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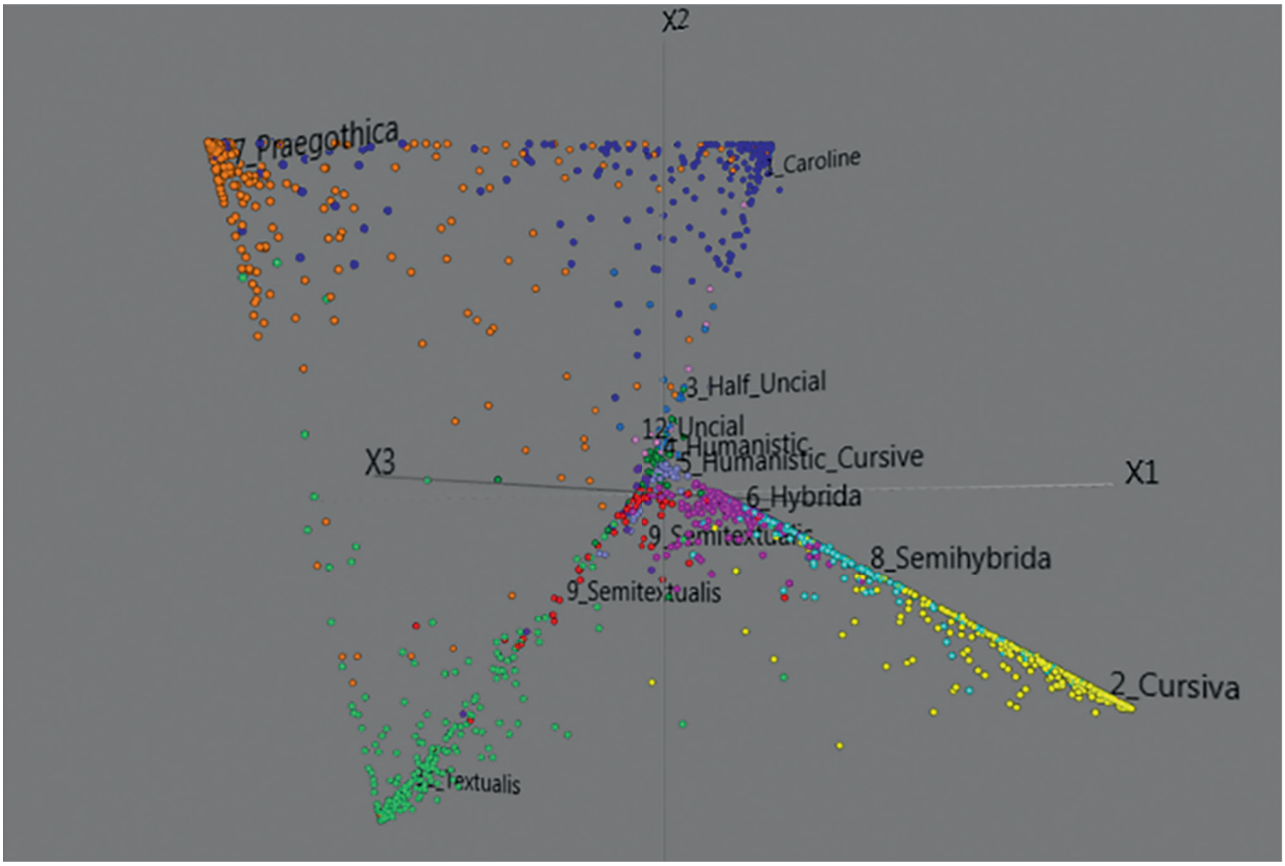

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Article

The Techniques and Materials Used in Making Lao and Tai Paper Manuscripts

Agnieszka Helman-Ważny, Volker Grabowsky, Direk Injan, and Khamvone Boulyaphonh | Hamburg, Chiang Mai, Luang Prabang

Abstract

This article discusses the materials and techniques used in the stab-stitched binding of paper manuscripts from Laos and northern Thailand. Eighteen bound manuscripts selected from the collections of the Buddhist Archives in Luang Prabang, Laos, and the Chiang Mai Rajabhat University Library in Thailand were studied in terms of their bookbinding style, form and the materials used to make them. Historical and scientific methods were combined to understand this particular binding style better along with the functional and historical aspects of these manuscripts.

1. Introduction

The history of books in South-east Asia is yet to be studied systematically and currently seems to include more theory and opinion than evidence. There are some important cultural studies that relate to manuscripts from the region in various ways, however. One of the first modern scholars to focus on Thai manuscripts was David K. Wyatt, an American historian who published an immense body of literature on Thai history and culture.[1] He also pioneered the study of manuscripts, which culminated in his last book, *Manuscripts, Books, and Secrets*.[2] Various Shan manuscripts kept in German libraries have been edited by Barend Jan Terwiel and Chaichuen Khamdaengytodtai, who wrote a comprehensive introduction on the production, use and transmission of Shan paper manuscripts.[3] Prior to that, Henry Ginsburg, who was then the curator of the British Library's South-east Asian collection, published two excellent books on South-east Asian manuscripts: *Thai Manuscript Painting*[4] and *Thai Art and Culture: Historic Manuscripts from Western Collections*.[5]

Scholarly interest in the rich manuscript tradition of South-east Asia was revived in the 1980s and gained further momentum in the early 2000s, indicating that Tai manuscripts provide an extensive, fascinating and rewarding field of research to scholars from a wide range of disciplines, such as philology, history, religious studies, social anthropology, material culture and preservation. One of the key people whose research shaped the mainstream at that time is Volker Grabowsky, who has developed a number of projects devoted to cataloguing, documenting and editing Tai manuscripts at the University of Hamburg in recent years. He has written on the revival of the Tai Lü manuscript culture in South-west China in collaboration with Apiradee Techaririwan, whose dissertation on the function and historical development of paratexts in Tai Lü manuscripts from Yunnan and northern Laos also discusses material aspects.[6] Together with Khamvone Boulyaphonh, Grabowsky has edited several catalogues of collections of Lao manuscripts in Luang Prabang.[7] Bounleuth Sengsoulin's PhD thesis from 2016 is a detailed study of Lao manuscript culture. A comprehensive analysis of these manuscripts was recently published in the *Journal of the Siam Society*.[8] Modern studies of northern Thai (Lan Na) manuscript collections are also considered in it, including the material aspect of these manuscripts.[9]

Over the last two decades, Jana Igunma, Ginsburg Curator at the British Library in London, has also published a number of excellent articles on Thai, Lao and Cambodian manuscript cultures.[10] She has contributed to various exhibition projects

[1] Wyatt 1984, 2002, 2003.

[2] Wyatt 2006.

[3] Terwiel and Chaichuen Khamdaengytodtai 2003.

[4] Ginsburg 1989.

[5] Ginsburg 2000.

[6] Grabowsky and Apiradee 2013, Grabowsky 2019a; also see Apiradee 2019.

[7] See Khamvone and Grabowsky 2017 and 2018.

[8] Grabowsky 2019b.

[9] Direk 2015 and 2016.

[10] Igunma 2007, 198–211, Igunma 2010, Igunma 2013a, 25–32, Igunma 2013b, 629–634, Igunma 2014, 35–50, Igunma 2015, 65–81, Igunma 2017, 22–81.

Figs 1a and b: The traditional technique of writing on palm leaf with a sharp tool (a), then rubbing ink into the scratches (b).

promoting the art and material cultural approach to South-east Asian manuscripts. Her *Buddhism Illuminated: Manuscript Art from Southeast Asia* (co-authored with San May) focuses on a variety of types and forms of manuscripts, writing tools, bindings and storage cabinets, but also sheds light on other aspects of South-east Asian manuscript culture.[11] In 2017, a special issue of *Manuscript Studies* was published that was devoted entirely to the history and collections of Thai manuscripts kept in museums and libraries.[12] This excellent survey of collections clearly shows the increase in interest in Thai manuscript culture. That same year, David Wharton published his PhD thesis *Language, Orthography and Buddhist Manuscript Culture of the Tai Nuea*, which focuses on local practices that are part of the endangered scribal tradition of the Tai Nüa and a number of closely related Tai groups which have generally been overlooked in the field of Buddhist Studies.[13] Wharton undertook a detailed study of a single manuscript in a Tai Nüa village near Müang Sing in north-west Laos and used it as an entry point for a broader investigation of Lik (Lik Tho Ngòk) manuscript culture, as found in Müang Sing today, including the distinct roles of the Lik and Tham orthographies, scribal vocation, manuscript production, uses and functions and the contents of the texts. A vast number of Thai manuscripts have been digitised and made available to the public online in recent years.[14]

There are thousands of palm-leaf and paper manuscripts on shelves and in trunks waiting to be discovered and studied. They are excellent sources of information on the historical reconstruction of craftsmanship, such as manuscript production. The last few years have seen a growing appreciation of old manuscripts as material objects, and preliminary studies of materials have also been carried out. There are no detailed studies on the process and technology involved in making manuscripts yet, however, other than sparse promotional information for tourists. From a scholarly point of view, this subject is largely unexplored, even in China and other countries in South-east Asia. Research on palm-leaf production is even rarer. One of the few Thai academics who have devoted their energy to this subject is Kongkaeo Wiraprachak, a senior scholar who works at the Manuscript Department of the National Library of Thailand. [15]

Originally, Lao and Tai manuscripts were written on palm leaves; paper is only recorded as being used as a writing support from the seventeenth century onwards.[16] The usage of a new material, among other things, stimulated a change in the form of books. Palm leaves were primarily used for religious texts. This does not mean that secular texts were only written on paper, though. Paper – a much more flexible material – simply made a greater variety of formats possible and was consequently employed for various types of texts, including religious, astrological and medical subjects. The history of manuscripts from this region of Asia is complex

[11] May and Igunma 2018.

