Middle Mekong Archaeological Project

Report on Period July 2009-June 2010 For the Department of Heritage, Ministry of Information and Culture



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#### **Executive Summary**

Luce Year Two of the University of Pennsylvania Museum's (Penn Museum's) collaborative research program in the Middle Mekong River Basin (July 2009-June 2010) has achieved several objectives. It has:

- built upon the substantial infrastructure of archaeological skills, laboratory facilities, and institutional cooperation laid in Year One to expand research in the Luang Prabang area
- conducted test excavations at two rock shelter sites, Tham Sua and Tham An Mah, expanding our knowledge of stone age occupation and iron age burial practices and producing a large and well-curated collection of cultural and biological data ready for analysis
- added materially to previous knowledge of the human settlement of the region by expanding the survey in the Luang Prabang region for a total of 84 archaeological sites identified by MMAP
- continued a multi-national multi-disciplinary border-crossing research design that lays intellectual and logistical foundations for future regional archaeological development in Southeast Asia as well as development of Southeast Asian archaeology studies in the United States and Europe.
- presented 8 papers on the results of MMAP research at the nineteenth Congress of the Indo-Pacific Prehistory Association conference in Hanoi
- expanded our database of archaeological data, including the analysis and recording of more than 6000 artifacts, and distributed a copy to Lao museum personnel
- began a collaboration with geosciences researchers on new methods of paleoclimate research that will help reconstruct the environment of human occupation of the region
- laid foundation in terms of personnel, facilities, and research objectives for field and laboratory research for the next two years of Luce support and beyond

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#### Background

In June of 2008, the University of Pennsylvania Museum was deeply honored to be named a recipient of a four-year institutional research grant from the Henry Luce Foundation, as part of its Initiative on East and Southeast Asian Archaeology and Early History. The grant builds upon the Museum's previous work in Thailand and Laos, particularly the Ban Chiang Project, begun in the mid 1970s. The Middle Mekong Archaeological Project (MMAP) in Luang Prabang was first conceived in 2001 as an ongoing collaborative research program of Lao, Western, and Thai scholars, students, and heritage management officials. The Lao program is co-directed by Joyce White and Bounheuang Bouasisengpaseuth.

MMAP has two aims. The first aim is to investigate the human prehistoric settlement of the middle reaches of the Mekong Basin. This research will help archaeologists better understand a key and under-explored region of prehistoric Southeast Asia, and will throw light on the origins of the Ban Chiang Cultural Tradition. The second aim is to provide archaeological training and institutional capacity building for Lao, Thai, and Western researchers working in mainland Southeast Asian archaeology. The Luce funding is enabling the Penn Museum to pursue both objectives with greatly enhanced rigor and speed, which in turn will positively affect the future of Asian archaeology at collaborating institutions and in the region generally.

Year One (2008-2009) of our Luce-funded program was focused on both the training and the research goals. A primary objective was to train a team of Lao culture heritage managers and museum professionals in basic archaeological techniques of artifact analysis, recording, survey, illustration, and database creation and management. This was achieved in a seven-week training session in January through March 2009 (MMAP 2009a), using a variety of Lao, Thai, and Western trainers. The second objective was to continue the regional survey for prehistoric and historic sites in the area around Luang Prabang, northern Laos.

This Year One training and survey was a great success. The Lao trainees, although not yet equipped with a full range of archaeological skills, acquired a practical, hands-on acquaintance with a suite of techniques vital to the practice of modern archaeology. Concrete results included the creation of a trilingual Lao-Thai-English dictionary of archaeological terms and the building of stone identification and shell identification keys that can be used for years to come by future researchers. During the survey, the trainees and trainers were introduced to the use of GIS and field data recording instruments and were trained in field artifact collection and recording. As a result of the Year One survey, eleven new sites were added to the 57 already discovered in previous MMAP surveys. Year One laid critical infrastructure foundations in Laos, at Penn, and at other collaborating institutions for the next three years of the program. MMAP 2009a

was capped off with a road trip of all Lao National Museum Vientiane staff to visit the Ban Chiang National Museum in Thailand, a new state-of-the-art archaeological site museum in Ban Chiang village.

Year Two of our Luce-funded program included two separate seasons of work in Laos. The first season took place in July of 2009 (MMAP 2009b), with the test-excavation of the rockshelter site of Tham Sua. This excavation was intended to be Part Two of the training program, continuing from MMAP 2009a. The July season included intensive, hands-on work in site excavation, along with artifact recording and analysis of the excavated materials. The University of Washington supported this season, and Ben Marwick of the University of Washington was excavation director.

The second season of Year Two (MMAP 2009c) began in Luang Prabang and comprised preparation for and attendance at the 19<sup>th</sup> Congress of the Indo-Pacific Prehistory Association meetings in Hanoi. This international conference occurs every three to four years and is the most important conference for Southeast Asian archaeologists. Five hundred participants attended the Hanoi congress.

From early November, Dr. Joyce White worked with Bounheuang Bouasisengpaseuth, Sengphone Keophanhya, Souksamone Sonethongkham, and Phousavanh Vorasing in preparing 5 MMAP papers – both analyzing the data and preparing PowerPoint presentations. Korakot Boonlop, Sureeratana Bubpha, Helen Lewis, and Ben Marwick prepared an additional 3 MMAP papers in their home countries. The Lao were assisted by MMAP team members Kongkeo Phannasy, Norseng Sayvongdouane, and Sengmany Sananekhom, who did photography, data entry, and other tasks that contributed to MMAP scholarly results and presentation. During the Congress, November 29th – December 5th in Hanoi, an entire session was mostly devoted to MMAP and its work. It was standing room only at the session with additional listeners standing outside the door to the session room. Papers were presented by Joyce White and other Western researchers associated with MMAP, and also by Lao team members, using data accumulated in the Year One and Year Two analyses.

We are very pleased that we have, in these two years, provided our team members with exposure to the full range of archaeological work, from initial survey, excavation, analysis and recording of artifacts, database management and synthesis of results, to the presentation of results, both to scholarly audiences and the general public. At the IPPAs, Dr. White hosted a dinner bringing together all 17 conference attendees who are involved in Lao archaeology, including the Director General of the Lao Department of Heritage, Thongsa Sayavongkhammdy. This represented a milestone in the international integration of Lao archaeology into an international milieu. Only two IPPAs ago, only a couple of researchers (indigenous or not) who worked in Laos attended the conference.

MMAP 2010 really began in mid December 2009. After the IPPAs, Dr. White and the Lao team returned to Luang Prabang. Elizabeth Hamilton flew in, followed by other team members, who came and went to the end of January. In the first few weeks, artifact analysis and recording continued, and deeper experience with the MMAP archaeological database was the focus. On January 1<sup>st</sup>, Helen Lewis from the University College Dublin arrived and the next test excavation could begin.

