3 Materials of Daily Use

Learning Objectives

To know about

- clothes from animal sources—wool and silk.
- the process of extraction of wool—sheep breeding.
- the process of extraction of silk—silkworm and silk rearing.

In the previous class, you learnt about different types of fibres obtained from plants. You also learnt how cotton and jute fibres are obtained and woven to get clothes.

Recall, that there are three types of fibres: **plant fibres**, **animal fibres** and **synthetic (artificial) fibres**.

Fibres obtained from plants are called ***plant fibres***, for example, cotton, jute, flax and hemp [Figs. 3.1(a and b)]

Fibres obtained from animals are called ***animal fibres***, for example, wool and silk [Figs. 3.1(c and d)].

Fibres manufactured in industries by humans are called ***synthetic (artificial) fibres***, for example, nylon, rayon, polyester and plastic [Figs. 3.1(e and f)].

We all wear clothes to protect ourselves from heat, cold, dust, rain and insects. In this chapter, you will learn about how fibres such as wool and silk are obtained from animals.

Fig. 3.1: Types of fibres

3.1 WOOL

We wear sweaters in winter to protect ourselves from the cold. Wool is a fibre obtained from animals such as sheep (Fig. 3.2), goat, yak and lamb. Animals from which we get wool bear a thick coat of hair on their bodies. Can you tell why these animals have a thick coat of hair on their bodies?

This is because air is a poor conductor of heat. The thick coat of hair traps a lot of air, thereby creating an insulating

Wool

Wool is a fibrous protein obtained from specialized skin cells called follicles.

Do you know?

Wool has several qualities that distinguish it from hair or fur. It is crimped (tight curls), it has a different texture, it is elastic and grows in staples (clusters).

Fig. 3.2: Sheep with a thick coat of hair

barrier. Thus, hair shield their bodies from cold and keep these animals warm.

Wool is a fibre obtained from the **fleece** (hairy growth) of these animals. Wool fibre is made up of protein. It is usually white in colour, although, it can also be brown or grey. Wool is mainly derived from sheep.

Difference between fleece and hair

Fleece: Thick covering of wool on a sheep, used to make a piece of clothing

Hair: The mass of thin thread like structure that grows out of the skin

Activity 3.1 (Compare)

To differentiate between different types of fibres

- Collect threads of cotton, wool, jute, silk and nylon.
- Now observe these threads carefully and note down your observations in the table given below.

Differences between different types of fibres

S. No.	Fibre	Texture (soft/coarse)	Lustre (shiny/dull)	Strength (weak/strong)
1.	Cotton			
2.	Wool			
3.	Silk			
4.	Jute			
5.	Nylon			

Do you know?

In 2007, a Croatian company designed an entire dress for a fashion show with 165 feet of blonde human hair.

Like the human body, the hairy skin of sheep has two types of hair that form its fleece:

(i) the fine soft under-hair that are present close to the skin and

(ii) the coarse beard hair.

Out of these two types of hair, the fine soft under-hair provide the fibres for making wool. Some breeds of sheep are specially chosen to give birth to sheep, which possess fine soft hair only. *The process in which parents are selectively chosen in order to obtain certain special features in their offsprings is called* ***selective breeding***. Certain breeds of sheep having thick coat of hair on their bodies yield good quality wool in large quantities. Such breeds of sheep are also selectively bred with one parent being a sheep of a good breed.

Key Fact

The major commercial producers of wool in the world are Australia, China and New Zealand.

3.1.1 Breeds of Sheep

In India, different breeds of sheep are found in various parts of the country. A few breeds of sheep found in India are mentioned in Table 3.1.