[12] *Manuscript Studies*, vol. 2 (2017), no. 1, edited by Justin McDaniel.

[13] Wharton 2017.

[14] Examples of such databases can be found on websites like *Thai Manuscripts Online: Digital Collections of Thai & Tai Manuscripts and Rare Books*, ed. by Jana Igunma <http://www.thaimanuscripts.de/>.

[15] Kongkaeo 1990.

[16] The oldest extant paper manuscripts from Thailand and Laos are from the seventeenth century, while the oldest dated extant palm-leaf manuscript (from northern Thailand) is from 1471.

Fig. 2: An example of a leporello book from the Chiang Mai Rajabhat University Library in Thailand. The manuscript, which contains part of the *Suttantapitaka*, is written in Pali in Mon script.

Fig. 3: An example of a leporello book collection in-between wooden covers, from the Buddhist Archives of Luang Prabang, Laos.

Figs 4a–c: Manuscript DS 0062 00257 showing typical illustrations in Lao and Tai manuscripts concerned with astrological and divinatory rituals.

Fig. 4a: Fol. 28^{v} showing a drawing of various animals: a tiger, serpent (*naga*), rat, elephant, horse, *garuda* and cat, which the Tai-Lao regard as *tua phoeng* (animals one can rely on). A man counts the number of years he has lived, starting with the tiger as the animal he relies on the most and continuing until he reaches his present age and the animal that corresponds to it. A woman would do the same, starting with the cat. These 'dependable animals' are used for an exorcising ceremony for someone whose destiny is deteriorating.

Fig. 4b: Fol. 1^{v} showing a diagram used when building a new house to determine whether the year will be appropriate for the endeavour. It contains eight drawings, including a bamboo tree, a crystal altar, a coffin, a crystal staircase, a crystal castle, a house, a house upside down, and a *kalakini* (representing 'misery'). The divinatory procedure works in the same way as the one mentioned above, counting the person's age starting at the bamboo tree and moving in the direction of the coffin. If the counting ends at the coffin, upside-down house or *kalakini*, then the year will not be a good one for building. If the age ends at other drawings, it will be a good year.

Fig. 4c: Fol. 5^{v} shows a drawing called *Roek saphao* ('The Occasion of the Junk') or *Roek fa* ('The Occasion of the Sky') and shows a junk in the shape of a swan. It contains twenty-seven numbers and is used to determine the fate or destiny of a newborn child.

Fig. 5: Examples of old stab-stitched books found in Luang Prabang in Laos.

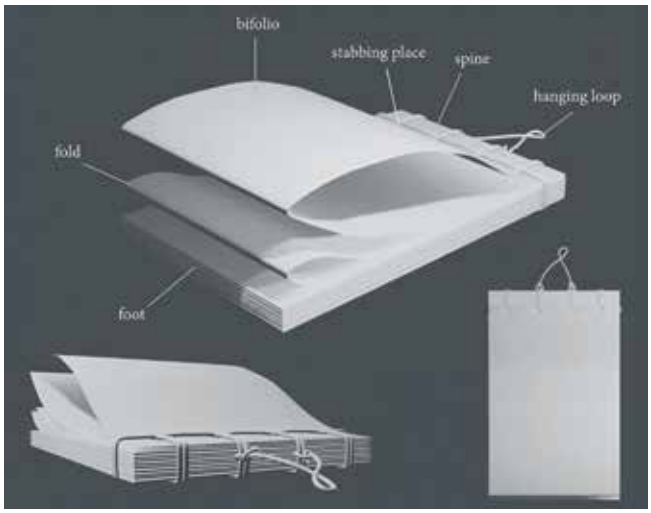

Fig. 6: Image of a 3D model of a stab-stitched book based on books found in Laos and northern Thailand.

and conditioned by both local and global factors, such as the availability of materials, social and economic change, cultural habits and patronage, and, of course, the purpose they were meant to serve.

Palm leaves were readily available in the tropical climate zone and were durable and resistant to insects (more so than paper). However, they were not as convenient as paper when it came to making notes or writing down other less formal texts; it is easier to make a note in ink on paper than scratch the text onto a palm leaf and then rub ink into the scratch (see Figs 1a and b). A piece of paper was also easier to fold, put in one's pocket or carry than thick, heavy and brittle palm folios. The next disadvantage of palm leaves is that they can easily fall out if the thread joining them together happens to break, which may lead to the book leaves getting put back in the wrong order, obviously making it hard to read the text from 'page' to 'page'.

As soon as paper was adopted in the area in the seventeenth century, palm-leaf books (Thai/Lao: *khamphi bailan*) started to be replaced by leporello books (also known as concertina or accordion-style books; see Figs 2 and 3). The thick paper – a new writing support used in a leporello format – was comparatively durable and rigid enough to serve the same writing purposes as palm leaves. At the same time, its greater flexibility and size, which was not limited by the shape of the palm-leaf, made it the most convenient material for book production. Moreover, although some impressive examples of illustrated palm-leaf manuscripts do exist,[17] especially from northern India, paper was much more convenient for drawing the kinds of illustrations that are common in Lao and Thai manuscripts (Figs 4a–c).

Since paper was used as a new writing material, there is no doubt that a major change in book technology occurred. Other book forms were also developed, such as the leporello mentioned above. Loose leaves were also bound using a stab-stitched technique particularly employed in Laos and northern Thailand (Fig. 5), although it was also used in adjacent Tai-speaking areas in eastern Burma (Shan State) and south-western China (Sipsòng Panna, Dehong, Menglian/Moeng Laem, etc. in Yunnan). In Asian bookbinding history, we do not have any exact dates to determine when a particular style was created or when it fell into disuse. Most styles actually co-existed for long periods of time, and we can only assume when the peaks of their popularity were in particular periods, specific regions or when they were used for specific purposes. The techniques and materials employed for binding are rarely mentioned in a historical context, being considered too common to be noted, as opposed to those related to the mounting of paintings or used in art genres regarded as more prestigious than manuscripts (which often are not even perceived as art because of their literary nature).

Stab-stitched books are the least well known of all the books made in Tai manuscript culture. It is hard to say how many of those works have been preserved, which areas they were most often produced in and how this format evolved historically. The general technique, however unique it may have been, varies considerably in terms of its technological details and the materials that were used. This variety resulted

[17] See Guy 1982, 18.

in a diversity of views about these books, which can only be understood through detailed documentation of their forms, material components and production techniques.

It should be noted here that English terminology on the binding of Asian books is not uniform and can be vague at times. Stab-stitched books, for example, can also be described as four-hole stitched, side-stitched,[18] threaded, double-leaved,[19] stabbed, stitched, pouched[20] or sewn. These terms are simply related to a variety of typical binding elements, but some of them are more specific than others. When such books are described in English, the terms used generally follow Western bookbinding terminology, which can lead to misunderstandings sometimes. Despite similar objectives, the specific binding traditions evolved from different origins, concepts and ideas. As Minah Song explains in her article 'The History and Characteristics of Traditional Korean Books and Bookbinding', the complexity of Asian book terminology and original terms is often lost in translation.[21] She states that most vocabulary describing the parts of a book used by Chinese, Korean and Japanese people originates from ancient Chinese terminology, which adopted anthropomorphic terms related to the human head, for example. Specific names were created from the function, location, shape or even symbolic importance of particular elements.[22]

A stab-stitched binding (Fig. 6) is characterised by using a thread-stitch. There are many variations of it, depending on the book's size, the materials used and the local binding tradition. The common denominator, however, is that a thread is pulled through the stabbed holes in the book and wrapped around the 'back' of it to produce a spine. Traditional Asian books bound this way are usually significantly lighter in weight than leporello and loose-leaf books due to the specific

Fig. 7: The leaves and spine of a stab-bound manuscript in the Buddhist Archives of Luang Prabang (Nan Savaeng Ms. 1).

properties of the paper used to make their leaves. The best paper for the production of folded books was made of bark from paper-mulberry trees, referred to locally as *sa* trees (*Broussonetia papyrifera*). This paper is softer and more flexible than paper made from the *khòi* tree (*Streblus asper*), which is used further south in central and southern Thailand as well as in Cambodia.[23] The folios of a stab-bound book never open all the way, which is why a book of this kind will not lie flat when open. One of the most typical features of stab-stitched books is that the head and tail of the spine are sewn around, giving it a very distinct appearance (Fig. 7).