Although the original plan for MMAP Luce Year 2 was to conduct a larger excavation, Dr. White rethought priorities based on her assessment of skill levels. She decided that MMAP would still expand its team in various ways as originally planned, but that each team member would focus on developing skills in a specific assigned specialty. Thus Souksamone Sonethongkham continued with database development, as he had shown special interest and aptitude in this area. Khammeung Boudthavixay and Sengmany Sananekhom showed special excavation aptitude during the Tham Sua excavations and thus they were part of the main excavation team. Lao newcomers Sysouphonh Singpaseuth from the Lao National University and Bounphone Lasy of the Oudomxay Culture Section worked to develop basic skills in artifact preparation, labeling, and storage. New nationalities were represented on the team, including the Philippines and Italy, along with new participants from Australia and the US. Speleothem research led by Kathleen Johnson of University of California at Irvine was added as part of our continued survey for archaeological sites. The goal of the speleothem study is to reconstruct patterns of ancient climate change during the past 20,000 years in order to provide environmental context for human occupation of the region.

In January, the team test-excavated the rockshelter site of Tham An Mah. The excavation uncovered a number of well-preserved iron age burials, one in a form never before seen in Laos (photo on cover). The site also produced evidence of links with the Plain of Jars. More evidence for the Hoabinhian occupation of the region was also found. Simultaneously the survey continued along with the speleothem study. The survey team explored deep into caves to find stalagmites and stalactites to sample along with recording cultural remains. In addition, Jill Thompson of Bradford University came and continued with the flotation and wet-sieving program.

These Luce Year Two projects are the culmination of MMAP's Luce-funded fieldwork in Laos. MMAP has come a long way in fulfilling our stated goals: to investigate the prehistory of this stretch of the Mekong River, and to train a cohort of Lao culture heritage managers and museum professionals in the full range of archaeological techniques, with the goal of building a solid foundation of individual and institutional competence and capacity for future archaeological research programs.

The focus of the Lao research now turns to analysis of materials and other data recovered. Although MMAP has a good start on this, with over 6000 artifacts digitally

catalogued with basic description and measurements, and some samples under analysis at collaborating laboratories (e.g., archaeobotanical samples at Bradford University), a study season in Luang Prabang will be required to complete the artifact cataloguing and study of specific subsets of materials such as human and animal bone. At the time of writing, the specific budget or schedule for this study season has not been finalized.

#### **People and Facilities**

Year Two continued the effort, established in Year One, of bringing together archaeologists and heritage managers of diverse backgrounds and interests in an environment set up for mutual learning. The Luce grant was used to set up work space, artifact storage, and acquire equipment and other technical requirements needed to foster interactive learning and the expansion of knowledge of the ancient past. Several sub-programs, including two test excavations, laboratory work including artifact and sample processing and recording, and compilation and presentation of results at an international meeting, were undertaken. While the foundations for the archaeological research program were laid in Year One, the fruits of this effort are emerging in Year Two.

#### Personnel

Individuals involved in the past year's MMAP activities originate from the United States (5), Laos (15), Thailand (3), Britain (1), Ireland (1), Italy (1), Australia (3), the Philippines (1), and Canada (1). More than seven non-Lao institutions of higher learning were represented. From these, there were six Ph.D.s and three graduate archaeology students. Of the rest of the team, several are planning further education in archaeology or a related discipline, and most are already employed in heritage management or archaeological research in some capacity.

Although most of the Lao MMAP participants are professionals in heritage management and museum work, and thus have much to teach in their fields, before the establishment of MMAP many had no opportunity to acquire any formal training in modern archaeology. The first university program in archaeology in Laos was only established late in 2009 at the National University in Vientiane. Thus Year One training was predicated on the need to train these professionals in the most basic and fundamental aspects of modern archaeology. Most of the participants of the Year One training returned for the Year Two programs, so that MMAP was able to build on the knowledge and skills acquired in Year One.

In July of 2009, eight Lao and two Thais participated in a two-week excavation training season at Tham Sua, organized by Penn Museum's Joyce White, now Associate Curator in the Asian Section. Ben Marwick was th excavation director at Tham Sua,

and Helen Lewis, and Andy Cowan, a graduate student from the University of Washington, also participated. The Lao were from offices of the Ministry of Information and Culture in three different provinces, as well as several separate branches under the Lao Ministry of Information and Culture; the Thais included a lecturer in a cultural management program at Thammasat University and a researcher from the Sirindhorn Anthropology Centre (see Appendix 1).

In January 2010 the training practicum continued as fifteen Lao, two Thai, one Filipino, and ten westerners excavated at Tham An Mah or conducted a variety of subsidiary research activities. This site will be written up by Joyce White, Helen Lewis, and Bounheuang Bouasisengpaseuth. A digital lab was set up near the site so that data from the excavation could be entered into computers shortly after excavation. GIS/GPS survey was also conducted, as was artifact processing and drawing. A special aspect of this season was the participation of the Museum's digital media specialist, Amy Ellsworth, who filmed the research program with the objective of public dissemination.

#### Facilities

In Year One, the governmental Culture Section of Luang Prabang gave MMAP the use of a spacious building. In Year Two, MMAP was moved to a large single room in another building nearby (Figure 1).



Figure 1. MMAP's new quarters were smaller but adequate.

Though we had less space than in Year One, the space proved adequate for artifact storage, photography, and data entry. We were permitted to use a large outdoor pavilion nearby, which allowed us to process artifacts, bones and botanical finds (Figure 2). Many of the Luce fund-purchased technical items acquired last year, such as digital calipers, scales, and hard drives, were usable this year. Luce funds also allowed the

purchase of two new netbook computers for data entry, two new digital cameras, storage boxes and shelves, and a contract with a company providing wireless internet capacity.



Figure 2. The outdoor pavilion used for artifact, botanical, and bone processing.

The Nomad PDAs with GPS used in Year One continued to be very useful in data collection and analysis, allowing us to collect survey data efficiently, eliminate paperwork, and reduce data-entry errors. Using this system was a significant part of the training; most Lao participants have limited access to and familiarity with computers of any kind. For them, learning how to use the mobile GIS was an unusual challenge and made a strong impression of how technology can assist the organization and analysis of heritage data.



Figure 3. The field camp at Ban Xieng Mouk: living space and lab space.

During the excavation of Tham An Mah, MMAP was fortunate in being able to rent the "conference center" of the nearby village of Ban Xieng Mouk to use as a field camp. This camp was within walking distance of the site, and contained not only bedrooms but also a separate kitchen and a covered area for storage, computer use, and artifact analysis.

#### Activities

Joyce White designed all MMAP 2009-2010 programs. Unlike the January-March 2009 training program, which involved both lectures and hands-on work, this year's learning took place primarily during hands-on activities, practicing skills while doing productive archaeological work, including preparation and presentation of results for scholars. Trainers were not trainers as such, but experienced participants sharing knowledge while conducting excavation and research.

Hands-on tutorials, exercises, and practicums were conducted in the laboratory and the field. When individuals showed special aptitude or interest, additional instruction and experience was provided on a case-by-case basis. Particular expertise in excavation and stratigraphic recording and interpretation was provided by Dr. Joyce White, Dr. Helen Lewis, Dr. Ben Marwick (Tham Sua), and Ms. Patrizia La Piscopia (Tham An Mah); by Dr. Elizabeth Hamilton in database design and management; by Dr. Gillian Thompson in paleobotany; by Mr. Emil Robles in GIS; by Ms. Stephanie Howton in survey; and by Dr. Kathleen Johnson and Dr. Michael Griffiths in cave exploration and speleothem research. Mr. Norseng Sayvongdouane, a Lao team member experienced in archaeological illustration, provided training in artifact drawing to a new Thai team member, Mr. Rhuet Nakchuen. Team member Mr. Souksamone Sonethongkham provided invaluable instruction and assistance in computers and computer maintenance. Mr. Korakot Boonlop and Ms. Sureeratana provided training in transit, photography, and general excavation. Mr. Boonlop also led excavation and preparation of the human skeletal materials.

