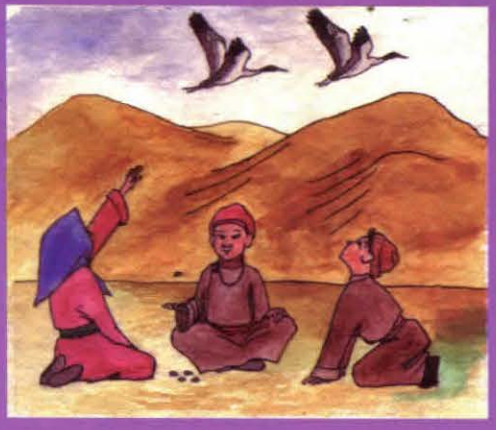
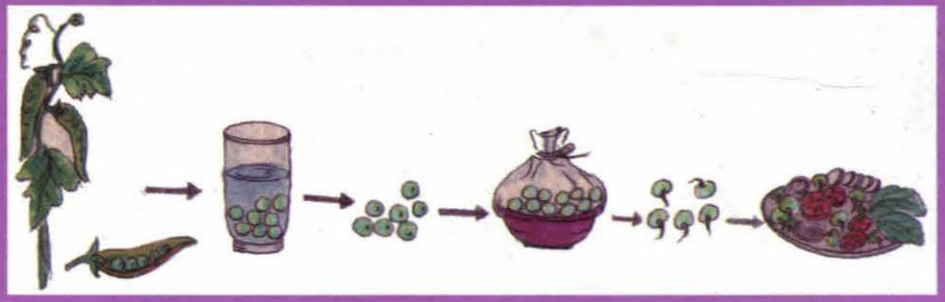
Environmental Studies Part I

For Class IV

A Textbook of Science for childern of Ladakh





Published by

J&K State Board of School Education

for

Operation New Hope

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A text book of Science for children of Ladakh

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SECMOL
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for Operation New Hope

Foreword

From the begining children are curious about the people, animals, plants and materials around them. They learn about their environment through their own first hand experiences, from their parents, through the media and from a variety of other sources. Schools have a definite role in helping their pupils make sense of these experiences and in developing their knowledge and understanding of the physical and human processes which interact to shape the environment. It is why Environmental Education is one of the most important and compulsory areas of our school curriculum. This area is to generate and promote among learners :

- Scientific temper characterised by the spirit of enquiry and problem solving;
- Understanding of the environment in its totality, both natural and social, and their interactive processes, the environmental problems and the ways and means to preserve the environment; and
- Understanding of the diversity in lands and people living in different parts of the State's composite cultural heritage.

This textbook of Environmental Studies, Part I (Science) has been developed to realize these objectives. It has been prepared by SECMOL for class IV children of Ladakh region and is based on the physical and social environment that surrounds them. The efforts of SECMOL in preparing this book are laudable. It is hoped that the book will help us to develop among children awareness of the environment, build on and reinforce their curiosity about the natural and man-made environment. Awareness and curiosity take different forms like: recognition of beauty in a stretch of country side; the appreciation of landscaping, etc. The essential element common to all this is the desire to understand why things are as they are and what is needed to maintain or, where necessary, to change them.

The Board is indeed happy to produce this book developed by SECMOL for Operation New Hope for children of Ladakh region.

I take this opportunity to appreciate the efforts of Sh. Sonam Wangchuk and his team of dedicated colleagues at SECMOL, Leh for preparing this book. I also place on record my profound appreciation of Mr. B.A. Dar Director academic of the Board for his contribution in editing the book. Efforts of the staff of Academic Division (Curriculum Development and Research Wing and Academic Section) in getting this book processed are equally recognized and appreciated.

PROF. J.P. SINGH

(Chairman, J&K Board)

Contents

Introduction

Diversity is the strength and beauty of our country. However, diversity, if not handled sympathetically in education, can sometimes cause hardship, especially for children in remote places like Ladakh. Ladakh, a trans-Himalayan mountain-desert at altitudes ranging from 9,000 feet to 14,000 feet above the sea level, is very different from the rest of the state and the country in climate, topography, language and culture.

It is true that children should not be confined to just local knowledge; they need to learn about other lands, people and about national and international issues as well. However, this can never be done at the cost of understanding one's immediate environment. We cannot expect primary school students in the Himalayas to understand oceans and ships before they understand rivers and boats. This is what "from known to unknown" would mean.

Seeing this fact and the vastness, cultural diversity and biodiversity of our state, the J&K Board of School Education took a bold initiative in 1996 when it printed an English primer for Ladakh region in collaboration with SECMOL. This book had locale specific content and themes, where Y stands for Yak and not Yacht. After the success of the primer, a series of primary school books for Ladakh was prepared and field-tested. We are happy to place this science textbook of the 4th class Environmental Studies in your hands as part of our efforts to making education more meaningful and less painful to the children. This book has also been printed by J&K Board and produced in collaboration with SECMOL. We are grateful to Prof. Jai Pal Singh Chairman J&K BOSE for his help in this project. We are specially thankful to Prof. BA Dar, Director Academic for his nurturing support and help.

The Ladakh Autonomous Hill Development Council (LAHDC) deserves a special mention for their support in the realisation of this project as this series of books was produced as per their desire to make primary education relevant to local environment.

The book brings the subject of Environmental Studies close to the actual environment of our children. At the same time, it conforms to the state and national standards. In the Social Science part we have woven a lot of stories so that history and geography can come alive as an interesting drama for the children. Similarly in the science part there

are activities suggested for each chapter so that children have an opportunity for learning by doing, rather than memorisation.

Thanks to International Snow Leopard Conservancy, O.P. Chaurasia (FRL), Pankaj Chandan (WWF-India), Stanzin Dorjai Gya (Secmol), and Sujatha Padmanabhan for providing their beautiful photographs.

Thanks to Gelong Konchok Phandey for doing the final corrections on the Ladakhi language vocabulary sections.

