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HEMP - A COMMON THREAD

by Patricia Cheesman Naenna

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Introduction

Archeological evidence of weaving dating from 2000 B.C. have been found in many archeological digs in Thailand. Actual dates for hemp are scarce, the oldest being 900 B.C. and hemp disappeared from archeological finds in the historic period approximately 700 A.D. Hemp is not used by the Tai peoples in Thailand, Laos or Vietnam today, cotton and silk are the most popular materials. From the archeological evidence, cotton appears to have been used later than hemp, the earliest evidence being from the late bronze age 300B.C. - 200 A.D. and the earliest silk being 500 - 400 B.C. These dates are not conclusive and it is possible that there was earlier use of these materials but the climate and conditions were not suitable for preservation of delicate fibres. In this research the archeological evidence is studied together with existing technologies in order to find the link between the backstrap loom used for weaving hemp today by the Hmong and the standing frame looms of the Tai. In this way light can be shed on the history of hemp. I am able to present here information which I documented in the field over last two years and which also draws on twenty years of research into Tai textiles.

Hemp is the oldest known fibre used by people in Thailand, Vietnam and Laos. It was gradually replaced by cotton and by very early on in the first millenium had virtually disappeared from use. However, the knowledge of techniques and rituals of hemp weaving and hemp threads are still known by the Hmong people in these three countries. The fabric woven from hemp is narrow, the width being restricted by the technique of the backstrap loom. The preparation of the yarns is very lengthy and time-consuming. The resultant fabric is coarse and not suitable for dyeing bright colours from natural dyes as it is difficult to bleach to white. As people wanted softer fabric and brighter colours, these factors probably led to the majority of the population changing to cotton. Some groups kept the backstrap but wove cotton while others (in particular the Tai) developed a wider loom that was fixed in position and became what we call today the standing loom or frame loom. It is not uncommon to see this type of loom under the houses using one or more of the house posts as part of the frame of the loom. It would be an obvious development to attatch the warp of a backstrap to the frame of the house, particularily if the house was perminant. The backstrap loom is very suitable for nomadic peoples and peoples that cultivate land far from their houses or are still hunters and gatherers, because of the convenience of easy transportation.

Looms in southeast Asia vary from a continuous warp backstrap loom with no comb (Suvanese, Indonesia) to continuous warp backstrap looms with combs that are used for separating the warp only, not for beating in, (Karen, Thailand) to discontinuous warp backstrap looms with combs used as warp dividers, (Hmong in Thailand, Laos and Vietnam) to discontinous warp standing frame looms where the comb is used to beat the weft in as well as to seperate the warp yarns. There are a great number of variations on the theme of the latter, but they all have the same essential techniques. These main types of loom can be seen to progress in complexity and seem to have evolved from the very basic backstrap to a sophisticated loom which reaches a height of technical brilliance in the draw looms of the Chinese. A main feature of the backstrap loom is a large cylinder, usually made of bamboo which is used to open one of the sheds for plain weave while the other shed is determined by a set of heddles called a shaft which is operated by hand or foot. On the standing looms, there are usually two shafts for the plain weave, both operated by foot.

The Hmong loom is an interesting mid-development example. This loom has the warp tension system of the simplest backstrap loom, but does not have a continuous warp and there is one foot-operated shaft, whereas the simple loom only uses hand operated shafts. The Tai Khao loom in Vietnam is also an interesting combination of simple and developed techniques. The loom is actually very advanced, with a rolling system for storing the warp and a frame structure. However one fabric type that they weave called **hoa buan** does not seem to fit this loom, but nevertheless is woven on it. The warp for this weaving is wound around the roller, but the width is only 12 - 24 cm. There is a set plain weave shed determined by a large piece of bamboo and the other plain weave shed is operated by one foot, similar to the Hmong loom. A series of hand operated shafts very similar to the simple backstrap loom are used to create a warp orientated design.This structure was obviously once made in the backstrap loom technique. Both these examples are mid-development looms indicating a gradual change from backstrap to frame looms.

The decorative techniques associated with the backstrap loom are warp orientated designs such as warp stripes, warp ikat, supplementary and complementary warp and warp wrapping. The earliest decorative techniques in southeast Asia were warp orientated. The change to weft orientation is often credited to the influence of raw materials such as silk brought by Indian traders since the 6th century and the popularity of gold and silver yarns in the 16th century. The Indian influence in textiles during the Indianised states

such as Funan in the first century is not known but the archeological evidence in Thailand indicates a possible local origin which would have instigated a very early change from warp orientated designs to weft orientated designs. Certainly the silks found today and dating to no more than 100 years old in northern Laos seem to display designs and symbols which are prehistoric in origin. These symbols are dubbed Dongson relating to the famous bronze drum site in Vietnam dating to the period 500 B.C. to 100 A.D. Silk was a luxury raw material that was woven on the wider standing looms and was best woven in a weft faced fabric such as weft ikat, weft stripes, supplementary weft and brocades which are the predominating techniques used by the Tai groups today.

Although the Chinese archeological silks are much older than anywhere else, this may be due to the climatic conditions and is not conclusive of the origin of silk. The silk yarns produced today from Thailand, Laos, Cambodia, Vietnam and south China are of the same silkworm variety and many of the tools and containers for sericulture are very similar in these regions. The Chinese and Japanese silk is different. Cotton was used for working clothes amoung the lowland and valley-dwelling peoples and was exported to China, indicating that the Chinese did not introduce cotton to the area. It is most likely that cotton was indigenous to southeast Asia.

This paper is concerned with the development of the weaving techniques in Thailand, Laos and Vietnam amoung the Tai speaking groups of which the Lao, the Thai (Siamese) the Phutai, the Tai Daeng, the Tai Khao and the Tai Dam are the major groups studied. In order to study the techniques, the Hmong have been studied in Thailand, Laos and Vietnam. The phonetic system used is the Library of Congress.

The hemp plant- *Cannabis sativa*

True hemp is a dioecious annual plant of the Cannabaceae or the Moraceae family. It has been cultivated for its fibre since prehistoric times and more recently for the intoxicating resin that exudes from the flowers of the female plants called marijuana. It is a native of Asia and the seeds were probably consumed along with millet, rice, barley and soya beans in ancient China. It did not appear in the West until the first century A.D. The best conditions for growth are temperate climates with over 100 cm of rain per year. The plants grow up to 3 meters tall and have large long-stalked digitate leaves of five - seven leaflets which are toothed and grayish-green. The flowers of the male plant are greenish cream coloured, have five sepals and five drooping stamens in auxillary panicles while those of the female are in axillary spikes. The fruit is an ovate seedlike achene.

