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# SILK IN BURMA.

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BY

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ASSISTANT COMMISSIONER.



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## I.

### HISTORICAL.

THERE is no mention in authentic historical record or local legend of the source from which the silk industry was brought into Burma, of the channel which it followed, or of the manner or date of its introduction.

There is a similar silence concerning the introduction of silk into India generally. The weight of opinion favours China as the fountain country. Philologists point out that the equivalents in other languages of the Chinese *szu* (silk) are phonetically allied to that form, and quote *sericon* (Gk.), *sericum* (Lat), *soie* (Fr.), silk (Eng.) and others. Even the classical name of the country (*Seres*) is said to be derived from the *szu* which was its chief product, though the lay reader might suggest that it is equally probable that the product was named from the country.

This is not the only argument. Chinese legend, which may be given a certain value on general points, mentions the art of silk-weaving as known in B.C. 2602 and, though the date has to be accepted with discrimination, the antiquity of the art in China is undisputed. The industry is said to have spread from China into Corea about 1100 B.C.; into the Annamite kingdom (according to Mons. de Rogny) about 300 B.C.; and into Siam about 700 B.C. The complete silence of all records as to the date at which the industry found its way into India is surprising; but it would be still more surprising if the industry had been known and practised there without leaving any trace of its presence. One such trace, it is true, is said to occur. In the *Mahabharata* there is a passage which runs: "The Chinas and the Hunas from the mountains brought tribute to Yudhistira, silk and silkworms." Now the Hunas were a Himalayan tribe; and it is suggested that the Chinas, named in association with them, were their neighbours, and hence also Himalayan. The passage is of,

doubtful authenticity and the deduction is possibly excessively rigorous, but the ingenuity of the "Cis-Himalayans" in boldly claiming "Chinas" as their own commands unlimited admiration. A much more significant fact is that it was from China that silkworm culture was introduced into Europe. Theophanes of Byzantium, writing at the end of the sixth century A.D., says: "Now, in the reign of Pasturian a certain Persian exhibited in Byzantium the mode in which [silk] worms are hatched, a thing which the Romans had never known before: this Persian on coming away from the country of the Seres had taken with him the eggs of these worms concealed in a walking-stick, and succeeded in bringing them safely to Byzantium." If the industry was from the earliest times native in India, it is not at once apparent why the introduction could not have come from near India instead of from far China. It has hardly been seriously disputed that *Seres* approximately corresponds to the Central China of modern history (*v. infra*).

Perhaps a safer basis to take in reviewing the question of the birthplace of the silkworm is a consideration of the habitat of those forms of food which are most congenial to it. Building on this foundation Hutton holds that all forms of the domesticated mulberry-feeding insect came from the north-western tract of China, where a temperate climate favoured their development, and thence spread later to India, where they are purely exotic.

The chief exponent of the Himalayan *nidus* theory, Mr. N. G. Mookerji, admits the advisability of a temperate climate, but finds it in the Northern Himalayas, and is absolute enough to trace the silkworm to a principal home on the skirts of Mount Everest, whence they were "diffused to the "sunnier regions of the north and south \* \* \* and became entrapped as slaves to the Turanians and Aryans." The theory is poetically expressed and India is doubtless supplied with a numerous series of forms of the *Bombycidae* and *Saturnidae*; but it does not follow from this that the most conspicuous genus of the former tribe, the domestic silk moth—much less all the silk moths—is native to the Indian Peninsula. It also appears that the *Morus*, the most congenial food of that moth, never grows wild in India, nor even when cultivated takes kindly to an Indian soil.

The discussion of the point is interesting but fruitless, and all that can be said until further investigations and discoveries have been made is that the Chinese theory has

most evidence to support it. Accepting this theory as correct, the statement of Sir George Birdwood in his *Industrial Arts of India*, page 270, that "the Issidones, the inhabitants of the modern Khotan, had from the earliest ages been the chief agents in the transmission of silk from China over the Himalayas into India, and across the Pamir steppe into Western Asia and Europe" throws light on many difficulties. Following this route, it is obvious that there would have been the insuperable barrier of the Himalayas between the caravans that bore the silk from China westwards and the Indian Peninsula, and an easy clue is given both to the silence of all Indian records as to the existence of an early silk industry south of the Himalayas and to the reason why it was from China that the industry had to be introduced into Europe.

This too may supply a conjecture as to the route by which the industry came into Burma. In a paper, dated the 16th August 1870, Lieutenant-Colonel Horace Browne surmises that neither the silkworm nor the mulberry plant being indigenous in Burma, they were introduced from Assam and China at an early date along the Irrawaddy valley. There is no support for a theory that the introduction came from Siam, nor indeed any evidence that the industry was imported from China into Siam in 700 B.C., except the bare statement recorded above, and it is probable that Lieutenant-Colonel Browne's surmise will prove to be well founded. It is beyond doubt that what is now known as Burma was not included in the *Seres* or *Serica* of the ancients. Ptolemy defines the southern boundary of it as India, and leaves it fairly clear that by *Serica* is meant what is now Central China.

The following somewhat imperfect account of the industry in Burma appears in the *Cyclopædia of India* of 1873; it sheds little light on the date when the industry was first introduced:—

"Eastward of the little lake of Rangoon lies a little suburb which has received the name of Thay-bwe-chaung, or the white sand creek, from which nearly all the sand is obtained for house-building in town. In the neighbourhood of the creek, there is quite a settlement grown up of Cathays and Muneepoorians, who have been attracted from the Burmese capital to Rangoon. Many years ago in the wars which were waged between the kings of Burma and the rajahs of Assam, victory generally crowned the arms of the rulers of Ava. In those wars, the Cathays and Muneepoorians, whose territories lie on the borders of Assam, suffered greatly. Large numbers of them of both sexes were

taken prisoners and led into a condition of captivity at the Burmese capital. These people early turned their attention to different branches of industry, and among them was that of weaving silks for the use of the royal family of the kingdom. The king, queen, and all members of the royal household dress invariably in silk garments. The *putsoe* [*paso*] worn by men is silk and the *tammè* [*tamein*] worn by women is also silk. Silk fabrics formed therefore a branch of home industry, in which Burmese kings and queens and princes and nobles and ministers and officers and priests, all alike, felt an interest. Hundreds of these Muneepoorian and Cathay captives were put to weaving. All the ingenuity, skill, and tact of which the people are capable were developed in the prosecution of the art of weaving, the art of dyeing, and the blending and arrangement of colours. \* \* \* These Cathay weavers understand ornamental work, and when they can obtain silver and gold thread, such as tassels and fringes are made of in England, they are able to work them up, to blend them up with silk so as to make a very handsome pattern of an ornamental *putsoe* or *tammè*.

About a hundred of the Cathay and Muneepoorian families gradually moved down the river and took up their abode under British protection. Silk first from the Straits and China found its way into the hands of these weavers and they used it to good purpose. All their weaving is done with the hand-loom. \* \* \* The price of silk varies, but the weaver generally doubles it as the value of his work. An ornamented piece of Burmese silk is sold at from two to three rupees per cubit. The silk fabrics of Burma look coarse compared with European-manufactured articles, but they are very strong and durable."

The colony referred to at Rangoon does not now seem to exist, as the Deputy Commissioner of Rangoon Town reports that no silk is woven in his district.

The *Cathays* and *Muneepoorians* of the above extract are one and the same people, *Kathè* being the Burmese translation merely.

The path which the industry followed on its way to Burma has been touched on above. From what can be gathered there does not appear to be any ground for the assumption that the Manipuris (Burmese, *Kathè*, Cathay) did more than engage in and perhaps develop an existing industry. It is certain that they now far outnumber, in Amarapura, the pure Burman silk-weavers. Nor can the resemblance in instruments and processes employed by a certain caste in the Madura district of Southern India be adduced as anything more than a coincidence. It was in Bagyidaw *Min's* reign, *Circ.* 1822, that the Manipuri captives whose descendants are the present silk-weaving community were brought to Burma,

and it was not unnatural that, as the Burmans held the best cultivable lands, the idea should have occurred to him of employing his captives in developing the art of silk-weaving. Local tradition says that he lined off his captives—so numerous were they—along a rope of a certain height. Those who topped the rope he exiled to Bhamo, Mōng Nai (Monè), and other unhealthy places to die; those who were fortunate enough to pass beneath it he allowed to settle in the villages near the capital.

The industry was always encouraged by the Palace, for it was of silk that the most elaborate of the Court robes were woven. King Thibaw is said to have spent sixty thousand rupees yearly on silk robes for his household, and the total custom of the Palace must have been many times greater than this. In private circles too the *paso* and *tamein* took the place of the *trinkgelt* of less picturesque climates. Thus, an *akunwun* of King Thibaw is said to have given away in one year twenty-thousand rupees in this form by virtue of his office, and possibly to retain it also.

Mr. Kenny, Subdivisional Officer of Kyauksè, writes:—

“After the conquest of Assam by Alaung-paya, (1755), a large number of silk-weavers were brought down as prisoners of war to Ywa-bein and Pauk-kaung, near Prome. Here apparently the silk industry was started. After the Prome people had been thoroughly well taught, the deportees were recalled to Ava and there again started the industry, instructing the local people, who readily acquired it. From Ava the industry spread to Paleik, Ebya, Zigôn, Se-ywa and the Myit-ngè valley. The raw silk and the thread were brought first from Pauk-kaung, where the rearing of the silkworm had been introduced. Silk thread of a better quality from China took the place of the local product later, being brought down, as now, in caravans.”

Locally, each centre of the silk industry has its own account of how the industry came to it; in Taungdwingyi the weavers say that they got the art “two centuries ago” from Pwa, twenty miles to the north, and that there the industry centred in Nyaung-hmaw and spread thence along the Kyauk-myaung stream: at Shwedaung the weaving is said to have come with the colonists from Upper Burma in 1200 B.C. (1838 A.D.) In Mōng Sit there are rumours of a once-wide-spread industry, now utterly insignificant; and in the Central-Division of the Southern Shan States the domesticated worm is said to have been brought from China. Unfortunately none of these accounts is more than vague and meagre and, such as they are, they rival in discrepancy the list of the birthplaces of Homer.



## II.

## THE LOCAL DISTRIBUTION OF THE INDUSTRY.

Sericulture, at the time when Mr. Geoghegan wrote (1871-72), was carried on in the districts of Prome, Thayetmyo, Henzada, Toungoo and the northern portion of Rangoon by a class of people who lived in villages by themselves and held but little social intercourse with their neighbours; the occupation was a lucrative one, but the silk produced was of an inferior description, arising from the "vile" methods in practice in the rearing of the worms and the reeling of the silk. In 1883 the centres of the industry were still Prome, Rangoon, and the Shwe-gyin, Thayetmyo, Henzada and Toungoo districts. The system, too, had not altered noticeably, to judge from the account given of it in the *Imperial Gazetteer of India* (1881) [*v. infra.*]

The Revenue Administration Report for 1889 thus describes the industry: "Of the local industries of Lower Burma silk-weaving is the most important. It is carried on to a considerable extent in the Hanthawaddy district, where two thousand eight hundred and eighty-two persons are said to be engaged in it, and nine hundred and ninety, and two thousand nine hundred and ninety-three in two subdivisions of the Prome district. Practically all the weaving is done for local use by women, in addition to their other household duties. In the Henzada district the weaving is carried on by Mani-puris and is said to be in a flourishing condition."

This is a little sketchy, but it can be filled in from the Census Report of 1891. Statistics of the population engaged in silk-using processes before 1891 are either totally wanting or are unreliable. From this report it appears that the industry in the Hanthawaddy (Rangoon) district must have been over-estimated in 1889 or else was rapidly declining. Over the whole of Burma there were—

Silkworm rearers and cocoon gatherers...	...	3,229
Silk carders and spinners ...	...	9,724
Silk-weavers and dyers ...	...	11,660
Silk-printers and dyers ...	...	886

or a total population engaged in processes dependent on silk of twenty-four thousand nine hundred and ninety-nine persons.

The local distribution of the industry is shown by the following table, which exhibits the numbers in the eleven districts where the industry was most flourishing:—

	RANGOON.			PROME.			HENZADA.			TAVOY.			TOUNGOO.			MANDALAY.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Silkworm rearers ...	...	...	...	795	808	1,603	21	...	21	...	2	2	351	425	776	2	...	2
Caders and spinners.	...	...	...	978	1,476	2,454	...	...	...	...	...	...	...	2	2	2,117	4,704	6,821
Weavers	241	118	359	664	1,356	2,020	180	355	535	208	899	1,107	125	119	244	1,318	1,855	3,073
Printers	...	14	5	19	6	5	11	20	85	105	...	...	...	...	...	22	124	146

	SHWEDO.			LOWER CHINDWIN.			PAKOKKU.			MAGWE.			PYINMANA.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
1	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Silkworm rearers ...	2	5	7	3	67	70	13	19	32	123	151	279	193	117	310
Caders and spinners	...	...	...	12	143	155	20	98	118	...	...	...	1	1	2
Weavers	453	634	1,117	276	241	517	197	235	432	217	151	368	25	24	49
Printers	2	...	2	...	1	1	...	...	...	...	46	46	1	...	1

( 27 )

From this it appears that sericulture was chiefly carried on in Prome, Toungoo, Pyinmana and Magwe, and that almost the same number of males and females returned themselves as engaged in the occupation : carding and spinning in Mandalay and Prome, almost twice as many women as men being employed and no home-grown silk being used in Mandalay, where there was no sericulture : and weaving in Mandalay, Prome and Tavoy, where the proportion of women to men employed shows an even greater excess.

Sericulture also appears in the census returns as an auxiliary occupation. Thirty-four persons returned themselves as combining the rearing of the silkworm with cultivation, and four hundred and thirty-eight market gardeners found time to gather cocoons and feed silkworms in their leisure moments.

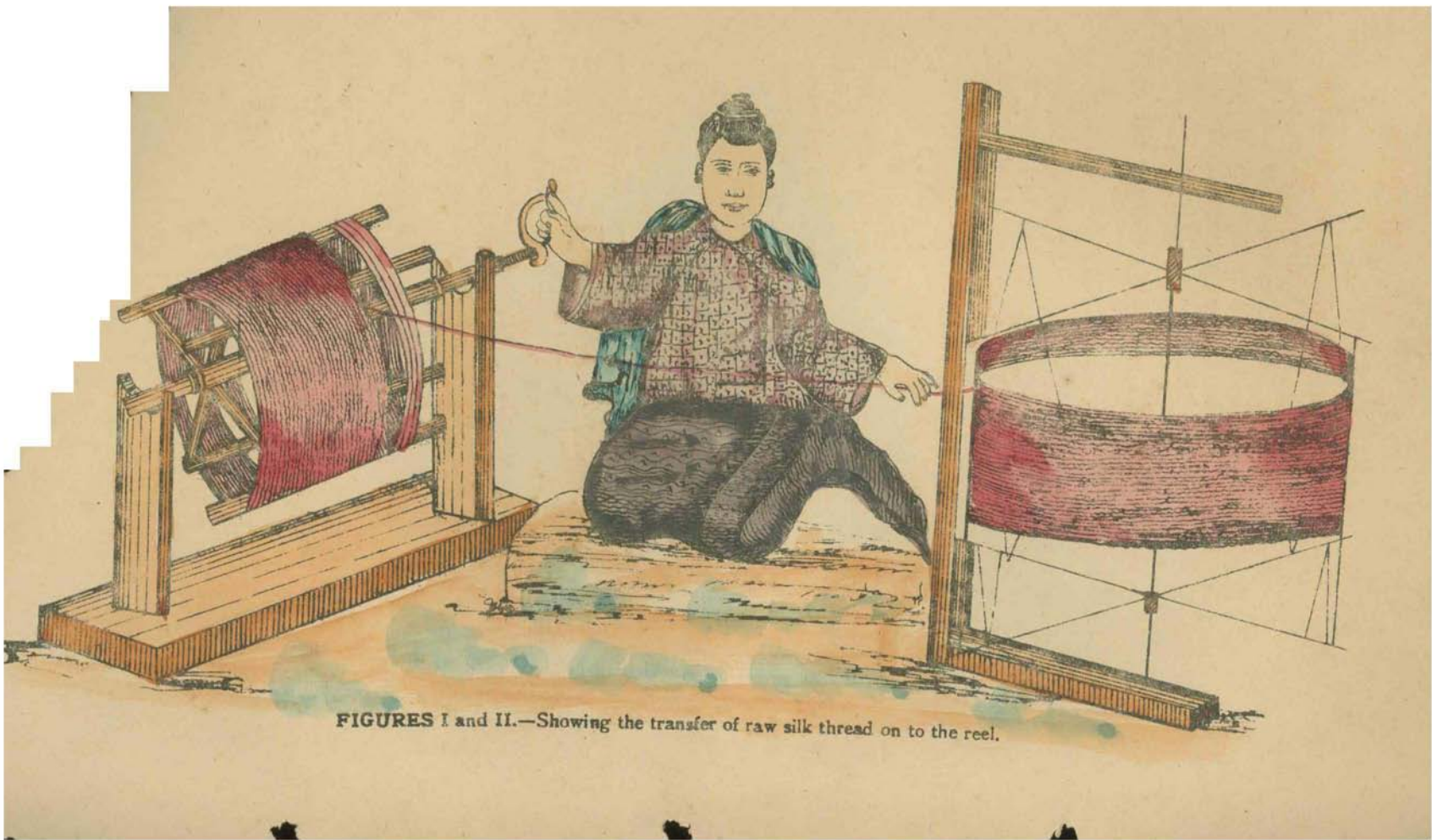
Silk and occupations in which silk is essential found employment for 32·8 per 10,000 of the whole population, and of this figure 18·7 lived in the larger towns and 14·1 in the country.

The reports sent in by District Officers for the year 1899 are incorporated below, and show the modifications the industry has undergone since the census year. It is reported that there is no silk industry in the districts of Bhamo, Pegu, Minbu, Salween, Kyaukpyu, Rangoon Town, Akyab, Ruby Mines, Pakókku, Ma-ubin, Katha, Thatôn, Meiktila, Bassein, Northern Arakan and Tharrawaddy.

*Mandalay.*—Mr. E. P. Cloney, Subdivisional Officer of Amarapura, writes :

“Silk in the raw state, spun by the *Bombyx Mori* or domesticated worm, is not and never has been obtained in the subdivision. Until about twenty years ago raw silk, as wound off the cocoons, used to be imported into Mandalay from China *via* Bhamo. It was called *talók-po* or *kingyi-po* from the huge size of the coils, which were twelve feet in circumference. [Of late years the import from Bhamo has given place to imports from the Straits (*v. tables infra.*)]

“The weaving industry is on the other hand considerable, giving employment to nine thousand two hundred and fifty-eight persons, adult and children, in the Amarapura and one hundred and forty in the Patheingyi township. Very few of these families are rich. Their occupation is sedentary and they are weakly people of poor physique. Often they keep up till midnight and they rise with the lark. To make up for their want of recreation they are passionately addicted to gambling.



FIGURES I and II.—Showing the transfer of raw silk thread on to the reel.

The children, boys and girls, are at an early age, from ten to twelve, apprenticed to skilful master-weavers, especially *acheik*-weavers. The apprentice fetches and carries and is taught his work, and when he has learnt it he works in his master's house and draws a small wage in addition to his board and lodging.

\* \* \* \* \*

Old women and little girls spin or unwind the raw silk on to the reels (*Figures 1 and 2*).

\* \* \* \* \*

The *bala* industry centres in the villages of the Shwe-gyet-yet, Ngèdo, Bôno and Amarapura town circles, and most of the *acheik* are turned out in the Banaw, Sadaw, Myittu, Einywa, Ye-gyi-bauk and Sado circles. All are woven for merchants in Mandalay. At present none of the local traders has amassed more than a small competency.

\* \* \* \* \*

The silk-weaver is to be pitied when, as in bad seasons of drought or famine, there is no demand for his products; then though wages are low and the price of rice is high, his physique unfits him for the cultivation to which another man could turn to tide him over disaster.

\* \* \* \* \*

The number of persons now engaged in silk-weaving is larger than it was in Burmese times and the tendency is still to grow, not from a natural expansion of the industry, but from the physical inability of the weavers to adapt themselves to more arduous employments.

