# 3 ANIMAL FIBRE

One day Neelima went to a flower garden to pluck flowers with her friend Reshma. Suddenly, while plucking flowers, Neelima shouted and started crying, by seeing a caterpiller had crawling on her dress! Reshma quickly threw it away. “Are caterpillars dangerous?” Neelima asked. Reshma said, “All caterpillars are not dangerous, some are useful too.

Do you know your dress is made of something we get from caterpillars?” Neelima was surprised and started thinking about how dresses are made up of material obtained from caterpillers. She remembered studying about that in class VI; The fibres derived from plants like cotton & jute are made into fabric. So the animals also give us fibres!

What fibres do animals give us? Is the way of obtaining them similar to plants? Which part of animal is useful to make fabrics? Neelima asked question after question. She wanted to get answers to all her questions.

We get fibres from plants and animals. Cotton, Jute, Gongoora, Alovera, Coconut plant fibres are useful to make different kinds of fabrics. In the same way we get fibres of silk and wool from animals like silk worms and sheep, goat, camel, yak etc. Let us find out about these animal fibres.

### Story of silk:

Making of silk or silk fabrics is a very interesting story. This involves various persons and efforts. To know about silk, Neelima visited a sericulture exhibition. People there, shared the following experiences with Neelima.

### Stall-1 (Moth to egg)

This was the stall where eggs and different moths were displayed.

Fig. 1

Hello….! I am Prathima living in Dharmavaram of Ananthapur district. My father works in a seed growing centre.

Do you know we call the eggs of silk moth as ‘seeds’?

Silk moth is like butterfly. We keep those moths in grill mesh boxes in separate rooms. My father takes care of those silk moths. We call them as ‘Chilakalu’, my father said another name of these moths is ‘Bombyx Mori’.

At the time of laying eggs we arrange white cloth pieces or paper. Moths lay hundreds of eggs on them( a female moth lays around 500 eggs in one go and dies). Those eggs are very small in size.

Farmers from different places of our districts come and purchase these eggs. Most of the times my father allows these eggs to hatch in special chambers usually over mats, on beds of chopped mulberry leaves to get small worms. Farmers from Kurnool, Kadapa, Chittoor and some other places of our State come and purchase these tiny worms.

Sometimes silk moths are also sold. People buy these silk moths to produce eggs. These centers are called ‘Grinages’. “I saw a big seed growing centre at Horsely Hills in Chittoor district “ said Prathima.

Neelima walked on to the next stall .There she met Rehman.

**Stall- 2 (Egg to cocoon)** Here, large trays with leaves and larva feeding on them could be seen. Some trays had white and yellowish egg like structures.

Fig. 2

Fig. 3

As-Salam-Alekum… ! I am Rehman from Hanuman Junction of West Godavari District. We grow silk worms to get cocoons. We get 5-6 harvest of worms in a year. My grandfather, father and my brother work on our farm. We have two acres of Mulberry plantation. My grandfather bought Mulberry twigs from Palamaneru of Chittoor district, where sericulture(the whole process of obtaining silk starting from silk moth) is carried out. We plant the twigs to get the mulberry crop.

My father purchased tiny white coloured silk worms (caterpillars) from seed growing

centres at Horsely Hills. We place these worms in trays. We chop Mulberry leaves into small pieces to feed them.

These worms eat leaves day and night. They need good hygienic conditions and proper light to grow. When they grow bigger in size, we transfer the worms into big sized cane frames called “Chandrikalu”

After 30-35 days the caterpillar stops eating and settles at a particular place. It weaves a net to hold itself. Caterpillar moves its mouth from side to side and secretes fibre-like substance. When it is exposed to air and heat it becomes strong. The net is woven completely to cover the body of the caterpillar. This seems to be a closed sack. This is called ‘Pattukayalu’ (Cocoon).

My father said the larva of silk worm undergoes changes in the cocoon to change into a moth. After 2-3 weeks young moths come out from the cocoons and fly away. So we have to be very careful. Within 2-3 days of formation of cocoon, we start removing them from the tray.

We kill the larvae inside by a process called stiffling by putting a lot of these in a steam oven for 10 to 15 minutes. The cocoons have to be stiffled to kill the larva inside as otherwise, it will cut its way out after growing into a moth and spoil the cocoon. We will not be able to get a continuous thread of silk from such a cocoon. Thus we won’t be able to obtain quality fibre for fabric!

Stiffling helps us to store the cocoons for a long time.(Fig 4)

This process is usually done in a reeling centres.

Fig. 4 Stiffling

These cocoons are kept in sealed bags and sold at the cocoon market. If not stiffled, we sell them off within a week. My father usually enquires about rates of cocoons in the market at Hindupur, Madanapally, Dharmavaram, Kadiri, Palamaneru, Rayachoti.