We are grateful to Marina Littek; Jayshree Ramdas (Homi Bhaba Centre for Science Education); O.P. Chaurasia (Field Research Laboratory); Pankaj Chandan (WWF-India); Rinchen Wangchuk (Snow Leopard Conservancy); Bashir Ahmed Dar; and Abdul Hakeem;z for their useful material, comments and/or advice. Many teachers gave valuable comments and suggestions during the field testing of the lessons.

These books have been made possible with the help of resource persons from across the country and collaboration provided by Eklavya, Madhya Pradesh - an organisation with over 20 years of experience in elementary education. Sujatha Padmanabhan and Sumathi Sudhakar(Chennai), Vinitha Nayar (Delhi), Alex George (Kerala) with long experience in education, science and social science - spent between one and five months in Ladakh to write the chapters. Eklavya deputed three of its senior personnel - Anjali Noronha and Tultul Biswas (Bhopal) and Gautam Pandey (Hoshangabad) who spent time with SECMOL in facilitating the development and finalisation of the curriculum, content and methodology of the textbooks. SECMOL would like to acknowledge the contributions made by this team and express its thanks to all of them.

Another unique feature was the trial of the chapters. These chapters were tried out in a few schools of Leh district. We are grateful to all the teachers who helped in this trial process and provided valuable suggestions for finalisation.

A special thanks is due to Phuntsog Namgial who spent long hours & months doing all the beautiful illustrations & patiently put up with the frequent changes that were required.

And thanks to Rinchen Dolma, Tsewang Paldan, Jigmet Lanzes, Disket Spaldon, Dechen Angmo, Gabriele Reifenberg, Lobzang Tandar, Sebastian, Viraj Puri, Susannah Deane, Jon Mingle, Anant Nautiyal, Mario and Alex Norbu Tondup for their help in various ways. It is difficult to list the names of all those who helped, as the making of this book became almost a community activity at SECMOL.

Sonam Wangchuk
14 October 03

Section 1
Our Bodies and Health

Hints for the Teacher

Why this section

This unit includes the chapters Food for Health, Internal Organs and the Skeletal System, What Happens to the Food We Eat, and Sources of Water.

It is important for children to know their bodies, the various organs, and their functions. This will enable them to take care of their bodies and themselves. To stay healthy, children should be aware of the relationship between their health and the food and water they take.

"Food for Health" discusses different kinds of food and their importance in a person's daily diet. It introduces the concept of a balanced diet, and also stresses the need for adequate safe drinking water.

The chapter on "Internal Organs and the Skeletal System" is divided into two parts. The first part introduces some of the vital organs in our body. It gives children the opportunity to voice their existing knowledge about some of these organs, and then builds on that knowledge. We expect children to develop a familiarity with various internal organs before the details of their functions are taken up in following lessons and future classes.

The section on the Skeletal System uses the human body as a live working model to describe its functions. Try to make each child do all the simple activities given in the lesson. By the end of the lesson children should have an impression of how all the bones in our body work together as a functional system.

"What Happens to the Food We Eat" describes the main organs of the digestive system, and how they work. Some simple experiments have been included to make children understand the processes taking place during digestion of food. Moving one step ahead from the previous lesson, this one deals with some processes taking place in our internal organs, in addition to their functions. Keeping in mind the grade level, some organs like liver, pancreas, etc. with complex functions have not been included.

"Sources of Water" familiarises children with different sources of water we use and the causes and prevention of water pollution.

Materials Needed

Food for Health

Snakes and Ladders game: dice, some counters.

What Happens to the Food We Eat

Food-pipe activity: One-foot-long flexible pipe, some left over food.

Stomach activity: Plastic bag, left-over food.

Absorption of Food: A shirt or *kameez* sleeve, small stones or pebbles.

Points For Discussion/Clarification

Food For health

Sprouted peas and dal are a good source of fresh vitamins in winter. To make a sprout salad in class, soak a few peas in warm water 2 to 3 days before the class so that you have the sprouts ready for the class.

What Happens to the Food We Eat

The incident with Dr. Beaumont and the soldier happened in France.

If a flexible pipe is not available for the food pipe activity, you can make one with a plastic sheet. Take a one-foot-long and six-inch-wide piece of plastic. Roll it into a hollow tube and either sew the edge or seal it by burning. This will serve well as the food pipe. Some students can do this activity as a demonstration. All the other activities can and should be done by all students for themselves.

Chapter 1

FOOD FOR HEALTH

Why do we have to eat food every day?

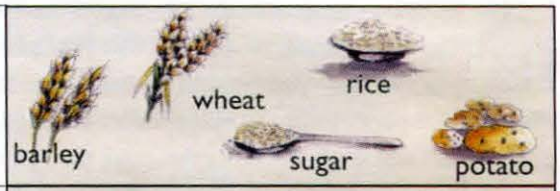
Food is important for us. We all need food to work, play and study. We need food to stay healthy. We need food to grow and fight diseases.

Make a list of all the kinds of food that you ate yesterday.

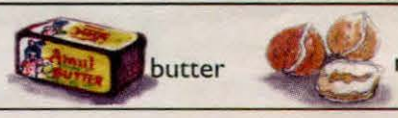
As you have learnt in Class 3, different foods have different nutrients. Different nutrients help our bodies in different ways. How they do so?

Some nutrients give us energy. They are called **carbohydrates** and **fats**. People doing more work or sports need more energy foods. Other nutrients help to build our bodies and are called **proteins** and **minerals**. Then there are nutrients that protect us from getting ill and help us fight diseases. They are called protective nutrients, such as **vitamins** and **minerals**.