*Sagaing*.—In Sagaing domestic silk-weaving may be seen in almost every village in Sagaing township, while in the villages of Seingôn, Thawtapan, Tagaung, Pônazu, Moza, Linzin, Asigan, and Da-we-ze the local industry exists side by side with that which aims at supplying the Mandalay market.

The silk is bought in Mandalay, the four kinds on sale there being—

Quality.	Price per viss raw.	Price per viss dyed.
Madein	Rs. 35	Rs. 39—40
Kingyi	32	39—40
Thabeik-chi	27	...
Ya-bein	25	...

Of these varieties the first two are imported from China and the last two are manufactured in Burma: the discrepancy in price is due to the superior evenness, smoothness, brightness and facility of the Chinese product. The trouble and expense of dyeing their own material lead most of the weavers to prefer the ready dyed silk.

Women are for the most part engaged in the weaving: for the industry is comparatively unimportant and, such as it is, is moribund. One of the causes co-operating with the introduction of foreign-made fabrics is that in the few cases where the male member of the family is a weaver he is usually in the hands of the money-lender, who advances him money on the security of his future turnout. The work is consequently slackly undertaken and carelessly finished and the quality and estimation of the fabric suffer proportionately.

The industry has disappeared entirely from the Myotha subdivision.

*Kyauksè.*—The industry is chiefly carried on in the villages of Paleik, Segôn, Ebya and Se-ywa of the Kyauksè subdivision, and in times past these villages contributed largely to the silk markets of Mandalay. Traders from Moulmein, Bassein and Rangoon came up yearly to make large purchases, chiefly of *lun paso* and *lun tamein*, i.e., fabrics woven in variegated colours and shot with silver and gold threads [*q.d.*, the *acheik*].

The number of persons now regularly engaged in the industry in the villages named above is—

Women	...	...	...	...	485
Men	...	...	...	...	84

The number of weavers and of looms has considerably decreased of late years, owing to the subsiding demand for Burmese-made fabrics and the fall in prices.

\* \* \* \* \*

The weaving is carried on mostly in the slack season, when there is little else for the women-folk to do.

There is no culture of the worm in Kyauksè district, all the raw silk used being imported from other places.

*Shwebo.*—In the Shwebo subdivision the manufacture is confined to the villages of North and South Chiba and of Seit-kun. The silk is bought in the rough in Mandalay. There are no local peculiarities in the plant or processes employed. \* \* In Chiba village the silk-workers number one hundred and fifty, they buy their silk in Mandalay for twenty-five rupees the

viss and work about four hundred and fifty viss in all, and make a total profit of one thousand three hundred and fifty rupees.

In Seit-kun village there are one hundred and sixty-five weavers; they buy five hundred and fifty viss of rough silk and make a total profit on the year's working of one thousand six hundred and fifty rupees.

The profit, nine or ten rupees per year per worker, would not seem to encourage a feverish development of the industry.

*Lower Chindwin.*—At Kothan in Lower Chindwin district the weaving industry is only twelve years old. Formerly the skeins, after being cleansed and dyed, were sold to weavers of the *yaw paso*, but of late there has been an inconsiderable local weaving industry, which is, however, now falling off. Most of the fabrics woven are taken for sale to Upper Chindwin district. Twenty of the two hundred households in Kothan are weavers, and each keeps three looms working on an average.

The silk is obtained in unspun skeins from retail vendors in the village, who import it from Mandalay in four qualities:—

<i>Madein.</i>		<i>Law.</i>
<i>Kingyi.</i>	•	<i>Kunhein.</i>

*Madein* silk is the first quality. It is white in colour, clean and smooth, and the coil of the skein is larger. It fetches twenty to twenty-one rupees the viss. *Kingyi* is the second quality. It is either white or yellow, and is less smooth than *madein* and the coil is not so large. Its price is eighteen to nineteen rupees the viss. *Law* and *kunhein* are the inferior qualities. *Law* silk is yellow and coarse and the coil is small: it fetches from eleven to twelve rupees the viss. *Kunhein* is coarse and white, but not so white as *madein*, and the coil is smaller than *madein* and *kingyi*: it sells for nine to eleven rupees. All these qualities are sold retail at Kothan village, at one rupee the viss above the prices quoted.

The culture of the worm is carried on in the villages of Sè-ywa-chaung, Saing-de, Ku-seik and Gwinga in the Kani township, the worm being imported from Yabein. The silk obtained locally is too coarse for use and consequently has to be mixed with foreign silk before being woven.

There are twenty-six silk traders in the township. The local fabrics are falling out of fashion and there is no prospect of a recrudescence of the industry.

*Henzāda.*—In Henzada district weaving is carried on after the ordinary fashion in Kyanzin village.

*Prome.*—Sericulture is found in the Padaung township of Prome district at the villages of Kangyi and Ywa-thaba, and in the Mudôn township at Paukkaw. The price of one sieve of cocoons varies from one rupee eight annas to five rupees, according to the quality and weight.

\* \* \* \* \*

The husband should cultivate the mulberry plants and assist generally. It is the woman's part to feed the silk-worms and wind off the silk from the cocoons.

\* \* \* \* \*

Precautions to be taken—

(1) Protect the worms from ants and flies and feed them regularly.

(2) See that no tobacco comes near them and that they are not annoyed by the smell of the trumpet fruit (*Bignonia Indica*) being cooked.

\* \* \* \* \*

The silk-breeders sell their silk to traders for sixteen to seventeen rupees the viss and the silk is retailed by them at eighteen and nineteen rupees the viss.

\* \* \* \* \*

The weavers buy the raw silk at eighteen to nineteen rupees the viss, and the dyed silk thread sells for thirty to thirty-three rupees.

\* \* \* \* \*

The best silk cloth is woven in Amarapura and the next best in Shwedaung and Kyithè, the northern and southern circles of Prome ranking next. Shwedaung town, eight miles below Prome on the right bank of the Irrawaddy river, has long been noted for its silk-weaving. Of its twelve thousand inhabitants some two-thirds are engaged in the industry. The silk used is not obtained locally. Some comes from Shwe-le in the Prome district, some from Myedè in Thayet-myo, and some from Toungoo, but probably even more at the present time is imported thread of Chinese manufacture.

The different kinds of silk used in Shwedaung and the prices that obtain for each are—

					Rs.	
Kingyi	...	...	...	...	30	} the viss.
Madein	...	...	...	...	24	
Law	...	...	...	...	15	
Yabein	...	...	...	...	22	
Thabeik	...	...	...	...	21	



The Shwedaung weavers make *paso* only and these, when wanted for *tamein* or *lóngyi*, are cut into the required sizes. The season spreads over the rainy months and at the close of the rains traders go over the whole of Lower Burma disposing of the season's turnout, to come back when the next rains break. Probably there are few parts of Lower Burma which are not thus annually visited. The Shwedaung *paso*, which was of considerable reputation up to ten or fifteen years ago, is now losing its pre-eminence: like all silk fabrics of Burmese make it is beautifully finished and practically everlasting, but the showier imported fabric is ousting it. Kyithè village, eight miles south of Shwedaung, also weaves silk, but its turnout is of inferior quality.

In spite of the considerable extent of the industry the weaving class as a whole cannot be considered prosperous: the fortunes are made by the trader who buys from the weaver and sends his agents through Lower Burma in the rains to dispose of his goods. In other cases the *entrepreneur* relation takes another form: the head of a firm keeps a large number of weavers at work in their own houses and in return for wages paid them takes and disposes of the output.

*Magwe*.—In Taungdwingyi it often happens that the mulberry leaf fails and the stock of worms dies out, usually in *Tawthalin* (September) and then eggs have to be imported. They are brought from Mindôn in the Thayetmyo district, the sales taking place in *Tabawng* (March), *Waso* (July) and *Thadingyut* (October).

\* \* \* \* \*

The culture is carried on by about one hundred families living in the villages of six circles that border on Forest Reserves. The number has greatly diminished of late years, for other reasons than the general one of depression in the local weaving industry. Much of the land on which the mulberry was formerly grown now falls within forest reserves, and the forest rules restrict the practise of *ya* cultivation there. The mulberry was formerly grown on these cultivated uplands, and reservation has considerably curtailed the area within which it can be planted.

There is little prospect of the culture expanding, nor will there be much call for expansion until the demand for the Burmese-made fabric revives.

\* \* \* \* \*

From six to ten *sagaws* (trays) of worms yield a viss of silk, which sells at from twelve to fifteen rupees. The refuse silk also finds a market and sells for about ten rupees the viss. Most of the raw silk is brought into Taungdwingyi as produced, the purchasers being for the most part the women weavers of the Maungdaing quarter, which boasted once fifty or sixty looms. Then nearly every house included one among its furniture. The Maungdaing silks (*Maungdaingzin*) had at that time a considerable local reputation. Now, however, the use of foreign-made fabrics has lessened the demand for them, and there are twenty looms only.

*Yamèthin*.—Maung Tun Ôn, *Akunwun* of Yamèthin, writes :—

“Silk is worked at the villages of Chaungzû, Thapetchaung, Swedaw-myaung, Pedônmyaung and Myogôn in the Lewè township and at Kyaukmyaung in the Yamèthin township. The worm reared at the first five of these villages is said to have come from Kanyinmaw in Magwe district, whilst Myogôn cultivates a worm whose progeners were brought from the Shan States, where it is sold at one rupee for six hundred *pupæ* in *Kasôn* (May) and *Nayôn* (June).

“ \* \* \* \* \*

“Not much silk is worked and no weaving is done except in a very few villages.

“The worms cannot be preserved throughout the year owing to the falling off of the mulberry leaves in *Tabaung* (March) and *Tagu* (April) for want of water. For these reasons, as well as for the restrictions placed on the cultivation of the mulberry by the proximity of reserved forests, there is no prospect of a development of the industry.”

\* \* \* \* \*

The names of the two varieties of worm are not specified, but they would probably be sub-species of the *Bombyx Mori*.

*Toungoo*.—In *Toungoo* the rearing of the worm is carried on in some villages by Yabeins and Karens, but large numbers of the breeders are now taking to cultivation instead, as the free import of European silk of recent years has narrowed the local industry. In fact there is no regular local industry. The silk produced is exported to Prome for the most part.

\* \* \* \* \*

The reeler, who is usually a woman, can reel some ten cicals of silk in a day : three hundred persons are employed in the ~~rearing~~ *rearing* of raw silk and their outturn is estimated at one

thousand five hundred viss. This is made up into skeins on a *yahat* and is then ready for the market, where it is sold at fifteen rupees the viss to the weavers.

*Upper Chindwin.*—In the Kabaw township of Upper Chindwin district some nine persons breed the silkworm. The process is identical with that described at page 412 of the *British Burma Gazetteer*. The silk obtained is coarse and inferior and is made up into fabrics for local consumption only.

*Thayetmyo.*—One village in the Thayetmyo subdivision, Tanyin-hmaw, cultivates the worm, and weaving is carried on, not extensively, at a few other places.

*Sandoway.*—Up to about ten years ago silkworms were bred and silk locally manufactured in the Southern township of Sandoway district, in the Gwachaungbya and Satthabya circles. The industry has now died out and there is no silk locally manufactured \* \* \*. Very little silk-weaving is done either: such silk as is needed for the looms is bought in the rough in Rangoon and then dyed with aniline dyes, which have, like imported silk fabrics, stifled the home product.

*The Shan States.*—In the Central Division of the Southern Shan States the culture of the mulberry-feeding domesticated worm is confined to a few isolated villages of Yinlaws on the higher hill slopes of Lai Hka and Mōng Kang. The breeding is carried on in a careless, slovenly and unsystematic manner, usually in the dwelling-room of the breeder, and the silk is naturally of an inferior quality. The winding off of the silk from the cocoon is equally carelessly done and the already bad thread is made even worse. Hence the outturn is totally unfit for export.

The articles woven are nevertheless much more durable than the showy fabric of foreign make. More careful supervision throughout each process, better feeding of the silkworms, more attentive liberation of the silk from the cocoon would produce a much better article than can be expected under the present destructive conditions. \* \* \* The outturn is scanty and does not meet the local demand, and silk is consequently imported from China, Siam and Burma.

Weaving is carried on with the silk thus imported in the villages round the Inle lake in Yawng Hwe State. The occupation is usually subsidiary, very few families supporting themselves exclusively by it. As a rule the household looks to its loom to supply

its members with clothes for their personal use and does not think of exporting. The instruments employed are identical with those in use in Burma. \* \* \*

No development of the industry is to be expected. The raw silk of home growth is no cheaper than the imported silk: the fabrics made from it cannot compete in attractiveness with imported silks; and the sericulturist is an object of too great aversion to his neighbours to make the calling popular. He lives with a little colony of his fellows in some isolated village and has no inducement to improve on his present stupid methods. \* \* \* The foreign-made fabric is also sold more cheaply than the Burmese in the local market, so that unless a compensating foreign market can be found for the Burmese fabric, the industry here as in other parts of Burma may be considered doomed.

In the Eastern Division, from the Nam Pawn to the Salween, no pure silk fabrics are manufactured, though some silk is used in the manufacture of the *Hpa Ho* (an account of which is given later).

Sericulture is carried on to a small extent in the Eastern circles of Mōng Sit and in the Southern circles of Lai Hka. The industry is confined to the Yang Sek (*Burmese*, Yin Sit), who inhabit these localities. None of the silk produced is used locally. It is usually taken in small quantities to the Pang Lōng bazaar in Lai Hka and there sold to traders from the Western States, Yawng Hwe and other places: one rupee is the price paid for seven rupees weight of the silk, which is coarse, uneven and rough, though it is said to be strong and to last well.

\* \* \* \* \*

From the extracts put together above it is clear that the local silk-weaving industry is disappearing. In Hanthawaddy and Henzada the disappearance is most marked. In no case is the forecast favourable. The causes of this have been incidentally mentioned here and will be treated of later.

### III.

#### THEN SILKWORMS OF BURMA.

Neglecting varieties which are not reared in large quantities it may be said that the silk crop of Europe is got from a worm which thrives in a temperate climate, requires cold for the hatching of its eggs, and produces but one crop of cocoons in the year, these cocoons, however, containing a large amount of silk, which can be easily reeled. In Burma, and in India

generally, on the contrary, the silk crop is produced by smaller varieties, which thrive in sub-tropical climates, do not require cold for the hatching of their eggs, and produce each year several crops of cocoons : these contain a comparatively small amount of silk, in quality perhaps equal to that produced by the European worm, but so loosely wound upon the cocoon that it is almost impossible in reeling it off to prevent entanglement and thus to produce a thread equal in value to the thread easily obtained from the European variety.

For facility of classification the whole body of silk-producing worms is divided into two classes :—

- (1) Domesticated or mulberry-feeding.
- (2) Wild or non-mulberry-feeding, feeding for the most part on the leaves of trees and plants that grow within the jungle.

The term 'wild' is used more in a commercial than a literal sense, for many of the second class, though they do not feed on the mulberry, yet, like the *tusser*, have been for many centuries domesticated in India and China. In Burma each of these classes is exemplified, but three species only are of importance enough to demand detailed consideration.

These are, of (1)—

(i) the *Bombyx Arracanensis*, or *Ngapaw*.  
and of (2)—

(ii) the *Cricula Trifenestrata*.

(iii) the *Attacus Atlas*.

(i) The *Bombyx Arracanensis*, one of the numerous sub-species of the *Bombyx Mori*, the source of the silk of commerce, is a multivoltine silkworm, or one which goes through many generations in the year, and it may be doubtfully regarded as distinct from the *desi* and *Madrassi*-races of Bengal. It is the peculiar form bred in Burma and hence got its specific name, which was assigned by Captain Hutton. It is said to have been introduced from China. One of the earliest notices regarding it is found in the *Journal of the Agricultural Horticultural Society of India* for 1850. Lieutenant Fytche forwarded samples, together with an interesting note on the methods of breeding and manufacture pursued in Sandoway. He alluded to a former sample which had been communicated in 1847. These samples seem to have excited some attention, owing to the cocoons being larger than those of Bengal, but interest on the subject appears to have died out until Hutt<sup>14</sup>

re-awakened it. An account of the insect appears in the comprehensive pamphlet on the *Silks of British Burma* compiled by Mr. R. A. Manuel in 1884. He says:—

“ The domesticated silkworm of British Burma was named by Captain Hutton, who believed it to be a species distinct from any of those domesticated in Bengal.

\* \* \* \* \*

“ Silk-growing is a profitable occupation in this province; nevertheless it is not followed largely.”

\* \* \* \* \*

“ The industry has its chief seats at Tharrawaddy, Prome, Thayetmyo and Toungoo. Spinners and weavers of silk are found in other places, as in Henzada, Shwegyin, Tayoy and Mergui, but the occupation of breeding, with few exceptions, is confined to the higher latitudes of the country, on the slopes of the Pegu and Arakan *Yomas*.

“ The chief food-plants are the red and white mulberry, the latter being preferred. The Agricultural Department has lately introduced the Philippine variety, which seems likely to be an improvement upon the white.

Food.

“ The local worm is multivoltine, and completes its cycle of existence in from 32 to 43 days. The length of the cycle, however, depends on the season of the year; it is longer in the cool weather and shorter during the warm; the silk yield of the cool weather is, however, finer than at other times. The average weight of a single fresh cocoon is twelve grains, and the seeds, as the eggs are commercially termed, are sold in the bazaar.”

\* \* \* \* \*

“ The extent of European enterprise is *nil*, and there are practically no exports of it. Yet imports of raw silk by sea and land for the three official years ending 1879-80 averaged annually nearly twelve lakhs of rupees, while the value of the imports of manufactured silks during the same time was about fifty lakhs of rupees. \* \* \* These figures will show what room there is for capital and enterprise, \*

\* and the vile treatment to which the worm is subjected what room there is for improvement in the processes. The usual reeled thread represents from eighteen to twenty-five filaments taken together: it is no wonder the produce is pronounced coarse and harsh. Very different would be the result if five instead of twenty-five filaments were used and better machinery brought into play. Samples of thread reeled with only ‘five brin’ have been pronounced equal to the best Chinese crops. With better treatment of the worms, better cultivation of the trees, and better apparatus for reeling, the produce of the domesticated worm of Burma is capable of very much better use than that to which it is now put.”

M. Randot gives five generations as peculiar to this insect, no rearing taking place between the 16th January and the 22nd June. The fibre is, he says, about 22·9 thousandths of a millimetre in thickness, its tenacity 6·56 grammes, and its elasticity 17 per cent.

The larvæ which are preserved for purposes of breeding turn into moths in due time, and come out of the cocoons about a week after spinning. The males and females are put into *sagaws*, in which they pair. After the males leave the females the latter are put into *gwe*, or bins, made out of the fronds of the toddy palm. The female moths lay their eggs in the space of twenty-four hours, and are then thrown away. About thirty-five moths are put in each bin, and ten bins may be bought for a rupee.

Mr. Liotard, in his *Memorandum on Silk in India, 1883*, gives the following particulars regarding a sample of Burmese silk, doubtless produced by the *Bombyx Arracaneensis* :—

“From samples of raw silk of the Prome district received by the Government of India in the early part of 1882, there was certainly no improvement apparent. The samples were transmitted to the Secretary of State and were reported upon by Messrs. Durant and Co., Silk Brokers of London, thus :—

“We are not able to give you a very encouraging report on the samples : (1) the thread is very imperfect, being uneven, gouty, and knobby ; (2) the length of reel (*i.e.*, the circumference of the skein) is too large for any machinery now in use in this country, and if such did exist it is doubtful if any employment could be found for silk so defective in all respects. There being no market here for such silks, it is difficult to give anything like an accurate quotation of the value : but if a market could be found in Marseilles, where there is an outlet for ‘*dapioni*’ of Italy and France, with which it might compete (at a distance), the value would be about seven shillings per pound.

“So far as we can judge, we are inclined to think favourably of the nature and quality of the cocoon : and if technical skill was brought to bear so that the temperature of the water, the laying of the thread on the reel, and some minor points in the manipulation of the cocoon could be accurately determined, the silk produced from such cocoons as the samples indicate would, we think, compete successfully with that of Bengal, as also with that produced in some of the north-west provinces of China.”