#### **Excavations**

In July 2009, MMAP conducted a test excavation at the site of Tham Sua. Over 3000 sherds and lithic artifacts were produced from this test excavation. Dr. Ben Marwick of the University of Washington will write up this site.

In January 2010, the site of Tham An Mah was excavated (Figure 4). Two small trenches were dug. The first square was 1 m by 1m. This square was excavated to a depth of nearly one meter; excavation ceased because the excavators were encountering too much buried rockfall. The second pit started out as 2m x 1m, expanding as intact pots were discovered in the side walls. A total of 3514 stone flakes and 44 cores were found, along with 1237 sherds. Many environmental samples

(flotation, pollen, fauna) were recovered. The most significant and interesting finds were several burials. One largely intact jar contained remains of three individuals, adults and a child; additional bones were found outside the jar. This type of jar burial is extremely unusual in Lao or Southeast Asian archaeology. The well-preserved remains offer scope for significant investigation by physical anthropologists. Another jar was found intact but empty, along with a smashed but reconstructible vessel. All the pottery suggests that these burials date from the iron age (c. 600 B.C.-A.D. 500). This pit was excavated to a depth of about a meter, with deeper cultural remains left to be excavated at a later time. This site will be written up by Joyce White, Helen Lewis, and Bounheuang Bouasisengpaseuth.



Figure 4. View of the excavation of Tham An Mah.

#### Analysis

The MMAP program was designed to study data and materials previously collected in Penn Museum/Department of Heritage research programs as well as to collect new data to add to our knowledge of the prehistory of the middle Mekong River Basin. In 2005 MMAP conducted surveys along the Khan, Seuang, and Ou rivers in the vicinity of Luang Prabang, recording 57 sites. MMAP found twelve more sites in 2009 and fifteenmore in December 2009-January 2010, for a total of 84 sites in the MMAP database. Small quantities of sherds and lithics were collected from each site. Previous excavations had been carried out by MMAP at Phou Pha Khao Rockshelter (2007) and Tham Vang Ta Leow (2008). Thus in Luce Year Two, participants processed materials that had been collected by MMAP at the previous excavations and surveys, as well as new data they themselves collected from the excavations of Tham Sua in 2009 and Tham Ah Mah in 2010, and the fifteen new survey sites.

Materials excavated from the four sites provided thousands of artifacts for analysis. The site of Phou Phaa Khao Rockshelter produced portions of seven burials, along with over 2000 stone flakes and tools and almost 400 potsherds. At Tham Vang Ta Leow, over 6000 Hoabinhian stone cores and flakes, along with 83 pottery sherds and numerous shells, were recovered. These latter two excavations were funded by the University of Pennsylvania Museum.

The thousands of stone, bone, ceramic, and botanical artifacts recovered from the test excavations of the four sites provided a great variety of research materials for the Luce Year Two programs. The team analyzed and recorded details about 6000-7000 stone flakes and cores, using the stone identification key developed in Year One with the assistance of Mr. Phonepeth Journamounty of the Lao Department of Geology and Mines, Vientiane. Great emphasis was laid on proper curation of artifacts: every lithic and potsherd from Tham Sua and Tham An Mah as well as previous sites was washed, labeled with unique artifact designations, and properly stored at the laboratory. There they will be readily identified and easily accessible by future researchers. The importance of this was brought home to the team when the database manager (Elizabeth Hamilton) checked all entries for completeness and compatibility with previous entries. Having to go back and locate a single flake to correct a data entry mistake made the necessity for clear labeling and correct storage very clear to the trainees. Radio carbon dates have been run for all four sites. The summary of the excavations is in Table 1.

Table 1. Summary remains from four MMAP test excavations

	PPKR	TS09	TVTL	ТАМ
~Cubic M excavated	2	2	3	4
Cores	13	61	57	44
Flakes	2306	~2000	6107	3514
Sherds	393	1183	83	1237
dates	~1800 BP cal from burial	TBA (Ben Marwick, Andy Cowan)	3 dates ~ 11000 BP cal	1 date ~ 13000 BP cal
Summary	Iron age deposits dug into stone age	Iron age deposits dug into stone age	Terminal Pleistocene through early Holocene	Iron age over stone age (Terminal Pleistocene)

## Summary of 4 tested sites

In addition, under the supervision of Dr. Jill Thompson, 28 flotation samples with remains of tiny shells, bones, and seeds were floated, dried, sieved, and had all artifactual and biological material separated out, identified, and weighed. These samples, together with the 16 samples from Year One, have considerable potential for revealing details of what people ate and what plants and animals they used. Phousavanh Vorasing completed the identification of thousands of shells and shell fragments discovered during the four excavations.

Scientific samples have been or are currently being analyzed around the world. Helen Lewis in Ireland conducted soil micromorphology studies, Ben Marwick in Seattle conducted sediment analyses, Huw Barton in the United Kingdom is conducting lithic use-wear and residue analyses, and Dan Penny in Australia is analyzing pollen. In the future Phil Piper will analyze the faunal remains.

#### **Products**

The products of this MMAP year were both tangible and intangible. Many of the products of the year developed from the results of previous MMAP years. The year provided additional experience and training in archaeological techniques and regional material culture. These products include:

- refined recording methodologies for survey, excavation, and finds;
- an expanded database with modules for bags, artifacts, sites, shells, and botanical processing, including a GIS database with our 84 sites;
- a reorganized storage facility in Luang Prabang in which lithics, ceramics, plant remains, bone, shell and other materials recovered during four excavations and three seasons of survey were cleaned, sorted, organized and ready for more specialized study;
- the presentation of eight PowerPoint papers that derived from MMAP and MMAP materials at an international conference, as well as several PowerPoint lectures for public presentations
- A well-developed project website at <a href="http://penn.museum/sites/mmap/">http://penn.museum/sites/mmap/</a> that includes videos from Tham An Mah and Tham Vang Ta Leow, two blogs from 2010 and 2005, and many other features.

#### **Recording methodology**

The Year Two recording methodology for survey, excavation, and artifact analysis continued its reliance upon the fundamentals established during the Ban Chiang excavations, i.e., bag logs and provenience labeling. MMAP has also gone beyond Ban Chiang in implementing newer forms of interpretation and recording, such as the use of Harris Matrices under the guidance of Dr. Helen Lewis of University College Dublin. Both methods offered substantial insights into the interpretation of stratigraphy.