The precise origin of the stab-stitched binding used in Lao and Tai manuscript culture is unknown.[24] However, in view of how book- and papermaking technologies spread in Asia, this book format may have been adapted indirectly from China via communities living on or near the Laos-Yunnan-Myanmar border.

In Laos, northern Thailand and adjacent Tai-speaking regions in Shan State (Myanmar) and south-western Yunnan, books made of paper-mulberry paper (called *chia sa* in Lao and *kradat sa* in Thai) are known by the generic term *phap sa*, sometimes pronounced *pap sa*, or by its variant, *pòp sa* (in the Tai Lü tradition). *Sa* is the indigenous name of the paper-mulberry tree and *phap* means 'to fold'. This reflects the dominant use of the leporello as the standard

[18] Song 2009.

[19] Martinique 1973.

[20] Ikegami 1979 [1986].

[21] Song 2009, 63.

[22] For details of the Chinese stab-stitched binding style, see Li and Wood 1989, 114–117. The authors refer to material and written sources. In terms of material evidence, they describe the selection of Buddhist devotional works from the British Library collection written on both sides of folded and stitched leaves of coarse hemp paper. As for written evidence, Li and Wood refer to an account by Wang Zhu (who lived in Henan province during the Northern Song in the first half of the eleventh century) where the stitching method of bookbinding was mentioned as being used to restore old books (making them more durable) even before Wang Zhu was born. Additionally, the colophons in some of the booklets tell us that they were copied and bound during the Tang (618–907 CE) and Northern Song (907–960 CE) Dynasties.

[23] Regarding the production of *sa* and *khòi* paper manuscripts, see Kongkaeo Wiraprachak 1990. Also see Bounleuth Sengsoulin 2016, 45–46. *Khòi* paper is made of *Streblus asper* and has been used in Thailand for centuries for Buddhist folding books and official records. The paper is less refined than *sa* paper, but is more durable and resistant to yellowing and insect damage.

[24] Regarding the history of the stitched binding in China, Korea, Japan and Tibet, see Helman-Ważny et al., forthcoming.

Fig. 8: Manuscripts hung up on a wall in the house of Ai Saeng Kham, an elderly scribe from Ban Mòng Mangrai near Chiang Rung in Sipsòng Panna.

book format of paper-mulberry paper manuscripts in that region. Although *phap sa* covers all kinds of mulberry-paper manuscripts regardless of their binding, special terms exist which differentiate the more widespread leporellos from the stab-stitched bound books. The Lao call the latter *phap nyip*, which literally means 'stitched/sewn folding books', while the leporellos are known as *phap lan*. The Shan call the leporellos – which resemble the Burmese *parabaik* in terms of the size and decoration of their covers – *pap tup*, whereas the bound books are named *pap kiñ*.[25] Apart from the Tai Nüa, the Tai Lü – in their Yunnanese homeland and in neighbouring areas in Myanmar, Laos and northern Thailand – are the only major Tai ethnic group where stab-stitched binding predominates. These bound books are called *pap hua* in the vernacular, a term that is also used in northern Thailand and refers to sewing the folios at their top (Tai: *hua*, 'head'). Terwiel and Chaichuen have observed that '[t]here is a special kind of *pak kiñ*, made of a single sheet of paper,

[25] For details of the typology of Shan books, see Terwiel and Chaichuen 2003, 20–28.

Fig. 9: Stab-stitched binding of a manuscript from the Buddhist Archives in Luang Prabang, which is archived as Nan Savaeng Ms. 1. The fold of the bi-folio is at the bottom of the book.

which may consist of several pieces that have been glued together to form [a] single sheet. This paper is fastened at the upper side to a wooden rod that has been exactly cut to the width of the paper'.[26]

More than three dozen stab-stitched manuscripts were recently found by the staff of the Buddhist Archives in Luang Prabang during a survey of home collections belonging to villagers living in a rural area in Luang Prabang province (in northern Laos) (the study was supervised by Khamvone Boulyaphonh). The villages in Pak U and Nambak are all inhabited by Tai Lü whose ancestors migrated from the Laos-Yunnan-Myanmar borderlands generations ago.[27] It is the manuscript culture of the Tai Lü rather than that of the mainstream Lao which is best known for the production of such sewn paper-mulberry paper manuscripts. This underscores the fact that the tradition of making such stab-stitched bound manuscripts is still alive in northern Laos, at least in Tai Lü communities, as is the case in the Tai Lü heartland of Sipsòng Panna (Yunnan) and Müang Sing (in the Lao province of Luang Namtha). Usually, two to five families in the villages comprising local healers or astrologers owned manuscripts. These books were all in a specific rectangular format, usually bound at the top with folded folios stitched through the stabbed holes that had been made by a sharp tool, hence the name 'stab-stitched binding'.

[26] Terwiel and Chaichuen 2003, 26.

[27] These manuscripts are going to be inventoried and digitised in a sub-project carried out by Dr Khamvone Boulyaphonh as part of the *Digital Repository of Endangered and Affected Manuscripts* (DREAMSEA) project run by Prof Omar Fathurahman (Jakarta) and Prof Jan van der Putten (Hamburg) with financial support from the Arcadia Fund, London.

Figs 10a and b: Stab-stitched binding of two manuscripts from the Chiang Mai Rajabhat University Library in Thailand. Manuscript (a) is archived as ARP.Tai. Nüa.001 and has bi-folios folded at the right side-edge, and manuscript (b) is ARP.TAI.001, which is folded at the left side-edge.

The manuscripts studied contain incantations, astrological treatises, including horoscopes and divination texts, along with medical treatises. The manuscripts tend to be informal, having been used to keep notes on topics like the calendar or records of weather patterns.

In February 2020, the authors of this article conducted a survey of manuscript collections in the Buddhist Archives of Luang Prabang, Laos, and at Chiang Mai Rajabhat University Library in Thailand. We were able to select eighteen sewn manuscripts (see Table 1 in the Appendix) and study their bindings, form and materials in an effort to understand the nature of the developments in bookbinding and the functional and historical aspects of these manuscripts.

2. Techniques of binding

The stab-stitched manuscripts we surveyed were generally produced locally for home use, which is the main reason why they have this particular form: to serve the specific purpose of being carried easily or hung up on a wall or on the pillars of the traditional wooden-stilt houses the Tai build (Fig. 8). The rectangular format of the manuscripts varied from 23.5 to 59 cm in height and 16 to 49 cm in width. We did not observe any repetition of particular sizes, which suggests that the format of books of this kind has not been standardised. Their leaves (folios) are folded in half, thus their outer edges were all sewn together at the end opposite the fold, which also prevented the ink from bleeding through the paper (like the Chinese stab-stitched manuscripts mentioned earlier; paper in Lao/Tai manuscripts of that type is usually thicker, however). In our sample, the number of bi-folios in the books ranged from 8 to 187. Usually, bi-folios were bound at the top opposite the fold (see Fig. 9), but two manuscripts from the Chiang Mai Rajabhat University Library consisted of bi-folios folded on side edges still sewn at the top (CMRU ARP.Tai.Nüa.001 folded at the right side-edge and CMRU ARP.TAI.001 folded at the left side-edge) (Figs 10a, b). Most folded bi-folios were usually stabbed at intervals of 2.5 to 4 cm using a sharp metal tool approximately 1 to 3 cm from the edge of the binding (opposite the fold) (Figs 11a, b). The distance depends on the size of the manuscript. The sewing process usually starts at the central hole (or one of the central holes) on the inside cover. Whenever the binder wanted to pull the cord around the spine of the book-block, he would switch to the other side of the block first and make sure the stitches were already done and mirrored on the other side. The half-point sewing process is demonstrated in Figures 12 and 13.

In the manuscripts we studied, there were between 4 and 13 stabbing points, depending on the manuscript's size, where the string had been pulled through to bind the book (Fig. 14). However, the manuscripts that were intended to be hung up typically have 5 or 7 stabbing points, and those that were wrapped in a roll and tightly bound usually have even more. The binding was done using a strong cotton string and was protected by a layer of cloth (Fig. 15). Such manuscript

Figs 11a and b: The holes are 'stabbed' by using a sharp metal punch with an eye in it through which a cotton cord is then threaded. The technique is being demonstrated here by Direk Injan from the Chiang Mai Rajabhat University Library in the city of Chiang Mai, Thailand.

rolls were usually stored below the ceiling of the owner's house (Fig. 16).

In general, the folios would only be stab-stitched once the whole text had been written down and finalised. An experienced scribe would leave enough space before the first line of the text at the top of a page to ensure that this line would still be fully visible after binding. In some manuscripts, the first line of at least some of the folios is hardly visible at all, though, providing evidence that backs up the hypothesis that the writing proceeded the binding. However, there are also cases where the binding proceeded the writing, as several of the last few folios have been left blank.