Carbohydrates

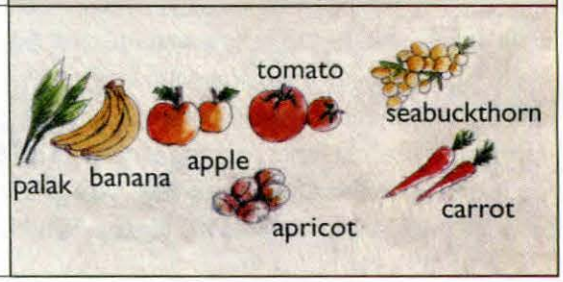


Fats



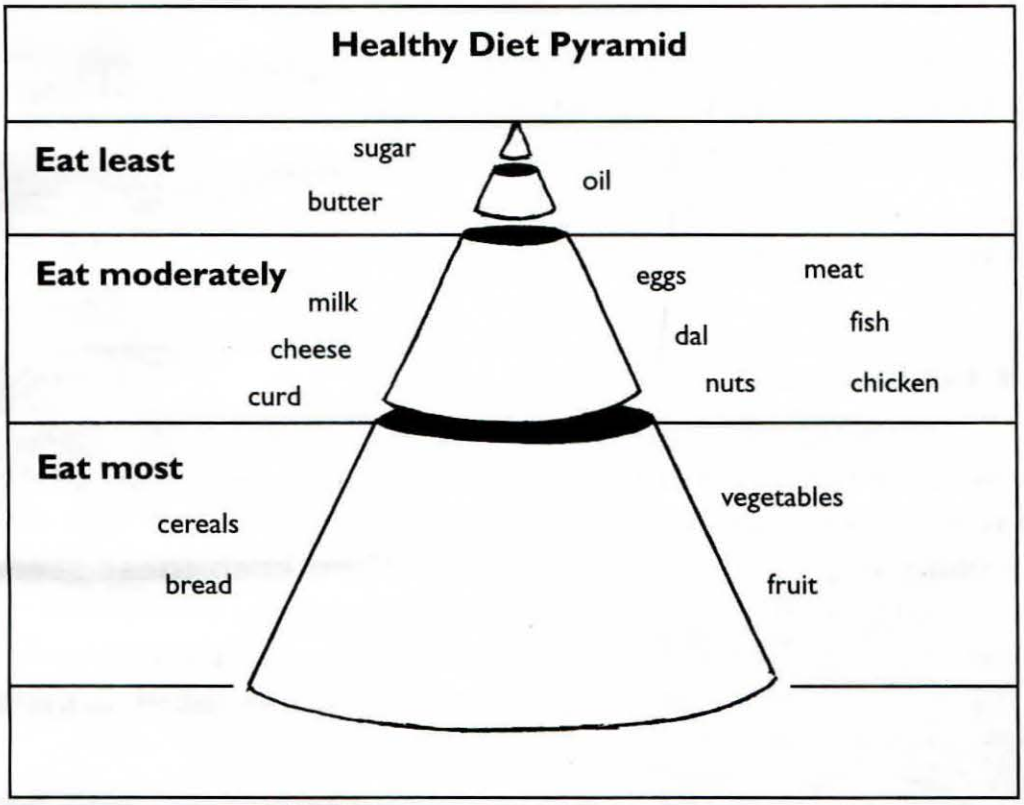
Proteins

Vitamins and Minerals



Balanced Diet

The food we eat is called our **diet**. If we eat only one type of food, we will become weak or ill. Therefore, we should eat enough of all kinds of nutrients (carbohydrates, fats, proteins, vitamins and minerals). This good mix of food to meet all the needs of the body is called a **balanced diet**.



a. Look at the list of foods that you ate yesterday. Make a chart like the one below. What kind of nutrients does each food contain? Tick mark the nutrients as shown in the table below.

List of Foods	Carbohydrate	Fats	Proteins and Minerals	Vitamins
khambir	✓			
thukpa	✓	✓	✓	✓

Do you have at least one tick in each column? If so, you ate a balanced diet yesterday.

b. The students are divided into teams of two or three. Each team plans a balanced diet for a day (breakfast, lunch and dinner) and then shares its menu with the class. Discuss whether it is balanced, or what is missing to make it a balanced diet.

Staying Healthy

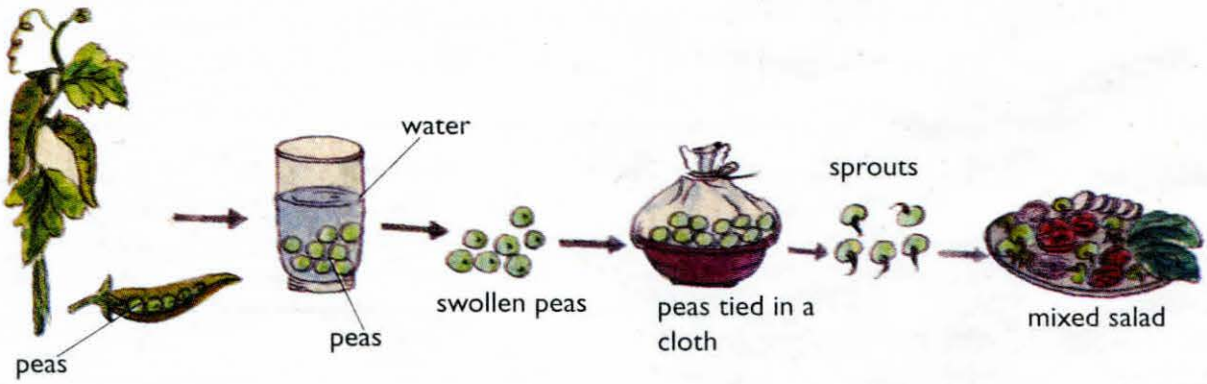
Most of the food we eat is cooked. Cooking helps to kill any germs that may be in the food. It also makes it soft, tasty and easy to digest.

However, cooking destroys some of the vitamins in the food. So, along with cooked food, we should eat some raw foods like turnips, radish, carrots and tomatoes everyday.

Sprouts for Winter

Here is something you could do, especially in winter when there are not many fresh vegetables: take some local peas and soak them for two days. Use slightly warm water in winter. You will find the seeds become big as they absorb water. Then keep these seeds in a thin, wet cloth until you see that the root has developed. These are called "sprouts" and are very good for you. In order to sprout, the seeds need to be moist and warm. They will die if they freeze, get too hot, or dry out.