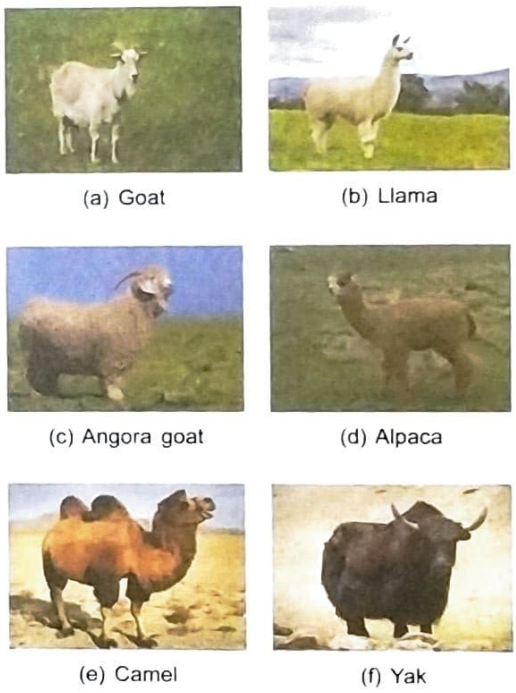
Key Fact

- In number of sheep, India ranks third in the world after China and Australia.
- The life span of a sheep is 10–12 years.

Table 3.1: A few breeds of sheep

S. No.	Name of breed	State where found	Type of wool
1.	Bhakarwal	Jammu and Kashmir	For woollen shawls
2.	Lohi	Punjab and Rajasthan	Good quality wool for sweaters
3.	Marwari	Gujarat	Coarse wool
4.	Nali	Punjab, Haryana and Rajasthan	Carpet wool
5.	Patanwadi	Gujarat	For hosiery
6.	Rampur Bushair	Punjab, Haryana and Rajasthan	Carpet wool

Although sheep are a major source of wool, wool is also obtained from goats and yak hair. Angora wool is obtained from angora goats, found in hilly areas like Jammu and Kashmir. The under-hair of Kashmiri goat are fine and soft. They are woven into fine shawls called **Pashmina** shawls. Wool is also obtained from the fur (hair) on the body of camels. In South America, wool is obtained from Llama and Alpaca (see Fig. 3.3).



(a) Goat (b) Llama (c) Angora goat (d) Alpaca (e) Camel (f) Yak

Fig. 3.3: Wool yielding animals

3.1.2 Production of Wool from Sheep

The fine hair of sheep are used to make wool. Sheep are reared for this purpose.

Sheep are reared in different parts of our country. You might have noticed shepherds taking their herds of sheep for grazing on hilly areas such as Himachal Pradesh, Jammu and Kashmir, Uttarakhand, Sikkim and Arunachal Pradesh or on the plains of Rajasthan, Gujarat, Punjab and Haryana.

Sheep are herbivores and mainly feed on green grasses and green leaves. Sheep are also fed on corn, jowar and mixture of pulses and oil cakes (material left after taking out oil from seeds). In winter, sheep are fed on leaves, grains and dry fodder and majorly kept indoor.

Shearing of sheep includes the following six steps:

(i) Once the reared sheep have developed a thick coat of hair, their hair are removed for getting wool. *The*

Do you know?

Machines used for shearing are similar to those used by barbers to shave off your hair. They do not hurt sheep as they do not hurt you when you shave or get a hair cut.

Key Fact

- The wool, straight off the sheep, contains a lot of oil called **lanolin**. It is removed from the wool, and later used in cosmetic industry.
- The best quality of wool comes from the shoulders and the sides of the sheep.

Do you know?

Many people in our country earn their livelihood from the wool industry. During sorting of wool, sometimes workers get infected by a bacterium, *Anthrax*, which causes a fatal blood disease called **sorter's disease**. Such risks faced by workers during their jobs or because of their occupation are called **occupational hazards**.

Fig. 3.4: Shearing of sheep

Fig. 3.5: Scouring in tanks

sheep are held on a wooden board and their fleece along with the thin uppermost layer of skin is shaved off. This process is called ***shearing*** (Fig. 3.4). Shearing of sheep for wool is done mainly in early summer. This enables sheep to survive without protective coat of hair. The thin uppermost layer of skin that is shaved off is dead. The hair of sheep grow again just as your hair grow.