The fiber is "very light coloured and quite lustrous. Individual cells are quite long. The shape is cylindrical with surface irregularities in the form of frequent joints, longitudinal fractures and swollen tissues. The cross section is polygonial with rounded edges. The cell walls are thick. The lumen is broad and rather flat. The diameter of the cell varies considerably with broad, flat lumen." (quote Khun Chiraporn Aranyanak). For use as a fibre the plants are tightly planted to encourage tall straight growth, for which the males are most suitable as they do not branch out thus rendering a continuous strip of outer skin on the stalks which is made into fibre. The plants mature for fibre harvesting in four months. Female plants are cultivated by fibre growers for the seeds for the next year's crop. The drug control laws have caused the growing of hemp in recent years to be a problem for the Hmong in Thailand and the practice of hemp weaving was in danger of disappearing altogether. However, since the strain of *Cannabis sativa* used is quite obviously developed for its good fibre qualities and not narcotic qualities, the law has been more leniant on the growers in the past four years. The strong beliefs of the Hmong have withstood the pressures of time and they have maintained their tradition of weaving hemp.

Hemp fibres were grown commercially as cordage, rope, canvas and sail cloth in Europe, China, Japan and USA. The first pairs of the famous Levi Strauss jeans were made out of hemp cloth imported from Nimes in France and were thus called "denims". Hemp has been used as a herbal treatment for glocoma and asthma and is an excellent source of fibre for the paper industry and many other end uses. However its narcotic potential has led to its disuse in the West and in the East the arduous processess required for production of cloth have led to very few remaining groups growing it.

The Hmong use of hemp

The Hmong living in Thailand, Laos and Vietnam live on the very tops of the mountains. They use hemp fibre for weaving fabric and for their rituals of spirit healing, weddings, new years festivals, child birth and burial. Their beliefs are very strong and their traditions of hemp weaving the most ancient that we have for study.

Interestingly, the loom used by the Hmong is not the most ancient type but shows evidence of development which makes it an intermediary between the standing loom and the continuous warp backstrap loom. The Hmong loom has a discontinuous warp on a fixed semi-frame which supports one set of heddles called a shaft. This shaft is operated by one foot. As with the continous warp type of backstrap loom, the Hmong loom has a large piece of bamboo fixed in position to determine one shed but the other shed is opened by the foot operated shaft. The same loom design is used by the Hmong in all three countries.

The Hmong believe that hemp cloth is a protective fabric and have many taboos concerning its use and production. The women are responsible for all the processes. The fibres are softened by crushing them between a large log and a rock. The woman stands on the rock and rolls it back and forth over the yarns that have been laid on the log. This rythmic rolling is symbolic of the reproduction process, the rock representing the male and the log the female. If any damage should come to the rock, great misfortune befalls the family. They believe that the woman's husband will die or become sick. In order to dispell these dangers, offerings must be made to the spirits and in some cases a man will take a new wife. If the woman is unmarried, noone will take her for a wife. A woman without a husband is said to be like a house without a roof. These gender related beliefs place the woman in a dependant position to the men. Roles and responsibilites are not shared, but divided, the men taking the administative role and the women the labour role. In fact many women claim their husbands know all the hemp preparation processes and some can even weave, but they do not because it would not be right and possibly dangerous to his health. If a man twists the hemp yarns, snakes will enter his traps.

In Hmong society the men are the teachers and the women are the listeners. It is a patriarchal, polygamous society and women often marry at 13 or 14 years of age. The life expectancy of their people is only 40 and their fear of illness understandable in the rough conditions of their mountain homes. Healing is arranged by a shaman (man) or a spirit medium (woman) depending on the

gravity of the illness. Animals are killed and offered to the spirits and herbal medicines are administered. These are all very costly items which must be provided by the immediate family If the treatment does not work, the whole process is repeated with different healers until the person is healed or dies.

Their beliefs are animist giving great status to the spirits of their ancestors and fearing evil or unfriendly spirits that upset the balance of their lives. Most illnesses are believed to be caused by evil spirits and the only way to be cured is by appeasing them. Hemp is believed to be the connecting thread between the outer and the inner world which the shaman can use for healing. When animals are sacrificed for the spirits they are connected to the sick person by a hemp thread and that thread goes to the shaman's alter and up in the roof to the spirits. This symbolic use of a thread as the connection between the spirit world and the human world is also seen amoung the Tai groups in Laos, Thailand and Myanmar today but a cotton thread is used. The use of hemp is seen with the White and the Blue Hmong.

Hemp thread is also used to tie around a family in a special protection ceremony to bring good health and dispel bad luck for the whole family by uniting their souls. A pig is offered and the pigs soul will protect them. During childbirth, a woman must wear a hemp cloth skirt because it will protect her and absorb her blood and can later be buried or burned so that no spirit or animal can smell her blood and destroy her. It is believed the the wearing of the skirt helps her to have an easy birth by opening up the skies. At a girls wedding, she must wear hemp as well as all the guests. She must have a dowry of hemp clothes woven by her mother to take to the man's house. There must be sufficiant for the relatives to show that she will be as hardworking as her mother.

In death, the Hmong must wear all hemp cloth clothing to journey to the land of the spirits. Magic hemp shoes are made for the dead so that the giant caterpillars, as large as sheep, will not harm them. Balls of hemp are prepared to throw into the mouths of the tigers that will try to attack them. When they reach the last resting place, they will be able to find their mother easily if they are wearing the hemp cloth clothes she made for them. When they find their ancestors, they will be in peace. If they do not wear hemp, their bones will ache and they will bring illness to the children that are living. If they wear Chinese hemp, Chinese spirits will snatch their clothes away. The coffin of the dead is suspended by a length of hemp cloth and hemp rope. If the family do not have hemp for this purpose, the dead person' sister will scold them for being lazy.

Hmong hemp yarn processing techniques

1. The hemp seeds are planted at the beginning of the rainy season, in July. They are planted in a large rectangle very closely together and in a sunny location. The plants will grow tall and straight because of the proximity to eachother and the best ones for yarn are those on the inner part of the rectangle.

2 The plants are harvested by cutting off at the ground and removing the leaves in the field. The green stems are taken home. The plants must be harvested before the flowers form, in about October.

3. The stems are stripped while still green and subtle, but can be kept for up to a month before they become too dry and crumbly. The stripping process is one whereby the stem is pressed into four even creases in the centre part. The thumb of the right hand is used to separate one of these four sections and pull off the outer skin of the stem. The skin is removed in four strips from the upper part of the stem first and then the lower half. When stripping the lower half, the thumb of the left hand presses the skin on top as the thumb of the right hand lifts it up from beneath. This helps to prevent the fibre from breaking at any joints that are on the lower half of the stem. The stripped fibres are pounded in a pestle and mortar to start softeneing them and then stored in long bundles until ready to join.