You can also sprout green *moong dal* and *channa*. Any sprouts mixed with other raw vegetables make a very healthy salad!



Are all foods good for health? Play the game of snakes and ladders, shown on the back cover, to find out.

Don't forget water!

Besides food, safe water is also very important. What will happen if you do not drink lots of water? Your food will not be digested well. You will get dehydrated, and you won't have energy to work or play.

More than half of your body is made up of water. So never forget to drink water. At least 6 to 8 glasses every day!

What is safe water?

A few ways to keep your water safe for drinking and cooking:

1. Boil the water well to kill germs. (In cities, chlorine is added to the water to keep it germ free.)

2. Store clean and boiled water in a clean container with a lid. Put the lid back on every time after use.

3. Always use a long-handled dipper to take water out of the container.

EXERCISES

Oral/Written Work

1. Choosing from the food items given below, and give some sources for each kind of nutrient..

   Seabuckthorn, eggs, rice, wheat, pulses, apples, meat, sugar, carrot, milk, potato, green leafy vegetables, apricots, fish, butter, curd, radish, turnips, tomatoes, oil.

   Carbohydrates: 1_____, 2_____, 3_____, 4_____

   Fats: 1_____, 2_____

   Vitamins and Minerals: (1_____, 2_____, 3_____, 4_____, 5_____, 6_____, 7_____, 8_____, 9_____

   Proteins: 1_____, 2_____, 3_____, 4_____, 5_____

2. Which of these things are good for you and which are bad?

   a. eating a lot of fried food

   b. drinking lots of butter tea

   c. eating lots of vegetables and fruit

   d. drinking only 2 glasses of water everyday

   e. eating sprouts, especially in winter

3. Match the following:

Carbohydrates	Protective nutrients
Fats	Body-building nutrients
Proteins	Energy giving nutrients
Vitamins and minerals	Energy giving nutrients

4. Fill in the blanks using the following words: diet, germs, balanced, carbohydrates, digest.

   a. The foods which we must eat the most of every day are _____ .

   b. Boiling water kills the _____ in it.

c. Water in the body helps the food _____ well.

d. A good mix of food meeting all the needs of the body is called a _____diet.

e, The food that we eat is called our _____ .

5. Name two of your favourite foods that contain carbohydrates.

6. Name any three foods that you like to eat raw.

7. What is the importance of vitamins and minerals in our diet?

8. Which foods help to build the body?

9. What is a balanced diet?

10. Here are a few common meals. Are they balanced or not?

a. *kholak* with curd

b, *skyu* with potato and meat

c, *phemar* and butter tea

d. *thukpa* with dried cheese, peas, and vegetables

e, *paba* and *tangthur*

f. rice with sugar

g. rice with dal and vegetables

If the meal is not balanced, what could you add to make it balanced?

GLOSSARY

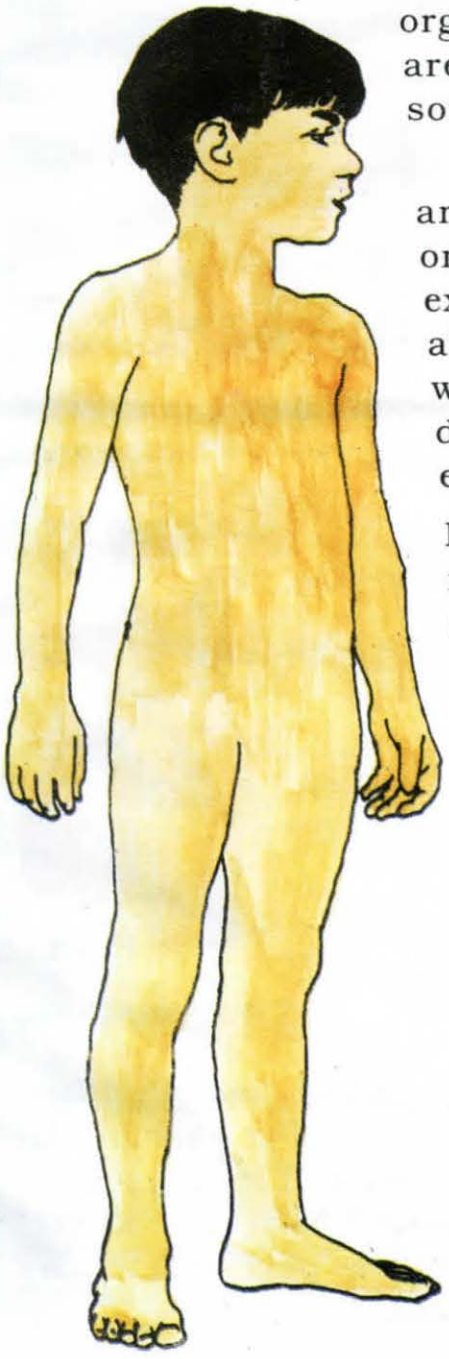
advice	བསྒྲག་བྱ། ཁ་དེ།
at least	ཉུང་ངན་ཏོ་ནའང་།
balanced	སྙོམས་པོ།
chick peas	ཅན་ན་དུལ།
chlorine	ཀླ་ཞི་འབྱུ་གསོད་སྨན།
condition	གནས་སྟངས། གནས་ལུགས།
container	སྣོད།
diet	ཁར་ཟི།
dipper	ཆུ་ཐུམ། ཆུ་སྐྱོགས།
disease	རྨུག་མོ། ནད།
energy	སྐྱོབས། ཤུགས།
especially	དམིགས་བསལ་གྱིས།
ever	ནམ་ཞིག་གང་།
fats	སྙུམ།
freeze	གངས་ལ་ཆ་བྱས། ཁྱགས་ལ་ཆ་བྱས།
germ	ནད་འབྱུ།
ladder	སྐས་ཀ
leafy	ལོ་མ་ཅན།
lid	ཁ་ལེབ། ཁ་གཅོད།
menu	ཁར་ཟི་ཐོ།
moist	ཉུས། བད།
needs	དགོས་སྡོམ།
nutrient	བཅུད།
otherwise	དེ་མན་ན།
protective	སྐྱོབ་མཁན།
raw	རྗེན་པ།
salad	ཚོད་རྗེན།
seabuckthorn	ཚེར་ཀ་ལུ་ལུ།
shares	བསྟུན་བྱས།
snake	སྦྲུལ།
soft	འཇོལ་མོ།
sprout	སྐྱེས་མཁན་ནི་ནས་གློ་དང་སྲན་མ་ སོགས།
tasty	ཞིམ་པོ། བྱོད་ཅན།
team	པ་ཚོ།
to boil	བསྐོལ་བྱས། འཁོལ་བྱས།
to digest	འཇུ་བྱས།
to get dehydrated	ཆུ་མེད་མཁན་ཆ་བྱས།
to soak	སྦྱང་བྱས།
treatment	སྨན་དབྱད།
wet	ཉོན་པ།
whether	གལ་ཏེ།