**Do you Know?**

Apart from Mulberry , Tasar silk (Desali Pattu) is produced in our State. Some species of silk moths that lay eggs on termanalia oak plantation produce tasar silk. Mostly tribal people rear these kind of cocoons. This silk plantation is mainly concentrated in Ananthapuram, East Godavari and Visakhapatnam and coastal regions of AP.

## Stall 3 (Cocoon to fibre –process of reeling; fibre to yarn)

Neelima observed that some people were to boiling and stirring something in large pots(Fig 5)

Fig. 5 **Locating ends of thread of cocoon**

Fig. 6 **Located ends reeled onto reels**

A person stood in the corner explaining about the process of obtaining fibre from cocoon. I am Sujatha from Madanapalli of Chittoor district. I work in the reeling centre.

Neelima saw cocoons being boiled in water. She was shocked and uttered ‘Hey … ! What are you doing?

We are boiling cocoons to get silk fibre. Caterpillar of silkworm spins fiber which is mainly made up of two types of protein (sirisine and fibroin) and is very strong. The cocoons have to be boiled to loosen the fibre to be able to reel it

Obtaining silk fibre from cocoon is called reeling. It is done with special machines called reelers and twisters. The silk fibre is carefully collected from the cocoon and nearly 3 to 8 of such threads are wound together to make yarn from it which is reeled (Fig 6). This yarn is cleaned, bleached and coloured.

The yarn is ready to be woven into a variety of designed fabrics, on looms. You can see reeling centres at Nandikotkur, Hindupur, Dharmavaram and Madanapalli etc.

Fig. 7 Warp of sari being p **repared.**

## Stall 4 Reeling to weaving

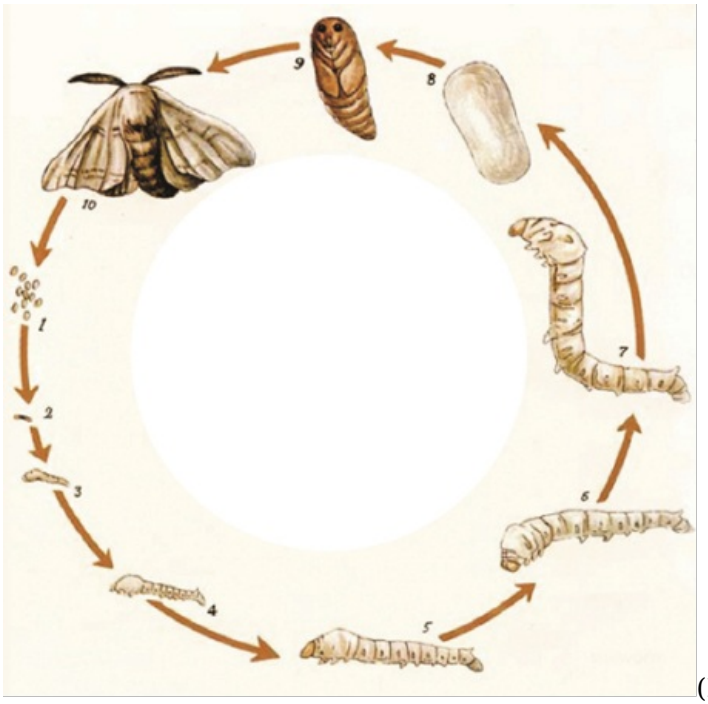
**N**eelima saw a handloom at one corner of the exhibition and talked with the person displaying it.

Namasthe ...! I am Bhupathi belonging to Dharmavaram - silk city of Andhra Pradesh. We weave silk fabric by using silk yarn on handlooms. For us, weaving is a traditional occupation. We get silk yarn from reeling centres to weave a variety of sarees. Venkatagiri pattu and Dharmavaram are famous types produced by our state. Dharmavaram is famous for its wide border and rich buta or dots.

Fig. 8 A jamdani sari on loom. weft being woven over warp.

Banaras, Kanchipuram, Dharmavaram, Narayanpet, Kothakota, Pochampally are all types of silk fabrics. They get their names from the places where they are made. You may have also heard the names of tasar silk, mooga silk, kosa silk, eri silk etc as you went through different stalls here. These are all several varieties of silk. Some chemicals add strength to silk fibres. Silk is used to make other products as well like satin and crepe. We have both handlooms and power looms to weave silk.

Neelima was filled with wonder and delight about the fabric of her silk frock. She tried to make a flowchart of the life cycle of silk moth. Try to help her.



(Fig 9)

**LIFE CYCLE**
**OF**
**SILKWORM**

Fig. 9

Draw the flow chart of life cycle of silk worm in your notebook.

**Do you know?**

The thread you get from the average cocoon ranges from about 1,000 to 3,000 feet, and about 2,000 to 3,000 cocoons are required to make 500 gm of silk. That is about 5,000,000 feet or more than 1,000 miles!