4. The joining process is usually done when walking to the field or in groups of women who talk and enjoy the group activity. The thick end of one piece is split in two, about half an inch up from the end. The end is broken off to tidy up any straggly parts. The thin end of another piece is split in two and each half is twisted into the split section of the other piece anti-clockwise. The two are then twisted together clockwise to make a firm join. As the fibre lengthens, it is wound onto a hand-held niddy-noddy. This is done until the niddy noddy is full and the compact bundle of fibres is removed, stored and the niddy-noddy is used repeatedly until all the fibres are joined and a number of compact bundles are ready.

5. When the weaver is ready to twist the yarns and the twisting machine is free to use (usually there are only one or two in the village and they have to wait in line) the compact bundles are soaked in water for an hour or more.Twisting is done on a four spool, foot operated twisting mechanism that is home made from wood and leather. The yarns are twisted onto bamboo spools.

6. The twisted, green fibre is wound off the spools onto a large horizontal winding frame. The yarns from each spool are joined so they are continuous and thus large skeins are formed.

7. These skeins are taken off the winder and boiled in lye made from ash water (PH 12). Often the ash is left to boil in the same pot which is boiled all day. The yarns are wrapped in large jungle leaves overnight, rinsed in a stream and dried in the sun in the morning. This process is repeated three or four times until the yarns become white.

8. In the last boiling, some bees' wax is added to the pot to make the yarns slippery and shiney.

9. The yarns are rolled by using a large log and a large rock. The woman stands on the rock and roll it on top of the log, crushing the yarn between them. They log represents the female and the rock the male in their iconography. The yarns become soft, compact and shiney.

10. The yarns are hung against the wall of the house and sorted. The thicker yarns are used for the weft but the tighter, smaller yarns for the warp.

Preparation of the warp.

1. The large skeins are wound into small skeins in baskets and ten piles of yarns are arranged in a row.

2. The yarns are threaded individually through ten holes on a frame which separates the yarns for the winding process.

3. The set of ten yarns are wound around spikes that are stuck in the ground that designate the length of the warp. This process is usually done inside the house to prevent the animals spoiling it and the floor of the house is swept smooth and clean. For a long warp many spikes are needed. These spikes are arranged in pairs about four meters apart. Two special spikes are placed at the furthest end around which the yarns are put into a cross to separate the two sheds for the weaving process. To make this cross each yarn is wrapped around the palm and laid into the cross one on top of the other. The set of ten yarns are then wound back along the same path as before creating ten pairs of yarns the length of the total track around the spikes. Enough repeates of the winding are made to fill the comb exactly. If there are three hundred holes in the comb, then thirty repeats are made etc. Two shed sticks are placed in the

warp to hold the cross point and the rest of the warp is looped for storage until the weaver is ready to thread up her comb.

4. The comb is threaded by passing the loop made at the cross point through each hole in turn, being careful to follow the exact order set in the winding process.

5. The rest of the warp is held in tension by one or two women who work together. The warp is wound onto a piece of wood that has been passed through the loops. As it is wound on, the comb and the shed sticks are carefully pulled along the whole length of the warp. Flat sticks are placed into the warp roller to separate the layers of warp and even out the tension.

6. The warp is placed on the loom and a large bamboo tube is placed into one of the sheds designated by the shed sticks. Heddles are attatched to the second shed. These are attatched to a shaft that is lifted by a foot-operated arm which hangs above the loom.

Weaving

1. Weft yarns are wound from the large skeins into small skeins by hand and then transferred onto spools using a spool winder while someone holds the small skein by hand.

2. The weft yarns are passed into and beaten into the warp using the shuttle which is shaped to hold the spool and pointed along one side for beating-in.

3. The weaver has a leather strap attached to the end of the warp and hooked around her back. She pushes against the ground to achieve the best tension and pulls one of the sheds open with her foot to pass the shuttle through. The next shed apears as she releases this shaft as the yarns pass over the permanent bamboo tube. The weaving continues with two sheds until the warp is finished, or until enough fabric is woven for a skirt length (aprox 8 meters).

4. In order to make the fabric shiney and soft, it is crushed again in the log and rock roller after weaving. If the fabric is to be used for batik it is boiled first to remove the wax that was put in earlier and then decorated. After decoration, dyeing and removal of the wax pattern, the fabric is rolled to soften it.

Tai textiles with ancient origins

Techniques of weaving that are still used by the Tai and that can be associated with backstrap loom techniques are a major part of this research. These techniques include: narrow fabric widths suitable for backstrap but not practical for standing looms; the use of warp orientated designs and weaving techniques such as supplementary warp, compound weaves, and warp stripes; the use of the shuttle for beating in the weft rather than the comb, the comb being used only as a warp divider; the use of a large round piece of bamboo to determine one of the sheds and a hand or foot system for operating the other shed. Below are a number of examples of fabrics woven today by various Tai groups which fall into these catagories.

Pha chong blankets

This textile is woven in a supplementary warp technique and has a join down the centre. The two pieces are woven only 40 centimeters wide and have tassles at one end. Tassles of this type are also seen on blankets woven by Karen peoples that use a continuous warp backstrap loom system. They are created when the warp is cut at the final point where the beginning and the end of the fabic meet but cannot be completely closed off because the warp is continuous and there is not enough space for the shuttle to fit through the shed. These cut warp yarns are twisted or plaited into tassles which fall at on end of the blanket. **Pha chong** are made by the Phutai peoples of southern Laos and northeast Thailand and the Tai Phuan of Xieng Khouang province in Laos. It used to be a common fabric used as a blanket or warm wrap but more recently in Thailand it has been used as a funeral cloth by the Phutai in Mugdahan province because they are rare and the old people wish to be buried with this ancient fabric. They build a tent-like structure over the body while it rests in the house before cremation and cover this structure with the **pha chong** blanket.