3. Materials

3.1 Thread

In our sample, the string was usually made of thickly wound thread, sometimes doubled. Thin thread was occasionally employed as well, however. The thread was usually cotton twine, possibly a type also used for tying up palm-leaf manuscripts. The thread of a manuscript made of twisted paper was also used sometimes, as exemplified by manuscripts archived as Nan Savaeng Ms. 3 (cotton paper) and DS 0062 00295 (paper/mulberry paper). Occasionally, the stitching ended in a loop so the manuscript could be hung up on the wall, as can be observed in all of Nan Savaeng's manuscripts as well as DS 0062 00293, DS 0062 00294, CMRU ARP 060, CMRU ARP 067, CMRU ARP 094 and CMRU Ms. 1 (Fig. 17). The manuscripts which were supposed to be hung up on the wall usually had an odd number of stabbing points, so the hanging loop was exactly in the middle.

3.2 Covers

Some precious manuscripts were bound together with a cloth cover (which could be coloured or patterned), as exemplified by manuscripts CMRU ARP.Tai.Nüa.001, CMRU Ms. 2 and CMRU Ms. 3. The covers used in our sample were usually larger than the manuscript folios, as Wharton also observed in his own study of Tai Nüa manuscripts.[28] Terwiel and Chaichuen also confirmed this for Shan stab-stitched bound books, which are called *pap kiñ* in the local vernacular, in

[28] Wharton 2017, 51.

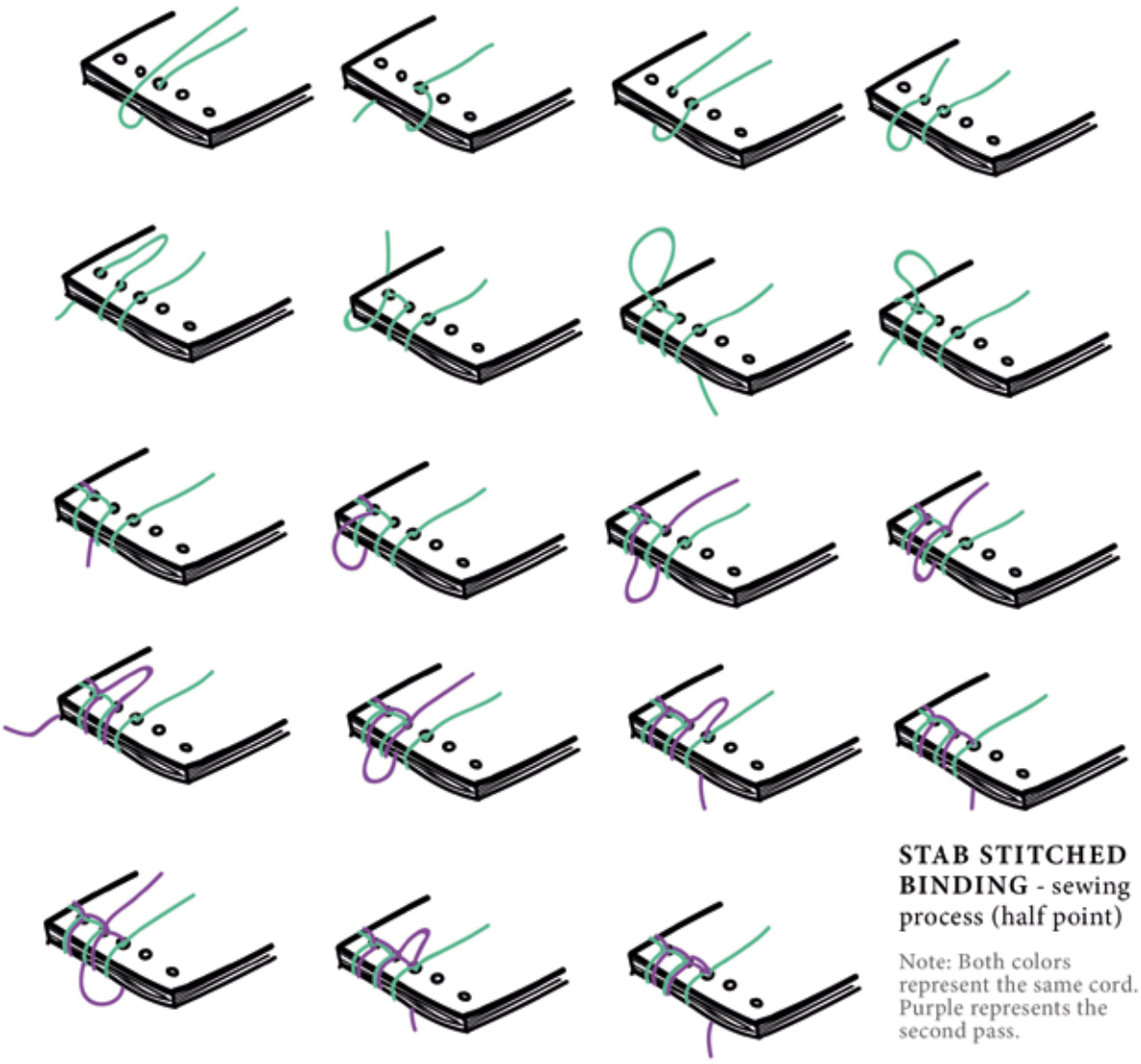

Fig. 12: The sewing process observed in stab-stitched books in Laos and northern Thailand.

contrast to concertina-style folding books (*pap tup*).[29] If cloth covers are used, they are attached to the front and back of the manuscript as part of the binding process or only at the back in some cases. The cloth covers are folded in over the spine on both sides to protect the edges of the folios when the manuscript is rolled up (see the images in Table 1). Covers are more common for larger manuscripts, which are sometimes rolled up for storage, and often have floral patterns on them, which is particularly common in Tai Nüa manuscript culture. An additional length of cotton cord is attached to these manuscripts to hold the rolled-up manuscript together instead of a loop. This can be seen in CMRU RP.Tai.Nüa.001, CMRU Ms. 2 and CMRU Ms. 3.

3.3 Paper

One of the most important features distinguishing these manuscripts is the use of local *sa* paper made of the bast (*phloem*) of various types of mulberry tree. While only the paper-mulberry tree (*Broussonetia papyrifera*) was grown in northern Thailand and Laos until the early 1970s, Japanese paper-mulberry trees – notably *Broussonetia kazinoki* and *Broussonetia kurzii* – were introduced in the late 1970s as well. Their share of the total production of *sa* paper is still

[29] Terwiel and Chaichuen 2003, 21, 24.

Fig. 13: Stab-stitched method with double threading, demonstrated by Direk Injan, Chiang Mai Rajabhat University Library.

Fig. 14: The leaves and spine of a stab-bound manuscript archived as CMRU ARP.TAI.006 at the Chiang Mai Rajabhat University Library in Thailand.

Fig. 15: Manuscript ARP.Tai.Nüa.001, Chiang Mai Rajabhat University Library, Thailand, has a stab-stitched binding and a flowery cotton cover. It is bound up in a roll here.

Fig. 16: The house of Nan Chai Saeng, Ban Nam Kaeo Luang (a Tai Nüa village) in the district of Müang Sing, Luang Namtha province, Laos, where manuscripts are kept in protective bags and stored below the ceiling of the main living-room.

limited, however.[30] Despite the common assumption that the bound manuscripts were always made using paper-mulberry (*sa*) paper, the fibre analyses[31] we performed revealed that other kinds of paper such as industrial paper made of bamboo and other grass-type fibres were used instead; our microscopic analyses showed that one was made of bamboo and other types of grass as opposed to seventeen made of paper mulberry (*sa*) (see Table 1).

The long paper-mulberry fibres were well preserved. This was observed in all the samples and is shown in Figure 18. The fibres are characterised by having thick walls, narrow, slightly irregular lumens, irregular cross-markings, a transparent membrane enveloping the fibres, and blunt and rounded fibre ends (Figs 19 and 20). Marja-Sisko Ilvesallo-Pfäffli presented micrographs of the bast fibres separated

[30] See Siriporn 2001 and Aubertin 2004; Chaiyapol 2013.

[31] The fibre analysis was conducted by Agnieszka Helman-Ważny, Centre for the Study of Manuscript Cultures, University of Hamburg. An Olympus BX51 BF/DF Transmitted/Reflected Light Microscope with polarised light was used for fibre identification. An Olympus UC30 camera and Olympus Stream software were used for separate photographic documentation and image analysis. A range of magnification was used from 40× to 400× with both plain and polarised light. The paper samples were immersed in distilled water in a small beaker and boiled for ten to twelve minutes. The water was then decanted and the samples were drained off. About 0.2 g of paper pulp was placed on a microscopic slide and separated into a fine suspension of individual fibres. The fibres were then observed in a water solution using polarised light. The selected samples were stained with two drops of Herzberg staining reagents (zinc chloride-iodine) and observed through an optical microscope. The colour of the resulting stain depends on the lignin content of the fibre and helps to distinguish the species and morphological characteristics of the fibres as well as other cells and elements in the paper pulp. The results were compared to reference samples collected earlier by Agnieszka Helman-Ważny and to available fibre atlases.