In Year Two, MMAP continued its reliance on the handheld TDS Nomad, a field-rugged PDA that collects GPS point data, and allows the entry of large quantities of data into ArcGIS forms that are downloadable to PCs. The usefulness of the Nomad was established in previous survey seasons, as its collected data not only allowed the creation of ArcGIS maps of survey sites and landforms, but also populated a site table with almost a hundred fields of specific site data. Maps and data collection were refined during Year Two, with the assistance of Emil Robles of the University of the Philippines and Stephanie Howton, a CRM archaeologist from Australia, both experienced in GIS applications.

#### Databases

MMAP has continued to develop a comprehensive relational database of our finds in Luang Prabang since 2005. The database used last year, based on experience with the Ban Chiang artifact database and populated with the data we have collected from northern Laos since 2005, was refined and expanded by Dr. Elizabeth Hamilton to improve the ease of data entry and include new categories of information on shells and Buddha figurines. Intensive data entry on stone artifacts in particular took place during the June 2009 and December 2009-January 2010 seasons. A version of this database was given to the Culture Section in Luang Prabang and the National Museum in Vientiane, there to serve as a possible model for their collections database. The ultimate goal, to be carried out in Years Three and Four, is to collect and integrate all the Lao data and data from northeast Thailand into one comprehensive regional archaeological data set for the Middle Mekong Basin.

#### Collection of new data

In Year Two, MMAP continued its survey program with a different team format. Rather than emphasizing survey methodology and training for all team members, a single team of experienced Lao and Westerners took charge of survey. For most of the December-January season, the survey area was contracted to the region around Tham An Mah, in an effort to fine-tune our knowledge of settlement patterns in one area. Later, the survey team ventured further up the Ou River, an area that had been under-surveyed in previous seasons. This focused effort resulted in the discovery of 15 new sites, for a total of 84 sites (Figure 5). This wealth of sites and the artifacts collected during the surface survey will allow the formation of hypotheses about stone tool procurement, land use, and site distribution that can be tested by later research.



Figure 5. Sites discovered in 2005, 2009, and 2010. Some sites to the north of the map area are not shown here.

#### Storage and collections management

One of the main lessons MMAP seeks to instill is that properly labeled, organized, and stored artifacts are essential to archaeological research. The artifacts must be accessible and easy to locate years after their initial acquisition. The dedicated storage room used in Year One was unfortunately unavailable in Year Two, but storage space was found in the large lab/working room for banks of shelves and storage boxes with bilingual labels. Luce funds continued to enable the purchase of shelving, storage boxes, sturdy zip-lock bags, and a wide variety of labeling equipment. The storage set-up continues to allow team members and visiting specialists to easily retrieve exactly the boxes they need and return them to their proper location when done.

#### Scholarly presentation

MMAP's work, both in the Luce-funded Year One and in previous years, bore fruit in the presentation of MMAP research in an international conference in Hanoi. Eight MMAP team members gave talks at a special all-Lao archaeology session and other sessions at the meetings of the Indo-Pacific Prehistory Association (IPPA) in late November in

Hanoi, Vietnam (Figure 6). The IPPAs are the most important conference meetings for Southeast Asianist archaeologists in the world, with over 500 participants this congress, and occur only once every three to four years. MMAP co-director Bounheuang Bouasisengpaseuth delivered a paper on the procedures to be followed if archaeologists wished to obtain permission to work in Laos, using MMAP as an example of a successful process. All the others gave papers presenting different aspects of MMAP data. Joyce White gave an overview presentation on MMAP: its history, what it had accomplished so far, and its future plans. Ben Marwick (University of Washington) gave a presentation on cave formation processes at Tham Sua, the site which MMAP excavated the summer of 2009. Helen Lewis (University College Dublin) discussed the problem of how to predict which cave sites might contain intact Hoabinhian levels in advance of excavation.



#### Fig. 6. Some of the MMAP team in Hanoi

Phousavanh Vorasing of the World Heritage Centre, Department of Information and Culture, Xiengkuang Province, in a talk that received praise from some senior archaeologists at the conference, reported on the results of his ethno-archaeological investigation of shell remains uncovered in three MMAP excavations: Phou Phaa Khao Rockshelter, Tham Vang Ta Leow, and Tham Sua. Mr. Vorasing not only studied the shell species found archaeologically, he also conducted interviews in the street markets of Luang Prabang with women who collected and sold snails and other shelled species. By doing this, he was able to get an idea of the relative abundance and collecting season of each species found in the prehistoric sites. Souksamone Sonethongkham of the National Museum, Vientiane, presented the findings of a study that he and Joyce White had conducted assessing variations in raw materials used for core tools among three sites excavated by MMAP, the first time anyone had ever looked quantitatively at those kinds of distinctions in Hoabinhian assemblages (Figure 7). The study revealed the that stone types chosen for core tools differed considerably from site to site. Sengphone Keophanhya, a collections manager assistant at the National Museum in Luang Prabang, gave a presentation on MMAP and Lao cultural heritage, concentrating on the MMAP training program for Lao cultural heritage staff. Korakot Boonlop and Sureeratana Bubpha presented on the crossing-borders aspects of MMAP. Helen Lewis also discussed MMAP data in a session on geoarchaology in Southeast Asia, comparing with her other data from Borneo, and the Philippines.

The Hanoi IPPA meetings were the first presentations some MMAP team members had ever made at a scholarly conference, much less an important international meeting. These talks provided for valuable exposure to international scholars and training in professional presentation of research results.



Fig 7. Souksamone Sonethongkham delivers his talk at the IPPA conference in Hanoi.

#### **Public communication**

Drawing from Dr. White's long experience with Ban Chiang, MMAP regards public communication as an essential component to the long term success of an archaeological project. Public communication comes in many formats, and modern day archaeology requires that archaeologists find many ways to engage the public. The public lecture is a standard venue. Dr. White gave three talks about MMAP to lay audiences this past year – one in Vientiane at the National Museum, one in Luang Prabang (this one in Lao) at the Culture Section (Figure 8), and one in Philadelphia at Penn Museum. Bounheuang Bouasisengpaseuth presented a power point to the villagers who supported us at the excavation of Tham Sua.

The talk in Vientiane, sponsored by a local mining company, drew more than 90 people even though it was announced by email only three days in advance of the lecture. This great attendance was probably due to the front page coverage of MMAP's excavations at Tham An Mah in the *Vientiane Times*, and the excavations also received coverage on Lao television and other news media. The coverage of the project and excavations in Lao news media was a great opportunity for the Lao members of the MMAP team,

providing an occasion for them to explain their research to Lao television and newspaper journalists. Not only does media interest in their work help them become and stay excited about archaeology and heritage management, practice explaining our work to lay persons helps them clarify their skills in articulating the process and importance of what we are doing. Ultimately, the preservation of Lao sites and data are the responsibility of the Lao people, and the heritage managers we work with are on the front lines of saving the archaeological record of Laos for posterity.

MMAP also has sought exposure via 21<sup>st</sup> century media, and on previous seasons have had videos and a blog posted on the web developed by project volunteers. In 2010, for the first time the Penn Museum sent its professional Digital Media Developer, Amy Ellsworth, to film, blog about, and photograph the MMAP project. The blog, photos, and video were posted on the Museum's and MMAP's websites as well as Flickr and YouTube, ensuring ample exposure of the project in current social media. Amy also worked with Ban Chiang and MMAP staff and volunteers to develop attractive MMAP web pages. The MMAP site includes a photo and statement about every MMAP team member, past and present. This webpage demonstrates the wide impact MMAP has had on Lao culture heritage management simply by the people we have involved, Lao and non-Lao, in the research program over the years. Other collaborating institutions, particularly the University College Dublin, have linked their websites to the MMAP site based at Penn.