Hoa Buan waist bands

A certain type of waist band is used in Vietnam and Laos by the Tai Daeng, Tai Khao and Tai Moei as well as some non Tai groups such as the Muong in Vietnam. This cloth is woven with a delicate and very complex supplementary warp pattern to a width of 12 cm. for single pieces and 24 cm.for double pieces. The loom for making these was seen in a Tai Khao village in Vietnam on a standing loom. The warp was very narrow and had a fixed piece of bamboo to determine one shed and a set of hand operated heddles for the other shed. The pattern itself was made by special shafts holding sets of heddles that

lifted the warp in a certain order to create the pattern. The weft was beaten in with the shuttle and the comb was only used as a warp divider. Ther shuttle looked similar in shape to the Hmong shuttle but was smaller. All these elements in the loom are typical of a backstrap loom and although their other weaving use a comb for beating-in and two plain weave shafts operated by foot treadles that are typical of the devloped standing loom, the **hoa buan** is always woven in the old technique. In Vietnam the **hoa buan** is arranged with the patterned **hoa langteng** above the striped **hoa langtue** which are sometimes woven in one piece and sometimes seperately. The **hoa langteng** have bird, crab, **nak**, turtle, and many other motifs carefully arranged in the warp decoration. These are used on everyday **phasin** and worn high above the breast. In Laos the **hoa buan,** as it is called by the Tai Daeng in Houa Phan province, is used only for burial and is considered a special cloth that assists the dead in their journey to the "land of golden mangoes". A woman is buried in as many as seven **phasin** with at least one having a **hoa buan**.

Tin tam nae or **tin ti** hem pieces

These hem pieces are made in a compound weave using the shuttle to beat in the weft and a small comb for seperating the warp. Many of the Tai groups living in Houa Phan, Xiang Khoang, Vientiane, Louang Phabang, Savannakhet, Pakse, Bolikhamxai, Kammouan, Salavan and Champasak provinces in Laos and in nearly all the provinces in Isan in the northeast of Thailand weave it. Today the old weaving technique which made a long, narrow cloth is being repaced by a wider version which reverses the warp and weft direction of the old format and requires two side seams. However the same texture and design is rendered and thus the old design is given a place in modern living. This is surprising since it is such a plain, unassuming design, but is obviously considered asthetically pleasing to the Lao, Phuan, Phutai, Tai Daeng, Tai Moei and non Tai groups that weave and use it. It is essentially a strong woven ribbon that protects the hem of the **phasin** from tearing and was woven in cotton in white, red and indigo, However, the Vientiane and Luang Phabang Lao have embelished it with gold and silver thread and woven it in silk for their fine silk **phasin**. The readjustment to the weft orientation has permitted this, whereas before when it was woven in the warp orientation, it was suitable for simple yarns in the warp only, such as cotton.

Traditional bags called **thung**

The fabric for making traditional Tai bags is woven in a narrow strip to the exact size of the bag. Very little cutting or shaping is required. One strip makes the handle and sides of the bag and a piece on each side completes it. The fabric usually has a simple warp stripe or is plain, most likely having its origin in a back-strap loom weave. All the Tai groups have a bag of this type, with slight variations in colour and pattern such as white with tiny black stripes of the Lanna area of Thailand and the plain white bags called **thung khao** of the Tai Daeng of Houa Phan in Laos.

Phasin muk and **phasin thieu** tube skirts

These two types of **phasin** are interesting for their warp orientated decoration. The **sin muk** has a supplementary warp while the **sin thieu** has simple warp stripes of red and black. The **sin muk** is still woven by the Tai Daeng, Tai Moei and Tai Lao in Houa Phan province and the Tai Phuan, Tai Lao and Tai Moei in Xiang Khoang, Vientiane, Bolikhamxai, Khammouan, Savannakhet, Salavan and Champasak provinces in Laos and by the Lao in Isan. There are also Tai Phuan in Sukhotai province that weave it and Lao Khang in Phichit and Nakorn Savan provinces in Thailand that imitate it in a weft orientation. This simple design is rather difficult to weave, requiring two warps, one for the plain and one for the supplementary. This is a typical arrangement for a backstrap loom weaving and although today some are woven in wide widths, many are still narrow, indicating an old origin.

The **sin thieu** is a plain looking tubeskirt that would not normally catch the eye and might appear plain black at a distance. This charming arrangement of red and indigo in the warp is seen from Houa Phan province in the north of Laos all the way down to the southern part of Isan in Thailand. In Houa Phan there are a number of variations on the theme such as **sin pa pan** which has a tiny warp ikat in it, **sin saet** and **sin lueang** named according to an orange or a pale green put into the warp as well. The Lao in Houa Phan and the Tai Dam in Xiang Khoang call it **sin taran** and weave it in cotton and silk. In Vientiane this same colour arrangement can be seen in the finest silk **phasin** with a gold **tin tam nae**. It is a design associated with old women who prefer the subdued colouring and is used as a ground for weft ikat silks today.

Archeological studies of textiles

In the geographical areas studied for this research, Thailand has the most written evidence on archeological data, but still the findings are far from conclusive. Many textile finds at Ban Chiang, Udorn Thani province, were lost or left undated. A great number of the artifacts have come from unknown or illegal digs with no method of dating available and on the whole, archeological textiles have not been of major focus in any of the digs to date with the exception of the Ban Na Di site in which fibres were dated and some identified. Lack of conclusive dating and identification of archeological finds has led to some wild conclusions and imaginative writings on the origins of Thai textiles including presumtuous dates for the earliest silks. Khun Chiraporn Aranyanak is an expert on the indentification of archeological textiles and is skilled in laboritory techniques using sterio, biological, polarized light and scanning electron microscopes to examine cross and longtitudinal sections of tiny fragments of textiles and X-Ray Diffractometers, X-Ray Fluorescence Spectrometers and Differential Thermal Analyzers. Of 188 occurrences of textiles taken from 1700 bronze and iron artifacts, she identified 141 as being hemp, cotton or asbestos with one occurance of banana fibre. None of the examples had definate dating but all the hemp examples were from prehistoric sites and most of the cotton occuring in the historical sites dating later than Dvaravati period, 6th - 9th centuries. In order to paint a picture of textile production I have used the general style of associated objects and levels for comparative, stylistic dating.

Textile fibres were preserved by the prescence of various metals, in particular bronze which preserves them by the leaching of the metal salts into the yarns themselves as the metals corroded and thus fusing the metal with the textile or fibres. In some archeological analysis, textile pseudomorphs have been used. (e.g. John Vollmer from the Royal Ontario Museum in Toronto.) These are the indentations of corrosion made by a salt saturated textile into a metal object. In some cases these are so clear that the thread size and count can be identified.

The datings we have from China are hemp pseudomorphs from the Shang period dating to 1500 - 1028 B.C. and Han period from 206 B.C. - 220 A.D. All these yarns had a counterclockwise twist (S) and were in a tabby weave. The other evidence from China are the Dongson culture bronze body-tension loom parts from the Shin-Chai-Shan cemetary in Yunnan which date to the second and third century B.C. These were probably models for ceremonial use only, but give evidence of the backstrap loom in an area inhabited by Tai groups today.

Silk weaving in China was very developed in the north and differs greatly in species and technology to that of the south. There is no cotton found in early sites in China.