(ii) *The sheared skin with thick coat of hair is then washed thoroughly in tanks to remove grease, dirt and dust. This process is called* ***scouring*** (Fig. 3.5). Earlier scouring was done in tanks but nowadays, it is done by machines.

Fig. 3.6: Carding

Fig. 3.7: Rolling fibres into yarn

(iii) After scouring, hair are graded and sorted. In factories, hair of different textures are separated.

(iv) The small soft fluffy fibres called **fuzz** (burrs) are separated from the hair. The remaining fibres are again scoured and dried.

(v) The fleece of goat and sheep is white, brown or grey in colour. At this stage, it is dyed in desired colour.

(vi) The dyed fibres are then passed through metal teeth to straighten them. This process is called **carding** (Fig. 3.6). They are further combed and rolled into yarn (Fig. 3.7). Threads of wool are formed by **spinning** two, three or four strands of wool together, as per the requirement. The longer fibres of wool are used to make sweaters. The shorter fibres are used to spin and weave woollen clothes.

Answer Orally

1. Which part of a sheep has wool?
2. Apart from sheep, hair of which other animals are processed to yield wool?
3. What are the two types of hair that form the fleece of sheep?

3.2 SILK

Silk fibres are derived from **silkworm** and are therefore called animal fibres. Silk is produced by a moth (species) known as **silk moth**. The scientific name for the silk producing moth is *Bombyx mori* [Fig. 3.8(a)]. It is one of the most beautiful moths ever found.

The breeding and management of silkworms for production of silk is called ***sericulture***.

3.2.1 Life Cycle of Silk Moth

The female species of silk moth is shorter and stouter than its male counterpart. It attracts the male counterpart by secreting pheromones. The female species of silk moth lay eggs on leaves [Fig. 3.8(b)]. After about 20 days, eggs hatch into larvae. These hatched larvae are called **silkworms** or **caterpillars** [Fig. 3.8(c)].

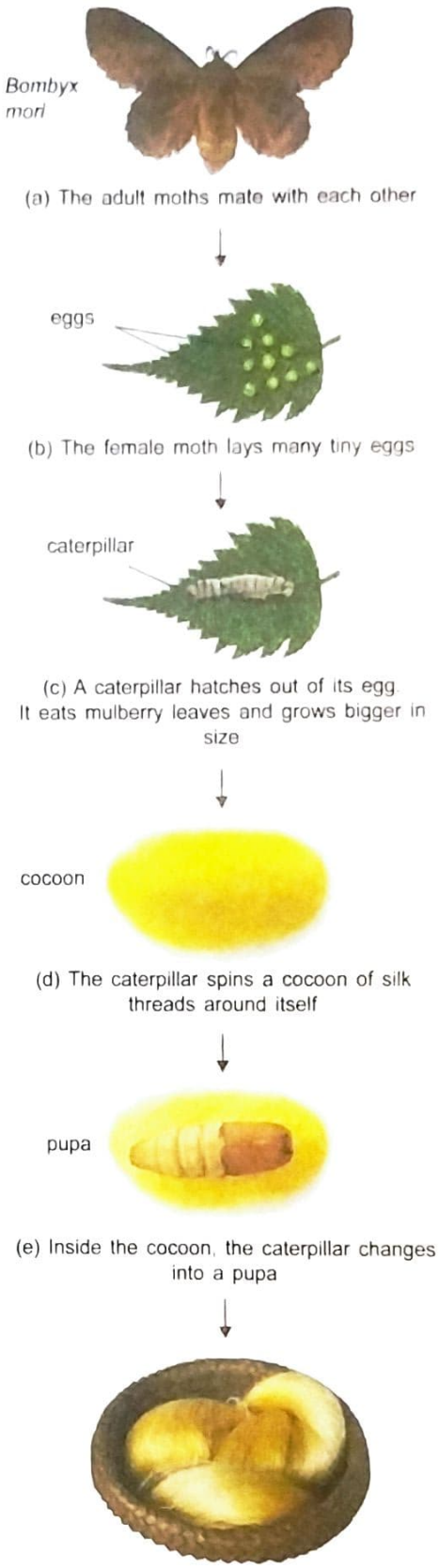
The silkworms are continuously fed on finely-chopped mulberry leaves, for about six weeks. During this period, they grow in size and their glands that produce silk develop and attain one-third the size of the larvae. At this stage, silkworm is ready to enter the next stage of its life cycle called **pupa**.