Figure 8. Joyce White delivering a summary for heritage managers in Lao of MMAP activities in the Culture Section conference room in Luang Prabang

#### **Institutional Development and Collaboration**

The four core collaborating institutions participated in Year Two of the Luce grant and through this process have expanded and strengthened their commitment and capacity to undertake archaeology in Southeast Asia.

#### Penn Museum

Under Director Richard Hodges, Penn Museum restructuring included the designation of Ban Chiang as one of the Museum's 'five key long-term research locations.' With this designation, Penn Museum's research in Southeast Asia has achieved greater recognition and stability. The Museum, with the goal of publicizing research and reaching out to undergraduates and the public, sent Museum graphic designer Amy Ellsworth to Laos for 2 1/2 weeks to record MMAP's work and to publish a popular and well-received blog about Laos and MMAP. This blog is accessible at http://middlemekong.wordpress.com/. The Ban Chiang Project's newsletter for the Friends of Ban Chiang this year also featured several short articles on MMAP fieldwork in Laos. The Museum is looking ahead to Luce Year Three's Year of Ceramics and has helped us in terms of suitable space for the visiting researcher program on ceramics analysis, as well as programmatic, equipment, and curricular development (a year-long course in ceramics analysis), and raising the additional funds needed to support that particular year in terms of facilities and personnel. An international search was conducted by Penn faculty and Museum staff for the post-doctoral researcher who will teach a formal course in archaeological ceramics, lead the Ban Chiang ceramics analysis, and train the visiting researchers from Southeast Asia.

#### Department of Heritage, Lao P.D.R.

The Department of Heritage (DOH) in Laos has always been a partner with Penn in all previous seasons of MMAP. It contributes staff, space, time, access, use of buildings, and much assistance in helping to meet governmental regulations. Our Lao counterparts in particular bring the legal knowledge, social and governmental networks, and interpersonal skills necessary for effectively conducting complex projects in one of Asia's least developed nations. Every season MMAP has sought to expand the range of Lao personnel to include new provinces and new work units who participate in MMAP training.

This year Luce funds enabled twelve DOH staff members and one Lao National University faculty member to participate in the training: three from the National Museum, including MMAP co-director and National Museum deputy Director Bounheuang Bouasisengpaseuth; one staff member from the Division of Archaeological Research; two staff members from the World Heritage Centre, Department of Information and Culture, Xiengkuang Province; two staff members from the National Museum, Luang Prabang; three staff members from the Culture Section Department of Information and Culture, Luang Prabang Province; and one new staff member of the Culture Section of Oudomxay Province. Having the training cross-cut five normally independent DOH offices from four provinces in Laos, plus for the first time bringing in a Lao National University presence, has the effect of bringing the new skill sets and knowledge and thus "capacity building" into several divisions of Lao culture heritage management simultaneously.

MMAP also has provided a variety of equipment and facilities enhancements. MMAP has left equipment including three laptops, one scanner, two digital cameras, two GPS devices, one external hard drive, two printers, and a wide variety of office, excavation, and survey equipment for use of the offices in Luang Prabang and Vientiane in between field seasons. The Lao National Museum received a digital scale. Luang Prabang also has six banks of steel shelving, dozens of plastic storage boxes, a refrigerator, and one large lock box. One Luang Prabang Culture Section building has had a complete electrical upgrade funded by MMAP. Small libraries have been started at both sites. In previous seasons MMAP purchased four wooded tables, twelve wooden chairs, and sixteen plastic chairs, which were left in the office at Luang Prabang.

#### **University of Washington**

The Department of Anthropology of the University of Washington (UW) contributed expertise and funds for the July 2009 training excavation at Tham Sua (MMAP 2009b). Ben Marwick, assistant professor at the Department of Anthropology at the University of Washington (UW), led the test excavation. With additional financial support (\$1000-\$2000) from the University of Washington, he brought several technically advanced analytical procedures to bear on the MMAP excavation at Tham Sua this year, including geochemical and geophysical analysis of archaeological sediments, elemental analysis of ceramic and stone artifacts, and thermoluminescence dating of ceramics. He also brought one UW graduate student (Andy Cowan) who anticipates doing dissertation research in Southeast Asian archaeology. Other UW graduate and undergraduate students have been involved in laboratory research projects in Seattle. These developments in themselves contribute to MMAP objectives of training the next generation of archaeologists, strengthening institutional programs, and promoting scholarly links between Asian and North American scholars and institutions.

#### Sirindhorn Anthropology Centre

The Sirindhorn Anthropology Centre (SAC) continued to participate in Luce Year Two by the involvement of Korakot Boonlop, a SAC staff researcher. Mr. Boonlop has had many years of experience as an archaeologist in Thailand, emphasizing investigation of the Ban Chiang Cultural Tradition. He also specializes in analysis of human skeletons. Boonlop participated in the MMAP 2009b excavation at Tham Sua, the MMAP 2009c IPPA session, and the MMAP 2010 excavation at Tham An Mah. Boonlop contributed in countless ways to the Year Two program, from helping explain excavation procedures to Lao participants to conducting a complicated excavation of a secondary group burial at Tham An Mah. His ongoing participation has greatly assisted the "border-crossing" objectives of the MMAP program, helping to transmit knowledge across national and linguistic boundaries, and enhancing his own experience which he brings back into the milieu of professional Thai archaeology.

#### **Additional Institutional Collaborations**

In the process of bringing expertise into MMAP programs, institutional collaborations can expand. The most noteworthy example is the collaboration developing with University College, Dublin (UCD) through Dr. Helen Lewis. Dr. Lewis has been the principal excavation archaeologist at all four excavations undertaken by MMAP in Laos. Her expertise in cave archaeology has been invaluable. She has contributed funds to the program, as well as facilitated the involvement of several participants and institutions, including Emil Robles (U of the Philippines), Huw Barton (U. Leicester), Patricia La Piscopia (UCD), Dr. Kathleen Johnson (U. Cal Irvine), and Phil Piper (U of the Philippines), thus bringing to MMAP expertise and institutional involvement in GIS, single context excavation, specialized artifact studies, and palaeoenvironment research. We hope to bring UCD students to Penn Museum for short term research projects with Southeast Asian materials. Another developing collaboration is with the Smithsonian's Freer/Sackler Galleries, Conservation Department, and Curator Louise Cort during the Year of Ceramics. This collaboration is facilitating the international workshop in Southeast Asian ceramics as well as analysis of Ban Chiang pottery. Institutions that may develop deeper collaborative links in the coming phases of MMAP include the University of the Philippines and the University of California at Irvine.