The hemp cloth evidence in Thailand is from over seven sites scattered over the northeast and central Thailand. Most of the yarns are in a clockwise twist (Z) and are large in size and open in count per centimeter, indicating the use of hand spindles. Prehistoric spindle whorls from Ban Chiang in Udorn Thani province and other related sites are evidence of yarn production dating to 2000 B.C. and although we do not have the fabric pieces to match these dates, it is most likely that the material used was hemp as most of the Ban Chiang archeological textiles are identifiable as hemp. The fabric remains were commonly seen on simple, plain bronze bracelets stylistically associated with the early and middle periods 3600 - 300 B.C. In Ban Na Di, Udorn Thani province dates include hemp from 700 - 500 B.C. and silk from 500 - 400 B.C. There is no definate evidence of silk at Ban Chiang since the one fragment found has been lost and was never scientifically analysed. Hemp remains identified at Kanchanaburi sites date between 900 - 700 B.C., and at Lopburi sites to 500 B.C.

The majority of cotton samples identified by Khun Chiraporn date to the historic periods after the Dvaravati period, 6th - 9th centuries, but a few early examples exist at Ban Chiang on heavily decorated bronze bracelets. The stylistic dating of these type of bracelets is the late period, 300 B.C. - 200 A.D. The cotton type found is *Gossypium arboreum* Cotton yarns were twisted in both counterclockwise and clockwise directions and the yarns were much finer and more even than hemp yarns indicating the use of a spindle wheel, the development of which is a major step in textile technology enabling smaller, more even yarns than the hand spindle. The cotton yarn counts were 20 x 14 and 18 x 18 per cm. in comparison to hemp counts of 10 x 6 and 14 x 12 per cm. Textiles in association with bronze are easier to identify than those with iron which destroys the yarns and thus many of the iron age textiles are impossible to identify. Iron was produced at Ban Chiang as early as 1000 B.C. but bronze continued to be made until the last period. At other sites bronze articles, some in association with cotton have been found dating as late as approximately 700 A.D.

Unfortunately no archeological evidence on textiles in Laos or Vietnam has been published, but I was told that hemp has been found in Dongson culture sites in Vietnam but the evidence has not been reconfirmed with scientific analysis yet.

Many other artifacts have been found as older evidence of fibre production in Thailand but the fibres can not be identified. These include cord marked pots from Spirit Cave dating to 4000 B.C., cord marked pots from Ban Chiang dating to 3600 B.C. and it is not unlikely that hemp was one of the materials used to make the cords and ropes since no other fibre has been identified in the prehistoric site other than asbestos. Threads for beads were fibrous and woven mats are closely related to textile technology . At Ban Chiang a pot with impressions of a twill woven basket was found dating to 1000 B.C. This complex weave has never been found in early textiles, but indicates the knowledge of a technique which could have been applied to textiles. Certainly the level of bronze technology was highly developed. Other evidence is in the form of stone bark beaters found in numerous sufrace finds, but two were excavated from a cave site in Suratthani province dating back to 1500 - 2000 B.C. This is indicates that bark cloth was widely used since Neolithic times.

Conclusion

There is no definate evidence of the production of hemp cloth by Tai groups in Thailand, Laos or Vietnam but in areas now inhabited by various Tai groups there are archeological sites with evidence of weaving with simple technology associated with hemp as early as 2000 B.C. and as late as 700 A.D. but it is not known whether these finds were the produce of proto-Tai groups or another people that have since disappeared or relocated. Since the cotton findings coincide with the disappearence of hemp in historical sites in Thailand and seem to continue from where the hemp technology left off, I prefer to think that proto Tai peoples lived in the northeast and central Thailand in small pockets long before the first organised Tai kingdoms were documented. The gradual inhabitation of the Chao Praya river basin and the accumulation of populations made it possible for the creation of the Sukhotai and Ayuthaya Kingdoms. These populations did not suddenly migrate from a given area. The Tai system of Muang evolved as the populations increased and with the concept of belonging, costume evolved as an expression of kinship. These expressions led to the variey in textile forms we have today. The stylistic types of fabric and costumes are more related to area than to ethnic group.

The Hmong loom from which they produce hemp cloth today is not the most simple loom, but show signs of intermediate technology which is the sign of gradual change. The Tai Khao weaving method of the **hoa buan** is evidence of marginal survival of an ancient technique using a backstrap loom and the bronze loom parts found in Yunnan are further evidence of backstrap looms in an old dwelling area of the Tai. More archeolgical evidence is needed particularily in Laos and Vietnam to fill in the current gaps in the knowledge that we have today. Cotton became the popular material for weaving by the Tai by the eighth century A.D. More advanced technology evolved with permanent settlements and the interest in cotton led to the use of frame looms and finer cyarnss. Silk and cotton were known to the Tai before Indian influence but there may have been some techniques brought from India which improved the quality of the products. The real extent of this is not known.

The step from the Hmong loom to the frame loom is a very small one, one which the Hmong have not made out of choice for the hemp raw material. This tradition has maintained its strength for survival through the Hmong belief in the after life and the role of hemp as the connecting thread to the spirit world from the human world. This is the connecting thread also to the history of the Tai people and their textile traditions.