Pupa holds itself by weaving a net around its body by swinging its head from side to side in the form of eight (8).

While swinging the head in this manner, the silkworm secretes a wet sticky substance. This substance is made up of protein, which hardens on exposure to air and becomes silk fibre. Soon, the silkworm is completely covered by silk fibres. This covering is known as **cocoon** [Fig. 3.8(d)].

A cocoon is spun by using two long continuous fibres from two glands. Finally, the two ends of the fibres are joined by using a sticky substance, i.e., sericine. The silkworm continues to develop inside the cocoon. Once the cocoons are spun, the pupae turn into adult moths.

After the complete development of silkworm, the cocoons are gathered and kept under the sun or boiled or exposed to steam. Boiling releases the silk fibres from the cocoon. The silk fibres from many cocoons are brought together to form



(a) The adult moths mate with each other

(b) The female moth lays many tiny eggs

(c) A caterpillar hatches out of its egg. It eats mulberry leaves and grows bigger in size

(d) The caterpillar spins a cocoon of silk threads around itself

(e) Inside the cocoon, the caterpillar changes into a pupa

(f) People unwind the silk threads from the cocoons to weave silk clothes

Fig. 3.8: Life cycle of silk moth

Pheromones

These are chemicals secreted by an insect to attract the attention of other members of its species.

Fig. 3.9: Reeling of silk

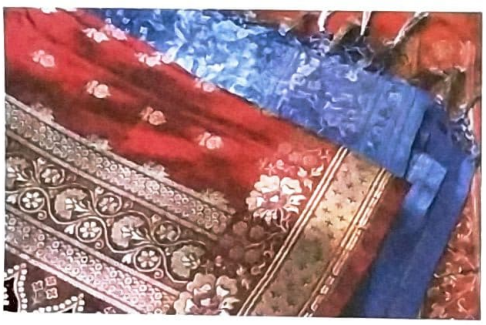


Fig. 3.10: Silk sarees

a single silken thread. This process is called ***reeling of silk*** (Fig. 3.9). Reeling is done in special machines, which unwind the fibres of silk from the cocoons.

Broadly, three grades of silk are obtained from a cocoon. The unwound fibres form the finest quality silk called the **reeled silk**. It is pure white in colour. Silk that remains after the reeling process from the damaged or waste cocoon is carded or combed. It constitutes an inferior quality of silk called the **spun silk**. It is slightly honey-coloured. After carding or combing, the short fibres which are left behind constitute an even inferior quality of silk called the **nail silk**. It is a richly-textured nubbly (rough) silk.