#### Summary and the Next Steps

#### **Academic Summary**

MMAP research done to date in Luang Prabang Province demonstrates that humans have lived in this landscape at least since the terminal Pleistocene (the oldest date is from TAM, 13000 BP cal.). The surveys reveal that early peoples lived in both open air and caves/rockshelter sites, and at altitudes ranging from riverside to over 800 meters above sea level. Our four test excavations show that iron age peoples often buried their dead in cave and rockshelters where stone age people had lived thousands of years before. We have found much variability in both stone age and iron age material culture and practices. Both supine primary burials and secondary jar burials have been found. A white disc from Tham An Mah resembles discs from the Plain of Jars. Preliminary analyses of stone age remains indicates that each site exploited local resources somewhat differently, with different stone types and different shell types predominating at each site. With continued excavation and analysis the research program should contribute much to our understanding of the little-known hunter-gatherer, stone, and metal ages of mainland Southeast Asia.

#### Luce Program Summary

The Henry Luce Foundation funding of a multi-year collaborative research program in the Middle Mekong Basin is enabling Penn Museum and our partners simultaneously to explore a keystone region in Asian prehistory and to develop the human and institutional resources to sustain archaeological investigation for years to come.

The Luce funding of a four-year expansion and enrichment of the Penn Museum's research in this part of Asia is enabling both the training of regional archaeologists and the incorporation of methodologies that would otherwise have been impossible. Techniques that have rarely been attempted in mainland Southeast Asia, such as residue analysis, palaeoethnobotany, shell analysis, and speleothem research, promise to address important questions in the area's prehistory, including the origins of agriculture and the nature of hunter-gatherer adaptation to tropical environments.

The building of "human capital" in Laos and Thailand in the areas of cultural heritage management, archaeology, and museum studies through our training programs will also have a long-term impact. Year One of the Luce grant was designed to establish field methodology and techniques, add new data both from survey and laboratory analysis of already-excavated material, and train the core team of Lao and Thais in basic survey and post-excavation skills. Year Two built on this infrastructure. Already-tested survey methodology and technology were extended into new areas. As a result, 15 new sites were discovered. Year Two also saw the expansion of previously-used research techniques such as flotation, and the introduction of new and experimental techniques, such as the analysis of past climate change using speleothem layers. The analysis of stone tools, shells, and other botanical remains continued at a greater level, with over 6000 stone flakes alone typed, measured, and added to the MMAP database. With the participation of an international crew of experts and trainees, the important site of Tham An Mah was excavated, with exciting finds of several iron age burials including a unique jar burial, as well as intact pots and well-preserved skeletal remains ready for analysis. Results of MMAP research were presented at an important international conference, not only by experienced MMAP researchers but also by newly trained young Lao team members.

All these results proved the worth of MMAP's strategy of combining collaborative research with progressive training; productive relations and collegiality have been maintained and expanded and the groundwork laid for future Lao participation in archaeological research, publication, and presentation. One key aspect of the success of the program is the lengthy periods Dr. White and some other staff have been able to

spend in Laos. To bridge the language and educational differences between international and country level archaeology, much sustained face-to-face time is needed to transmit knowledge and techniques. Luce Foundation funds have been instrumental in advancing Luce objectives of strengthening the next generation of regional professional archaeologists in Laos while simultaneously fostering dissemination of new data.

#### Next steps: MMAP Luang Prabang research

The current MOU between Penn Museum and the Department of Heritage expires at the end of 2010. We would like for Kathleen Johnson to bring a small team to collect speleothems from Tham Mai on the Ou for no more than 2 weeks in December 2010. This site is particularly promising for palaeopenvironmental evidence for Holocene environments (the last 10,000 years)

After that, we can contemplate another Penn/DOH MOU. Joyce White can discuss the time and scope of the new MOU with Bounheuang Bouasisengpaseuth during his upcoming visit to Penn for the ceramic study. Depending on funding, this continued work would include faunal analysis, artifact analysis, and continued testing of Tham An Mah under the direction of Helen Lewis, and possibly the testing of other sites.

#### Next steps: Year of Ceramics

The coming third year of the Luce grant to strengthen Southeast Asian archaeology at the University of Pennsylvania shifts the program's focus from fieldwork in Southeast Asia to laboratory work in Philadelphia and from Luang Prabang to northern northeast Thailand in geographic focus. During this year, two Southeast Asian archaeologists are coming to the University of Pennsylvania to participate in a two-semester study of ceramics excavated from Ban Chiang, Thailand.

This fall, Luce funds will bring Bounheuang Bouasisengpaseuth from the Lao National Museum in Vientiane and Sureeratana Bubpha from Thammasat University in Bangkok, Thailand, to the Penn Museum for nine months as visiting researchers to participate in the Ban Chiang ceramics analysis. They will be under the supervision of Joyce White and post-doctoral ceramics specialist Marie-Claude Boileau, who is funded by the Vice Provost's office of the University of Pennsylvania. An international workshop is also being developed jointly with Curator Louise Cort of the Smithsonian's Freer/Sackler Galleries that will assess the state of ceramics research in Southeast Asia.

The Year of Ceramics is structured around a formal two-semester course in archaeological ceramics analysis to be co-taught in Penn's Department of Anthropology by Drs. White, Boileau, and Tartaron. The first semester features an introduction to modern method and theory in archaeological ceramics. The Ban Chiang ceramics will be positioned within the mainstream of ceramics studies, while simultaneously being

used as a case study for teaching Penn undergraduates and graduates the basics of this kind of fundamental archaeological research. In the second semester, intensive laboratory analysis of Ban Chiang ceramics will be undertaken, featuring thin-section petrography, bringing state of the art analytical procedures to one of the most renowned collections of archaeological ceramics from Asia. The techniques developed with Ban Chiang ceramics can then be applied to the Luang Prabang collections.

Simultaneously during Luce Year Three, work on the databases will continue under the direction of Dr. Elizabeth Hamilton, with a focus on integrating the data from the four Ban Chiang Cultural Tradition sites excavated in the 1970s with the MMAP data collected from Luang Prabang since 2001. The goal is to create a comprehensive regional Middle Mekong database that can be used by MMAP, but can also be disseminated among other Southeast Asianist scholars.

The Thai and the Lao researchers participating in the Luce Year Three analysis will also participate in the Luce Year Four survey in northeast Thailand, ensuring continuity of scholarship and training from lab to field.