“The accuracy or otherwise of this opinion could, however, be determined only by testing the cocoons ; and Messrs. Durant and Co. accordingly asked for a few pounds of the cocoons, which they would get tried by a French or Italian reeler, and also for information as to the quantity of silk produced in a season. Their request was communicated to the Chief Commissioner of the province for compliance, but does not seem to have been complied with yet ; some difficulty at first arose in obtaining and desiccating good specimens ; then a larger plan was conceived of sending samples in pretty good quantities to several persons and firms in England, ~~France and~~

but ultimately nothing was done, apparently because of the expenditure that would be involved.

(ii) The *Cricula Trifenestrata*.—One of the earliest notices of this silk in Burma is that of Captain T. C. Houghton, who forwarded samples of the cocoons to the Agri-Horticultural Society of India in 1856. They were then regarded as useless. Helfer had described the insect some time before, but its existence in Burma was not definitely established till the receipt of Captain Houghton's samples.

Manuel furnished the following account of the worm in 1884 :—

“Among domesticated or *wild silk* spinners, although a number are to be met with in all three divisions of the province, the most notorious and the most extensively spread is the *Cricula fenestrata* or mango silk-worm, called by the natives the *thayetpo* because it is usually met with on the mango or *thayet* tree.”

So great are the ravages committed on this fruit tree by these insects that they have been known to denude a large tree of its leaves in a single night. The insect is also met with in India, where it is known as the Malda silkworm, but there its cocoon is so much reticulated and the silk so scanty and so loaded with gum that it is only sparingly used, and that to adulterate eria silk.

Captain Houghton mentions it as being found in Moutmein feeding on the cashew-nut, and Mr. Moore has identified it as the *Cricula trifenestrata*. The *raison d'être* of the specific name may be gathered from the description of the wings of the moth given by a writer in one of the earlier numbers of the *Journal of the Asiatic Society: Alis superioribus ad marginem externam fenestrâ tribus transparentibus*. As a matter of fact, the worm is to be met with all over the country and consumes the leaves of many more plants than the mango, as will be seen from the list given in a later chapter.

Dr. Mason, in his *Burma*, gives this most common worm only passing notice, saying—“The Malda silkworm, the cocoons of which are mixed with those of the eria silkworm, is found on the mango tree.”

The worm is multivoltine, working all the year round, though most extensively and vigorously during the rains. The cycle of its existence is from fifty-five to sixty-two days :—

			Days.
In the egg state	...	...	8 to 10
In the worm state	...	...	25 to 27
In the cocoon state	...	...	20 to 22
In the moth state	...	...	2 to 3
Total	...	...	<u>55 to 62</u>

The length of the cycle depends on the time of the year, the worms attaining a larger size and spinning a better cocoon during the rains



The cocoon is a little over one-and-a-half inches long by three-quarters of an inch in its broadest part. It tapers to a point at both ends, where it is open : hence the moth escapes without leaving any trace behind of its exit as with the tusser. But, just as with the tusser, the approach of the time for its exit may be known by the appearance of a dark, moist spot at one end of the cocoon. The weight of an ordinary cocoon is 20 grains with the chrysalis and 3·5 grains without it.

The worm is of a wild nature and never does well in the house,

Cultivation. however slight the restraint. The best way to rear it is to leave it alone on one of its many food plants. It is gregarious and does not wander much, and neither sun, wind, nor rain affects it in the least ; on the contrary, the more open it is kept, the more its condition approaches its wild state, and the better it thrives and spins. Under this head therefore all that will be related is the result of observations of the insect's habits and ways in its larva state in semi-domestication.

The ova are laid in irregular patches and are minute ; in colour white, and in shape like a miniature hen's egg, having one end broader than the other. The female lays from two hundred to two hundred and fifty eggs, and thirty-two of the fertilized ova weigh one grain. Shortly after laying, the ova pit in the centre and, as the time for emergence of the worm approaches, become first yellow, then light orange, then dark slate, until, a day previous to the cracking of the shell, a dark spot appears, oftener nearer the broader than the narrower end. Next the shell cracks and breaks, and the shiny, dark-brown head of the young worm appears. Soon it wriggles out of its shell and begins life by nibbling at it. It then remains quiet for a few hours before attacking the leaf. During all their larval state the worms are gregarious : they feed in rows or clusters, move in batches from place to place in search of food, and when the time comes they spin their cocoons in masses, frequently overlaying one another and invariably overlapping each other at the ends.

On emergence the worms are one-eighth of an inch in length, of a light yellow or ochrish colour, with two rows of dark-brown spots (tubercles) ending in brown hairs, two spots on each segment of the body, and one big dark-brown spot on the penultimate segment, that is, the one just before the anal segment. The head is dark polished brown, almost black, with a fringe of yellow advancing hairs just behind it, like a lady's lace collar of Elizabethan days. Behind this collar two brown crescent-like markings appear, concave towards the head. The first moult occurs in five or six days, after that there are four other moults, every five days. At the end of the moults the worms, if healthy, are fully four inches long, hairy, gaudy creatures, their prevailing colour being a rich maroon with bands of black and yellow, with tubercles having erect hairs surrounding their base, and one occupying the centre ; and the prolegs have brown markings at their joints. The cocoons are completed in from thirty-six to forty-eight hours, and in two or three days, after disappearing from sight in their silken envelopes, the last metamorphosis is completed and the insect becomes a light-brown chrysalis, in which condition

rests from twenty to twenty-two days before leaving its confinement as a brown moth, having an expanse of wing of from two-and-half to three inches, with three glass windows on its superior and one small one on each of its lower wings. They pair the very night of their emergence, though some eight or ten hours after. The males desert the females at early dawn, and then the females remain quiet all day, though beginning to lay their eggs almost as soon as the males have quitted them.

In consequence of the very irregular manner in which the insect lays the fibres of its cocoon, and also on account of the quality of the gum with which it loads its silk, the cocoons, though very handsome in appearance, looking like beaten gold, are very difficult to reel. In fact all attempts to reel them have hitherto proved failures. The only use they can be put to is the manufacture of "waste" or floss, from which silk may be spun. And very fine floss the cocoon does yield, so fine that English and Continental manufacturers are ready to purchase it for all purposes of spun silk. The threads are glossy, long, and fine, about one-half finer than tusser, and about half as coarse again as the local mulberry silk. A great future awaits this silk, as, in consequence of improvements in modern spinning machinery, a large demand exists for all kinds of silk which can be carded and spun. The eria of Assam is woven into cloths of great strength and durability from yarn spun out of its waste, and there really is no reason why the silk of the *Cricula* of Burma should not be utilized in the same way as eria. The fibres under a microscope of low power appear beautifully transparent and round, unlike tusser, and thus capable of taking the dyes which tusser refuses. Made into waste, the colour of the silk is of a light yellow ochre, which, however, can be easily discharged and the fibre made quite white.

On the other hand it is said that the silk irritates the skin of the wearer, owing to the qualities of the caterpillar's hairs, which are liable to get spun up with it. But this defect would be removed if improved processes were adopted, and the industry, to judge by the accounts of all who have studied it, promises a rich harvest.

The worm is said to be so abundant in Burma that the cocoons rot in the jungle for want of gathering.

(iii) The *Attacus Atlas*, Linn.—This moth is well known on account of its great size, some of the specimens in the Indian Museum being more than ten inches across from tip to tip of wings. It is common on the slopes of hill ranges all over India and Burma and, according to Gosse, ranges in South-Eastern Asia over 35° of latitude and 55° of longitude, being abundant in China and scattered over the whole of the Malay Archipelago.

The life history of the insect has been fully described by Gosse (*Entomologist* XII, page 25), Manuel (*Journal of the*

*Agri-Horticultural Society, India, N. S.*, Volume VII, page 291) and by Brownlow (*Journal of the Agri-Horticultural Society, India, N. S.*, Volume V, page 183).

According to Manuel the insect spins once a year in its natural state, though in domestication in Burma it will spin twice or even three times—once at the commencement of the rains, once during the rains and again at the close of the rains, the best cocoons being those formed towards the beginning of the cold weather. The cycle of its existence is from eighty-one days to eight or nine months.

The female moth is very sluggish and seldom flies; the male, which has a powerful flight, usually seeking her out and fertilizing her as she clings to the cocoon from which she has emerged; for this purpose the male is furnished with some sense, probably of smell, which enables him to find the female unerringly, however thick the foliage in which she is concealed. After fertilization the female lays about three hundred eggs, in masses which are firmly gummed on to the under surface of the leaves upon which the caterpillars afterwards feed. The eggs are ovular in shape, about 0.08 of an inch in diameter, in colour greenish-white, with brownish purple clouding which readily washes off.

They hatch about a week after being laid, and the caterpillars which emerge are generally indolent and solitary in their habits, seldom wandering to any distance from their birth-place, unless driven by scarcity of food. When first hatched they are little dark-coloured creatures about a third of an inch in length and covered with hairy tubercles. They grow rapidly, however, and after the first moult become lighter in colour and are soon covered with a dense, white, flour-like secretion which accumulates upon them after each moult. After passing some twenty days as caterpillars, and moulting about five times, they are full grown and ready to spin themselves up into their cocoons; very many, however, fall victims before they reach this stage to the ants, wasps and other foes which are always on the look-out for them. When the caterpillars leave off feeding, preparatory to spinning, they are sometimes as much as five inches in length by an inch in diameter, but they contract considerably before actually commencing their cocoons.

The cocoon is spun in the usual manner and is so closely enveloped in the leaves of the food plant that, when it is torn away, permanent impressions showing the shape and neuraction of the leaves are left upon the silk. The cocoon is

generally drab coloured, from two to three inches long by an inch in diameter ; it is irregular in shape, with thin firm walls, which are scarcely at all silky in appearance except at the upper extremity, where there is natural orifice for the exit of the moth. This orifice is formed as in the cocoons of other *Saturnidæ* by the convergence of a great number of silken fibres, which are left ungummed and are therefore soft and flossy, opposing an almost impenetrable hedge to any animal which tries to force its way into the cocoon, but opening readily when pushed aside by the moth which emerges from within. The moth thus effects its escape with hardly any perceptible disarrangement of the fibres, which close together again behind it. The stiff, gummed, parchment-like wall of the cocoon passes upon one side of the orifice, so as to form a cord which is firmly wrapped around the twig from which the cocoon hangs, thus securing it from mishap in case the leaves in which it is wrapped become detached. The cocoon contains a large amount of thick, strong silk, which cannot indeed be reeled easily enough to make it worth doing, but which would have a considerable market value for carding and spinning purposes, if large quantities could be obtained ; it is said that some of these cocoons have been collected in Burma and exported to England for this purpose, while attempts have also been made to domesticate the insect in China, but upon the whole experts seem to be agreed that there is no chance of the *Atlas* silk competing successfully with that of such species as the tusser, which can be obtained so much more easily.

Manuel, writing of the capabilities of the silk of the *Atlas* moth, notices the difficulty of freeing the filaments of silk from their position in the cocoon. Captain Hutton pronounced the silk to be decidedly good, and Dr. Chavannes of Lausanne considered its introduction into France desirable. The fibre is softer and finer than tusser. The "waste" or floss is easily prepared, and the dark brown umber or drab colour is easily discharged. Like tusser, however, the fibres are flat and will not take all dyes. The uses to which tusser is put are suited to *Atlas* silk, and China annually exports large quantities of *Atlas*-waste to the European market.

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[(iv) The tusser silkworm, the most important of the silk-producing 'wild' varieties (*Antheræa mylitta*, *Antheræa papahia*; *et all.*) is said to be found in Burma, but no detailed account of it has yet been given.]

These accounts of the silkworms of Burma show that any of the first three varieties might be profitably reared, and further that the methods at present in use are capable of considerable improvement. There is no climatic bar to the culture of any of the worms. The natural conditions that best suit them, a mild equable climate, an atmosphere free from an excess of moisture or heat, abundance of pure fresh air, are to be found in some districts of Burma, and would appear to be satisfied over a great part of the Shan States, where silk culture at present can hardly be said to exist at all. If rearing-houses were employed the conditions might be secured invariably. The additional points of practical importance in which the present domestic industry is most found wanting are (1) the provision of sufficient space for the worms to avoid overcrowding; (2) cleanliness in the treatment of them; and (3) the supply of fresh and suitable mulberry leaves.

In Burma, as in Bengal, the mulberry could be persuaded to yield several crops of leaves in the year. A multivoltine silkworm, therefore, one which could go through many generations in the course of the year, would best suit the requirements of the country. Crosses between the European univoltine and the tropical multivoltine varieties have been tried in India, but never with success as the cocoon degenerates rapidly, and there is no reason to suppose that the experiment of crossing would have a different result in Burma.

*Table of the diameter, strength, and tension of a single fibre, and dimensions of cocoon of the chief silks of Burma. (Taken from Mr. T. Wardle's Wild Silks of India).*

	DIAMETER IN FRACTIONS OF AN INCH.		TENSION OR LIMIT OF STRENGTH BEFORE BREAKING IN INCHES OF SINGLE FIBRE ONE FOOT LONG.		STRENGTH OF SINGLE FIBRE IN DRAMS AVOIRDUPOIS.		Dimensions of cocoons in inches.
	Outside of cocoon.	Inner part of cocoon.	Outside of cocoon.	Inner part of cocoon.	Outside of cocoon.	Inner part of cocoon.	
<i>Bombyx mori</i> of India ( <i>Mulberry-fed silk</i> ).	$\frac{1}{2,000}$	$\frac{1}{2,200}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2} \times \frac{1}{2}$
<i>Antheræa mylitta</i> ( <i>tusser</i> ).	$\frac{1}{770}$	$\frac{1}{710}$	1	1	7	8	$1\frac{1}{2} \times \frac{1}{2}$
<i>Attacus Atlas</i> ...	$\frac{1}{1,320}$	$\frac{1}{1,000}$	1	$1\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2} \times \frac{1}{2}$
<i>Cricula trifenestrata</i> .	...	$\frac{1}{830}$	...	...	...	...	$2\frac{1}{2} \times \frac{1}{2}$

## IV.

THE FOOD OF THE SILKWORM. THE MULBERRY AND ITS  
SUBSTITUTES.

The mulberry, the food of the *Bombyx Arracanensis*, is not indigenous in Burma. Indeed, it seems to be indigenous in no part of the Indian peninsula, nor can it be said even to grow 'wild' in any part, so purely exotic is it. Wherever it is met with in one of its many sub-species, there is always the proximity of human habitation to account for its presence. The question of the easiest method of developing sericulture is thus considerably hampered at the outset.

In Burma the red and the white varieties are principally cultivated, the latter, the *Morus laevigata*, flowering from November to March and fruiting from March to May, being preferred. [M. Liotard, writing in 1883, says that the black-fruited *Morus Indica* (v. m. *parviflora*) is most grown in Burma.] Kurz in his *Forest Flora of British Burma* mentions these two species of *morus* only as growing in Burma, and says that the *Morus Indica* is nowhere found really wild.

The cultivation of the mulberry has never received attention from the authorities, and the methods in use in the districts where sericulture is carried on are haphazard and oftenest unsuccessful. From the district reports it appears that the mulberry (*posa-bin*) is cultivated in Taungdwingyi township of Magwe district, exclusively for the food of the silkworm. It is planted from cuttings in *Wazo* (July) to *Tazaungmón* (November). The soil chosen is *nón-myé*, which occurs near streams. The jungle growth is burnt and the soil is turned up with spades; it is not ploughed. The cuttings are then laid down, and in a year's time the plants are four or five feet in height. After the first year the leaves are plucked as required, the most abundant leafage showing in March, August and November. In the remaining months there is only sufficient leaf to keep up the stock of worms from one year to the next. The *posakin* (plantation) lives for from two to four years, according to the nature of the soil. The constant stripping of the leaf rapidly weakens the plant, and after four years at the most a fresh clearing must be put in hand and new cuttings laid down.

As has been already noticed the plants often fail and the worms consequently die, usually in *Tawthalin* (September),

whilst the encroachment of Forest Reserves on lands which used to be planted out as mulberry nurseries still further impedes the culture.

In the Thayetmyo township of the district of that name silk is produced at one village only, Tan-yin-hmaw. At no other village, however, near to Tan-yin-hmaw, is the tree perennial. The silkworms necessarily die when their food-supply fails, and the Burman shrinks from continuing the culture of the worms with the certainty of incurring the guilt of taking life if he does so. The silkworms of Tan-yin-hmaw will not thrive when taken away from their own village, nor will silkworms imported from other villages thrive there. The Subdivisional Officer of Thayetmyo cannot account for this insularity on the part of the Tan-yin-hmaw worm.

In Yamèthin (*v. supra*) the mulberry leaves fall off in the months of *Tabaung* (March) and *Tagu* (April) for want of water. For this reason sericulture is not a permanent industry there. The mulberry is cultivated from cuttings along the beds of streams and in *taungyas* (upland clearings) on the hill side. The young trees are cut down every year and fresh cuttings planted, as the plants bear most leaves when young. If allowed to grow to size, their leafage diminishes. And in the hot season the leaves fall off. The proximity of the villages engaged in the culture to Forest Reserves also restricts the cultivation.

\* \* \* \* \*

In the Padaung township of Prome district culture is not carried on from March to June, owing to the scarcity of mulberry plants.

\* \* \* \* \*

No details of any peculiarities accompanying the growth of the mulberry in the other centres of sericulture in Burma (Toungoo, Lower Chindwin and the Shan States) are available.

Mr. R. A. Manuel writes in 1884: "Lately the Agricultural Department has introduced the Philippine variety (*Morus multicaulis*). - There is no doubt, if breeders can be induced to take it, that the silk industry will be largely benefited by such a step. The Philippine mulberry is a hardy plant and will suit the native breeders admirably, because it not only stands a good deal of rough treatment, but is also adapted to a variety of soils, is not inclined to grow into trees, and flushes

“earlier than other kinds. It puts forth many flexible shoots with a rapid growth of both stalks and leaves, making the gathering of the latter easy to women and children.” “In times of scarcity the natives use the leaves of the *Brouson-nettia papyrifera*, a plant of the same natural order as the mulberry, to feed the worms, just as in England they use the lettuce and in America the Osage orange. But the silk of worms fed on these substitutes is never so good as that of those fed on the mulberry.”

In weighing the usefulness of any variety of mulberry for the rearing of silkworms, the following points need consideration—

- (a) The time at which the new leaf unfolds.
- (b) The effects of the soil and climate on the quality of the leaves as food.

The second point is of importance, for where the leaf unfolds only in late spring the worm has to be fed in the hot season and is liable to become debilitated, whilst, if the unfolding is earlier, the rearing can be completed before the great heat declares itself.

The effects of soil and climate are also important. A tree may be luxuriant and afford ample nourishment to the worm, but not of the right kind, of the kind, that is, which is rich in silk-yielding ingredients. Of the constituents of the mulberry leaf it is the resinous matter which goes to fill the silk sack of the silkworm, and the proportion in the leaf of this matter needs careful consideration.

Count Dandolo thinks that “the best mulberry leaf, no matter of what variety, is that which is called ‘double’; it is small, not very succulent, dark-green, shiny, and contains little water.”

It was from considerations of this nature that the *Morus multicaulis* was introduced into India. No information, however, is available as to its progress in Burma.

\* \* \* \* \*  
The mulberry can be propagated by seed, by budding, by cuttings, by grafting, and by layers. Cuttings, except with the *multicaulis* variety, are less prompt and sure than seed-sowing or budding. \* \* \*

The mulberry grows in all soils, but its vegetation is more or less vigorous and excellent in each. It only refuses to grow in marshy lands, in too calcareous, too superficial and consequently too dry lands. It allows the use of arid pebbly slopes (not of course situated on continuous rock). Its produce there



is not abundant, but of excellent quality. In rich fresh deep soils its leaf is too watery.

\* \* \* \* \*

Cuttings should be planted in any good soil, having no excess of clay or chalk; a mixture of gravel and sand is desirable.

\* \* \* \* \*

The trees should be at least three years old before being denuded of leaf.

\* \* \* \* \*

Mr. Lepper says : " Sixty-five seers of leaf may be had from each tree per annum in a plantation of twelve feet by twelve feet distance; deducting fifteen seers for wastage, this leaves a net supply of fifty seers. One ounce of eggs would require twenty-six maunds of leaf; thus one acre of plantation would produce about twelve maunds of green cocoons, value Rs. 30 per maund, or Rs. 360 per acre."