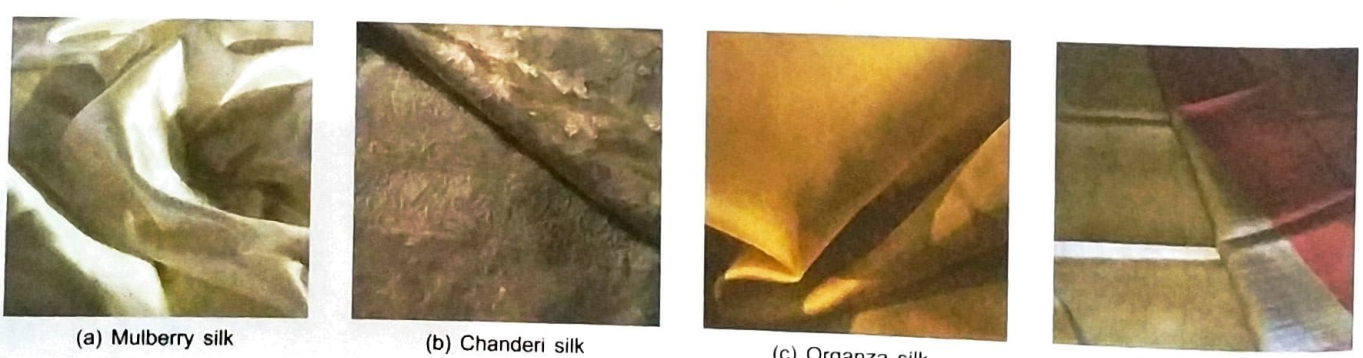
Sometimes, 3–4 silk fibres are twisted into a strand for weaving to prevent silk yarn from splitting into individual fibres. This process is called ***throwing***.

Silk fibre is mainly made of two proteins: **sericine** and **fibroin**. It is soft and elastic. It has shine and lustre. It is a very strong fibre. Do you know that a soft silk yarn is as strong as a synthetic fibre and comparable to a thread of steel?

Silk fibres do not conduct heat. They are good insulators. Silk clothes keep you warm in winter and cool in summer. Silk clothes can be dyed before or after weaving.

Silk is the **queen of fibres**. It is used for making sarees (Fig. 3.10), dress materials, jackets, carpets, scarves and gloves.

Crepe, chanderi, organza, mulberry, eri, tussar, mooga and kosa are a few varieties of silk (Fig. 3.11). Let us perform the following activity to observe burning characteristics of various types of fibres.



(a) Mulberry silk (b) Chanderi silk (c) Organza silk (d) Tussar silk

Fig. 3.11: A few varieties of silk

Activity 3.2 (Observe)

To observe the burning characteristics of various fibres

- Collect some unwanted pieces of cotton, nylon, silk and wool. You may take some more types of cloth materials.
- One by one hold these pieces in a candle flame, with the help of a pair of forceps.
- Observe the way each piece burns, its smell and the residue left.
- Record your observations in the table given below.

Burning characteristics of various fibres

S. No.	Fibre	Texture (soft/coarse)	Lustre (shiny/dull)	Strength (weak/strong)
1.	Cotton	Burns steadily and gives out light smoke.	Burning paper	Fine ash is produced, which crumbles on touching.
2.	Nylon	Melts, shrinks and drops of melted nylon fall on the ground	Burning plastic	Dry hard beads are produced that can be moulded when hot and are hard when cold.
3.	Silk	Burns slowly (Fire extinguishing)	Burning hair	Silver beads which crush easily to powder.
4.	Wool	Burns slowly, stops burning when removed from the source	Burning hair	First turns brown, then shiny hollow beads are produced, which crumble on pressing.

Answer Orally

1. Give the scientific name of silk producing moth.
2. Inferior quality of silk is also called _____.
3. Define sericulture.
4. What is the food of silkworm?

Mind Scrambler

Unscramble each of the following to form a word or term:

(a) NOCIGURS _____

(b) NIDHAREC _____

DEFINITIONS

- **Animal fibres:** Fibres obtained from animals
- **Plant fibres:** Fibres obtained from plants
- **Synthetic (Artificial) fibres:** Fibres manufactured in industries by humans
- **Selective breeding:** The process in which parents are selectively chosen in order to obtain certain special features in their offsprings
- **Sericulture:** The breeding and management of silkworms for production of silk

QUICK ROUNDUP

1. Fibres are woven to make clothes.
2. **Wool** and **silk** are animal fibres.

3. Wool comes from **sheep**, **goat** and **yak**.
4. Sheep fleece are **sheared** off from their bodies, **scoured**, **sorted**, **dried**, **dyed**, **spun** and then **woven** to yield wool.
5. Silk is obtained from **silkworm**.
6. Various varieties of silk are obtained from various types of silk moths.