That's not all. People involved in the process suffer from skin as well as respiratory problems due to continuous handling of the silk worm and the silk fibres.

## Story of Wool:

Next day Neelima visited another part of the exhibition with her Grandpa. The entrance was shaped like a big sheep! She entered through the stomach of the sheep into the exhibition hall. She was surprised because the setting seemed to be a real Kashmiri village. There she saw different varieties of woolen clothes like sweaters, mufflers, hats, long coats, table covers etc. There were models of different types of animals like sheep, goat, yak, llama, camel, alpaca etc there. She knew sheep gave wool but why were the other animals displayed at the stalls?

Grandpa told Neelima that wool is obtained from hair of all the animals displayed. It is also called fleece or fur collectively. It is mainly a protein. Good quality wool is obtained from Merino sheep. They are specially reared. The fleece is 3-5 inches long and very fine and most valuable. A merino sheep may yield about 5 to 18Kg of wool per year.

Grandpa do we find any difference between hair of all animals?

Certainly, hair of camel that lives in Rajasthan is not same as Angora goat that lives in Kashmir. Camels have rough and coarse hair. Under this rough hair some animals usually have soft hair as well. Angora goat or the Merino sheep have soft hair.

Grandpa where do we find sheep or goat that give us wool?

In Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh, Sikkim, Haryana, Punjab, Rajasthan and Gujarat. They are often reared on large farms.

Grandpa what are they doing with that scissor?

That is a shear to cut fleece from sheep. During spring season fleece of sheep is removed

from its body using this type of razor.

Fig. 10

This process is called shearing(Fig 10). To prevent damage to skin, grease is used.

Well Neelima , why is shearing done during spring season?

Neelima replied:

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(Guess what her answer is ? Write it down in your note book)

“Neelima come here. See this big water tank and spade”. Sheared skin with hair is dipped in such tanks and stirred with a spade. Often it may be washed under a stream of water as well. This water contains some chemicals to remove grease, dirt and dust. This process is called washing or scouring.

After washing, cool air is passed over the wool which makes it softer.

“Grandpa, What are they doing? “Why are they keeping heaps of fleece at separate places?

Fig. 11

Well, they are sorting coarse and soft ones as well as broken and long ones and making separate piles of them. Unwanted materials like twigs or bits of leaves etc that may be present with the wool are also separated out. This process is called sorting or wool classing. Fleece is the soft mass of wool.

“Grandpa, how do these woolen fibres get different colours? What is there in the tubs?”

There are bleaches and dyes in the tubs. Woolen fibres are bleached and then dyed with different colours. The coloured fibres are used to make yarn. These fibres are then combed.

There is a machine for combing or carding wool. Wool is pulled through many teeth of the combing machine.

 (Fig 13)

From there, a machine rolls and pulls and it out into a thick rope and still another pulls and twists it into a long thread. This is the process of spinning.

Here you can see it being wound on whirling spools as well.

Thus we get the yarn which may be dyed
before weaving.
“Grandpa how can I use those needles? What are they doing with the needles?”

“Neelima they are knitting woolen fabrics by using needles. Wool can be knit easily because it has a natural bend or crimp on it”.

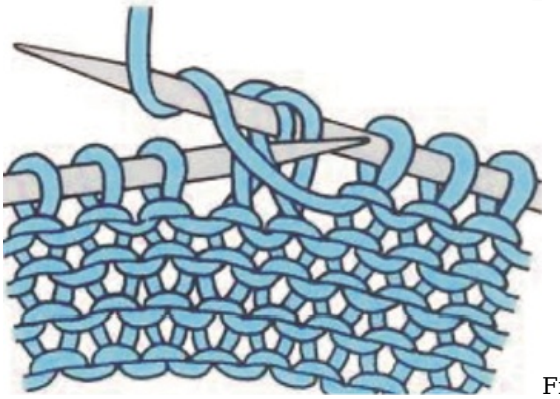
Fig. 14

By making knots with loops and rings of long threads of yarn, woolen fabrics are knitted. In addition to handmade process of knitting, handlooms and power looms are also used on which woolen yarn is woven to fabric.(Fig 14)

 Fig. 15

Woolen threads are stretched from the top of loom to the bottom. These are called warp threads. The threads that go side to side are weft threads. A shuttle like a big needle takes the weft threads over and under warp threads. One more important part of the loom is the harness. The harness lifts every other warp thread so that the weft threads go over one and under the next. All types of yarn whether cotton or silk or wool etc. are woven in this manner.(Fig 15)

Neelima was surprised to see how fast knitting was being carried out. She sat near a man to observe and learn how to knit. Neelima purchased a book about woolen fabrics and a sweater for her grandma and returned home.At home Neelima made a flow chart to show the processes involved from obtaining wool to producing fabric.