## APPENDIX 1: Middle Mekong Archaeological Project (MMAP) Team -

Name	Institution	Title (MMAP Role)		
Dr. Joyce C. White	University of Pennsylvania Museum of Archaeology and Anthropology (Penn Museum)	Senior Research Scientist; Co-Director MMAP; Director of Ban Chiang Project (MMAP trainer: Overall)		
Mr. Bounheuang Bouasisengpaseuth	National Museum, Department of Heritage (DOH), Vientiane	Deputy Director; Co-Director MMAP (MMAP trainer: Local/village relations; Cultural Resource Management, VT Museum)		
Mr. Korakot Boonlop	Princess Maha Chakri Sirindhorn Anthropology Centre, Bangkok	Archaeologist; Researcher (MMAP participant, skeletal analyst)		
Ms. Khammeung Boudthavixay	World Heritage Centre, DOIC, Xiengkuang Province	Researcher (MMAP participant)		
Mr. Souliya Bounxaythip	Division of Archaeological Research, DOH, Vientiane	Researcher (MMAP participant)		
Ms. Sureeratana Bubpha	Thammasat University	Lecturer in the Cultural Management Programme, College of Innovation at Thammasat University		
Mr. Andy Cowan	Graduate student, University of Washington	Luminescence dating of ceramics		
Mr. Michael DeWald	University of Pennsylvania Museum of Archaeology and Anthropology (Penn Museum)	Volunteer		
Mr. Sisomseun Doungsuliya	Senior Geologist, Lao Department of Energy and Mines	Helped with rock identification		
Ms. Amy Ellsworth	University of Pennsylvania Museum of Archaeology and Anthropology	Digital Media Developer at the Penn Museum, documented MMAP 2010 on video and blog.		
Dr. Michael Griffiths	University of Newcastle, (Australia)	Speleothem research		
Dr. Elizabeth Hamilton	University of Pennsylvania Museum of Archaeology and Anthropology (Penn Museum)	Research Coordinator, Asian Section. (Database creation and supervision)		
Ms. Stephanie Howton		Survey and GIS mapping		
Dr. Kathleen Johnson	University of California at Irvine	Assistant Professor, Earth System Science. (Speleothem research)		
Mr. Sengphone Keophanhya	National Museum, DOH, Luang Prabang	Collection Manager Assistant (MMAP participant)		
Mr. Nouphanh Keosouda	National Museum, DOH, Luang Prabang	Researcher (MMAP participant)		

### Luce Year Two

Mr. Suthone Ketphanh	MMAP consultant, Lao Forestry Department	Helped with plant interpretation		
Mr. Bounpone Lasy	Culture Section official, Oudomxay Province.	MMAP participant		
Dr. Helen Lewis	University College Dublin, Ireland	Lecturer, School of Archaeology (excavation)		
Dr. Benjamin Marwick	University of Washington	Assistant Professor in the Anthropology Department		
Mr. Rheut Nakchuen		Archaeological illustrator		
Mr. Onchansamone Ninethaphone	Department of Information and Culture, Luang Prabang District	Chief of Culture (MMAP participant)		
Ms. Kongkeo Phannasy	Department of Information and Culture (DOIC), Luang Prabang	Staff, Provincial Cultural Section (MMAP participant)		
Ms. Patrizia La Piscopia	University College Dublin, Ireland	Excavation		
Mr. Emil Robles	University of the Philippines	GIS and mapping		
Mr. Sangmany Sananekhom	National Museum, DOH, Vientiane	Conservator and Restoration (MMAP participant)		
Mr. Norseng Sayvongdouane	Department of Information and Culture (DOIC), Luang Prabang	Deputy Director, Provincial Cultural Section (MMAP participant)		
Mr. Sysouphonh Singpaseuth	Lao National University, Vientiane	Researcher (MMAP participant)		
Mr. Souksamone Sonethongkham	National Museum, DOH, Vientiane	Researcher (MMAP participant)		
Dr. Gillian (Jill) Thompson	University of Bradford, U.K. Division of Archaeological, Geographical and Environmental Sciences	Lecturer in Environmental Archaeology (MMAP Trainer: Archaeobotany/ flotation)		
Mr. Phousavanh Vorasing	World Heritage Centre, DOIC, Xiengkuang Province	Researcher (MMAP participant)		

#### **Specialist Reports**

# Elizabeth Hamilton, Ph.D.

#### Database Developer

Ban Chiang Project, Asian Section University of Pennsylvania Museum of Archaeology and Anthropology Philadelphia, Pa. 19104

Dr. Elizabeth Hamilton is in charge of database development for MMAP. She also manages the Penn Museum's Ban Chiang Project database.

#### The MMAP archaeological



database organizes and integrates data in both Access and ArcGIS. The ultimate goal is to have an online regional database of the archaeology of the middle Mekong region, including parts of both Laos and northeast Thailand. Data collected during both survey and excavation are incorporated into a single integrated whole. Dr. Hamilton has been involved in the design and implementation of the MMAP database since 2008.

Dr. Hamilton has participated in two MMAP field seasons in Laos. Her tasks during her stay in Laos in January-March 2009 included giving formal classroom training in database use and design, expanding and improving the MMAP database, and co-leading one of the three survey teams that recorded site information and merged it with GIS. In Luce Year Two (MMAP 2010), she spent an additional seven weeks in Laos, from December 11, 2009 to January 27, 2010. Her tasks for this season built upon the successes of the previous season. She continued to train and supervise the Lao participants, most of whom had undergone the classroom instruction in database in the last season, as they entered data on thousands of stone flakes and cores into the MMAP Access database. She also improved the MMAP database, adding new subforms to ease data entry and creating new tables and forms for new data classes, such as small Buddha figurines. The objective is to create a database that all MMAP

participants can use in their future work, whether at the Lao National Museum in Vientiane or the Culture Section in Oudomxay.

During MMAP 2010, Dr. Hamilton spent much time checking the data entered, running queries to make sure that all the artifacts entered had attached subforms, all the data about stone type, color, and texture, along with weight and size, were in place, and taking the errors back to the trainees for re-entry. As a result, the artifact data entered this season were clean data. With the help of Souksamone Sonethongkham, she also served as the head IT person, making sure that all the numerous laptops were up to date on virus protection and were in good working order, as well as straightening out problems with software.

Following the precedent set by Penn Museum's Ban Chiang excavations Joyce White's program in Laos continues an emphasis on up-to-date database design, recognizing that archaeological research is severely hampered if data cannot be integrated. Many current archaeologists and Heritage Managers try to organize their data solely by means of ad hoc collections of Excel spreadsheets and text documents, leading to a jumble of incompatible data sets that make it very difficult to compare data across, or even within, a single project. Well-designed databases allow the easy creation of numerous and easy-to-use data entry forms, can easily store multiple forms of data from numbers to images, provide greater security in data retention, and allow direct linking of data with such programs as ArcGIS and SPSS.

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MMAP's field strategy changed during Year Two. Last year, all of the participants, trainees and trainers alike, took turns doing all tasks including survey. This year, Dr. White appointed each participant to a single team, such as excavation, survey etc. The MMAP excavation team worked at Tham An Mah producing large quantities of artifacts as well as stratigraphic information. The stratigraphic information, in the form of the bag log, plans, sections, and context forms, was handwritten at the site, but needed to be entered into the database back in the lab. Dr. Hamilton remained in the base lab and concentrated on sorting, organizing, and entering the excavation and survey data that the teams brought in every day, not only downloading the GIS/field recorder data but also supervising the entry of the data about the artifact collected at the sites. These data continue to undergo refinement under Dr. Hamilton's guidance in Philadelphia at Penn Museum.

# Kathleen R. Johnson, Ph.D.

Paleoclimatologist

Assistant Professor Dept. of Earth System Science University of California, Irvine Irvine, CA USA



Dr. Kathleen Johnson joined the MMAP team in Laos in the 2010 season. The goal of her research with MMAP is to provide high-resolution reconstructions of past climate from cave calcite deposits (speleothems) collected from limestone caves in Laos. Michael Griffiths (a recent PhD graduate from University of Newcastle, Australia and a post-doctoral research fellow starting in August 2010 at University of California, Irvine, USA) accompanied Dr. Johnson during reconnaissance fieldwork in Laos caves in January 2010. Dr. Johnson and Dr. Griffiths are experts in the use of geochemical variations preserved in speleothems for reconstructing monsoonal and tropical climates of the past several thousand years. In addition, a PhD student is starting at UC Irvine in September 2010 and will focus on this project, under the close supervision of Dr. Johnson and Dr. Griffiths.