EXERCISES

A. Answer in Detail

1. Differentiate between plant and animal fibres.
2. How is wool obtained from sheep?
3. Explain the life cycle of silk moth.
4. How are silk fibres obtained from cocoons?
5. How do silkworms spin cocoons?

B. Answer Briefly

1. Why do you need clothes?
2. What are animal fibres? Give two examples.
3. How does wool fibre keep our body warm?
4. What are the three grades of silk produced?
5. What is throwing?
6. Name a few varieties of silk.
7. Name two breeds of sheep found in India. Also give the names of the states in which they are found.

C. Answer in One Word or a Few Words

C1. Match the two columns.

Column A	Column B
1. Silk moth	(i) Silk fibre
2. Cocoon	(ii) Removal of thick coat of hair
3. Food for silk moth	(iii) *Bombyx mori*
4. Fleece	(iv) Inferior quality of silk
5. Shearing	(v) Mulberry leaves
6. Nail silk	(vi) Hair of sheep

C2. State whether the following statements are True (T) or False (F).

1. Wool is obtained only from sheep. [ ]
2. Sericulture is a process of rearing of silkworm. [ ]
3. Removing fleece of sheep from its body is called scouring. [ ]
4. Silk threads are secreted from silk glands. [ ]
5. Sheep feed on mulberry leaves. [ ]

C3. Multiple Choice Questions (MCQs): Choose the correct answer for each of the following.

1. Which of the following animal does not yield wool?
   (a) Camel (b) Yak (c) Dog (d) Goat
2. Which of the following term or name is not related to sericulture?
   (a) Shearing (b) Caterpillar (c) Pupa (d) Cocoon
3. Pashmina shawls are weaved from which of these?
   (a) Angora wool (b) Yak wool (c) Kashmiri goat wool (d) None of these
4. From which of the following sheep do we obtain carpet wool?
   (a) Marwari sheep (b) Merino sheep (c) Lohi sheep (d) Nali sheep
5. Which of the following fibre is a good insulator?
   (a) Cotton (b) Silk (c) Jute (d) Nylon

DO AND LEARN

A. Complete the Matrix.

Step	Procedure
1. Shearing	_____ _____
2. _____	The sheared skin with thick coat of hair is then washed thoroughly in tanks to remove grease, dirt and dust.
3. _____	The dyed fibres are passed through metal teeth to straighten them.
4. Spinning	_____ _____

B. Research and Projects

1. Collect pictures and information on animals whose hair are used as wool. Paste their pictures in a scrapbook and write information against each.
2. Collect sample pieces of different types of silk. Paste them in your scrapbook and write the features of each against them.

C. Group Activity

Find information from the internet or other sources on how silk is obtained from silkworm. Present a report or a presentation in the class. Work in groups.