SHEARING

↓

SCOURING

↓

SORTING

↓

BLEACHING

↓

DYEING

↓

COMBING/CARDING

SPINNING

ROLLING AND TWISTING

WEAVING OR KNITTING

WOOLLEN FABRIC

Grandpa asked Neelima to check and make corrections in the sequence.What corrections do you think Neelima needs to make?

Neelima thought that silk and wool are also natural fibres like cotton. She wanted to find out the difference between silk and cotton. Let us help her.

| **Silk** | **Cotton** |
|---|---|
| 1. Mainly protein | 1. Mainly a carbohydrate called cellulose |

**Do you know?**

Wool is a poor conductor of heat. Air trapped in between the woollen fibres and our body prevents the flow of heat from our body to our surroundings. So we feel hot and are protected from cold. Woollen cloth also helps to douse fire.

Think why it is good to wrap a person, who is caught in fire, with a blanket.

Key words

Animal fibre, Silkworm, Cocoon Mulberry, Sericulture , Bombyx mori, Reeling, Fleece, Shearing, Scouring, Knitting, Bleaching, Weaving , Dyeing, Warp, Woof

**What we have learnt**

- Animal fibres are natural fibres.
- Animal fibre is a protein while plant fibre is a carbohydrate.
- Rearing of silk worms for obtaining silk is called sericulture.
- Egg, Larva, Pupa, Adult moth are the stages in the life cycle of silk worm.
- Separation of silk fibre from cocoon is called reeling.
- Hair of animals like goat, sheep, camel etc., are used to obtain woollen fibre.
- Angora goat hair is soft to spin different types of fabrics like shawls and sweaters.
- Removing of hair or fleece from the skin of sheep is called shearing.
- Cleaning of fleece with a stream of water is called scouring.
- Knitting is the process of making fabric by using knitting needles to form interlocking loops and rings of woolen yarn.

**Improve your learning**

1. In sericulture industry do which stages of silkworm weavers buy? Why do they do so?

2. Which place in our state is called silk city?
3. Prepare a chart showing life cycle of silkworm and display that in the classroom.
4. Why are cocoons stiffled?
5. What will happen if cocoon is not boiled?
6. What are the differences between fleece of angora goat and camel.
7. Make a flow chart showing various stages of production of woollen fabric.
8. In what way is knitting different from weaving?
9. Prepare a scrap book with pictures of different wool yielding animals.
10. Fill up the blank and give your reasons for the statement.

..... fabric protect us from cold.

11. If you are going to visit Dal lake at Kashmir which type of clothes would you like to keep in your luggage ? Why?
12. Do you find any similarities between silk and wool weaving? What are they?
13. Write 5 differences between wool and silk manufacturing.
14. Observe designs on silk sarees, trace them in your notebook and make your own designs.
15. In East India silk is called pat. You may collect different pieces of silk fabric from a cloth store and write the names of the type of fabric and make a chart.

## READ AND ENJOY

### SILK- THAT'S HOW IT BEGAN:

*Chinese traditions, along with the writings of Confucius tell the same 2700 BC tale. It states that the empress Leizu (Hsi- ling- shi) was having tea one day under a mulbery tree with her husband, emperor Huang-ti, when a silk worm's cocoon fell into her cup.*

*In an attempt to take it out, the thread of the cocoon began to unroll. So the Empress thought of weaving the thread. The Emperor, encouraged his wife to study the life of silk worm, and so she learned the art of raising silk worms or what is called sericulture. Her finding was taught as well and thus the advent of the silk industry.*

*However, archaeological evidences show that the origin of silk industry traces back to 3000 and 5000 BC. The sites of Yangshao culture in Xia Country, Shanxi reveal a cocoon of a bombyx mori or a domesticated silk worm along with silk weaving looms.*

### THE WORLD OF WOOL

*Woolen fabrics are as ancient as human civilization. According to archeological evidences domestication of woolly sheep may have started around 6000 BC by early Iranians. Earliest woven wool garments are dated 2000-3000 years later.*

*In 15$^{th}$ century, British made laws to control wool smuggling and at one time they punished people by cutting off their hands! The industrial revolution introduced mass production of wool. Leaders of wool production are Australia and China.*

# Spinning and weaving

6

The spinning of animal or vegetable fibres into **thread** dates from about 7000 BC, from the Middle East; the earliest tools used were a **distaff** (a cleft stick holding a bundle of fibres) with a weighted **spindle** to twist them together. The oldest known **textile**, from Asia Minor, dates from around 7000 BC. The first **looms** for weaving wool date from about 5000 BC.

**FAMILY SCENE** A Hittite lady spins wool in a bas-relief from the 8th century BC.