The goal of the January fieldwork was to explore multiple caves in the Luang Prabang region to assess their suitability for paleoclimate reconstruction. The primary criteria for determining suitable sites are: (1) the cave contains stalagmites that are preferably in isolated chambers with constant temperature and high relative humidity, far from the entrance, and (2) the cave is still actively dripping water and precipitating speleothems. Five caves were visited in the LP region, of which preliminary water and stalagmite samples were taken from four: (1) Tham An Mah (2 stalagmites collected [note this cave was test-excavated during MMAP 2010]), (2) Tham Kok Mu (located on same ridge as Tham An Mah; 3 stalagmites collected), and (3-4) Tham Loum and Tham Duk (near Ban Longkhoay; 5 stalagmites collected). During this work, Dr. Johnson and Dr. Griffiths were accompanied by Phousavanh Vorasing, Norseng Sayvongdouane, and Stephanie Howden who assisted with logistics and cave exploration and were trained in the proper collection of waters and stalagmites. Their primary role during this work, however, was to conduct archaeological surveys of each cave.

The most promising site found during this expedition was Tham Loum, wherein two local villagers were trained and hired to collect monthly water samples from the cave interior. In addition, several caves were visited near Ban Ngoy Nua on the Nam Ou to conduct archaeological and paleoclimate reconnaissance work. One very suitable site for paleoclimate reconstruction was found, Tham Mai, but no samples were taken on this initial visit. This site, however, is the most suitable cave visited during the 2010 fieldwork, so Dr. Johnson hopes to visit this site again to conduct preliminary sampling at a future date. This site would also be well suited for an in depth hydrogeochemical and speleological study that could provide research and work experience for local students.

Since the fieldwork has been conducted, all of the stalagmite samples have been encased in clear casting resin and sectioned in half along their growth axes. Microsamples have been drilled from the top and bottom of each stalagmite and sent to the University of Oxford, UK for uranium-series dating and the results are forthcoming. It is hoped that these samples will cover the last 10,000 years at least. Supplementary radiocarbon dating will also be done, but this is subject to large uncertainty due to "dead" carbon obtained from the limestone bedrock. Following this preliminary dating, more detailed U-series dating will be conducted on each sample and the samples will be sectioned for petrographic analysis and microdrilled for stable isotope ( $\delta^{18}$ O and  $\delta^{13}$ C) and trace element (Mg/Ca, Sr/Ca, etc.) analysis at UC Irvine. The primary paleoclimate "proxy" data in speleothems is the  $\delta^{18}$ O composition, which has been shown to reflect the strength of the Asian monsoon system. In addition, depending on stalagmite growth rates, it may be possible to resolve interannual variability in rainfall related to the El Niño Southern Oscillation. The carbon isotopes and trace elements will be used to provide additional information about past hydrologic variability.

It is expected that the first preliminary paleoclimate records from Laos speleothems will be completed by late 2010, and the results will be presented to an international audience of geoscientists at the Fall 2010 American Geophysical Union meeting in San Francisco, CA. In addition, Dr. Johnson is submitting a proposal to the National Oceanic and Atmospheric Administration Climate Change Data and Detection program September 10, 2010 deadline to complete the paleoclimate aspects of this research project.

## Helen Lewis, Ph.D.

## Excavations co-director

School of Archaeology University College Dublin Belfield, Dublin 4 Ireland



Dr. Helen Lewis has co-directed three of the four cave excavations carried out by MMAP (PPKR, TVTL, TAM), and assisted at TS. She has also conducted a soil micromorphological study of samples from the first three cave sites.

The four caves excavated were chosen from the MMAP survey database, on the basis of criteria outlined by Dr. Joyce White. The primary aim of the excavations was to explore cave/rockshelter sites along the various rivers near Luang Prabang, shown through the survey to have surface evidence for both flaked lithics and earthenware pottery, thus covering the period of interest to the MMAP project, in a variety of locations near streams and potentially good agricultural land. A second main aim was to ensure that archaeological training included some basis in field excavation and recording techniques. The recording approaches used combined the single context recording system (e.g. MoLAS) with that used at the Ban Chiang site.

At each site small test trenches were excavated, with the depth of excavation depending primarily on the time available each season. Most of the sites had human

burials dating to the Metal Age or later, along with features such as hearths and pits, and all produced a significant collection of pottery and lithics from various periods, as well as animal bones and human remains. All of the sites were fully dry-sieved, and were sampled for a variety of environmental archaeological analytical approaches, including phytoliths, pollen, soil micromorphology and starch. The TAM site was particularly impressive, with *in situ* jar burials being found and a stone disc similar to those found at the Plain of Jars.

Dr. Lewis conducted a soil micromorphology pilot study on the sediments of the sites, partly funded by a University College Dublin Seed Funding grant, with the aim of looking at site formation and ancient use-of-space, and to explore apparently homogenised cave sediments for microstratigraphy. Thin sections were made of block samples from the cave profiles by Ms. Julie Boreham of Earthslides, with assistance in sediment importing from Dr. Charles French at the McBurney Geoarchaeology Laboratory, University of Cambridge. The findings of this study will be integrated with other post-excavation analytical work on the sediments, environmental remains and finds as these are completed.

Dr. Lewis has made two study visits to the University of Pennsylvania Museum to work on MMAP publication and report writing, first in December 2008 and then in July 2010. As a result of these visits the collaborating team produced a note for *Antiquity*, a grant report for UCD Seed Funding, a Luce grant application, a report for the Lao PDR Department of Heritage, and publicity material for the MMAP website. The visits also allowed her to better integrate with the MMAP team in Philadelphia. Her other MMAP liaison and networking activities include supporting the involvement of Ms. Patrizia La Piscopia, a Ph.D. student from UCD, in the 2010 excavations at TAM, developing the MMAP connection with Dr. Kathleen Johnson at UC Irvine, and encouraging Mr. Emil Robles from the University of the Philippines to join the MMAP 2010 survey. This was an important set of links for Dr. Lewis, as it compliments and builds on an ongoing research project she is conducting in the southwest Philippines, in which all three have been involved, and the new collaborators brought a great deal to MMAP 2010 (see main report above). The involvement of Mr. Robles was especially important in further developing contacts and links between Southeast Asian archaeologists, a goal of many archaeologists in the region. Dr. Lewis gave a talk on behalf of MMAP at the Human Origins Patrimony in Southeast Asia workshop at the Muséum national d'histoire naturelle in Paris in 2007, funded by Asia-Link (European Commission), lectures on or including MMAP data at WAC in 2008 in Dublin and the IPPA conference in Hanoi 2009, funded through UCD, and has promoted MMAP at her home university through seminars, undergraduate lectures, the School of Archaeology website and a news item in the UCD Research Bulletin.