The following are amongst the plants on which the *Cricula trifenestrata* worm is most commonly found :—

- (1) *Mangifera Indica* (Burmese, *thayet*; English, mango).—Frequent in the tropical  
 Its substitutes : go).—Frequent in the tropical  
 (11) The food of and lower mixed forests all over  
 the *Cricula*. Burma from Arakan and Pegu  
 down to Tenasserim and the Andamans; also  
 generally cultivated all over the country.
- (2) *Semicarpus Panduratus* (English, cashew-nut).—Frequent in the upper and mixed forests all over Pegu and Martaban.
- (3) *Eugenia fruticosa* (Burmese, *thabye-ni*).—A tree frequent in the open, especially the *in* forests along the eastern slopes of the Pegu Yoma and from Martaban down to Tenasserim.
- (4) *Eugenia jambolana* (Burmese, *thabye hpyu*).—A large tree, frequent all over Burma in all kinds of leaf-shedding forests, but chiefly in the mixed forests. The bark is good for purposes of tanning.
- (5) *Tetranthera laurifolia* (Burmese, *ón lón*: the Burmese name is common to all species of this genus). *T. laurifolia* is a large tree, sometimes sixty feet high, frequent in all the moister forests all over the country. A glabrescent variety exists in the *in* forests of Prome, but the tree may be said to become pubescent, or glabrous, according to

situation ; in the moisture parts the leaves and even the peduncles are pubescent or downy, while in the drier parts, as about Prome, they are glabrous or shiny.

- (6) *Grewia microcos* (Burmese, *myatya* ; English, monkey berry).—A plant usually of a large size, and like a tree when full grown, but overrunning the country for miles in its shrubby state, only a few feet high. Frequent all over Burma from Chittagong and Ava down to Tenasserim, in all the mixed forests, particularly the lower ones.
- (7) *Careya arboria* (Burmese, *ban-bwe*).—A very common plant, the leaves and bark possessing the strange property of keeping salt dry in the rains, and used for this purpose by the natives. To be met with in all the leaf-shedding forests, especially in the open dry, lower mixed and savannah forests all over Burma, from Pegu and Martaban down to Tenasserim.
- (8) *Pterospermum semisagittatum* (Burmese, *ne ye*).—Frequent, with its large white flowers on short rusty tomentose pedicles, in the mixed and dry forests all over Burma, from Chittagong and Ava down to Tenasserim.

The food plants of the *Attacus atlas* are very numerous ; in Almorah the caterpillar has been found upon a bush belonging to the genus *berberis* ; in the hills about Mussoorie upon *Falconeria insignis* (Hutton) ; in Assam on *Vangueria spinosa* (Stock) ; in Sikkim upon *Tuccerium macrostachyum*, a species which grows abundantly from an elevation of six thousand feet upwards (Otto Möller) ; in Bangalore upon a species of *Ocimum* (Cameron) ; in Burma upon *Adisia* sp., *Clerodendron infortunatum*, *Dillenia pentagyina*, *Lagerstræmia Indica*, *Nauclea rotundifolia*, *Phyllanthus emblica* and *Schleichera trijuga* (Manuel) ; while Gosse succeeded in rearing it upon apple, and in Ceylon the form described by Moore as *Attacus taprobanis*, which is said to be very common about Colombo, feeds upon cinnamon (Thwaites).

## V.

### PROCESSES.

#### A.—Culture and reeling.

It does not appear how and at what date the culture was introduced or developed. The methods in use now are those

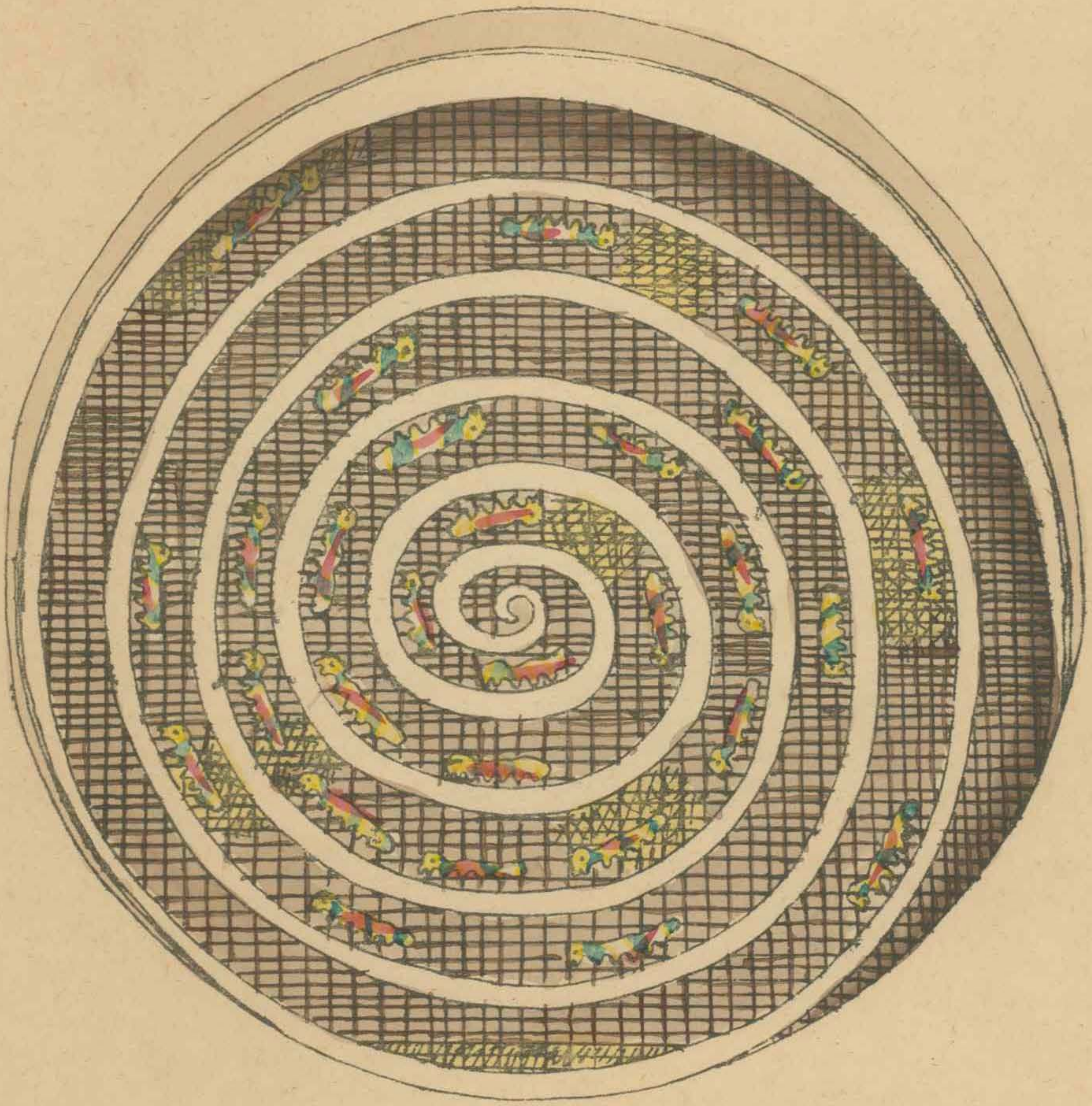


FIGURE III.

which would evolve themselves among a primitive people, and the restrictions placed on the culture of the worm by religious scruples have helped to keep them unimproved.

The following account is given in the *Imperial Gazetteer of India*, 1881, and there has been little or no change since it was written.

"The method pursued in this industry is rude and careless in the extreme, all the processes being carried on in the ordinary bamboo dwelling-houses of the country, which are smoke-begrimed and dirty. The plant of a Burmese silk filature is inexpensive, consisting simply of (1) a set of flat trays with slightly raised edges, made of bamboo strips from two to four feet in diameter; (2) a few neatly made circles of palm-leaves, three or four inches in diameter; (3) some strips of coarse cotton cloth; (4) a common-looking pot; (5) a bamboo reel, and (6) a two-pronged fork.

"It takes the female moth one or two days to deposit all her eggs, which average from two hundred to two hundred and fifty. The pieces of cloth on which the eggs are laid are put away till the sixth day, when they are taken out and inspected. By this time the worms have matured in the eggs, which have changed colour from white to deep yellow, and finally to dark purplish slate. On the eighth day the worms begin to appear as tiny black specks. The egg cloth is then covered with tender mulberry leaves, to which the worms speedily crawl, or the larvæ may be swept with a feather into a tray for further feeding. The earliest risers are considered the best worms, and the worms which do not crawl at all are considered too weak and worthless and are usually rejected. The selected ones are then kept in large circular trays, being fed in them without any change of bed and without being disturbed in the least. At first the mulberry leaves have to be chopped up finely for the young worms, but as they grow older the leaves are put in whole; the worm moults four times, lying dormant for a-day or two at each moult, and spins the cocoons after the last moult. In these trays during all their life they moult, defæcate, and here the refuse of their food accumulates till the mass attains to almost the level of the tray. By that time the worms show by their restlessness and their attempts to spin that they are "ripe;" they are then picked out by the hand and deposited in the cocooning trays. These are of large size, from three to four feet in diameter, and within them is a long ribbon of plaited bamboo a couple of inches broad, wound round with the edges on the flat of the tray, in a helix or spiral (*Figure 3*). The worms are scattered over these trays by the handful without any care or regularity, and left to themselves; they soon begin to spin. They finish the "cradle" in about six hours; in eight or ten hours the worms have disappeared from view, and in from twenty-four to thirty-six hours the cocoon is completed. In from eighty-four to fifty hours the last transformation is effected, and then the insect sleeps for eight or ten days, and eventually emerges a moth. The male is active and restless, seeking a mate; the female remains quiet until found by a male."

“ The whole treatment of the worm from its first entrance into the world to the time it disappears from sight within its silken enclosure is careless, slovenly and dirty. No separate place is provided except it be that a portion of the family sleeping-room is screened off with a *kalaga* [curtain]. The trays are never changed, the excreta never removed, the refuse of the food never cleared out, and all this with the sloughs of the moults, together with the silk the worm makes at all times form a dense matting of stinking fermenting materials, which must be deleterious to the healthy growth of an insect so sensitive as the silkworm. Under such circumstances, it would be surprising if the worms were not subject to disease. Enquiries amongst the breeders of Kynegy and Shwelè proved the truth of such suspicions. As a matter of fact the mortality amongst the worms was said to be always great, and sickness often swept away large broods. Hence the men were anxious to secure seed of the Bengal worm; and as a matter of fact breeders rarely depend on their own seed to any great extent, but purchase fresh stock annually from the itinerant Shan traders, who bring in quantities of eggs from the Karen States beyond the frontier.”

The most dangerous enemy of the larvæ is the ichneumon fly, and when one has deposited its eggs in the body of a worm, which soon gives signs of what has occurred, the worm is thrown away.

“ After the cocoons have matured and before the exit of the moths they are prepared for reeling. Torn away from the cocooning trays by handfuls, they are thrown into baskets and then the women and children of the family divest the pods of all their waste or floss. Then without sorting or selection of any kind, except that the yellow and white pods are kept apart, the cocoons are put into a chattie, or earthen pot of water, and slowly simmered over a fire. The reeler, generally a woman, who makes it her sole business to reel silk, tries the pods after they have simmered for a while, and as soon as she finds the fibre come away easily she picks up a handful of cocoons, each by a thread of silk,—the number usually being from eighteen to twenty-five,—shakes them well to a sufficient length, and then runs them through a loop of brass wire on to a reel fixed to a pair of cross sticks of bamboo. From the reel the filaments are given a slight twist and carried on to a cylinder of wood with a handle and turning on a trestle. One woman manages the whole operation. She sits beside the fire opposite the pot over which the cross sticks with the loop and reel are supported. In her right hand she holds an iron fork, with which she regulates the outcome of the threads from the pot, and with her left she turns the handle of the cylinder of wood, on which the silk is reeled (*Figure 4*). Some practice is necessary to attend to and carry out operations with both hands so as to produce a tolerably even and fine thread, and good reelers generally command good wages in their villages, so that it is difficult to get one to leave her home.

“ As much silk having been obtained from the cocoons as is possible, the pods are then taken out of the pot and whilst still moist and warm are stretched into a kind of coarse knobby thread, which



FIGURE IV.



FIGURE V.

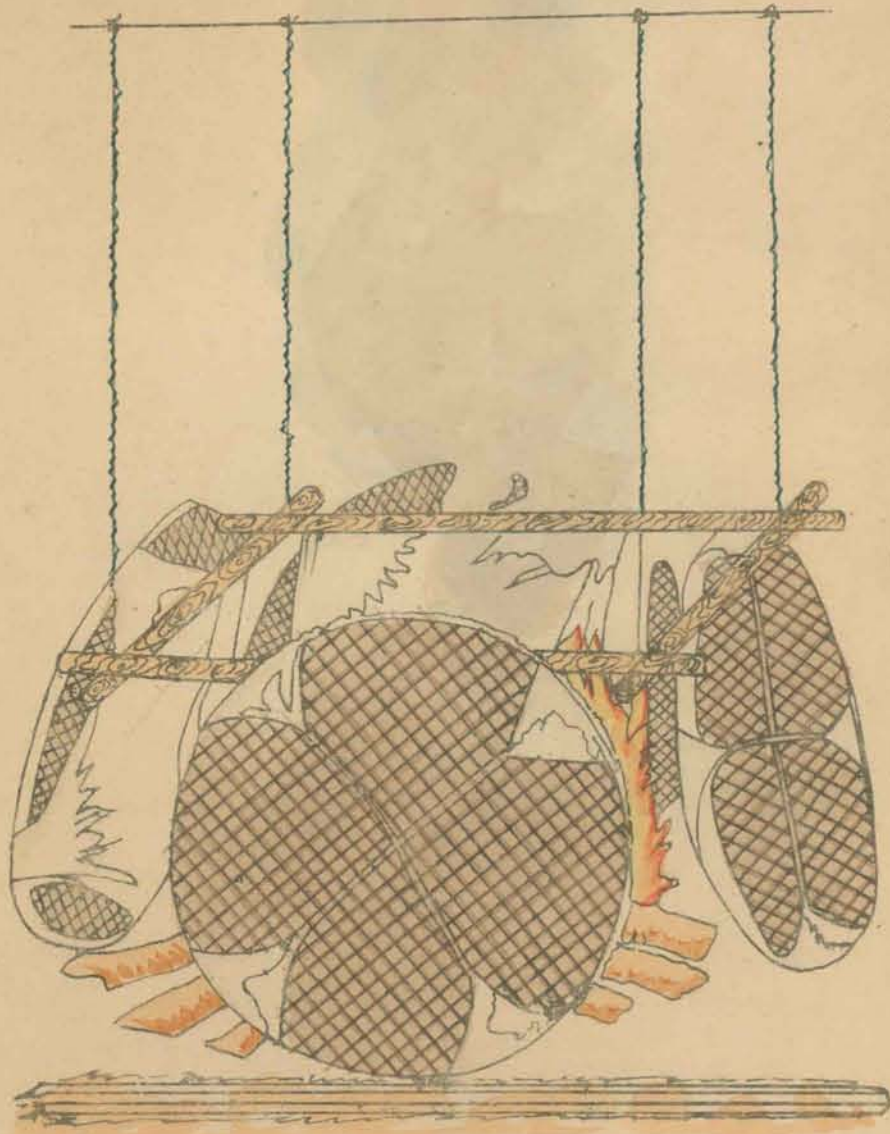


FIGURE VI.





FIGURE VII A.—Another method.

finds a sale in the markets for coarse work. The chrysalis, now divested entirely of its silken covering, is taken up by the children and eaten either fried in oil or unfried or as a condiment with pickled tea: the price in the bazaar is four annas the *pyi* or quart.

"The silk thus obtained is coarse and unfitted for export, though it answers very well for the well-known fabrics (*tamaings, lungyis pasos*) worn by the Burmese."

The method of culture in Prome district offers few points of peculiarity. The cocoons for breeding are laid out on a bamboo sieve and after being kept seven days in the wet and eight days in the dry season are cut open and the moths liberated. Within two hours of their emergence they mate, remaining thus for eight hours. At the expiration of this period the male moth is thrown away. A cloth is then spread over a sieve and several shallow circlets of palm leaf are deposited on it: the female moths are placed in these circlets (*Figure 5*) and a second tray is laid on top. The next morning the tray and circlets are removed along with the moths, which have deposited their eggs on the cloth in circular cartoons.

The cloth is then folded up and kept for seven or eight days, by which time the silkworms have hatched, when they are swept off with a feather into another cloth-covered sieve. The process of feeding then commences and during it the worms moult four times; before moulting they are said 'to go to sleep,' *eik se win thi*. They are finally transferred to the helix on which they spin their cocoons.

The cocoons are then dried in the sun for an hour and then baked from nightfall to daybreak before a fire (*Figure 6*).

Then the cocoons from which the fresh stock is to be replenished are taken out. The rest are now boiled in an earthen pot, and the clue is taken out with tongs and wound off on a spool in the manner described above.

The two varieties of worm that are cultivated in Yamèthin have been noticed above: there are some differences in the life of these worms, and it is unfortunate that they have not yet been identified. The method of culture is identical with that described above.

The *Kanyinhmaw* worm is said to lie dormant, preparatory to moulting, on the 5th, 8th, 12th, and 17th days after hatching, whilst the Shan States worm lies dormant on the 6th, 12th, 18th, and 24th days. Both worms are mulberry-fed. In the cold weather the worms lie dormant for two days instead of one.

*B.—Winding and Spinning.*

The process of winding the *kingyipo* is thus described :—

The weaver places the raw silk over the winding machine (*Figure 1 supra*), which was roughly constructed to receive the huge coil as purchased. From *Figure 1* the raw silk thread is unwound and passed over the huge reel, *Figure 2*. The person manipulating the wheel feels the thread as it passes on to the reel, and cuts it off when a skein of different texture is reached, winding the silk thus on separate reels for the medium, the coarse and the fine. The medium threads are used for the warp and the coarse and fine for the shuttle.

*Figure 2* is taken off its frame and hung up, and one end of the thread being wound round the reed-reel or spool, the spinning wheel is set in motion. All the raw silk thread is thus transferred in certain lengths to the reed-reels or spools (*Figures 7 and 7 (a)*), and when all the thread has been thus removed the reed-reels are placed in a basket and the threads are then twisted into singles in the combined machine (*Figures 8 and 8 (a)*). The process is as follows :—

The spools, usually eight in number, are fixed on to eight iron spindles attached to a large *yit* or spinning wheel. This has two wheels; that on the left has four strings passing round it. These strings in turn pass round each row of spindles placed one above the other and thus each turn of the wheel revolves the spindles simultaneously.

Each line of thread from each spool passes through an eyelet placed about twenty inches away from the quill-stand on to an eyelet on the main stand. The thread finally makes a skein round reel fixed above the spinning-wheel and revolved by the motion of that wheel. The spinner holds the threads in the palm of his hand between the two rows of eyelets in order to make the skeins round the top wheel tight and to prevent the skeins intermingling. To loosen the skeins of spun silk and to facilitate their removal from the reel a movable wedge is fixed in it. This increases the circumference of the reel so that when the wedge is removed the skeins are loosened.

The price of each spinning machine is ten to thirteen rupees in Mandalay.