D. Pair Work

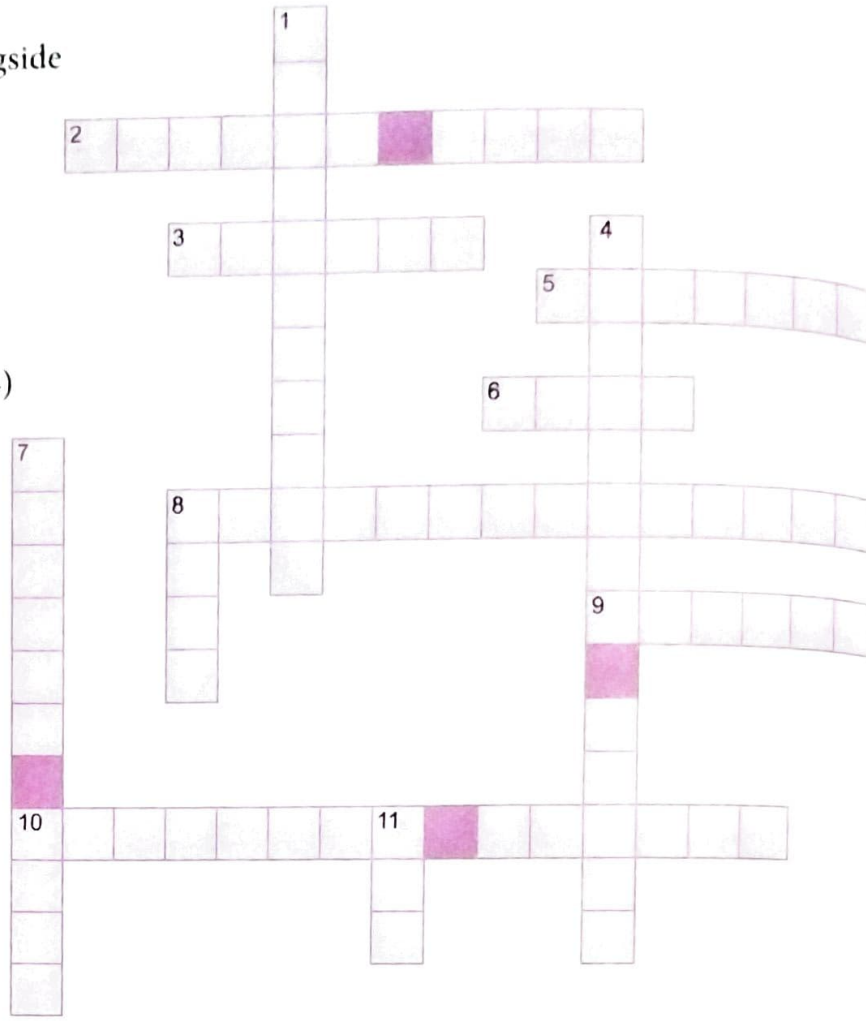
Take an outline map of India and the world. Mark the places where wool-yielding animals are found. Work in pairs.

E. Discussion

Is it fair to rear sheep and shear off their hair for getting wool?

F. Crossword Puzzle

Solve the **crossword puzzle** given alongside with the help of the clues given below.



Across

2. Source of Angora wool (10)
3. Covering of silk fibre (6)
5. Passing fibres through metal teeth to straighten them (7)
6. A breed of sheep found in India (4)
8. An occupational disease (6, 7)
9. A source of wool found in South America (6)
10. Food of silkworm (8, 6)

Down

1. Breeding and management of silkworms (11)
4. Obtained from fine hair of Kashmiri goat (8, 5)
7. Scientific name of silk-producing moth (6, 4)
8. Queen of fibres (4)
11. A source of wool (3)

Surf to Know More

Visit *http://www.wildfibres.co.uk/htm/animal_fibres.html* to collect information on natural fibres from animals and plants and their uses.

Discovery of Silk

The use of silk as a fibre originated in China, as early as the year 2640 BC. According to the Chinese legend, emperor Huang-ti asked empress Si-Ling Chi to find out why the leaves of mulberry trees growing in their garden were getting damaged. The empress found white worms eating the mulberry leaves. She also noticed that they were spinning cocoons around them.

Accidentally, a cocoon dropped into her cup of tea and a tangle of delicate threads separated from the cocoon. Since then, the empress Si-Ling Chi encouraged the rearing of silkworms on mulberry leaves. Reeling of silk yarn was, thus started.

Silk became such a precious thing that it was considered worth its weight in gold. Silk industry began in China and was kept a closely guarded secret for hundreds of years. Later silk production was introduced in Asia Minor when two monks smuggled the eggs of silk moth in hollow bamboo sticks. Slowly, the fabric reached other parts of the kingdoms outside China through the Silk Route.

Some Questions from NCERT

Fibre to Fabric

Exercises

1. You must be familiar with the following nursery rhymes.

   (a) 'Baa baa black sheep, have you any wool.'

   (b) 'Mary had a little lamb, whose fleece was white as snow.'

   Answer the following.