Chapter 2

OUR INTERNAL ORGANS

and

SKELETAL SYSTEM



In this chapter, we will learn about the internal organs of our body. Do you know what internal organs are? Internal organs are organs which are inside our bodies. We will get introduced to some and also learn more about some.

All the important organs in our body that are not visible to us are called the internal organs. They do very important functions. For example, the lungs help us breathe. We breathe all the time, so lungs work all the time, even while we are sleeping. The stomach helps us digest all the food that we eat. The food we eat gives us energy for all parts of the body.

Besides the lungs and stomach, there are many other internal organs in our body. List as many as you can.

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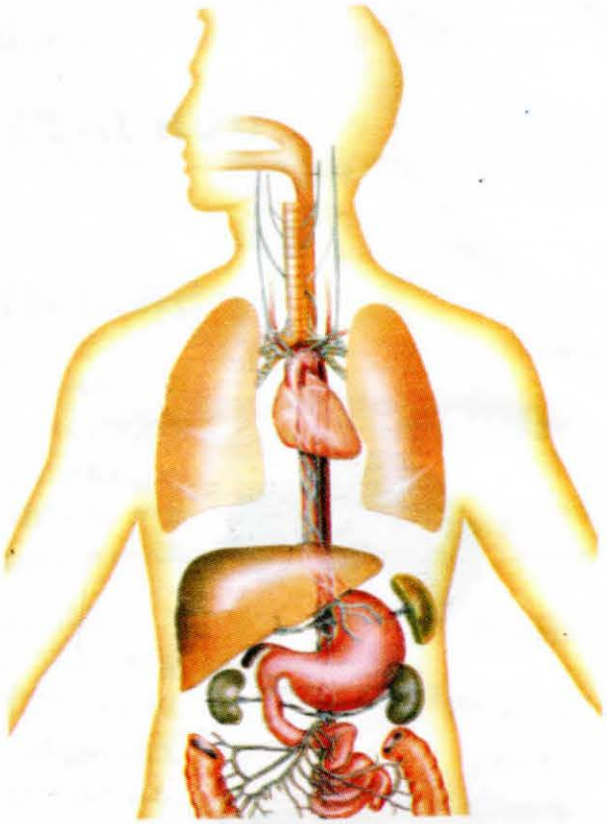
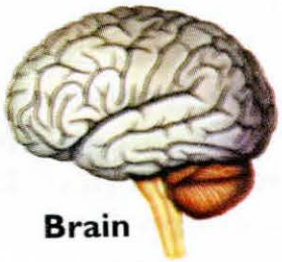
Here is the outline of a human body. Do you know where each of the organs that you listed is actually situated in your body? Draw the location of each of the organs listed above.

This picture of a human body shows some of the internal organs. Compare the position of each of the organs that you have drawn to their actual positions in this picture.

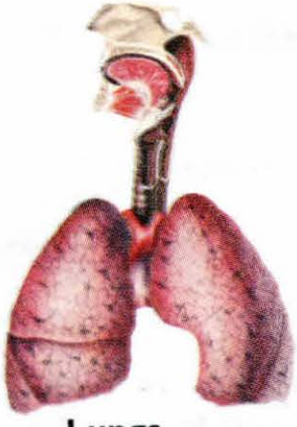
The names of some of our internal organs are given below. Their pictures are also given separately. With the help of this picture of the human body, write the correct names near the organs.



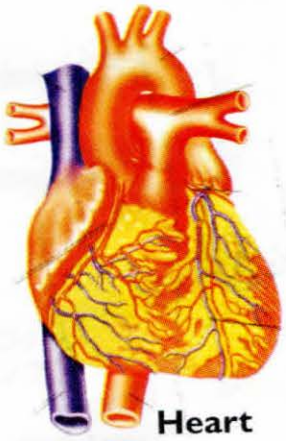
Skeleton



Brain



Lungs



Heart

Many of our internal organs are closely linked to each other. Together they form different systems in the body. For example all the bones in our body together form the skeleton and this system is called the **skeletal system**. We will learn more about the skeletal system now and about the digestive system in the next chapter. We must take good care of our organs and systems.

The Skeletal System

Norgay did not come to school today. He had slipped on a rock while playing and broken his leg. He had to be taken to a doctor in Leh. He could not walk. His sister told the class how their father had tied willow sticks to his legs while taking him to Leh.

"Why did they tie sticks to his leg?" Razia asked the teacher.

"That is because our bones support our body. But if a bone is broken then we need to give it support from the outside," the teacher said. "Do you know about bones? Let's learn about them today."

Know Your Bones

Feel your bones and answer the following questions.

Use your hands and fingers to feel what is under your cheek and nose. How does it feel?

.....

.....