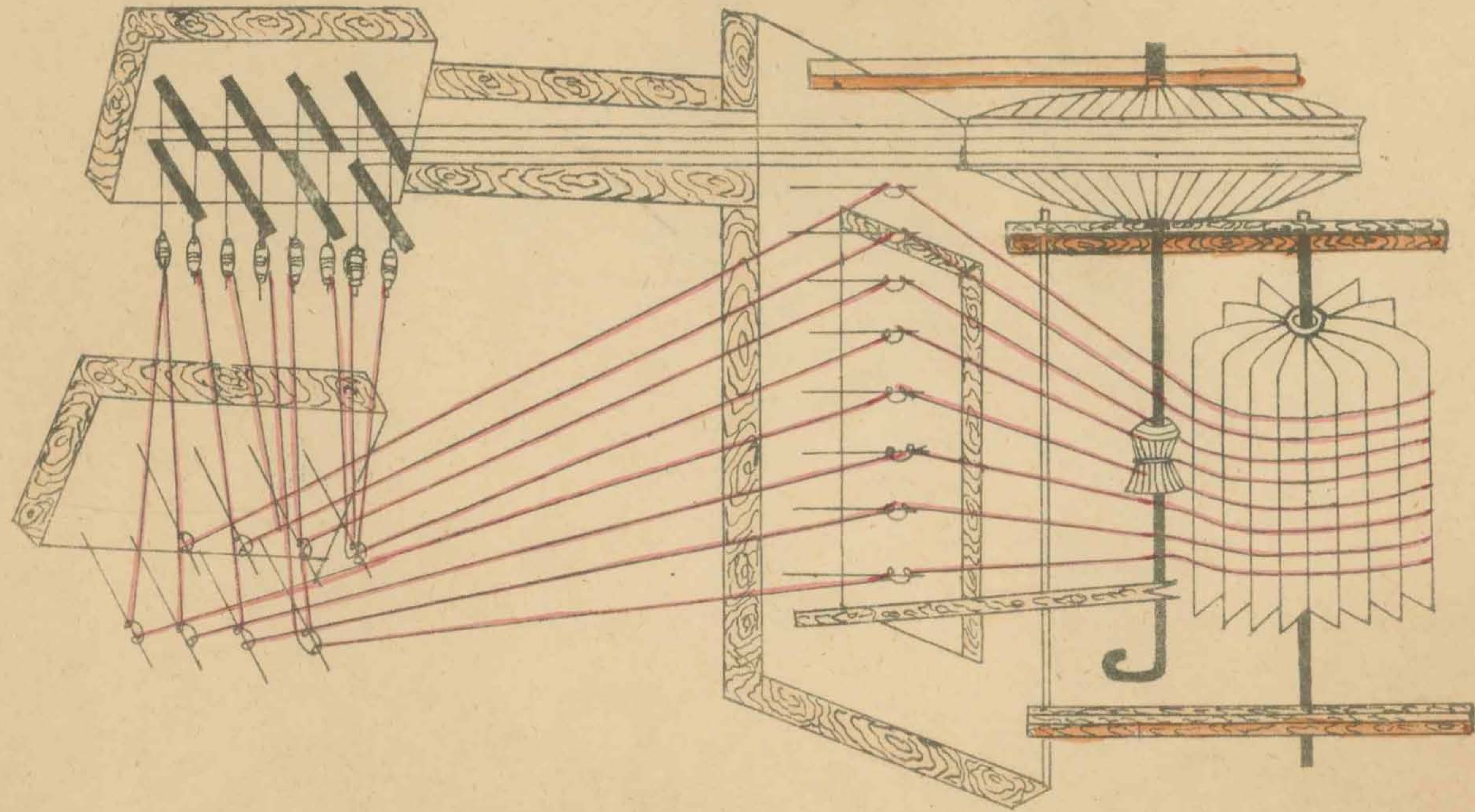


FIGURE VIII.

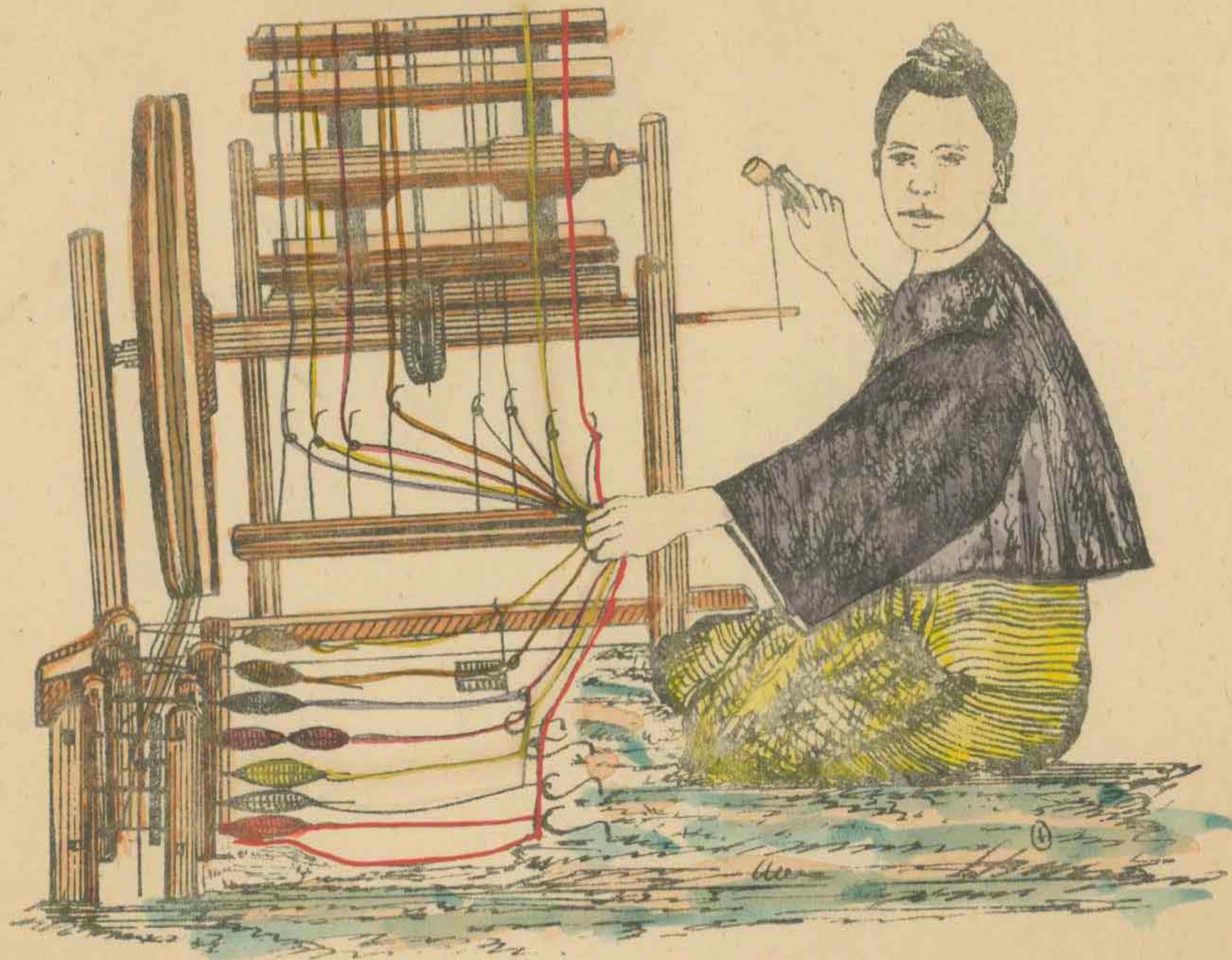


FIGURE VIII (a) — At Kothan, in the Lower Chindwin district.

## C.—Cleansing and Dyeing.

After the silk has been twisted by the process described

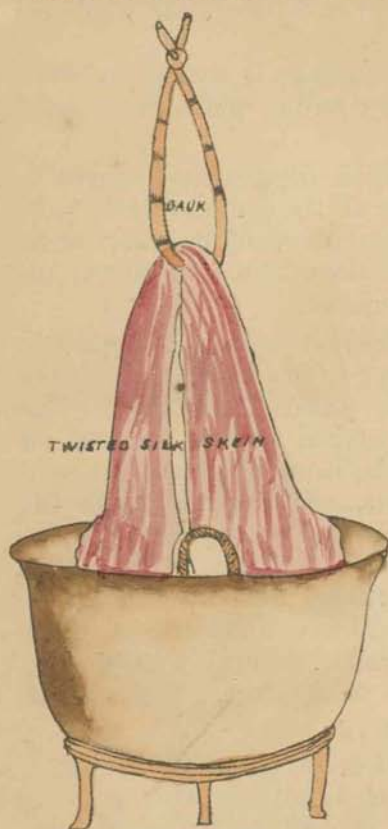


FIGURE IX

above into skeins (*akwet*), four measures (*pyi*) of soap sand are mixed with water and the mixture is put to stand for a night. The heavier ingredients settle at the bottom and leave the soapy water on the top. This is then poured into an iron cauldron or earthen pot and the pot placed over a furnace. When the water reaches the bubbling point, the twisted silk in skeins of about fifty threads is put into the hoop of a bent cane or *gauk*, which serves as a handle. The skeins are plunged into the water and are kept there till they become coarse to the touch (*Figure 9*). They are then taken from the pot and the water is squeezed out by holding the *gauk* with one hand and with the other hand forcing a piece of stick into the other end of the skein.

The skein is then cooled and washed in cold water four times to bleach it. The water is wrung out and the silk is dried for a day. The white silk has by this time become pure white, and the yellow silk pale yellow. The Burmese term for the cleansing process is *hpo chut thi* (*Figure 10*). The process usually reduces a viss of material to eighty ticals.

To obtain—

- (1) *Yellow*.—The white silk thread is well boiled in a pot containing pounded saffron bulbs, and is then thoroughly rinsed, cleaned and dried.
- (2) *Green*.—The thread dyed yellow is steeped in water in which the leaves of the indigo plant have been boiled. The plant was formerly grown in almost every garden.

FIGURE XII



FIGURE XI

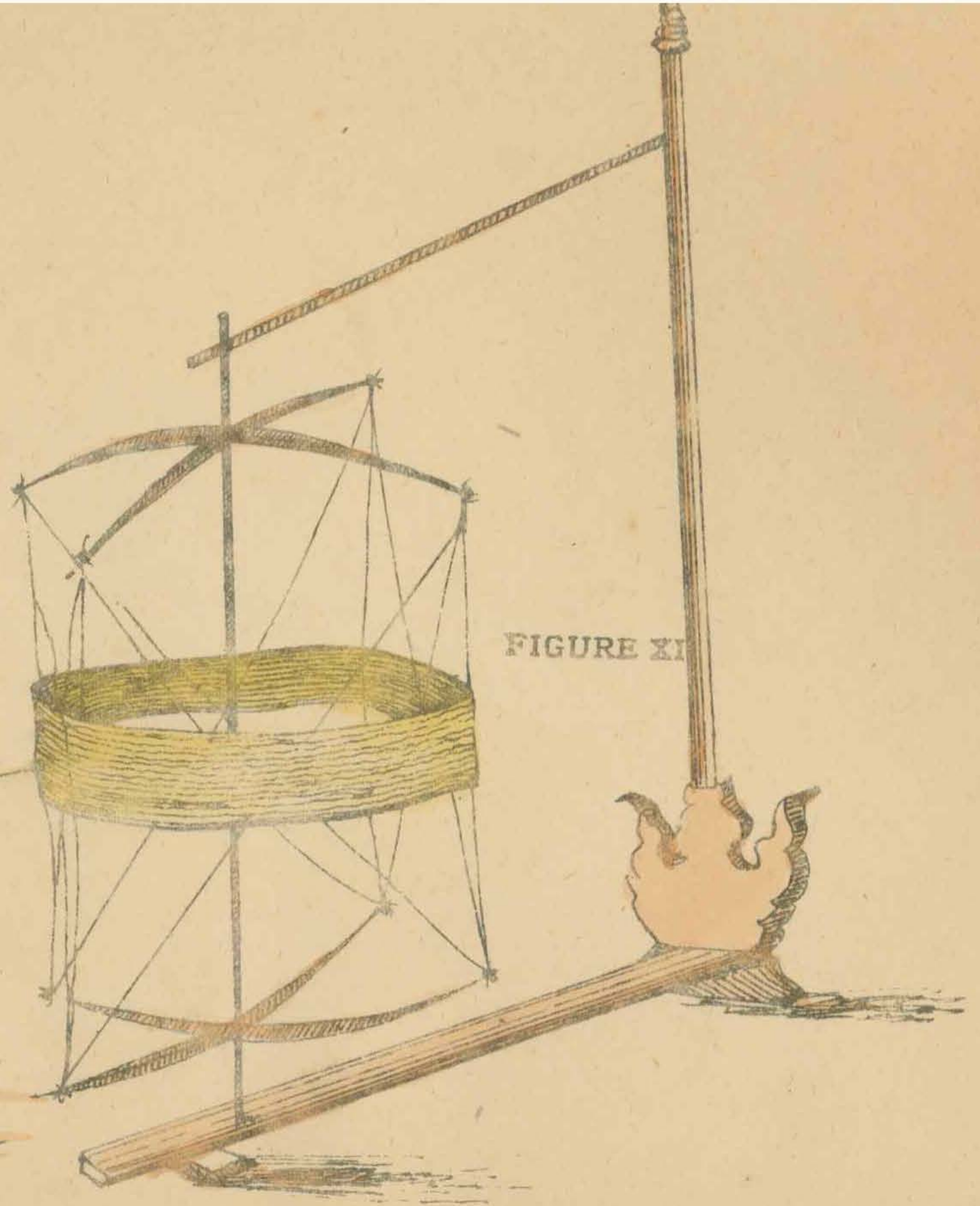


FIGURE XI AND XII.

- (3) *Orange*.—The seeds of the *thidin* tree are well rubbed together in water mixed with soap-sand. The white thread is then boiled in the orange-coloured liquor.
- (4) *Black*.—The thread dyed orange is soaked in water in which leaves of the indigo plant have been boiled.
- (5) *Blue*.—The white thread is dipped and stirred in water in which leaves of the indigo plant have been boiled. The temperature of the water must be just hot enough to allow the dyer to put his hands in without discomfort.
- (6) *Red*.—The ripe *zithi* (*Zizyphus jujuba*) is soaked in water until it is loose in its skin. It is then well kneaded, and the water drained off. The white silk thread is soaked in the drained off liquor, which contains both mucilage and an acid, for a day of twelve hours. Safflower is meanwhile soaked in water and kneaded or crushed with the hand. The thread, after soaking in the *zithi* water, is dipped and stirred about in the liquor obtained from the safflower until the required shade of red is obtained. Several washings or dippings in this liquor take place. The red obtained is called *panyin*.
- (7) The deeper red called *ani* is prepared thus: lac or stick-lac is well pounded, mixed with soap or soap-sand, and boiled in water; while boiling, white thread, not boiled nor cleansed, is put in and boiled for half an hour; when cool the dyed thread is rinsed in cold water and washed clean.
- (8) *Pink* (*pannu*) is prepared in the same way as *panyin*, but the quantity of safflower that is soaked and kneaded is less.

The native processes described are losing fashion, and imported aniline dyes are taking the place of the old vegetable products. Dyes of different colours in powders or cakes, put up in paper packets or in tins, are procurable in most bazaars. There is no doubt that the old methods will, except in out-of-the-way places, soon be entirely abandoned and the less troublesome and expensive prepared dyes of the market used.

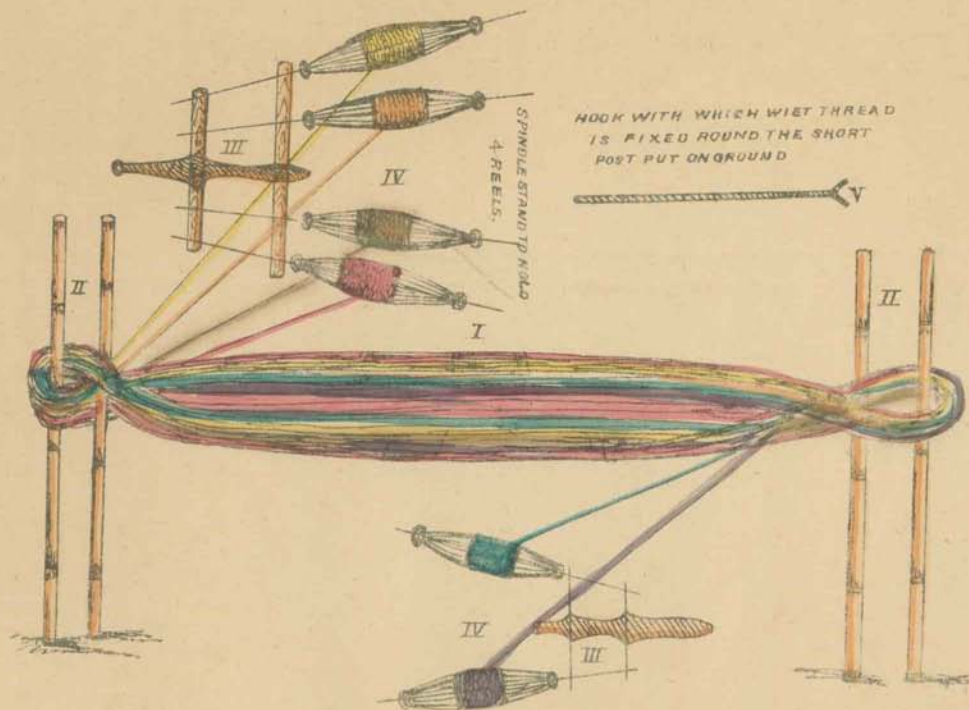




FIGURE X.



FIGURES XIII and XIV. —At Kothan, in the Lower Chindwin district.



HOOK WITH WHICH WIST THREAD  
IS FIXED ROUND THE SHORT  
POST PUT ON GROUND

- REFERENCES.**
- I.—Silk skeins (large).
  - II.—Wooden posts.
  - III.—Reel stand.
  - IV.—Reels.
  - V.—Semi-circular hook.

FIGURE XIV.—Extended lengthwise preparatory to weaving.

In some districts, as in Sandoway, it is reported that the indigenous method is already dead. In Taung-u the dyes used are said to be of Chinese manufacture.

Further information on dyeing in Burma with vegetable dyes may be found in Mr. J. D. Fraser's *Monograph on Dyeing*.

The *yaw paso* (*v. infra*) is thus dyed :—

The leaves and small branches of the indigo (*mè*) plant are immersed in a pot containing about thirty quarts of water ; after being thus kept for a day they are well squeezed and are thrown away. To the water is added half a viss of lime or chunam (*tón-chauk-tón*). The liquor is stirred for one or two hours until it ceases to froth, after which it is allowed to stand for about an hour until a sediment has formed ; the water is then poured out through a sieve, and the one viss or so of sediment that remains is the groundwork of the dye.

In the dyeing process a four-quart pot is placed bottom-upwards over a fire for a whole day, until the inside of the pot is well smoke-dried. The inside is then rubbed gently with the leaves of the *kyetsu* plant. Next the ashes of burnt dry plantain leaves, the *hin-nu-nwe* plant, the *thapan* tree, or any other wood or plant the ashes of which give a salt taste, are placed in a small cane basket and hot water is poured slowly over them, the water being received in a pot underneath. This water from the ashes is mixed with the *mè* sediment in the dried pot and the pot is covered and kept in the sun for three days till the liquid attains a darkish blue colour. The silk or cotton is immersed in this composition until it becomes dark blue. The fabric is then dried, care being taken not to expose it to the sun.

#### D.—Laying the Warp and Weaving.

The dyed silk of which it is purposed to build the warp is rubbed with rice-glue and dried in the sun. It is then combed, and is finally placed over *figure 11*, a winding machine of finer construction than *figure 1*, and the threads transferred to *figure 12*. The handle of *figure 12* is withdrawn and as a reel, pure and simple, it is placed on the spindles (*a*) of *figure 13*. On the reels have been wound threads of the different colours required for the fabric.

\* \* \* \* \*

Holding *figure 13* in one hand, the weaver extends over the frame (*figure 14*) the threads required for the warp: or he may, as in *figure 15*, unwind the long threads from the reels of the different coloured threads, and wind them round *figure 11*, in separate coils, without any confusion, according to their colours. A roller of bamboo or wood is used to wind the threads of the warp



FIG. XVIII.—HOOK *KAWSI*,  
OR *GVEIK*.



FIG. XIII.

*figure 16* and the looped ends are drawn through *figure 17* by means of the hook (*figure 18*); *figure 17*, with the roller of bamboo or wood attached to it, is held by one man or woman, while *figure 19*



FIG. XIX.—LEIK OR ROLLER WITH GROOVE.

has the loops passed over it, and is fixed in its groove by means of a thin split bamboo *figure 20*.