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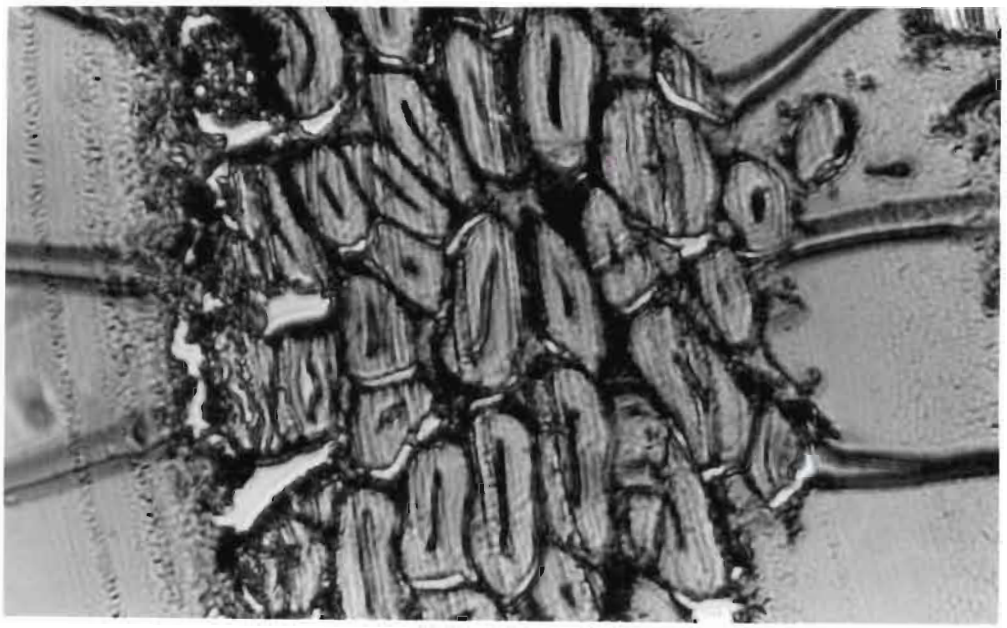
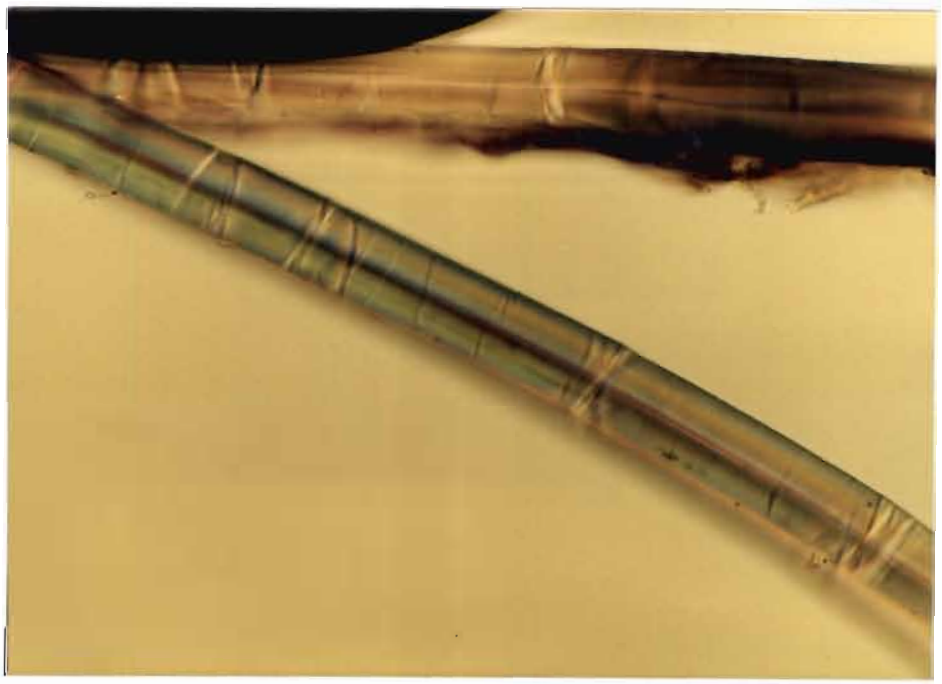
Threads of life. Hemp and gender in a Hmong village. Video by Kathy Culhane-Pera and Susan Morgan.



Cross section of hemp enlarged 400 times from a bronze bracelet, Ban Chiang, Udorn Thani province, Thailand.

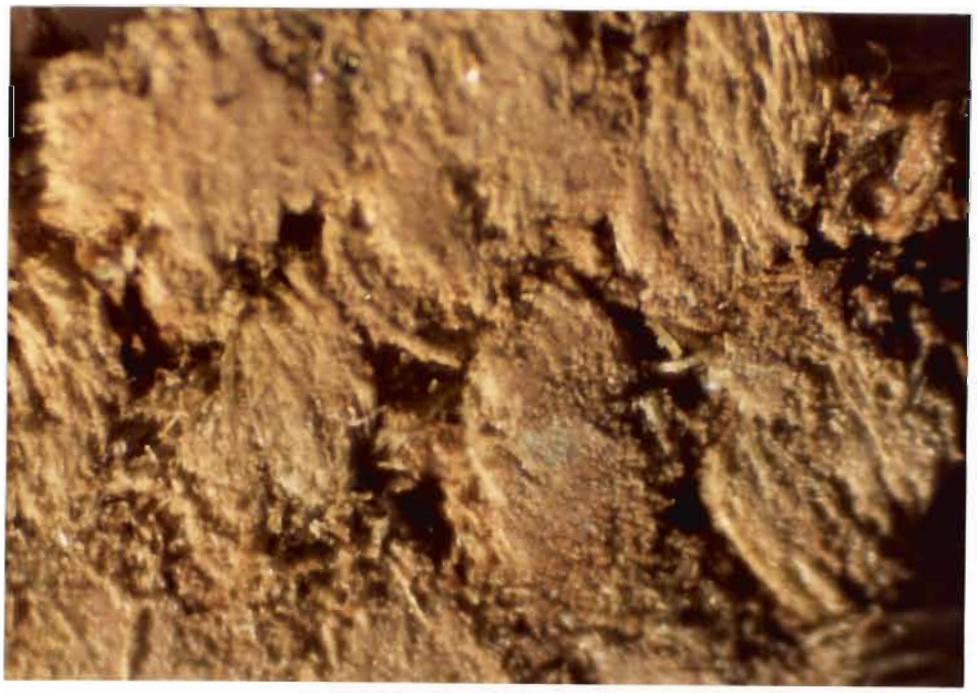


Longitudinal section of hemp enlarged 200 times. A combination of cross and longtidudinal sections is most reliable for identification.

Bronze necklace with hemp cloth attatched from Ban Chiang, Udorn Thani province, Thailand currently at the Ban Chiang Museum.

Hemp on bronze bracelets from Ban Na Di, Udorn Thani province, Thailand.

Top left and right: Hemp cloth on bronze bracelets from Ban Chiang, Udorn Thani province, Thailand.



Detail of hemp cloth on bronze from the prehistoric period showing the absorbtion of salts from the bronze that have preserved it.

Hemp plants are planted closely together to encourage tall straight stems suitable for making weaving yarns.

Stalks of hemp stored in the roof of a Hmong house waiting for the skin to be stripped and made into yarn.

Stripping the stems of the hemp plants so that four even strips are taken off each piece.

Joining the strips of skin from the hemp stalks together on the way to the fields. The extra, uneven parts are discarded to make as even a yarn as possible which is then wound onto a hand held niddy-noddy seen here on her left hand.

Bundles of green fibres are stored after removal from the niddy-noddy.

A group of White Hmong women working on their fibres. This group activity is shared by old and young alike.

Bundles of green fibre are soaked in water in preparation for twisting. The bamboo sticks are for the spools onto which the yarns will be twisted.

Twisting is done on a four spool, foot operated twisting apparatus. The wet bundles are laid on a log and passed over a frame to ensure smooth unravelling.

Twisting is a very skilled job. The left hand holds all four yarns between two fingers with a short stick while the right hand presses the twisted yarns evenly to pass them onto the four waiting spools which are turned by a foot lever.