Fig. 17: Manuscript archived as CMRU ARP.094 with a loop so it could be hung up on a wall (from Shan State, Burma); Office of Arts and Culture, Chiang Mai Rajabhat University Library.

from the inner bark of this fast-growing tree, highlighting the transparent membrane enveloping many of the observed fibres.[32] In early stages of the process of pulp beating, the membrane, which indicates a primary wall enveloping the fibre, is disrupted, becoming clearly visible.[33]

As stated above, despite the majority of fibres being identified as paper mulberry, we also found minor amounts of other fibres that could not be identified in the pulp. These fibres can be seen in the paper mulberry pulp in CMRU Ms. 1, shown in Figure 20. Furthermore, the paper of the manuscript archived as Ms. 3 from the Chiang Mai Rajabhat University Library does not contain any paper-mulberry paper at all, but is composed of bamboo and other grass-type fibres (Figs 22–23).

The paper mulberry fibres are almost unlignified. Detailed data on the inner bark of paper mulberry, also regarding the

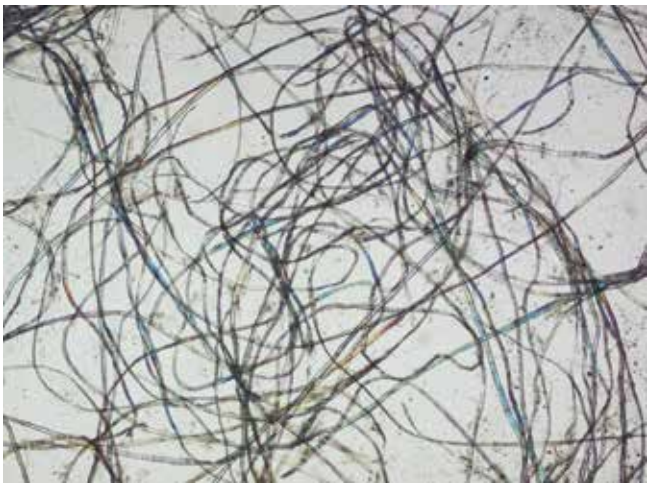

Fig. 18: Well-preserved paper-mulberry fibres observed under the microscope at 40× magnification in manuscript DS 0062 00294 from the Buddhist Archives of Luang Prabang, Laos.

parameters of its chemical pulping, is available in a research report published by Wikhan and Buapun in 2001.[34] Both the low content of lignin (3.32%) and the high content of holocellulose (71.03%) in the inner-bark are worthy of note. Thanks to the low lignin content, the cooking process of the paper-mulberry inner bark can be run under mild conditions with regard to the admixture of alkali and the cooking time. Besides identification of the raw material used for paper production, the next important material feature which allows paper to be characterised comes from the technology and tools used during its production. Generally speaking, there are two types of mould used in papermaking: a floating mould and a dipping mould. Both kinds are additionally characterised by the type of sieve they employ. A floating mould is placed on the surface of the water and paper pulp is poured onto the sieve in the frame of the mould (Figs 24a, b). With the dipping mould, however, the pulp is mixed with water before the mould is dipped into it (Figs 25a, b). As a result, paper made with a floating mould on which the pulp is poured is usually thicker and the fibres are more unevenly distributed in the sheet of paper compared to paper made with a dipping mould, where the pulp is mixed in the water tank. This is an important distinguishing feature between the two methods of papermaking.

In addition, a fixed sieve made of woven cotton, hemp or flax is often attached to the floating mould, while a movable sieve made of bamboo, reed or another kind of grass is attached to the dipping mould. The different sieves each

[32] Ilvesallo-Pfäffli 1995, 348–349.

[33] Helman-Ważny 2006, 3–8.

[34] Wikhan and Buapun 2001.

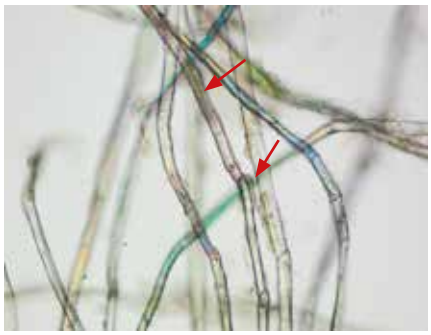

Fig. 19a: The arrows show some thick-walled fibres of paper mulberry enveloped by a transparent membrane. Observed at 200× magnification in the micro-sample from manuscript CMRU ARP.TAI 001 from the Chiang Mai Rajabhat University Library, Chiang Mai, Thailand.

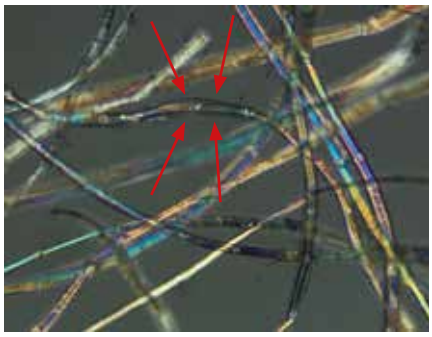

Fig. 19b: The arrows show some long and slightly rigid bent fibres of paper mulberry enveloped by a transparent membrane. Observed at 200× magnification in manuscript CMRU ARP.TAI 006 from the Chiang Mai Rajabhat University Library, Chiang Mai, Thailand.

Fig. 19c: A fibre of paper mulberry enveloped by a transparent membrane after being treated with a Herzberg stain. Observed at 400× magnification in manuscript CMRU ARP.TAI 001, the Chiang Mai Rajabhat University Library, Chiang Mai, Thailand.

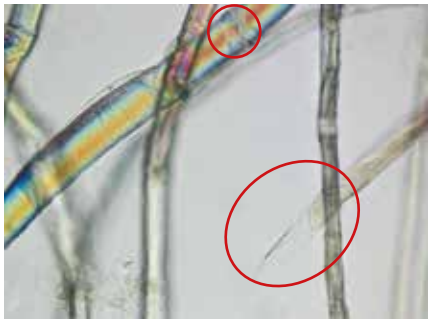

Fig. 20a: paper-mulberry fibres, cross-markings and a naturally rounded fibre end enveloped by a transparent membrane (red oval). Observed under the microscope at 400× magnification in manuscript DS 0062 00294 from the Buddhist Archives of Luang Prabang, Laos.

Fig. 20b: The natural blunt end of a paper-mulberry fibre after treatment with a Herzberg stain. Observed under the microscope at 400× magnification in manuscript BAD 13-2-021 from the Buddhist Archives of Luang Prabang, Laos.

Fig. 20c: The natural fibre end enveloped by a transparent membrane, also with a natural round end, observed at 200× magnification in manuscript CMRU ARP.060 from the Chiang Mai Rajabhat University Library, Thailand.

leave their own distinct imprint on the paper. A textile sieve leaves faint woven patterns (sometimes barely perceptible) and a movable sieve leaves a laid-line pattern (bamboo sieves leave regular laid lines, while reed or other grass sieves leave irregular ones). With them being the impressions of stitches that tie the strips of bamboo, reed or other grass together, the chain lines are sometimes visibly perpendicular to the laid lines. At some point when plastic started to be used in the region, possibly in the middle of the twentieth century, the textile sieve used in the fixed mould was replaced by a plastic one, which was more durable and resistant to microorganisms (which significantly extends the time it can be used for in a humid environment). The specific imprint it leaves on paper after it has dried on the screen (shown in Fig. 26) can be seen in manuscripts (Fig. 27). If we know the date when it was first made, we can also date the manuscript accordingly.

The paper used in some of the manuscripts in our sample was treated with various insect-repellent substances such as the oily resin collected from the wood of the *Yang Na* tree *(Dipterocarpus alatus* Roxb. ex G. Don). It resulted in the brownish colouration observed in these manuscripts, which is shown in Fig. 28.

4. Conclusions

In general terms, the stab-stitched method of bookbinding documented in Lao and Tai manuscripts is similar to the method commonly used in East Asian books. However, the technique of sewing with a double thread, making a loop (i.e. a stitch started in the middle) and the rolled form are unique

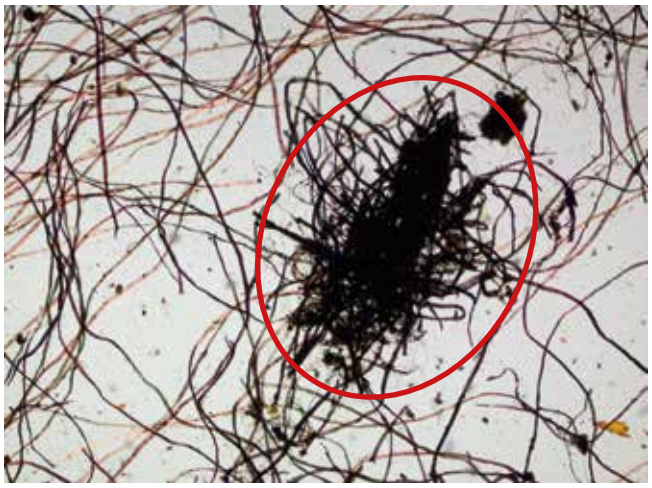

Fig. 21: A 'knot' of other fibres stained violet in paper-mulberry-based pulp. Observed at 40× magnification in the manuscript archived as CMRU Ms. 1 from the Chiang Mai Rajabhat University Library in Thailand.