   (a) Which parts of the black sheep have wool?

   (b) What is meant by the white fleece of the lamb?

2. The silkworm is (a) a caterpillar, (b) a larva. Choose the correct option.

   (i) a (ii) b (iii) both a and b (iv) neither a nor b.

3. Which of the following does not yield wool?

   (a) Yak (b) Camel (c) Goat (d) Woolly dog

4. What is meant by the following terms?

   (a) Rearing (b) Shearing (c) Sericulture

5. Given below is a sequence of steps in the processing of wool. Which are the missing steps? Add them.

   Shearing, _____, sorting, _____, _____, _____.

6. Make sketches of the two stages in the life history of the silk moth which are directly related to the production of silk.

7. Out of the following, which are the two terms related to silk production?

   Sericulture, floriculture, moriculture, apiculture and silviculture

   Hints: (a) Silk production involves cultivation of mulberry leaves and rearing silkworms.

   (b) Scientific name of mulberry is ***Morus alba***.

8. Match the items given in Column A with Column B.

Column A	**Column B**
(a) Scouring	(i) Yields silk fibres
(b) Mulberry leaves	(ii) Wool yielding animal
(c) Yak	(iii) Food of silk worm
(d) Cocoon	(iv) Reeling
	(v) Cleaning sheared skin

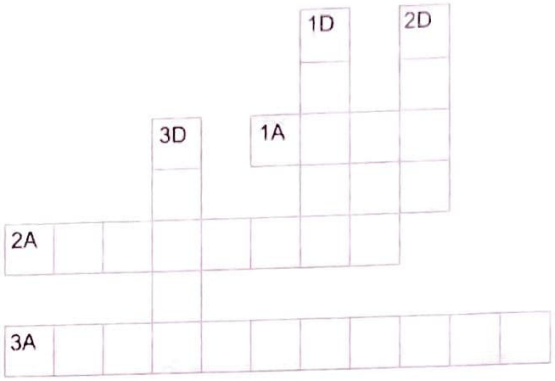
9. Given below is a crossword puzzle based on this lesson. Use hints to fill in the blank spaces with letters that complete the words.

Down

(D) 1. Thorough washing
2. Animal fibre
3. Long thread like structure

Across

(A) 1. Keeps warm
2. Its leaves are eaten by silkworms
3. Hatches from egg of moth



Extended Learning—Activities and Projects

1. Paheli wants to know the maximum length of continuous silk thread that can be obtained from a cocoon. Find our for her.
2. Boojho wants to know why caterpillars need to shed their skin when they grow bigger but we humans do not. Do you have any idea?
3. Boojho wants to know why caterpillars should not be collected with bare hands. Can you help him?
4. Paheli wanted to buy a silk frock and went to the market with her mother. There they found that the artificial (synthetic) silk was much cheaper and wanted to know why. Do you know why? Find out.
5. Someone told Paheli that an animal called 'Vicuna' also gives wool. Can you tell her where this animal is found? Look for this in a dictionary or an encyclopaedia.
6. When handloom and textile exhibitions are held, certain stalls display real moths of various varieties of silk and their life histories. Try and visit these stalls with elders or teachers and see these moths and stages of their life history.
7. Look for eggs of any moth or butterfly in your garden or park or any other place full of plants. They look like tiny specks (dots) laid in a cluster on the leaves. Pull out the leaves containing eggs and place them in a cardboard box. Take some leaves of the same plant or another plant of the same variety, chop them and put them in the box. Eggs will hatch into caterpillars, which are busy eating day and night. Add leaves everyday for them to feed upon. Sometimes you may be able to collect the caterpillars. **But be careful**. Use a paper napkin or a paper to hold a caterpillar.

   Observe everyday. Note the (a) number of days taken for eggs to hatch, (b) number of days taken to reach the cocoon stage, and (c) number of days to complete life cycle. Record your observations in your notebook.

   You can read more on the following website.

   www.indiansilk.kar.nic.in/