After twisting, the yarns are taken off the spools and wound into long skeins on this bamboo skein winder.

The twisting apparatus is home-made and is operated by the wooden plank which turns the lower wheel. A leather belt passes around the wheel and over the spools to turn them. The twisted yarns gradually build up on each spool until they are full and are then replaced by new ones.

The twisted yarns in large skeins are boiled in lye (ash water) several times. At the first boiling, the water is green as the yarns are fresh.

Boiled yarns are dried in the sun. They will not become white until they have been boiled several times in lye.

Top: On the last boiling in lye the yarns become quite white. Here an old skirt has been thrown in as well to brighten it up. Some bees wax will be added to the last boil to give the yarns a shine and to assist weaving.

Left: The waxed, wet yarns are rolled to flatten and condense them.

The large skeins are sorted after bleaching in lye, waxing and rolling. The smallest, most even yarns are put aside for the warp.

Warping up is done by arranging ten piles of yarns which are threaded through the wooden threading frame in the foreground. Ten sets of yarns are then wound around the warp frame which is on the ground.

The warp frame is a set of wooden spikes in the ground approximately five meters apart, depending on the length of warp required. This activity is usually done inside the house away from the animals, but this demonstration was arranged for the light.

The cross in the warp is made after each round on the frame.

The warp yarns are threaded through the comb which serves as a warp divider and then rolled onto the warp beam by hand. This is a group activity and many weavers come to the master weaver of the village for help in the process.

The weft yarns are wound onto spools using a simple winder. The lady on the right is holding the skein between her wrists for smooth unravelling while her daughter winds.

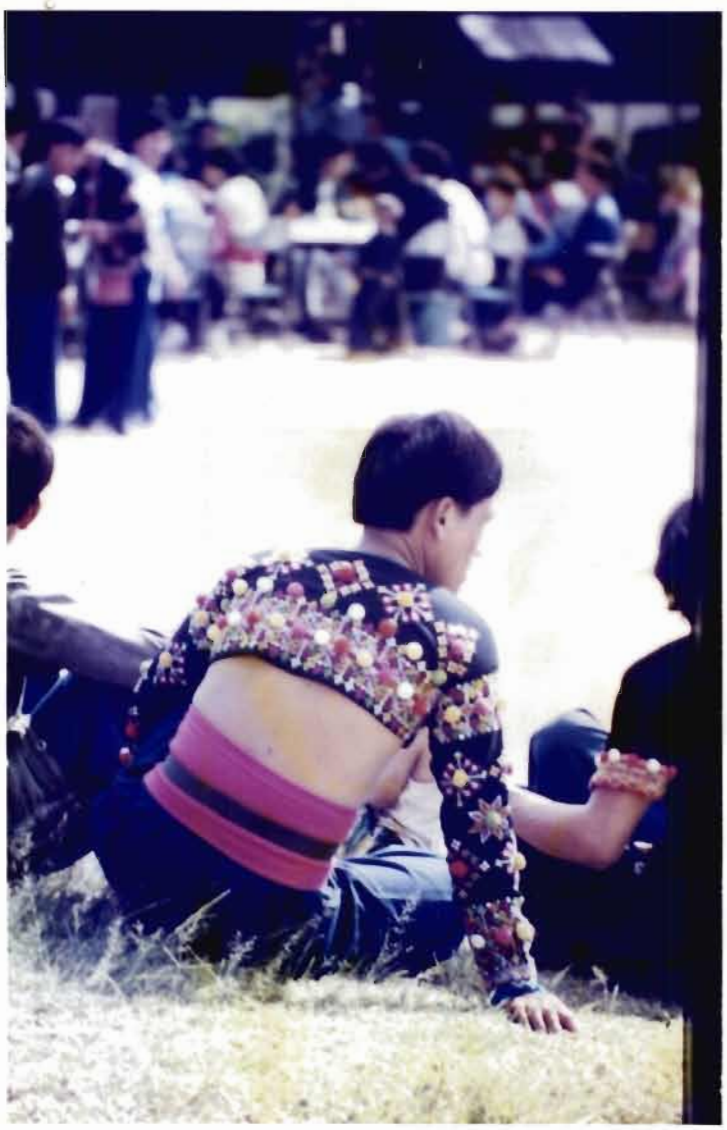
Weaving is done on a back-tension loom which has a semi-frame and one set of foot operated heddles. This shows the first shed of the plain weave which is opened by the large bamboo cylinder.

The second shed is opened by the foot operated shaft.

The White Hmong are named after their white hemp skirts of the women. These skirts are worn only for ceremonial occasions, childbirth and after death. For every day, indigo pants are worn. This photograph was taken at the new years festival.

The Blue Hmong decorate their hemp skirts with blue dyed batik, applique and embroidery. Here the finest new skirt is worn at the new year ceremony.

Below: A Blue Hmong woman working on batik designs. The designs are said to have come from an ancient written script once known to the Hmong.



Left: Men's costume is similar for the White and Blue Hmong. In the past all the items would have been made in indigo dyed hemp cloth but today cotton and synthetic fabrics are more popular. One set of hemp cloths is kept by each family in preparation for burial.

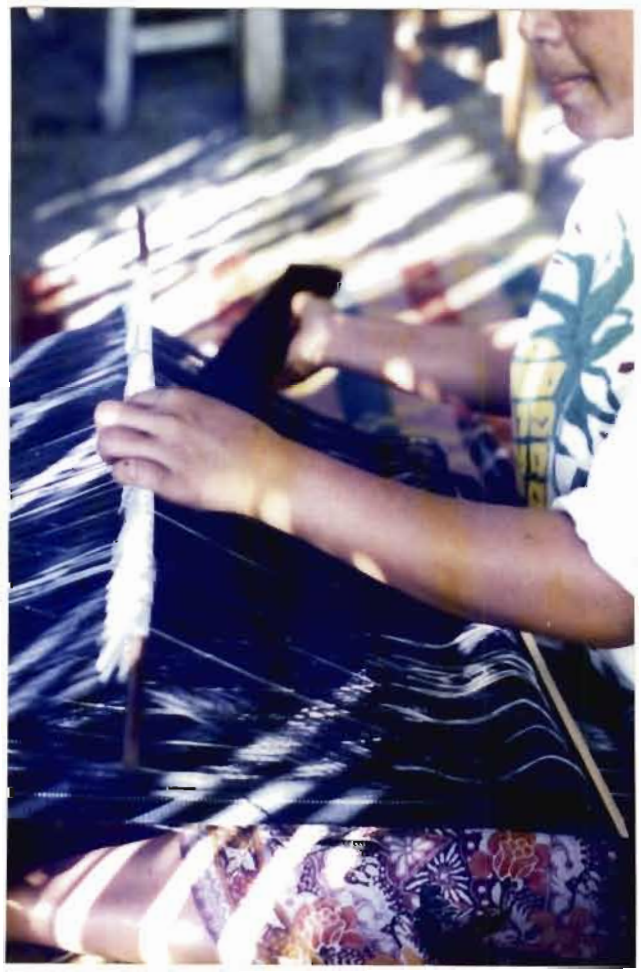
Below: Rolling indigo dyed hemp cloth to soften it.

