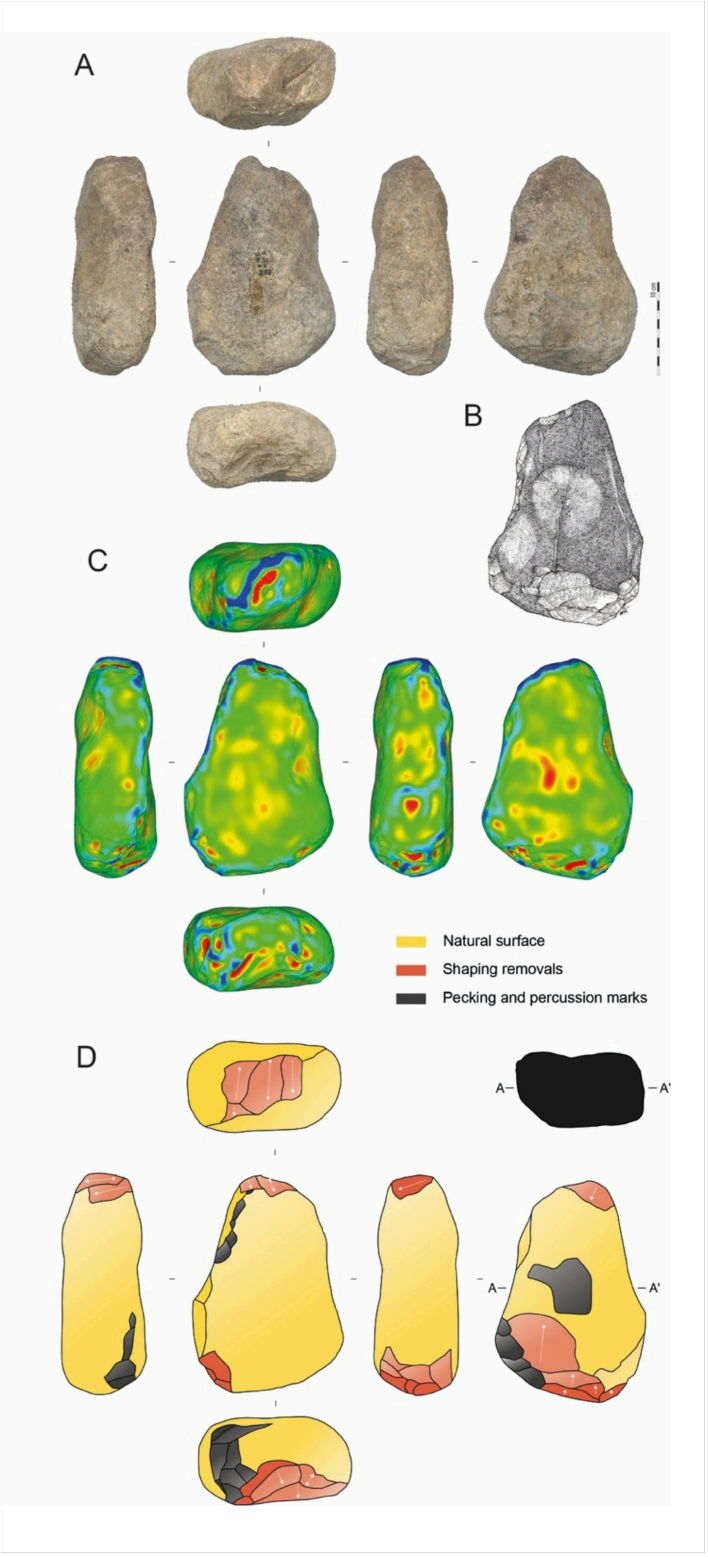


Figure 5

Anvil or Percussive stone tool (**A**) Photograph of artefact LS16 F31 n°7. (**B**) Drawing of the principal face. (**C**) Three-dimensional and topographic models of artefact LS16 F31 n°7. (**D**) Diacritical and structural

analysis of artefact LS16 F31 n°7.

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