\* \* \* \* \*

Now, while one person holds *figure 16* and the roller, two persons fix the *leik* (*figure 19*) into the two posts of *figure 20* in the sockets, and after preparing the threads nicely, *figure 19* is turned round by means of its levers and winds round itself all the threads of the warp. The roller, the comb, and the roller *figure 19* are carried to *figure 21* and there fixed preparatory to the actual weaving.

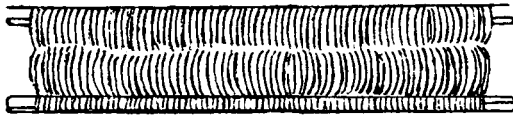


FIG. XXII.—COMB OR *HMAT*.

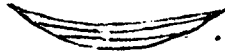


FIG. XXIII.—THE LUN (SHUTTLE).

Before beginning, two pairs of *hmat* or combs of strong cotton thread have to be made, and through these each single thread of the warp is made to pass (*Figure 22*). The cotton thread combs are hung up above the weaver's head and are attached below by chains or strings to long cylindrical pieces of wood which are the pedals for raising or depressing the threads of the warp, when it is intended to shoot the shuttle

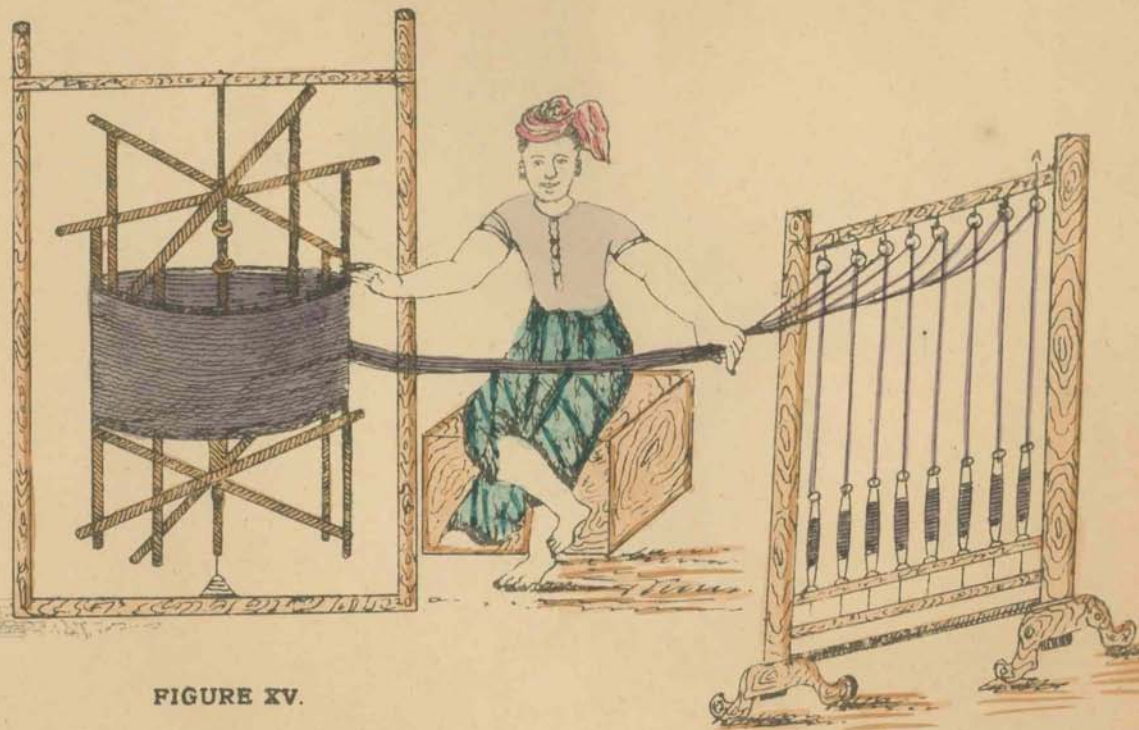


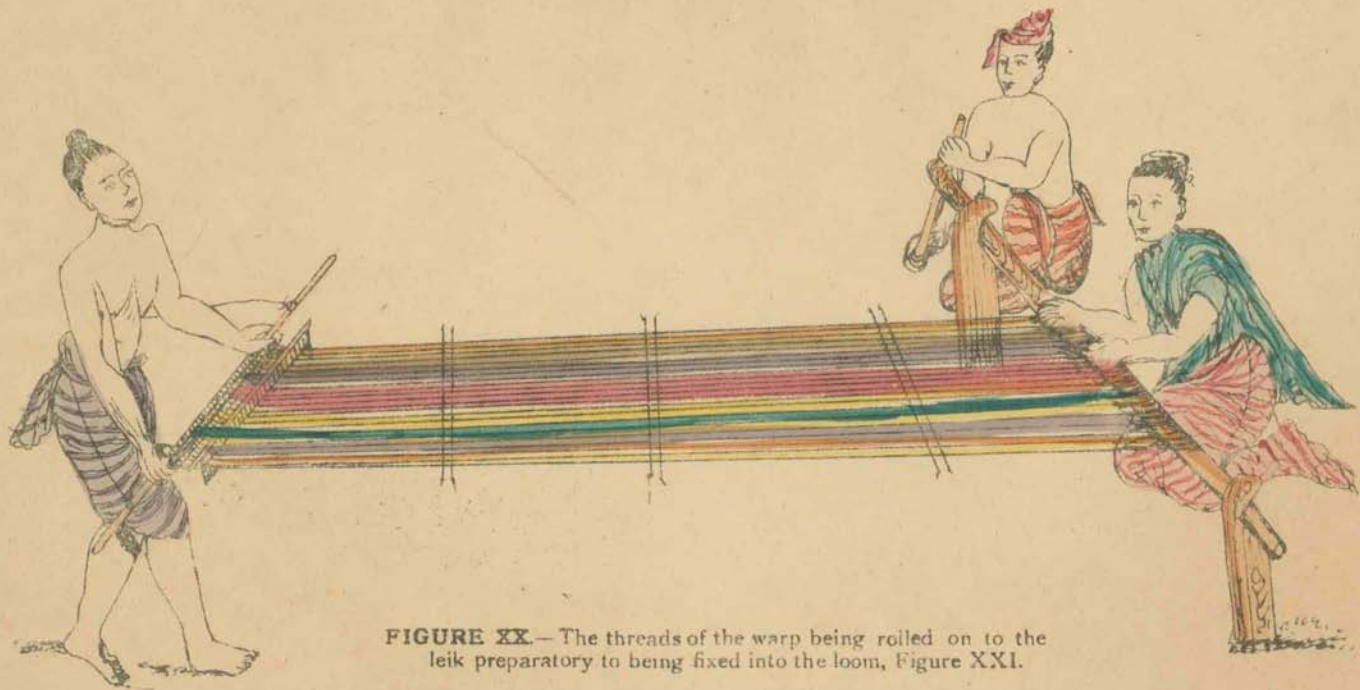
FIGURE XV.

Modified Figure XIII. called Yaukióngón.



FIGURE XVI.

FIGURE XVII



**FIGURE XX**—The threads of the warp being rolled on to the leik preparatory to being fixed into the loom, Figure XXI.



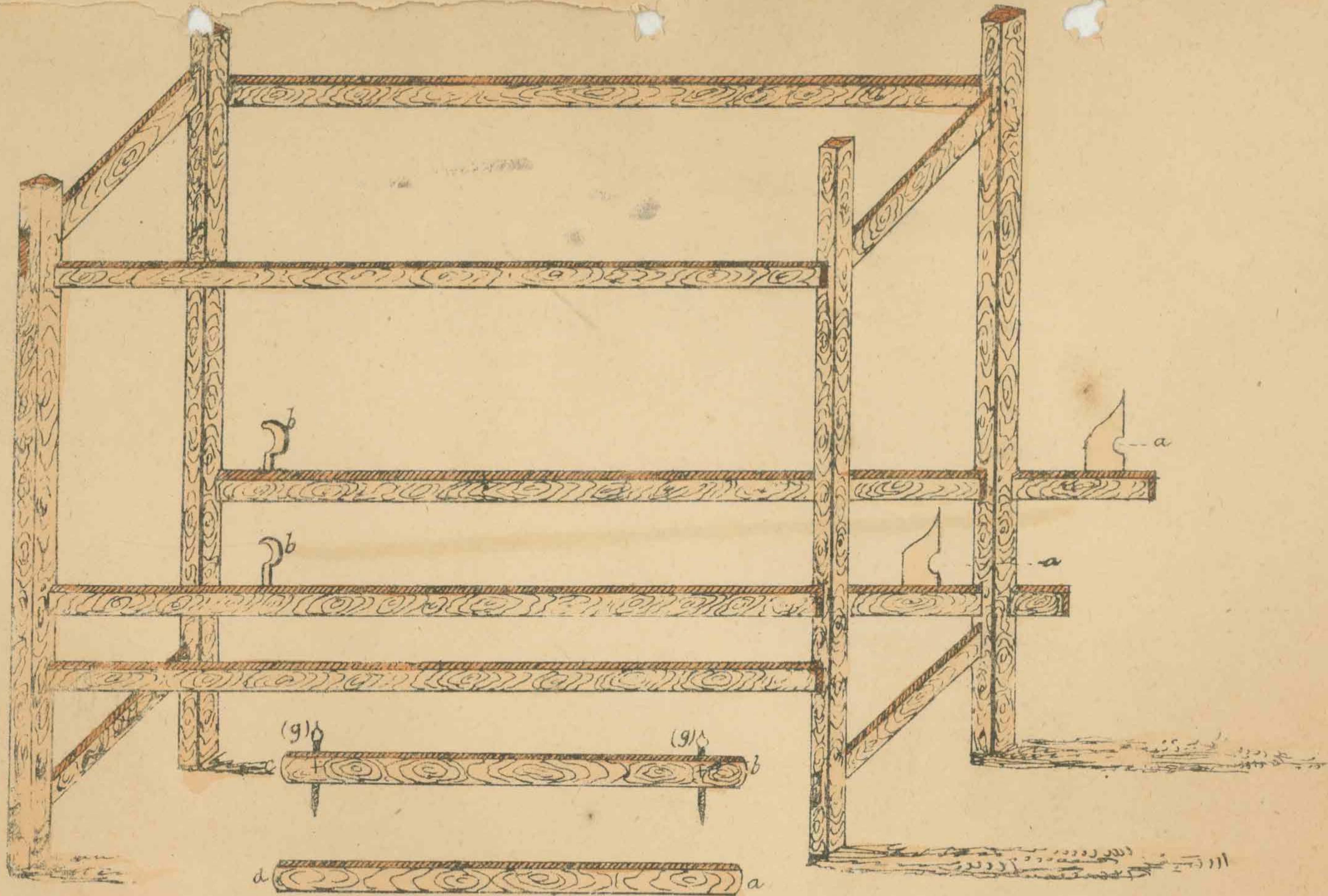


FIGURE XXI.

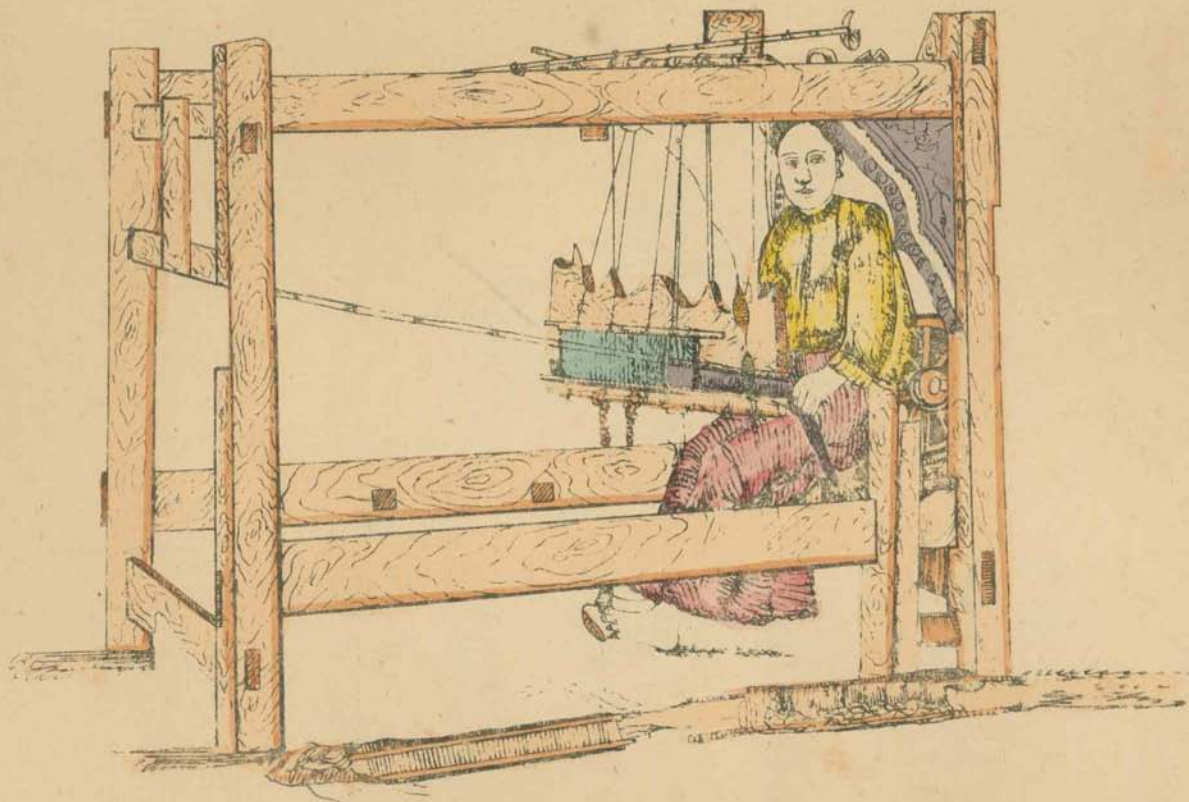


FIGURE XXIV.

(*Figure 23*) through with the threads of the woof. *Figure 17* drives back and tightens the threads of the woof. Reels (*Figure 12*) supply threads for the woof. The loom is ready now for weaving any kind of silk fabric required (*Figure 24*).

\* \* \* \* \*

The loom or *yekkansin* consists of a frame with four small perpendicular posts, forming a rectangle measuring about four cubits by two-and-a-half. These are connected by bars at the top, in the middle, and at the bottom, a few inches from the ground.

On the near, middle, and farther top side of the longitudinal bars rests a pair of rollers (*leik*) at the full distance of the length between the middle latitudinal bars. The roller at the nearer side, where the operator's seat is, is employed for rolling the finished fabric. On the other roller opposite are the threads which form the warp.

To separate the threads of the warp into the alternately upper and lower rows so as to allow of the shuttles being passed between them to make the web are two comb-like frames (*hnat*), closed by a bar at the points of the teeth. Stout cotton threads (*v. supra*) form the teeth of the closed comb. These combs are hung at their respective ends by sliding looped cords resting on a round bar, usually a piece of bamboo placed across the top longitudinal bars of the main frame. Beneath the knot is a latitudinal cross-bar on which are placed two pedals (*che-nin*) for the feet of the operator; the toe-ends of these are connected by cords with the combs, to enable the weaver to alternate the two series of threads of the warp by alternately pressing the pedals with his feet.

Placed in front of the combs and nearer to the weaver is a third frame (the *lek-khat* or *yinthwa*, pronounced *yathwa*), like the combs, but with twice as many spaces as each *hnat* has, to permit of all the threads of the warp being passed through the interstices. These are made of very fine slit bamboos. This third frame, which is employed for pressing the threads of the weft close together, is suspended at its ends by cords made fast to an independent cross-bar placed over the two top longitudinal bars of the main frame. Finally, there is the shuttle (*lun*), the body of which is made of hard black wood (*yindaik*) or, if large and for white fabrics and fabrics of simple patterns, of the almost equally hard red wood (*padauk*). The spindle is manufactured out of hard bamboo. A hundred of the former cost three rupees and one of the latter costs

four annas. An entire weaving frame with all appurtenances costs about ten rupees. The preparation for work is as follows:—The threads for the warp where the weaver sits are looped on to the roller (*leik*) and, after passing through the interstices of the pressing comb (the *lek-khat* or *yinthwa*), pass alternately through the lifting and depressing combs (*hnat*), then from under the farther roller (*leik*) round it, and over the top of the cross-bar and roller at the farther top part of the frame, till they reach the top bar above the weaver's head, where they are gathered into a bunch and secured to a piece of wood made fast to the top bar overhead, to allow of the worker paying out the warp thread as the fabric grows and is rolled up on the roller in front of him.

The seat is a rough bench, usually made of a moveable loose plank, with two holes let into projecting parts of two upright posts fixed into the ground.

Though the successive processes described above are carried on from beginning to end even now, prepared silk thread (singles) is bought in the Mandalay market both dyed and undyed. The silk thread known as *thabeik-chi* (figures 25



FIG. XXV.—  
*Thabeik-chi* silk thread when the coil is extended.

and 26) is said to be imported from Singapore. Silk thread already twisted and called *setpo* (silk of the mills) is said to be a French import, and although raw silk is still imported, a good deal of dyed and undyed twisted thread in smaller coils than the *kin-gyipo* is imported from China and is called *quanton* (Canton). The result of importing dyed thread is that people will not in most cases take the trouble of going through the tedious process of dyeing with indigenous dyes. The import of thread already twisted (in the mills or by other means) to do away with *figures 1* and *2*, the huge winding machine and reel, and with *figure 7*, the combined spinning wheel and *yahat* or reel.

The weaver can go on at once to *figure 8*, or he can begin with *figure 11*, &c.

## VI.

### THE RESULTS OF THE INDUSTRY.

Native-woven fabrics fall into four main classes, according to the design:—

- (1) The *bala* of thirty-seven patterns;
- (2) The *acheik* or *lun* of thirty;
- (3) & (4). The *gaik* and the *sat*, of one pattern each, but vary according to the number of colours employed.



FIGURE XXVI.—Showing the process of transferring the small coils of Singapore silk thread (*shabekchi*) from Figure I to Figure II.

The *bala* patterns have the following names:—

- |                               |                                |
|-------------------------------|--------------------------------|
| (1) <i>Saung-daw-baik.</i>    | (19) <i>Awa-sin.</i>           |
| (2) <i>La-bwin-saing.</i>     | (20) <i>Letmaw-sin.</i>        |
| (3) <i>Paung-du-sing.</i>     | (21) <i>Ye-gwet.</i>           |
| (4) <i>Paungbo-paungma.</i>   | (22) <i>Letmaw-gwet.</i>       |
| (5) <i>Ye-sin.</i>            | (23) <i>Awa-gwet.</i>          |
| (6) <i>To-gyaung-hto.</i>     | (24) <i>Hnit-tat-lawkadat.</i> |
| (7) <i>Lawka-dat.</i>         | (25) <i>Lawkadat-an-gwè.</i>   |
| (8) <i>Nadi.</i>              | (26) <i>Thanbat-sin.</i>       |
| (9) <i>Nadi-an-gwè.</i>       | (27) <i>Ngwe-ban-sin.</i>      |
| (10) <i>Padein-sin.</i>       | (28) <i>Dewi-sin.</i>          |
| (11) <i>Hnit-ka-dwe.</i>      | (29) <i>Kyauk-sein-sin.</i>    |
| (12) <i>Saung-daw-ku.</i>     | (30) <i>Mayan-sin.</i>         |
| (13) <i>Shweboyo.</i>         | (31) <i>Dawna-sin.</i>         |
| (14) <i>Shwebo-nanthein.</i>  | (32) <i>Bónbaing-sin.</i>      |
| (15) <i>Shweba-hteik-tin.</i> | (33) <i>Yathet-pan.</i>        |
| (16) <i>Tein-hko-sin.</i>     | (34) <i>Apyyu-gwet.</i>        |
| (17) <i>Kwet-híñ.</i>         | (35) <i>Hpu-nyo-sin.</i>       |
| (18) <i>Salwè-sin.</i>        | (36) <i>Ba-da-nyo-sin.</i>     |

(37) *Hpayan-sin.*

The *acheik* are—

- |                             |                                      |
|-----------------------------|--------------------------------------|
| (1) <i>Myo-ye-gyi.</i>      | (16) <i>Sado-sin.</i>                |
| (2) <i>Myo-ye-gwe.</i>      | (17) <i>Kyabu-kya-gaing.</i>         |
| (3) <i>Kali or wunno.</i>   | (18) <i>Shwe-tazók Ngwe-tazók.</i>   |
| (4) <i>Kyet-mi.</i>         | (19) <i>Shit-pwin-saing-kyogyi.</i>  |
| (5) <i>Kyo-gyi.</i>         | (20) <i>Sun-hnit-ein-sin.</i>        |
| (6) <i>Sein-no-hpan.</i>    | (21) <i>Kyogyi-hteik-hkaung-din.</i> |
| (7) <i>Tho-sin-ban-wút.</i> | (22) <i>Ye-sin-ban-wút.</i>          |
| (8) <i>Seindaing-sin.</i>   | (23) <i>Thón-sin-nawa-dat.</i>       |
| (9) <i>Atwin-sin.</i>       | (24) <i>Saung-daw-ku-sin.</i>        |
| (10) <i>Kala-ban</i>        | (25) <i>Dinga-ban.</i>               |
| (11) <i>Seinta-hket.</i>    | (26) <i>Hpa-yaung-pán.</i>           |
| (12) <i>Hnitpwin-gaing.</i> | (27) <i>Kywe-gyo-gaik.</i>           |
| (13) <i>Leikpyo-sin.</i>    | (28) <i>Taung-teik-pan.</i>          |
| (14) <i>Ye-cheik.</i>       | (29) <i>Hpila-cheik.</i>             |
| (15) <i>Kye-taya.</i>       | (30) <i>Keik-cheik.</i>              |

As a rule the outturn takes the form of articles of clothing, the *paso*, *tamein* and *lóngyi*, and is built in fixed widths, silk in the piece being turned out only to special order. It is only when made to order, too, that fabrics of silk and cotton are woven. For the market or for silk merchants, pure silk only is woven.