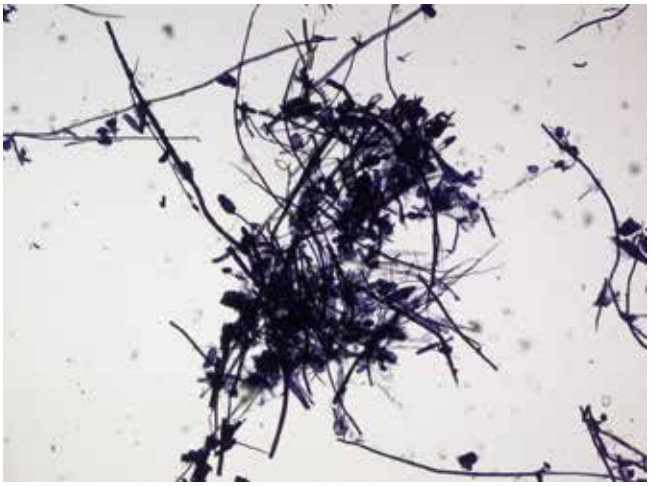

Fig. 22: The bamboo and grass-type pulp observed at 40× magnification in manuscript CMRU Ms. 3 from the Chiang Mai Rajabhat University Library in Thailand.

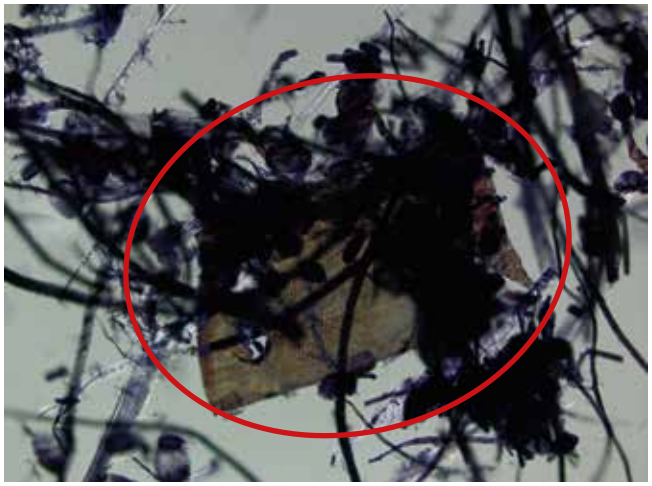

Fig. 23: The wide bamboo vessel observed at 100× magnification in manuscript CMRU Ms. 3 from the Chiang Mai Rajabhat University Library in Thailand.

elements of Lao and Tai book culture. Interestingly, this local feature of bookmaking is commonly associated with printed book culture in East Asia, and the method was used to bind manuscripts in our own sample. It should be noted here that we also observed some variation within Lao and Tai bookbinding in our sample: there were two main types, depending on the size of the manuscripts. One type was usually smaller and contained a loop in the middle, which allowed such manuscripts to be hung up on the wall. Relatively large manuscripts were usually stored in a rolled-up form. Different dimensions and materials as well as the style of this binding created a unique sense of aesthetics. The purpose is also related to the type of text and determines how a specific manuscript is supposed to be used.

The relationship between the function of a manuscript, the type of text it contains, the style of binding used and the format was also clearly apparent in our sample. The stab-stitched manuscripts contained incantations, horoscopes and divination and were either astrological or medical in nature. They all tended to be informal, being used to keep notes on the calendar, records of the weather or as ritual guidelines, for example. These manuscripts were produced in a geographical region inhabited by communities with shared cultural traditions that went (and still go) beyond national borders. In their Yunnanese homeland and neighbouring areas of Burma, Laos and northern Thailand where they also reside, the Tai Lü are one of the few ethnic groups where stab-stitched bindings still predominate. The Tai Nüa ('Chinese Shan') and the Shan (Tai Yai) are two others. Their bound books are called *pap hua* in the vernacular, a term also used in northern Thailand to refer to sewing the folios at their 'heads' (Tai: *hua/ho*). The villages in Pak U and Nambak in a rural area of Luang Prabang province in northern Laos where our stab-stitched manuscripts were found are all inhabited by Tai Lü whose ancestors migrated from the Laos-Yunnan-Myanmar borderlands generations ago. It is the manuscript culture of the Tai Lü rather than that of the mainstream Lao which is best known for producing such sewn paper-mulberry manuscripts. This underlines the fact that the tradition of making stab-stitched bound manuscripts is still alive in northern Laos, at least in the Tai Lü community, as is the case in the Tai Lü heartland of Sipsòng Panna (Yunnan) and Müang Sing (the Lao province of Luang Namtha).

Figs 24a, b: The paper-sheet formation method using a fixed mould with a plastic screen attached to a wooden frame. Observed at Say Namkhan Company in Luang Prabang, Laos. The floating method is characterised by pouring paper pulp directly onto the sieve in carefully measured scoops (similar to a technique widely used in the Himalayas).

Figs 25a, b: The paper-sheet formation method using a fixed mould with a plastic screen attached to the wooden frame at Sa Paper & Umbrella Handicraft Factory, Chiang Mai. The dipping method is characterised by the paper pulp being scooped from the water tank (as opposed to the technique above, observed in Laos, where the pulp is poured directly onto the sieve in carefully measured scoops).

The manuscripts in our sample also contain materials that are typically used in this kind of format. The paper in the various books we examined is of similar thickness; thinner than in leporello books. The manuscript leaves are made of folded sheets of paper that was made by hand using a papermaking mould consisting of a wooden frame with a finely meshed textile or plastic net spread over it. Some manuscripts were treated with insect-repellent substances, which left brownish traces on the paper. Our microscopic analysis shows that the majority of the manuscripts are composed of paper mulberry

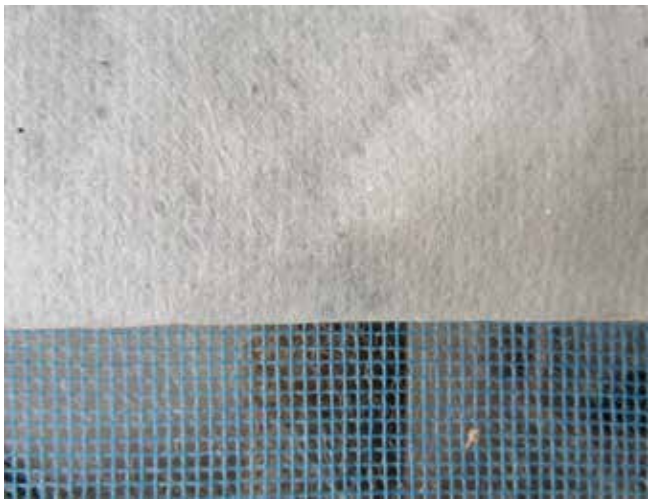

Fig. 26: The sieve imprint left on paper made using a plastic sieve attached to a wooden frame. The photograph was taken in a papermaking factory near Chiang Mai in 2020.

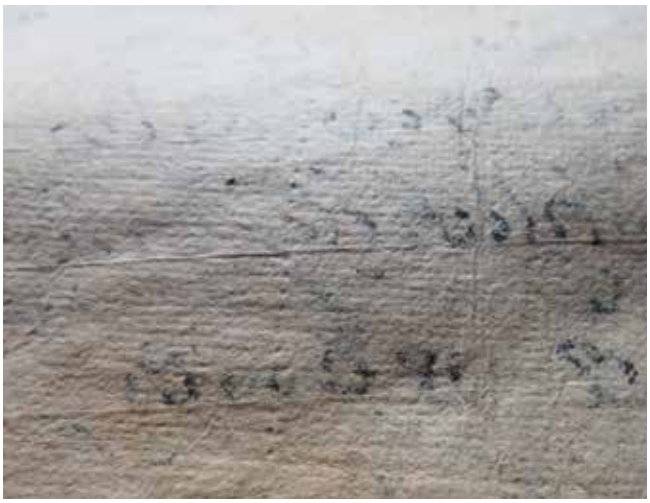

Fig. 27: The texture of paper showing the imprint of a papermaking sieve, seen in a manuscript from the Buddhist Archives in Luang Prabang archived as DS 0062 00292.