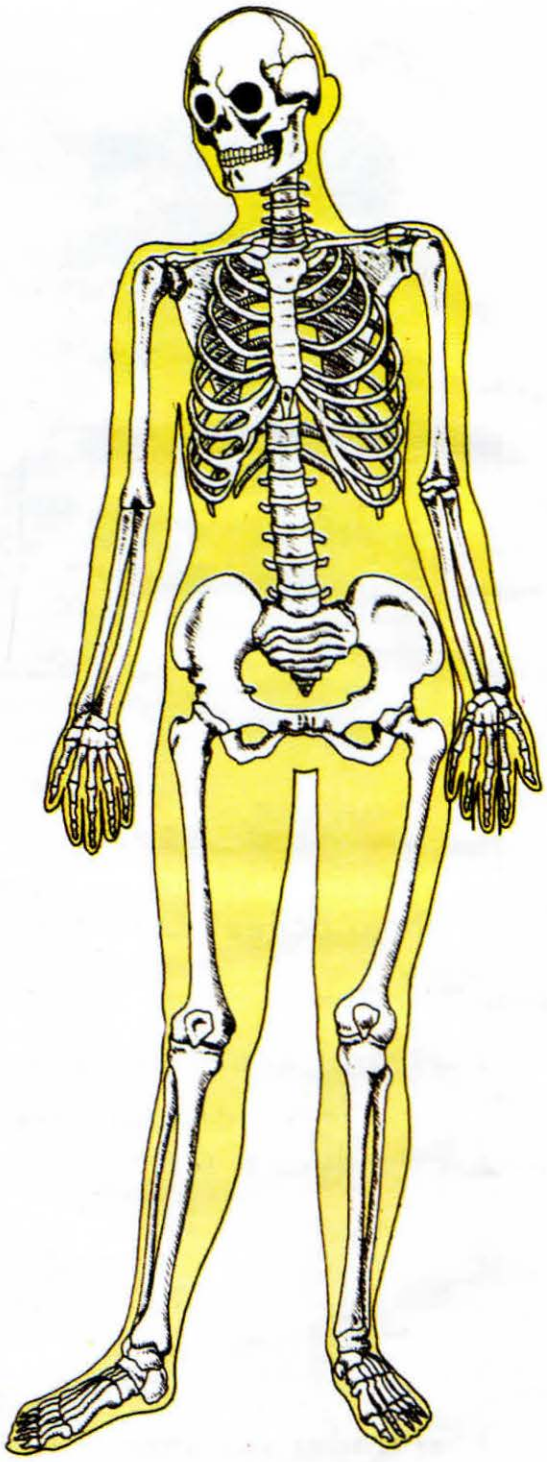
.....

Feel under the skin of the fingers of your hand. Can you feel the bones inside?

The Skeleton Protects our Internal Organs

Our body has many bones, more than two hundred. They are all attached to each other. The place where one bone is attached to another is called a joint. All the bones in a body joined together form the skeleton.

Look at this human skeleton and answer the questions below.



Look at the cage-like bones near the chest. This is the rib-cage and each bone is a rib. Try and feel the ribs in your own body.

How many ribs were you able to count?

.....

The rib-cage protects our lungs and heart. The lungs and heart are very important organs of the body.

One by one, look for all the bones in your body and match them with this diagram.

While matching the bones, also colour them on the diagram.

Did you feel your skull? Is it soft or hard?

.....

The skull protects another important organ of the body: the brain.

Joints Help in Movement

Imagine your body had one single bone with no joints in it. What difficulties would you have? Write down at least three difficulties.

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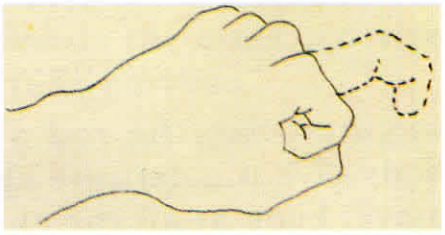
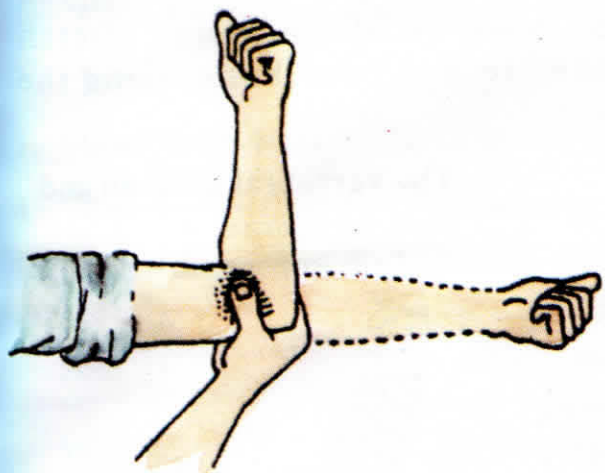
Let's look at some joints closely. Look at these pictures, follow the instructions and answer these questions:

Clench your fist. Now open out one finger. How many places can you bend the finger from?



Open the fist and move your palm up and down. Can you do it?

Close your fist again. Hold this wrist with your other hand. Now rotate the closed fist. Can you feel the movement of the bones inside?



Now look at your elbow. Can you bend your hand inwards as well as outwards from your elbow?

Can you rotate your hand from the elbow?

There are joints at your knee and ankle too. See what movements are possible at these joints. Write about them in detail.

Our body has many different kinds of joints. The joints between bones make it possible to bend our body at different places. This bending makes movement possible. Different joints make different kinds of movement possible.

Bones Give Shape to the Body

Have you seen an open umbrella? It has a rod in the middle and spokes attached to it.

What is the purpose of these spokes?

.....

.....

.....

What would happen if there were no spokes in an umbrella?

.....

.....

.....

Just like the rod and spokes of an umbrella, the bones in our body give it a definite shape. They also support it while allowing it to move. Look at all the children in your school. Some are tall and some short. There are fat ones and thin ones too. But the shape of their bodies is almost the same.