The articles produced are—(1) plain or check (*bala*) *paso* (waist-cloth), of different designs, according to the taste of the purchaser. The longest length of *bala paso* is twenty cubits and the greatest breadth twenty-two inches. Two pieces or lengths have to be stitched together lengthwise to make a *paso*.

Seven *tameins* (women's skirts) can be made out of the half *paso*, twenty cubits by twenty-two inches. The highest price of a *bala paso* for an adult is fifteen rupees : the lowest is nine for a length of only seventeen cubits by nineteen inches. Then come *paso* for boys of different ages. The highest price is eight rupees and the lowest four. The greatest length is fourteen cubits by twelve inches, and the shortest twelve cubits by ten inches. Boys' *pasos* and *lóngyis* are woven in single pieces, as are girls' *tameins* and *lóngyis*.

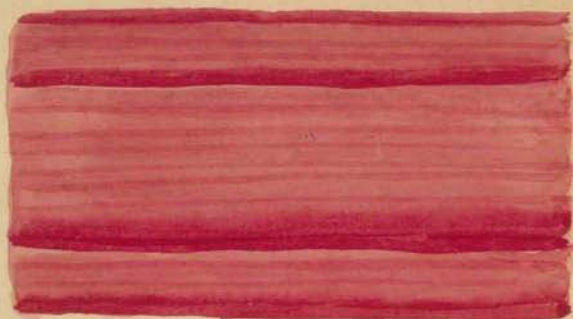
(2) The *acheik paso*.—The greatest length is twenty cubits, the greatest width twenty-seven inches. The comb or *yathwa* used in weaving this *paso* is longer, but the number of threads of the warp is less, being one thousand loops or two thousand threads only. Two lengths stitched together make one *paso*. The *paso* is woven in a single piece, unlike the *bala*. Boys' *acheik paso* are woven also in single pieces, the greatest length being sixteen cubits by eighteen inches and the smallest twelve cubits by ten inches. Women's *lóngyi* and *tamein* of *acheik* design are woven in the single piece, as are those of girls. The greatest length for a woman's *lóngyi* is five cubits by twenty-seven inches. Two pieces are joined to make a *lóngyi* and for a *tamein* the greatest length is three cubits by twenty-seven inches. For girls the greatest length for a *lóngyi* is three cubits by eighteen inches, and two pieces have to be joined lengthwise. For girls' *tameins* the greatest length is forty-five inches by eighteen inches. For little children the least length is two cubits by fourteen or fifteen inches.

The highest priced *acheik paso* for an adult is the *kyogyi-byat* [figure 27 (8)], worth under the old régime two hundred and fifty to three hundred rupees. Only the King, Princes, *Wuns* and *Sawbwas* could afford to buy it. The highest price obtainable now for the *kyo-gyibyats* is about one hundred and twenty rupees. Karens and Talaings are said to be fond of wearing it. Pure Burmans have relinquished the fashion set them by the "Lord and Master of Land and Water; the Possessor of Many White Elephants." The lowest price of a man's *acheik paso* is eighty rupees. The highest price of a boy's *acheik paso* is sixty rupees, the lowest thirty. The highest price of an *acheik lóngyi* of the best quality is forty rupees and the lowest twenty-five. The price of *acheik tamein* ranges from sixteen to nine rupees. Of girls' *acheik tamein* the highest price is rupees eight.

The word *acheik* implies that the threads of the shuttles (as many as one hundred to one hundred and twenty are used)

FIGURE XXVII--Burmese designs.

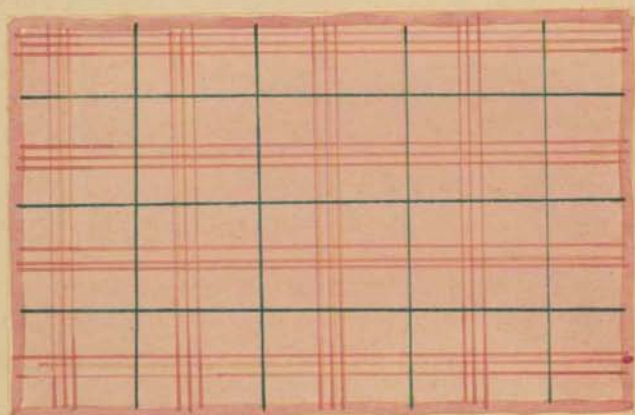
*Bala*, or plain designs,



(a) *Pannu panyin-sin*

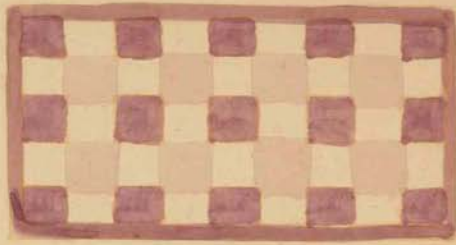


(b) *Awa-sin*



(c) *Pannu panyin gwet*

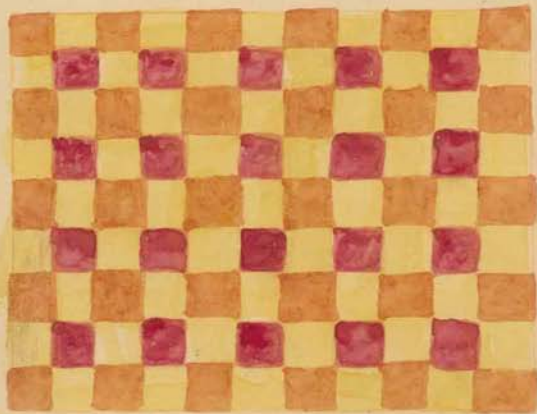




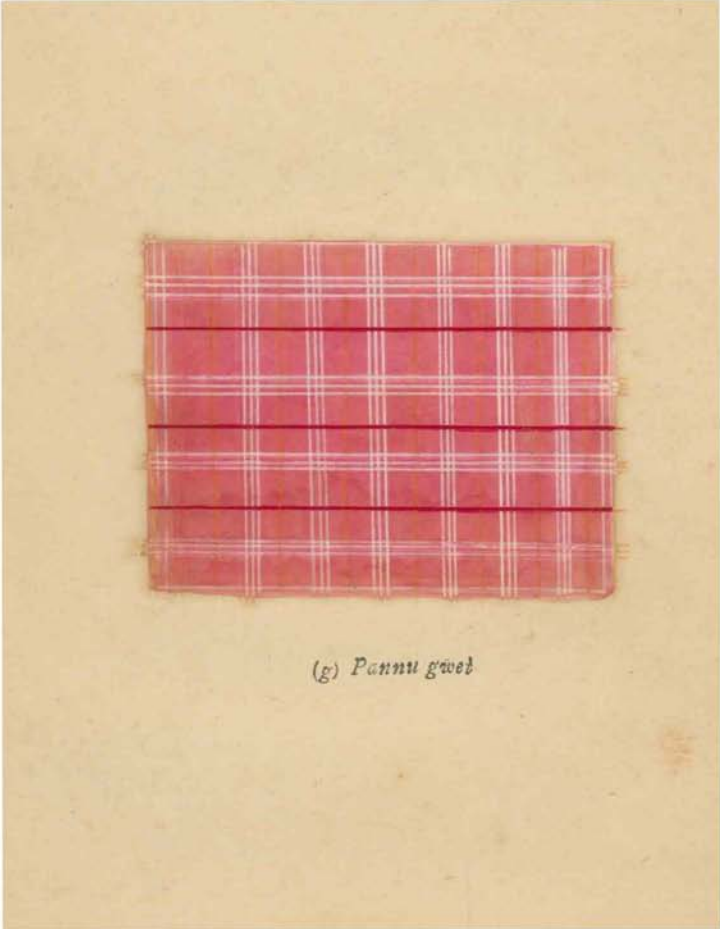
(d) *Pannu panyin-gwettón*



(e) *Pannu-zin*

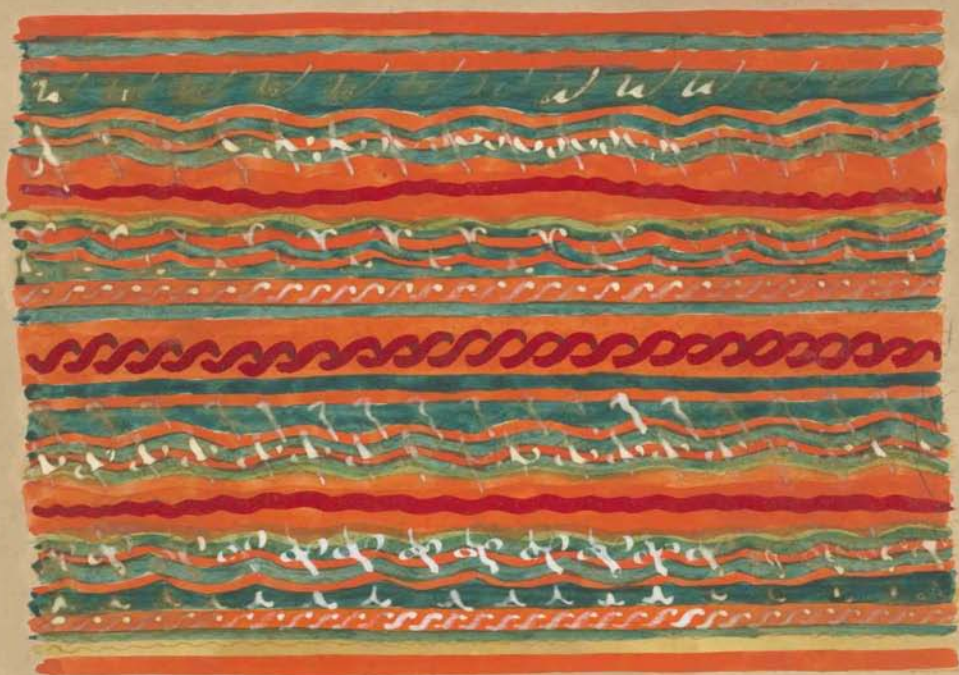


(f) *Wa-nu-wa-yin gwet*



(g) Pannu gwel

*Acheik, or flowered designs'*



(1) *Atwin-zin pansón*



(2) *Pansón-kyδ-byat*



(3) *Awa-gyo*



(4) *Nwèthagi anu-thwe*



(5) *Nwèthagi ayin thwè*



(6) *Pansón-sat*



(7) *Pansón kyetmyi atwinsin*



(8) *Kyo-gyibyat*



(9) *Pansón myosho-gyo*



(10) Panzón-gyo-gyi



(11) Panzón-sai gamón



hook into, or cross, each the other's thread. The threads of the warp are of different colours, but the spools in the shuttles contribute to the flowered figures on the surface of the fabric. There are no raised figures, so that *acheik* cannot be properly called embroidery, embossment or tapestry, be the design what it may. Both sides are exactly the same; there is no right and no wrong side.

It was in King Mindôn's reign that the number of shuttles used in *acheik* weaving was raised to one hundred or one hundred and twenty for the first time, the largest number employed before having been three only, in King Pagan's reign; and the term first used was not "*acheik*" but "*waik*," as the woof threads moved in zigzag patterns only. The Burman weavers who first introduced the *acheik* design lived at Amarapura, near the Patodaw-gyi pagoda, and the name of their quarter was called after them, *Letcheikdan*. They seem to have imitated in silk the designs on the silk curtains and carpets sent as tributary offerings or as marks of respect to the King of Burma from the east and west. *Letcheik* was the name first given to the work, which is peculiar to Mandalay and is woven nowhere else.

## VII.

### PRICES AND PROFITS.

In the *Imperial Gazetteer of India* of 1882 the price of Chinese silk is said to be £3-12-0 the *viss* as against £2-4-0, the cost of the home-grown and inferior product. In sagaing a *viss* of the ready dyed silk can now be bought for from Rs.

Sagaing.	39 to Rs. 40 and can be woven into four or five ordinary <i>bala paso</i> , which will realize Rs. 45 to Rs. 50 and, according to the working capacity of the weaver, will take a month to a month and a half to turn out. Thus, the profit will run from Rs. 11 to Rs. 3-8-0 the month, according to the skill of the workman and the economy with which he buys and utilizes his material. The extreme figure of Rs. 11 is no doubt seldom reached. The rate charged for the weaving of one <i>paso</i> is one rupee, which would give, if one week were allowed him for the work, a monthly rate of Rs. 4 a month.
----------	---

The *viss* of silk will produce nine *acheik tamein* and to turn them out nine months' time is needed. They will fetch Rs. 12 a piece. The amount of profit may be thus arrived at---

			Rs.
Cost of raw silk	...	...	40
Cost of sundries used in the working	...	...	15
		Total	55
Balance of profit	...	...	53
		Total (sale of nine <i>tameins</i> )	108
or a monthly profit of some	...	...	6

On the hire-system four rupees is charged for the weaving of a single *tamein*.

The price of imported, undyed, unspun silk ranges from Rs. 25 to Rs. 30 the *viss* and for the dyed product from Rs. 40 to Rs. 45 the *viss*. *Kyauksè*. *Lun paso* and *lun tamein*, as they are fabrics of more artistic design, fetch Rs. 50 and from Rs. 8 to Rs. 10 respectively. In Burmese times nothing less than Rs. 80 or Rs. 90 for a *paso* and Rs. 20 for a *tamein* of this kind was given. The prices have fallen with the diminished demand due to European and Indian competition and to the going out of fashion of the home-woven product.

In Shwebo the raw silk is bought in Mandalay at Rs. 25 the *viss*: the processes of winding and cleaning reduce the *viss* by two-fifths, so that only 60 *per cent.* of pure silk thread is left to weave with. *Shwebo*. From this three *pasos*, fetching Rs. 11 and annas 8 each, or nine *tameins*, fetching Rs. 4 each, or six *lóngyis*, fetching Rs. 5 and annas 12 each, can be woven. Thus, the turnout will be worth Rs. 35 approximately.

The profit may be thus estimated—

			Rs.	A.	P.
Cost of raw material	...	...	25	0	0
Expenses of manufacture	...	...	6	8	0
Net profit	...	...	3	8	0
		Total	35	0	0

In Seitkun village a different make of *paso* is woven; the *viss* of raw silk will turn out five of these, fetching Rs. 9 and annas 8 each, and the rate of profit will be somewhat higher.

In Taungdwingyi the home-produced raw silk sells as it is wound off the cocoons at from Rs. 17 to Rs. 20 or, on the spot, from Rs. 12 to Rs. 15 the *viss*. *Magwe*. *Yaméthin*.

The home-grown silk of Yamèthin district finds no sale except locally, where, if of good quality, it fetches Rs. 16 the *viss* and, if inferior, Rs. 14 and Rs. 13.

A *bala paso* worth Rs. 15 takes five to ten days to weave.

Mandalay. The weaver gets Rs. 2 the *paso*. The weight of silk is about one quarter *viss* at Rs. 30 the *viss*. The cost of dyeing is as. 8 and of putting the silk thread on to the reels Re. 1; of extending the silk as. 4; and of making the *hnat* or cotton thread comb as. 4.

Thus:—

		Rs.	A.	P.	Rs.	A.	P.
Value of <i>paso</i> ( <i>bala</i> )	...	...	...	...	15	0	0
Deduct wages	...	...	...	...	2	0	0
Value of silk	...	...	...	...	7	8	0
Cost of dyeing	...	...	...	...	0	8	0
Reeling	...	...	...	...	0	4	0
Making comb	...	...	...	...	0	4	0
					<hr/>		
					10	8	0
					<hr/>		
	Balance	...			4	8	0
					<hr/>		

The silk merchant or weaving master's profit is Rs. 4 as. 8 and Rs. 4 only. The wage of the weaver is therefore Rs. 12 or Rs. 6 a month, according as he is a quick or slow workman.

Old women and little girls, who sit and spin or unwind the raw silk thread from *figure 1* on to *figure 2* are also paid by the piece, at Rs. 2 the *viss*. This task takes sometimes as long as twelve days. A man is a quicker weaver than a woman. For twisting the silk into singles the wages are Rs. 2 the *viss*; one *viss* takes seven or eight days. For transferring the dyed silk thread from *figure 11* to *figure 12* the wages are Rs. 4 the *viss*, and the time occupied is about fifteen days. The cost of weaving an *acheik paso* of full length is Rs. 35, and the work would occupy a skilful weaver nearly six months. In certain districts, where money has been taken in advance from the silk merchants, about Rs. 25 only is paid, and the unfortunate weaver gets Rs. 4 a month as his wage.

At Kothan in Lower Chindwin district prices range thus:—

		Rs.	A.	P.		Rs.	A.	P.	
<i>Paso</i>	...	...	6	0	0	to	9	0	0
<i>Lóngyi</i>	...	...	3	0	0	to	3	8	0
<i>Tamein</i>	...	...	1	12	0	to	2	0	0
<i>Thingan</i> (Monk's robe)	...	...	15	0	0	to	18	0	0

One *viss* of silk will turn out four and a half *paso*: the cost of outturn is Rs. 30 as. 2 and the sale-price is Rs. 31 as. 8, so that the profit is all but visionary.

At Shwedaung an ordinary *paso*, measuring seventeen cubits long by twenty-one inches broad, takes up twenty ticals of spun silk, the weight in the raw before the cleansing and winding processes being twenty-nine ticals. - A

*Prome.* quick worker will turn out a *paso* in six days and her wage ranges from Rs. 1 as. 4 to Rs. 1 as. 8. The spinning and sorting of the silk are separate items in the cost of production, the former being paid at Rs. 1 as. 4 the *viss* of raw material worked and the latter at Rs. 1 as. 8. The finished *paso* fetches Rs. 9, as against Rs. 12 as. 8 or Rs. 13 in the days before foreign competition dislocated the local industry.

## VIII.

### THE TRADE AND ITS PROSPECTS.

[In the accompanying statements amounts, when so small as to be of little significance, have been omitted.]

#### A.—IMPORTS.

##### 1 and 2.—Raw Silk.

The Straits are practically the only market from which raw silk is brought by sea into Burma. The import from the United Kingdom is of small and uncertain amount, and it does not appear yet that there is any permanent direct Chinese supply. The total import trade amounted for 1897-98 to more than sixteen *lakhs*.

By land the market is of some size, amounting to nearly three *lakhs*, and is expanding rapidly. Until 1890 Siam was the chief source of supply, but since that year Western China has usurped its position, doubtless on account of the increased facilities and securities of commerce which have followed the Annexation. The increase from one-third of a *lakh* in the first triennial period reviewed to nineteen and a half *lakhs* in the last, is conspicuous.