Fig. 28: Paper treated with insect repellent, leaving a brownish discolouration. Observed in the manuscript archived as CMRU_Ms. 1 from the Chiang Mai Rajabhat University Library, Thailand.

fibres. Local people commonly associate the stab-stitched manuscript format with *sa* paper by tradition. However, our study shows that other types of paper were also used for producing the stab-stitched manuscripts. Both detected materials and technologies have the potential to help in dating and finding the place where manuscripts originated, especially when these pieces of information are combined with information gleaned from examining the text. Further research on the history of technologies employed during book production could help researchers to achieve even more precision in provenance studies of these manuscripts. It would be helpful to discover the dates when certain materials started to be used by craftsmen (such as plastic screens on papermaking moulds) or when materials other than mulberry fibres were used.

ACKNOWLEDGEMENTS

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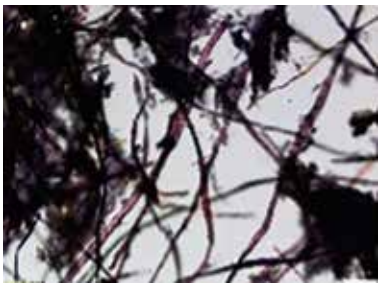
Table 1: The selection of eighteen manuscripts with stab-stitched bindings preserved in the Buddhist Archives of Luang Prabang, Laos and the Rajabhat University Library in Chiang Mai, Thailand.

No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
1	Nan Savaeng Ms. 1 	Ban Pak Chaek village, U district, Luang Prabang province	Traditional medical treatise	ຢາ ໜານພັດຂຽນໄວ້ ຜອດຄົນທັ້ງຫຼາຍ *Ya Nan Phat Khian Vai Pot Khon Than Lai* (medicine; *Nan Phat* composed for all people)
2	Nan Savaeng Ms. 2 	Ban Pak Chaek village, U district, Luang Prabang province	Secular ritual and ceremony; for reciting on various occasions of this kind	ຄຳສັບພະຄຳ *Kham Sappha Kham* ('All Kinds of Words')
3	Nan Savaeng Ms. 3 	Ban Pak Chaek village, U district, Luang Prabang province	White magic; the texts are recited by a ceremonial master in a ritual to heal a sick person.	ທໍລະນີສານຫຼວງ ນາງ ດຳ ແລະສານຈີດ *Thòlani San Luang, Nang Dam* and [Thòlani] *San Chüt* ('Great Message of the Earth', 'Black Lady' and 'Tasteless Message of the Earth')

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
23.5 × 16.5 × 2.0	20	Stab-stitched	11	Woven type of paper composed of paper-mulberry fibres Cover 
40.5 × 19.5 ×1.5	25	Stab-stitched	22–23	Woven type of paper composed of paper mulberry Fol. 1  Cover 
37.5×16.0×3.0	71	Stab-stitched; 5 stabs; double thread; fabric cover measuring 86 × 24 cm; additional paper cover	23	Woven type of paper (plastic sieve print) made of paper mulberry; various modern inks, blue ball pen Paper layer from the cover  Fol. 2  Paper string made of cotton 

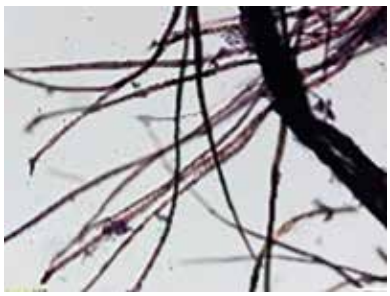
No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
4	DS 0062 00292 	Vat Manorom Sattharam, Luang Prabang	Astrology; traditional Lao calendar and tables for determining the compatibility of lovers before their wedding.	Untitled [ໂຫຣາສາດ *Horasat*] (astrology)
5	DS 0062 00293 	Vat Manorom Sattharam, Luang Prabang	Astrology; traditional Lao calendar and calculations of auspicious or inauspicious days for daily activities.	Untitled [ໂຫຣາສາດ Horasat] (astrology)
6	DS 0062 00294 	Vat Manorom Sattharam, Luang Prabang	Astrology; traditional Lao calendar and calculations of auspicious or inauspicious days for daily activities.	Untitled [ໂຫຣາສາດ Horasat] (astrology)

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
34.0×24.5 ×1.5	29	Stab-stitched; 7 stabs; fabric cover measuring 33.5–34 × 28–29 cm	20–21	Raw paper made of paper mulberry 
33.0×26.0×3.0	37 + fragment	Stab-stitched; 5 stabs	19–21	Raw paper made of paper mulberry 
39.0 ×28.0×3.0	46	Stab-stitched; 5 stabs	20–23	Raw paper made of paper mulberry 

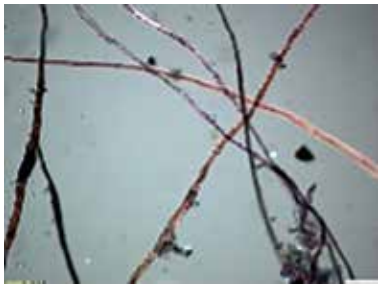
No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
7	DS 0062 00295 	Vat Manorom Sattharam, Luang Prabang	Astrology; traditional Lao calendar and calculations of auspicious or inauspicious days for daily activities.	Untitled [ໂຫຣາສາດ *Horasat*] (astrology)
8	BAD-13-2-021 	Vat Saen Sukharam, Luang Prabang	The texts are used at Buddhist and secular rituals and ceremonies.	Untitled [ພິທີກຳ *Phithikam*] (ceremony)
9	DS-0056-00640-017v 	Ban Mano village, Luang Prabang, Laos	Astrology; traditional Lao calendar and calculations of auspicious or inauspicious days for daily activities.	Untitled [ໂຫຣາສາດ *Horasat*] (astrology)

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
34.0–35.0 ×37.5×2.0	28	Stab-stitched; paper string; 16 stabs	17–20	Raw paper made of paper mulberry Fol. 1  Paper thread made of paper mulberry 
38.5 ×36.5–39.0 ×2.3	38 (front part 10 + bottom part 28)	Stab-stitched; 13 stabs; single thick string; rebound (previous stabs visible)	17–18	Woven type of paper made of paper mulberry 
29.0 ×49.0 ×1.0	19	Stab-stitched; 13 stabs; thin yellow thread; whole book folded in half	16 Leftside margin clearly marked in pencil, irregular right margin Drawings	Woven type of paper (plastic sieve print) made of paper-mulberry fibres Fol. 3 

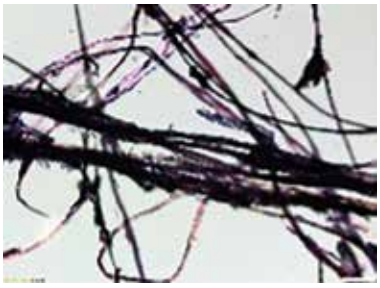
No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
10	CMRU_ARP.060 	Shan State, Burma Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	*Yanta* (magic spells) written on a piece of cloth or on paper to be carried by the person who wants to use it to ward off danger. Sometimes it is also kept at home for apotropaic purposes.	*Yanta* ("ยันต์" magic letters)
11	CMRU_ARP.067 	Shan State, Burma Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	These blessings are recited when various donations are made to the Buddhist Sangha as part of rituals and ceremonies. The second text is a collection of local Tai Lü songs and verses recited at Buddhist ceremonies.	Untitled (คำเวนทาน และคำขับ) (Blessings for donations / songs)
12	CMRU_ARP.094 	Shan State, Burma Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	These blessings are recited when various donations are made to the Buddhist Sangha as part of rituals and ceremonies.	Untitled (คำเวนทาน) (Blessings for donations)

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
27.5 ×31.0 ×1.5	12	Stab-stitched at the top; 7 stabs	9–13 Drawings	Woven type of paper made of paper mulberry treated with Yang oil (Dipterocarpus alatus Roxb. ex G. Don) to protect it from insects 
29.0 ×26.5 ×0.5	8	Stab-stitched at the top; 5 stabs	18	Woven type of paper made of paper mulberry 
35.5 ×28.0 ×1.5	25	Stab-stitched at the top; 7 stabs	17–18	Woven type of paper made of paper mulberry 

No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
13	CMRU_ARP.Tai.Nüa.001 	Northern Shan (borderland between Myanmar and China) Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	Non-canonical Jataka tale (used in preaching during various Buddhist ceremonies).	*Paet Laeng Òk Yòt* (แปดแล้งออกยอด) (*Bunding Kalae*, the joining of two ridges on a double-sloped roof, which point to the top by extending beyond their crossing point)
14	CMRU_ARP.TAI.001 	Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	On the principles of Buddhism (explanations of matters related to the human body and other phenomena of the body). Used on various occasions.	*Kham Sòn Rüang Khan Ha* Didactic poetry on the fifth *khandha* (คำสอนเรืองขันธ์ 5) (Body and emotion)
15	CMRU_ARP.TAI.006 	Shan State, Burma Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	On the lives of the previous Buddhas, the Buddha of our era and the future Buddha. Used in preaching.	Untitled (*Phutthawong* พุทธวงศ์) (On the lives of the Buddhas)