Hemp cloth weaving equipment and yarns.

Left:Weft winder and other equipment used for hemp weaving.
Right: Batik tools and a length of white hemp cloth.

A healing ceremony whereby the shaman (man) is going into trance while the sick person is seated between the alter on the left and the animal for sacrifice on the right. A hemp yarn is tied to the animal, around her and up to the alter. Hand made paper cut outs adorn the alter on which there are joss sticks burning and various amulets belonging to the shaman.

A Karen weaver on her backstrap loom. This loom has a continuous warp which is cylindrical.

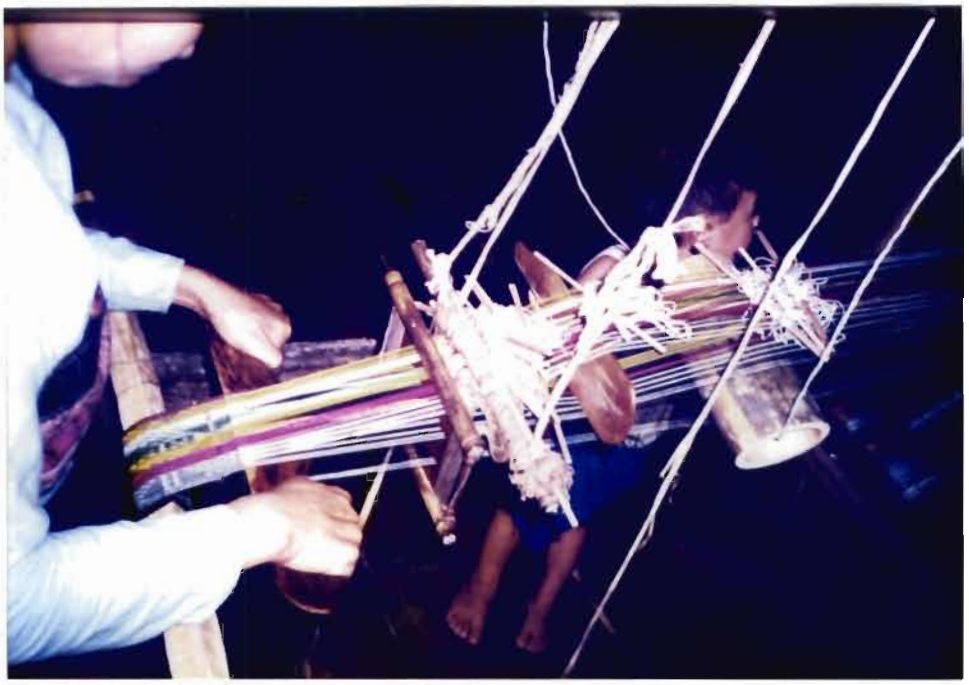


A Karen loom near Chiang Mai, Thailand. The sheds are determined by hand operated shafts.

Hmong loom in Houa Phan province, Laos. The shuttle is very large with one edge shapened for beating in the weft. The comb is used as a warp divider.

The tension on the warp is achieved by the weight of the weaver on the leather strap which passes around her back.

Tai Khao woman weaving a backstrap system but on a standing frame loom structure. The large bamboo cylinder determines one of the sheds, while the other is determined by a hand operated shaft. The warp is discontinuous and is wound around the warp beam on the frame. The tension is not made by the weaver's back but the other elements of the loom are reminiscent of the backstrap loom.



Detail of Tai Khao loom above, Mai Chau, Hoa Binh province, Vietnam.

Supplementary weft weaving of the Tai Khao from Mai chao, Hoa Binh province,Vietnam which is on the frame loom using two foot operated shafts for the plain weave.

Tai Daeng frame loom in Ban Kang That, Houa Phan province, Laos. The warp is passed around the frame beams and knotted above the head of the weaver. This particular weaving has two warps for the weaving of a supplementary warp skirt called **phasin muk**. The ancestor of this design was probably woven on a backstrap loom. This loom is seen all over Laos and the northeast of Thailand.

Another variation of the frame loom seen in the north of Thailand. The extension out the front of the loom does not seem to serve any purpose and apart from this, it is similar to the Lao loom.

Tin tam nae on **phasin** skirts from various locations. All are cotton woven in the traditional way without a comb except for the last two that are made in silver thread and silk in a supplementary weft weave using a comb.
top left to right: Isan, Thailand. Isan, Thailand. Phutai from Isan, Thailand. Phutai from southern Laos.
bottom left to right: Tai Phuan from Xiang Khoang province, Laos. Phutai from Savannakhet province, Laos. Phutai from southern Laos. Lao from Luang Prabang, Laos.

Hoa buan waist bands are called **hoa langteng** for the upper part and **hoa langtue** for the lower part by the Tai Khao in Mai Chau village, Hoa Binh province, Vietnam. They attatch it to a plain black main part of the skirt and wear a cloth belt called an **aeng**.

Hoa buan waist bands of the Tai Daeng in Houa Phan province, Laos. They are used for burial clothes. The set here includes a red shirt, a **phasin muk** and a head cloth. The extra **hoa buan** shows it was woven in one piece and attatched to the skirt differently to the Tai Khao woman's above. These waist bands are rare amoung the Tai Daeng but quite common amoung the Tai Khao in Vietnam.

Pha chong blanket of the Phutai in southern Laos and the northeast of Thailand. The design is a supplementary warp that was likely to have been woven on a backstrap loom in the past before the frame looms were developed.

An extraordinary example of **pha chong** from northeast Thailand showing complex patterns in supplementary warp.

Thung khao traditional bag of the Tai Daeng from Houa Phan province, Laos.

Thung Khao and **thung daeng** of the Tai Phuan in Xiang Khoang province, Laos.

Top: Fabrics woven by a Tai Lao weaver from Ban Na Sala, Houa Phan province, Laos. From left to right: blanket with supplementary weft designs, **sin taran** cloth, **sin lueang**, **sin muk** and **sin saet**.

Left: **Sin muk** of the Tai Daeng from Vietnam showing additional supplementary weft patterns which would have been introduced after the development of the frame loom. The upper part of the **phasin** is supplementary warp.