The Vertebral Column

Let us do an activity in pairs. Choose a friend with whom you want to do this. Ask your friend to go down on all fours and stretch his or her back upwards. You now have to put your hand along the middle of your friend's back and feel it.

How does it feel?

.....

.....

.....

Is there one straight bone along your back like the umbrella rod, or many bones?

.....

.....

What would happen if we had one long bone like a rod in the middle of our back?

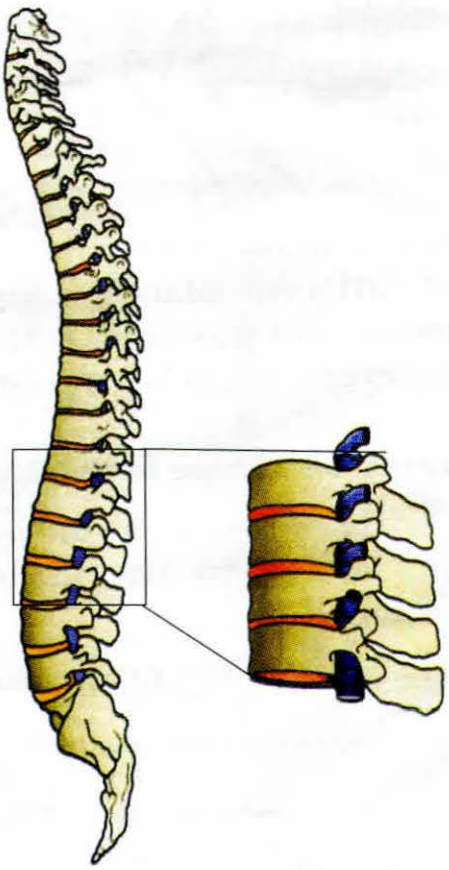
.....

.....

.....

There is a chain of many bones attached to each other running along the middle of our back. They start from behind our neck and go on down to the

The Vertebral Column and four vertebrae



place where our hips start. Each bone is called a vertebra and the chain is called the vertebral column. The vertebral column helps us bend forwards and backwards as well as sideways from the waist. It also allows us to twist from side to side. It gives us the erect posture when we stand and also protects some important nerves.

Think about what would happen if our body did not have any bones. Write about what such a body would be like in detail.

EXERCISES

Oral/Written Work

1. Make a list of all the internal organs mentioned in this chapter.
2. What are the main functions of each of these organs?.
3. Give three ways in which bones are helpful for our body.
4. Give the functions of bones and joints.
5. Match the parts of the body with their functions in the columns below:

A	B
Skull	Allows bending in only one direction
Wrist joint	Protects lungs and heart
Rib-cage	Gives the body an erect posture
Knee joint	Makes rotation possible
Vertebral Column	Protects the brain

5. Start from the small finger of your hand and go over your entire body. One by one, list all the joints that you find in your body. Ask your teacher or friend for help if you don't know the names.
6. Have you ever seen a case of bone fracture in your family or village? If so, write in about eight to ten lines all that you remember of that incident.
7. Draw a picture to show how it would look if your body had no bones.

GLOSSARY

along	མཐའ་མ་ནས།
attached	མཐུད་དེ་ཡོད་བྱས།
backwards	ཕྱིར་ལ།
clench your fist	སྡུལ་ཏུག་བྱོ་བྱས།
digestive system	ཁར་ཇི་འཚུ་བྱས་ཀྱི་དབང་པོ་ཀུན།
elbow	གྲུ་མོ་འཇོང་། གྲུ་མོང་ས།
erect	ཁ་དྲང་ང་ལང་ས་ཏེ།
forwards	མདུན་ལ།
fracture	རུས་པ་ཆག་བྱས།
function	ལས།
hips	དཔྱི་རུས།
internal	ནང་ངོས་ཀྱི།
intestine	ཀྲུ་མ།
kidney	མཁལ་མ།
linked	མཐུད་དེ་ཡོད།
liver	མཆིན་པ།
nerves	རྩ།
on all fours	ཀང་ལག་བཞི་ཀོ་སའ་བཙུག་སྟེ།
organ	དབང་པོ།
rib	རྟིབས་མ།
rock	བྲག
separately	སོ་སོའ།
sideways	གཡས་གཡོན་ཕྱོགས་ལ།
skeleton	གཟུགས་པོའི་རུས་པ་གང་པོ།
skull	ཐོད་པ།
to be situated	གནས་བྱས། ཆགས་ཏེ་ཡོད་བྱས།
to bend	བསྐུམ་བྱས།
to breathe	དབུགས་ལེན་བྱས།
to compare	སྡེ་བྱས། བསྡུར་བྱས།
to count	བཤྱོ་བྱས།
to feel	ཉོག་བྱས།
to follow the instruction	ཟེར་མཁན་ནང་བཞིན་བྱོ་བྱས།
to imagine	ག་རྟུག་མཐོང་དད་གྲོ་བསམ་བྱས།
to protect	སྐྱོབ་བྱས།
to rotate	བསྐོར་བྱས།
to slip	འདྲེད་བྱས།
to stretch	བརྒྱང་བྱས།
to tie	སྡེ་བྱས།
to twist	གཏུ་བྱས།
visible	མཐོང་ཉན་བྱས་ཅན།
vital	གསོན་ཉེ་ལྷས་བའི་ཕིའ་ཁག་ཅན།
waist	སྐེད་པ།
wrist	ལག་ཚིགས།

Chapter 3

WHAT HAPPENS TO THE FOOD WE EAT

Zenab and Kaneez sat down to have dinner. Their mother gave them each a bowl of *skyu* with spinach and some chutney to go with it.

"Oh no, *Ama-ley*, not again. You know I don't like spinach in *skyu*. I don't want to eat," Zenab complained.