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
59.0 ×35.0×5.0	84 bifolios folded at the right side-edge	Stab-stitched at the top; 5 stabs; fabric cover measuring 73.8 × 51.5 cm	20–21	Woven type of paper made of paper mulberry 
53.5 ×35.0 ×3.5	29 bifolios folded at the left side-edge	Stab-stitched at the top; 7 stabs; frag-ment of fabric cover measuring 20.3 x 40.8 cm	22–23	Woven type of paper made of paper mulberry 
53.0 ×31.6 ×7.5	187	Stab-stitched bound at the top; 7 stabs	21	Woven type of paper made of paper mulberry 

No.	Institution's/owner's accession number; image of artefact showing the front cover or the front page	Provenance	Category of text and function	Title
16	CMRU_Ms. 1 	Shan State, Burma Office of Arts and Culture, Chiang Mai Rajabhat University (donated by Prof. Anatole-Roger Peltier, 2018)	Principles of the Teachings of the Buddha. To be read or preached at various ceremonies.	*Sumaṇadevo* (สุมณเทโว) (Buddhist doctrine)
17	CMRU_Ms. 2 	Disangpani, Assam, India Office of Arts and Culture, Chiang Mai Rajabhat University	Buddhist text pertaining to the rules of monastic discipline.	*Vinaya Pitaka - Mahāvagga* (วินัยปิฎก มหาวรรค)
18	CMRU_Ms.3 	Disangpani, Assam, India Office of Arts and Culture, Chiang Mai Rajabhat University	The second of the three *Baskets* of the Theravada Buddhist Canon, also called the *Basket of Discourse*. It is used by monks as a manual for explaining the Dhamma.	*Suttanta Pitaka* (สุตตันตปิฎก)

Size (h × w × t) cm	Number of bi-folios	Form of binding style	Number of lines of text on page	Materials
34.5 ×18.0 ×2.2 Cover 41.0 × 19.0 cm	62	Stab-stitched bound at the top; 7 stabs; fabric cover measuring 41 × 19 cm		Woven type of paper made with paper mulberry (with minor addition of other fibres) 
51.0×32.0×2.0	34	Stab-stitched, bound at the top; 4 stabs; kept in a roll; sewn with thin thread; fabric cover	36	Woven type of paper made of paper mulberry 
45.5×28.5×0.5	15	Stab-stitched, bound at the top; 7 stabs; kept in a roll; fabric cover measuring 68.7 × 66.7 cm	26–27	Woven type of paper made of bamboo and some type of other grass (plus one unknown pink fibre) 

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INTERVIEWS

Nan Savaeng, son of Mai Saengkham, a local healer from Pak Chaek village, interviewed on the telephone on 21 August 2020.

Nan Pan, a ceremonial master from Pak Chaek village, interviewed on the telephone on 21 August 2020.

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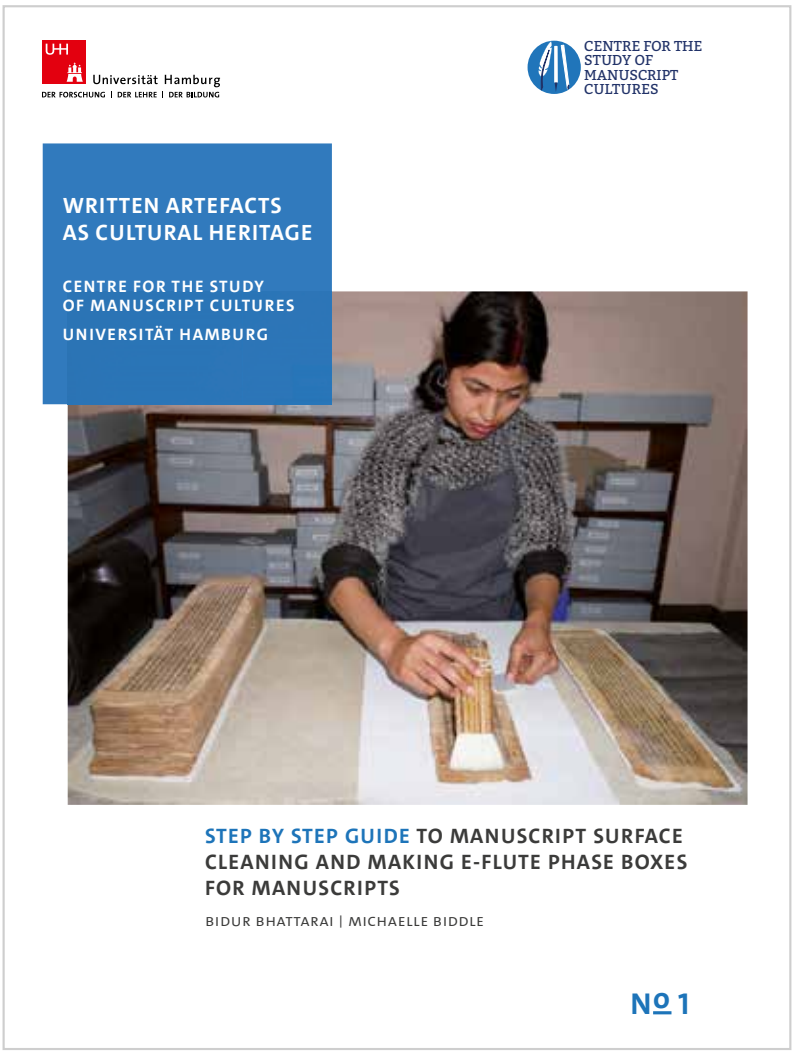

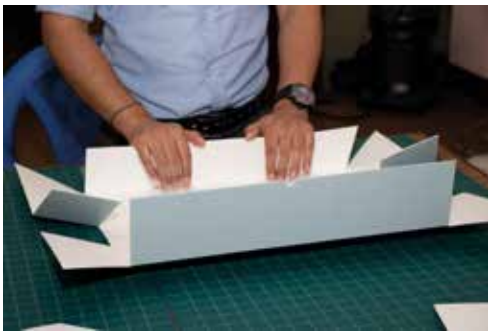

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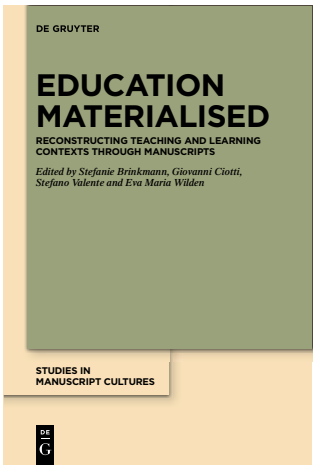

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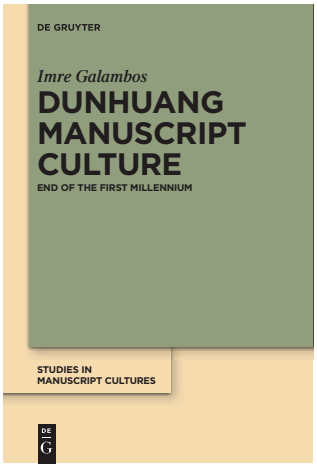

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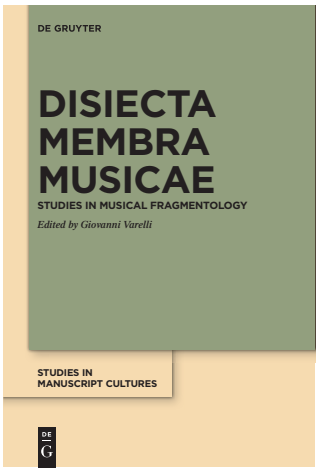

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Although fragments from music manuscripts have occupied a place of considerable importance since the very early days of modern musicology, a collective, up-to-date, and comprehensive discussion of the various techniques and approaches for their study was lacking. On-line resources have also become increasingly crucial for the identification, study, and textual/musical reconstruction of fragmentary sources. *Disiecta Membra Musicae. Studies in Musical Fragmentology* aims at reviewing the state of the art in the study of medieval music fragments in Europe, the variety of methodologies for studying the repertory and its transmission, musical palaeography, codicology, liturgy, historical and cultural contexts, etc. This collection of essays provides an opportunity to reflect also on broader issues, such as the role of fragments in last century's musicology, how fragmentary material shaped our conception of the written transmission of early European music, and how new fragments are being discovered in the digital age. Known fragments and new technology, new discoveries and traditional methodology alternate in this collection of essays, whose topics range from plainchant to *ars nova* and fifteenth- to sixteenth-century polyphony.

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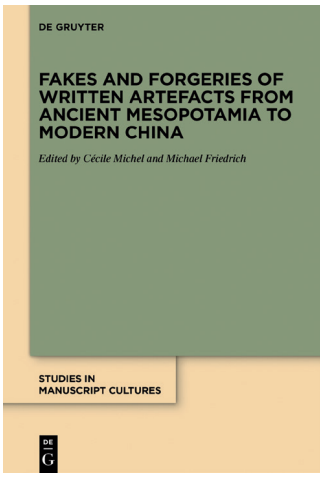

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