## 1.—Sea-borne trade.

Year.	From United Kingdom.		From China.		From Straits Settlements.		Total.	
	lbs.	Rs.	lbs.	Rs.	lbs.	Rs.	lbs.	Rs.
1889-90	168	250	...	...	389,309	24,53,187	389,477	24,53,437
1890-91	...	...	...	...	372,059	24,40,434	372,059	24,40,434
1891-92	...	...	...	...	319,745	20,30,859	319,745	20,30,859
1892-93	...	...	...	...	356,783	22,31,946	356,783	22,31,946
1893-94	...	...	...	...	348,888	21,81,651	348,888	21,81,651
1894-95	...	...	...	...	151,278	7,78,650	151,278	7,78,650
1895-96	...	...	1,094	6,564	388,147	21,58,830	389,241	21,65,394
1896-97	...	...	3,005	16,795	311,266	16,69,840	314,271	16,86,635
1897-98	...	...	19,081	87,048	361,641	15,44,133	380,722	16,31,186

## 2.—Land-borne trade between Burma and the adjoining countries.

Article.	FOR TRIENNIAL PERIOD ENDING 31st MARCH				FOR YEAR ENDING 31st MARCH	
	1887.	1890.	1893.	1896.	1897.	1898.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Raw silk ...	84,304 (Siam 21,179; China nil).	1,14,256 (Siam 67,546; China 27,000).	11,37,308 (Western China 9,53,100, Siam and Zimmè).	19,53,395 (Western China 18,97,100, Siam and Zimme).	4,38,130 (Western China 4,15,875).	2,84,619 (Western China 2,63,125).

## 3 and 4.—Made-up silk.

The figures of the sea-borne import are of considerable significance. For the year 1889-90 the United Kingdom was practically the sole source of supply, contributing approximately eleven-twelfths of all the piece-goods imported, most of the small remainder coming in from the Straits. In the year 1894-95 the contribution of the United Kingdom fell to eleven-thirteenths, and since then the fall had been, except in one year, constant, the proportion for the year 1897-98 being two-thirds only of the whole. This result is due, as table 3 shows, to the introduction of rival sources of supply, which have wrested the market from British manufactures. In 1895-96 Germany, Holland and Japan acquired, and have since retained, a portion of the market, and the increasing

and very rapid development of the import of silk fabrics from the latter country must intimately affect the prospects of the trade as a British monopoly.

Of the land-borne trade, totalling, as compared with the sea-borne, less than one lakh on an average to thirty, Siam is by far the largest supplying market, though Western China contributed a considerable proportion for the triennium closing with 1896. The figures for the years 1897 and 1898 suggest that the triennium ending in 1899 will show a large increase.

3.—Sea-borne.

Year.	FROM UNITED KINGDOM.		FROM FRANCE.		FROM STRAITS.		FROM GERMANY.		FROM HOLLAND.		FROM JAPAN.		FROM OTHER COUNTRIES.		FROM BELGIUM.		FROM CHINA.		TOTAL.	
	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.
1889-90 ...	4,826,191	Rs. 66,78,205	2,421	Rs. 6,579	404,884	Rs. 6,24,956	...	Rs. ...	...	Rs. ...	...	Rs. ...	...	Rs. ...	...	Rs. ...	...	Rs. ...	5,235,670	Rs. 73,10,874
1890-91 ...	3,938,890	54,64,032	210	700	378,417	4,37,091	...	...	...	...	...	...	...	...	...	...	...	...	4,316,330	59,03,408
1891-92 ...	4,115,390	61,50,465	29,042	24,858	118,915	1,68,293	...	...	...	...	...	...	...	...	...	...	...	...	4,268,872	63,61,090
1892-93 ...	3,709,484	52,51,267	26,595	33,468	100,386	1,79,348	...	...	...	...	...	...	...	...	...	...	...	...	3,847,732	54,75,696
1893-94 ...	4,214,841	52,42,567	50,605	53,220	206,817	3,52,244	...	...	...	...	...	...	...	...	...	...	...	...	4,487,608	56,55,506
1894-95 ...	2,328,632	22,80,846	58,890	35,815	188,264	1,49,044	...	...	...	...	...	349,651	1,45,248	...	...	...	...	...	2,878,051	26,03,218
1895-96 ...	4,630,686	44,21,768	1,659	1,177	263,824	2,13,914	6,301	5,514	297,087	90,606	23,998	16,062	...	...	...	...	...	...	5,214,328	47,50,211
1896-97 ...	2,374,120	19,51,730	382	382	182,279	1,54,706	11,037	9,799	210,268	66,001	361,283	1,77,462	...	...	...	...	...	...	3,142,713	29,62,958
1897-98 ...	2,660,985	20,58,344	5,382	8,977	152,428	1,11,180	11,7398	2,712	...	...	1,432 653	717 543	...	...	14,331	10,719	112,328	53,574	4,496,777	30,40,298

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4.—Land-borne.

TRIENNium ENDING MARCH.				FOR THE YEAR	
1887.	1890.	1893.	1896.	1897.	1898.
Rs. 85,046 (Siam, 41,336, Zimmé).	Rs. 30,691 (Zimmé, 16,014, Southern Shan States, Siam).	Rs. 96,683 (Siam, 64,417, Zimmé, Western China 6,000).	Rs. 2,02,716 (Western China 62,970, Zimmé 60,718, Siam.)	Rs. 61,587 (Siam 40,187, Southern Shan States).	Rs. 91,484 (Siam 85,117).

## B.—EXPORTS.

## 5, 6 and 7.—Raw silk.

The sea-borne trade both in the article of Indian and foreign production is fluctuating, inconsiderable and, such as it is, seems to be approaching extinction.

The land-borne trade is, on the other hand, increasing and is almost entirely limited to consignments for the Southern Shan States markets; the average value of it at present is half a lakh yearly.

## 5.—Sea-borne.—Raw silk of Indian manufacture.

Year.	To UNITED KINGDOM.		To STRAITS.		To CHINA.		TOTAL.	
	Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.
	lbs.	Rs.	lbs.	Rs.	lbs.	Rs.	lbs.	Rs.
1888-89 ...	21,256	19,666	2,212	3,715	...	...	23,468	23,381
1889-90 ...	5,054	3,381	3,474	1,855	...	...	9,567	6,336
1890-91 ...	7,733	6,422	...	...	1,450	725	9,183	7,147
1891-92 ...	3,144	2,569	...	1,220	...	...	3,927	3,365
1892-93 ...	13,973	21,683	...	...	...	...	13,973	21,683
1893-94 ...	11,163	10,912	140	250	...	...	12,103	12,012
1894-95 ...	1,960	1,960	...	...	...	...	1,960	1,960
1895-96 ...	...	...	...	...	...	...	...	...
1896-97 ...	...	...	...	...	...	...	...	...
1897-98 ...	...	...	...	...	...	...	...	...

## Sea-borne.—Raw silk of Foreign manufacture.

Year.	To UNITED KINGDOM.		To STRAITS.		TOTAL.		
	Weight.	Value.	Weight.	Value.	Weight.	Value.	
	lbs.	Rs.	lbs.	Rs.	lbs.	Rs.	
1889—1895 ...	...	...	<i>Blank.</i>				
1895-96 ...	...	...	8,409	14,697	8,409	14,697	
1896-97 ...	...	1,196	1,000	2,664	7,950	3,860	8,950
1897-98 ...	...	...	...	3,000	1,500	3,000	1,500



## 7.—Land-borne.

Article.	FOR TRIENNIAL PERIOD ENDING 31ST MARCH				FOR THE YEAR	
	1887.	1890.	1893.	1896.	1897.	1898.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Raw silk ...	9,844 (Southern Shan States 9,800).	6,925 (All Southern Shan States).	8,749 (Southern Shan States 2,678 and Northern Shan States).	71,967 (Southern Shan States 69,677 and Northern Shan States).	48,143 (Southern Shan States 46,113).	48,340 (Southern Shan States 48,055).

## 8, 9 and 10.—Made-up silks.

The sea-borne trade is slight, the only constant market being the Straits Settlements.

The land-borne trade, on the other hand, is considerable, and the expansion has been rapid and promises to be even more rapid. The chief consignee countries are the Southern Shan States and Zimmè, and a market with Western China is being opened out. The total trade in 1898 amounted to more than eleven lakhs.

## 8.—Sea-borne.—Made-up silks of Indian manufacture.

Year.	TO UNITED KINGDOM.		TO STRAITS SETTLEMENTS.		TOTAL.	
	Yards.	Value.	Yards.	Value.	Yards.	Value.
		Rs.		Rs.		Rs.
1888-89 ...	...	150	...	...	...	150
1889-90 ...	...	...	...	286	...	286
1890-91 ...	...	...	...	...	...	813
1891-92 ...	...	...	...	1,220	...	1,220
1892-93 ...	...	80	...	666	...	696
1893-94 ...	...	901	...	442	...	1,343
1894-95 ...	...	149	...	6,952	...	7,101
1895-96 ...	...	627	...	1,960	...	3,567
1896-97 ...	...	335	1,392	1,610	1,502	1,945
1897-98 ...	110	...	...	140	...	452

## 9.—Sea borne Made-up silks of Foreign manufacture.

Year.	To UNITED KINGDOM.		To STRAITS SETTLEMENTS.		To CEYLON.		TOTAL.	
	Yards.	Value.	Yards.	Value.	Yards.	Value.	Yards.	Value.
		Rs.		Rs.		Rs.		Rs.
1889—1895 ...				<i>Blank.</i>				
1895-96 ...	4,520	4,290	1,016	1,364	...	...	6,558	6,797
1896-97 ...	...	...	18,731	11,135	...	...	18,731	11,135
1897-98 ...	10,960	6,619	4,337	3,856	1,500	1,000	17,176	12,105

## 10.—Land-borne.

Article.	FOR TRIENNIAL PERIOD ENDING 31ST MARCH				FOR THE YEAR	
	1887.	1890.	1893.	1896.	1897.	1898.
Piece-goods, silk.	Rs. 8,31,472 (Southern Shan States 3,41,159, Siam, Karenji, Zimmé).	Rs. 10,44,918 (Zimmé 3,72,442, Siam, Southern Shan States: Northern Shan States, first appears 55,562).	Rs. 8,84,694 (Zimmé 2,67,173, Northern Shan States, Southern Shan States, Karenni, Siam, Western China 3,770).	Rs. 16,68,593 (Southern Shan States 6,77,500, Zimmé, Northern Shan States, Western China 1,10,622).	Rs. 10,06,538 (Southern Shan States 5,90,013).	Rs. 1,129,694 (Southern Shan States 6,41,978, Northern Shan States, Zimmé).

Silk does not appear in the customs returns as a separate head until 1894, when it accounted for Rs. 1,70,002 net collection. The figures for that and the following years were—

	Rs.
1894-95	...
1895-96	...
1896-97	...
1897-98	...
	Rs.
	1,70,002
	3,21,104
	1,89,992
	2,35,464

There is no duty on silk exported from Burma.

Prices.

Prices per maund of 80 lbs.

Article.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	1891-92.	1892-93.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Raw silk, Foreign	512	489	513	499	436	515	514	512
Raw silk, Indian	...	...	...	...	...	220	220	213
Piece-goods, Foreign.	1,814	1,887	1,872	1,688	1,731	1,500	1,490	1,460
Piece-goods, Indian.	...	...	...	...	...	1,000	1,000	1,000
	Average wholesale prices in Rangoon.							

The figures for the years 1894-95 and 1895-96 were affected by the general trade depression then prevailing, and due among other causes to the disorganization of the rice industry. But certain conclusions can be drawn with a fair amount of assurance in spite of this disturbing factor. The chief of these is that the import market of made-up silk goods is yearly becoming less and less a British monopoly. Yet there seems to be no reason why the British-made article should not, besides commanding the Burmese, find in Western China and the other bordering countries new and elastic markets. To ensure this the British producer must learn the conditions and the requirements of his market and show himself ready to comply with them. With the superior plant and organization at his command there is no reason why he should not completely drive out the native fabric as an article of dress. The Burman has an admiration for enticing patterns and for colours which are beyond his own powers of creation, and is quite willing to sacrifice durability for cheapness and variety. He finds it easy to earn a livelihood, and motives of thrift rarely appeal to him. He is fond of sightseeing, and he enjoys the sightseeing all the more keenly if his clothes are new and their colours brilliant. There is nothing he likes so much as new clothes, and fresh designs and colours. He has an Aristidean disgust for a head dress which lasts from one generation to another. Hence it is quite natural, as it is certainly indisputable, that the showier and cheaper imported dress fabrics are driving out and will soon entirely supersede the Burmese product.

It does not follow that the industry must come to an end. The qualities of durability and handsomeness which are tiresome to the Burman would no doubt, if they were known, commend themselves to a considerable class of consumers in other countries. The handloom of Burma might then survive: it is a distressing reflection that, otherwise, an industry which is intimately associated with the national life of a picturesque people should be doomed to a more or less rapid extinction.

Burma itself is not one of the quarters in which a market for Burmese silks can be anticipated. There is little prospect of increasing the industry to supply local wants so long as the well-to-do classes continue to wear the cheaper machine-made fabrics of Japanese or English manufacture unless the cost of producing the native fabric can be diminished.

ed. This might be perhaps achieved or at least helped by improving native methods of sericulture. It is estimated that improvements in this direction would enable weavers to buy their raw silk at half the present rates, and the Burmese fabric could then be put on the market at prices which would enable it to compete with goods of foreign manufacture.

The Amarapura report says that though the number of persons engaged in the industry is larger than it ever was, and though there is a tendency to still further development, it is not because the demand is greater but because the weaver and his offspring are unfitted for the hard manual labour of cultivation. In Amarapura it may be true that physical causes drive labour into the special channel of the silk industry. Nevertheless, taking the province as a whole, there can be no doubt that the general demand for silk fabrics is greater now, than it was in the King's time. The increased demand is not for Burmese silks but, as has been said, for cheaper forms of the foreign-made fabric. Among these the most noticeable importations are (1) The *Babu* or *Bónbaung*, the Bombay *paso*, sold at Rs. 5 as. 8 or Rs. 6 and having a life of three months only; and, (2) The *Kwantung* (Canton) *paso*, which sells for Rs. 6 or Rs. 7 but has a life of twice as long as the Bombay *paso*, whilst the Amarapura web, sold at Rs. 9, has a life, in constant use, of over twelve months. The Canton *paso* is now falling out of fashion, but the Bombay *paso* and the flowered Manchester silks are as much and as loud in the market as ever.

The Annexation of Upper Burma has caused much of the decline in the industry. In Burmese times the *acheik* was the *dernier cri* of fashion in dress and was exclusively worn by the court and its hangers-on. The court set the mode to the provinces, and the *acheik* was looked upon as the fitting dress of every official of any pretension to rank or consideration. There is now no glass of fashion. The well-to-do Burman can buy whatever design of silk pleases his generous fancy or happens to be the vogue of the hour. The *acheik* is comparatively seldom seen, and its place is taken by the cheaper *bala* or the still cheaper imported fabric. *Acheik* weaving is a dying art: the great number of shuttles employed and the intricacy of the operations involved made it at any time a costly form of weaving, and the products of the looms were proportionately valuable. Whilst the court remained and could decide on the direction fashions should take there was

room for it. But popular taste will hardly in the absence of a court-fashion automatically revert to a taste for these expensive fabrics: and the durability of them is no recommendation to a Burman.

The value of the silks actually worn now is said to be three *lakhs* of rupees only against Rupees six *lakhs* in the King's time. The disuse of the costly *acheik* may account in some measure for this, but the figures are in any case unauthoritative and, at the most, approximate.

To compete with other markets on their own ground, in other words, to establish an export trade in Burmese silks, the silk-weaver requires to know what silk piece-goods are in demand. This might be effected by the establishment of an agency to introduce Burmese fabrics to the outside world. This, again, might be supplemented by the production of specimens of the best form the art takes at exhibitions from time to time, and permanently in museums.

There are many obvious uses to which Burmese silk might be put in the Continental and American markets, where the durability of the fabric would hardly be the disability which it certainly is in Burma. The *bala* fabric might be made into articles of dress, blouses and the like: the colours are pleasing and subdued, and the designs unobtrusive. The *acheik* might serve for hangings, cushion-covers, for any purpose in fact in which bold ornament and decided colouring are desirable. No market has yet been sought for the Burmese fabric and it is purely speculative to do more than outline the uses to which it might be found to adapt itself. The experiment is at any rate worth the trying.

## IX.

### ALLIED INDUSTRIES.

The *yaw paso* is made in the Ka-le subdivision of Upper Chindwin district, for the most part in the Yaza-gyo, Tinnyin, Ka-le, Indin, Sehaung and Kyaukpyôk circles of Ka-le township. The silk used is wholly of foreign manufacture and the chief dye employed is indigo (*mè*). The fabric is woven of mixed cotton and silk, and the price of a *paso* ranges from Rs. 9 to Rs. 25, according to the delicacy of the pattern and the proportion of silk to cotton. If made entirely of silk the *paso* would cost from Rs. 40 to Rs. 50. The trade is not extensive, some two thousand *paso* and *tamein* being turned out in the subdivision yearly. Local consumption accounts for two-thirds of the total and one-third finds its way to outside villages.

The *hpa ho*, the head-dress of the matron of the Eastern Shan States, is woven of mixed silk and cotton. It is a many-coloured strip, some seven feet long by rather less than a foot in breadth. Of pattern there is none, the requisite degree of gaiety being achieved by a succession of different-coloured breadths inwoven; the width of each and the colour vary with the individual fancy. In Thibaw a *hpa ho* of one-and-a-half feet in width is sold for Rs 1 as. 4. Silk-ended *hpa ho* are woven in the Northern circles of the Keng Tawng sub-State of Mông Nai. The industry is purely local and is being stifled by the import of Europe silks.

## X.

## THE RACES ENGAGED IN THE INDUSTRY.

The Yabeins, a curious race of misty origin, are engaged almost entirely in silk processes. They numbered two thousand one hundred and ninety-seven persons in Lower Burma in 1891. They are said to have been once orthodox Burmese Buddhists like their neighbours until some of them took to breeding silkworms and, as this involved the destruction of the chrysalis, they were not only doomed to future and unenviable incarnations, but in this life also came to be looked on with contempt and dislike. The money question was too pressing, and they sacrificed good repute for an easy livelihood. Many colonies of them lived apart in villages of their own, and there they developed a *patois* distinct from the Burmese of the more religious stock. In 1881 the *patois* was still alive and was spoken by four hundred and thirty-six persons, but in 1891 there is no return of it and it appears to have vanished.

Another theory is that the culture of the worm is older than Buddhism, and that it was only on the introduction of Buddhism that the line of severance drawn between those who were willing to take life and those who were not, led to the secession of the Yabeins. If so, they at least had the courage of their opinions. The argument that hunters and fishermen take life and yet claim to be Buddhists does not disprove the theory: for these classes are much more numerous and important than the small class of silk-worm rearers, and might have forced the hand of the monasteries.

Or, again, the Yabeins may be a relic of one of the many broken clans like the Danus and the Danaws of whom little except a bare name and a barer claim to a separate existence is to be gathered. They may be counted among these 'lost tribes' with equanimity. Of late years many Yabein

villages, especially in Pegu district, have taken to cultivation, whilst some Karens have on the other hand taken to silkworm rearing. The culture of the silkworm by the Yabeins is hereditary, but is due to choice rather than caste obligation.

The part played by the Manipuri captives of the older dynasties of Burma in developing the existing silk industry was a very important one. Their colonization of Ywabein near Prome has been noted above and suggests a channel along which to trace the racial affinities of the Yabein. Their deportation to Ava and the settlement of the silk-weaving villages in Kyauksè district are recorded in Mr. Kenny's note quoted above. Their descendants in the Amarapura subdivision now far out-number the pure Burmans who are engaged in the industry.

Manipuris were said to be chiefly employed in the silk-weaving done in Henzada district in 1889. No details as to the part they take in the industry now have been supplied.

Sericulture is carried on to a small extent in Lai Hka and Mông Sit (*v. supra*) by Yangsek, and in Lai Hka and Mông Kang by the Yinaws.