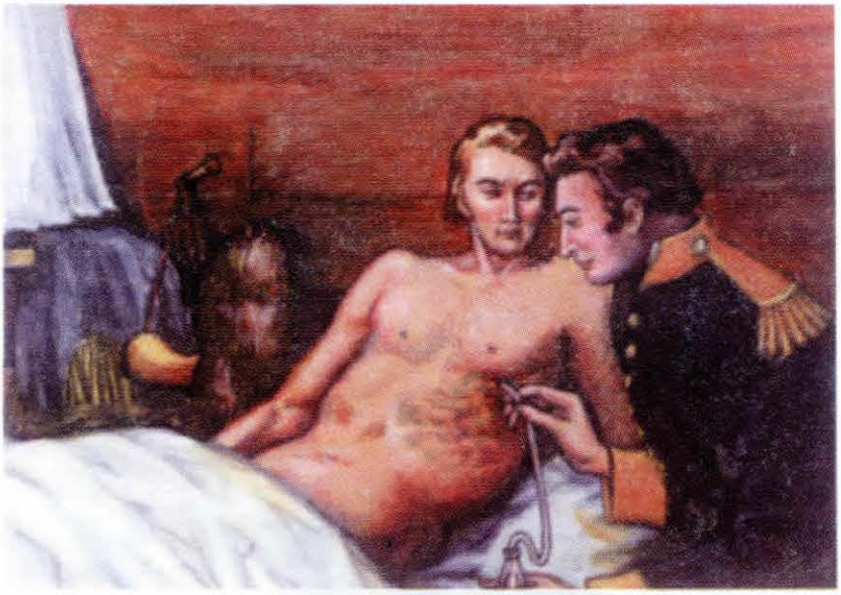
"But how will you play, and study, and do all your work, if you do not eat? Where will you get your energy from?" Ama-ley asked. "Didn't you learn in school that the food you eat gives you the energy to do things, repairs the worn out parts of your body, and also protects you from illness?"

"But Ama-ley, how does the food we eat turn into energy? What happens to it inside our body?" Kaneez asked.

"Well now, that's an interesting question," said Kaneez's mother. "So while you two eat, let me tell you the story of a soldier called Martin. It's a true story that happened more than 175 years ago. Before this, nobody knew what happened inside the stomach, not even scientists. There was no way of looking into the stomach of a living person, so it was all a mystery. People could sometimes hear their stomachs make a noise when they felt hungry. But then something interesting happened!"

Stomach with a Window!

It happened in the year 1822. Martin, a soldier, was shot with a bullet in the stomach and was brought to a Dr. Beaumont. The doctor started treatment at once. Slowly the wound in Martin's stomach began to heal. In those days treatments and medicines were primitive and recovery was very slow. For about one and a half years the doctor treated Martin. He bandaged the wound every day.



One day, when he removed the bandage to clean the wound, he noticed that the wound had more or less healed, but there was a hole in the stomach! It was possible to push aside the layer of skin on top of the wound and see inside. It was also possible to put a pipe into that hole and take out the half-digested food. The funniest part was that doing this caused no pain to Martin. Once cured, he remained healthy.

Dr. Beaumont thought this was a great chance to find out what happens to the food we eat. Therefore, for the next nine years, Martin stayed with him. He did various kinds of experiments on Martin's 'stomach with a window'!

But What Happens in the Stomach?

By the time *Ama-ley* had finished her story, Kaneez and Zenab had finished their *skyu*. They were so interested in the story that Zenab didn't even notice she had finished her *skyu* with spinach!

"But *Ama-ley*," she asked, "what actually happens to the food we eat?"

"Okay, let's look at it step by step. First you put your food in your mouth. Then what happens?" *Ama-ley* asked.

"We chew and chew and chew it, like you tell us to do all the time," Zenab replied in a tired tone.

"Very good! What happens in the **mouth** is that our teeth break the food up into small bits, then churn and grind it into something like a paste. You have seen me grind chutney with the mortar and pestle. I have to keep adding a little water to make the paste smooth. Similarly, the saliva produced in our mouth is actually a digestive juice that helps make food into a paste. It helps start the process of

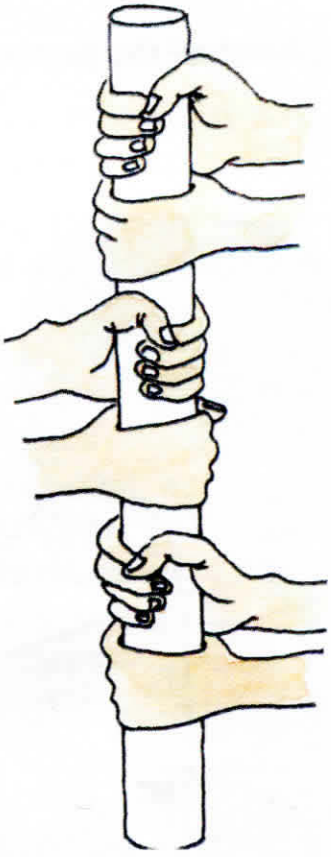
Model of the Food-pipe and Stomach

Collect the following materials:

1. A flexible plastic pipe, one foot long (for the food-pipe)

2. A transparent plastic bag (for the stomach)

3. Some leftover food made into a thick paste.



Hold the pipe vertically as shown in the picture.

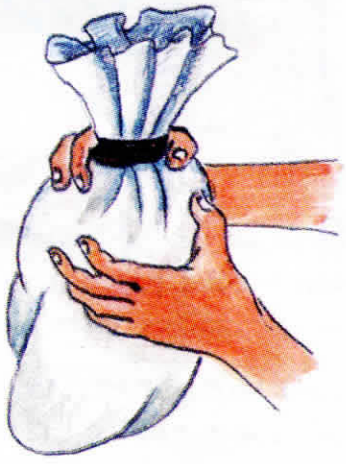
Carefully put the squashed leftover food into the pipe from the top end.

Now let you and two or three of your classmates hold the pipe. Clench and open your fists and move the lump of food downward.

Let one of you hold a clear plastic bag under the lower end of the tube. Take care that the food coming out from the pipe falls into this plastic bag - the stomach!

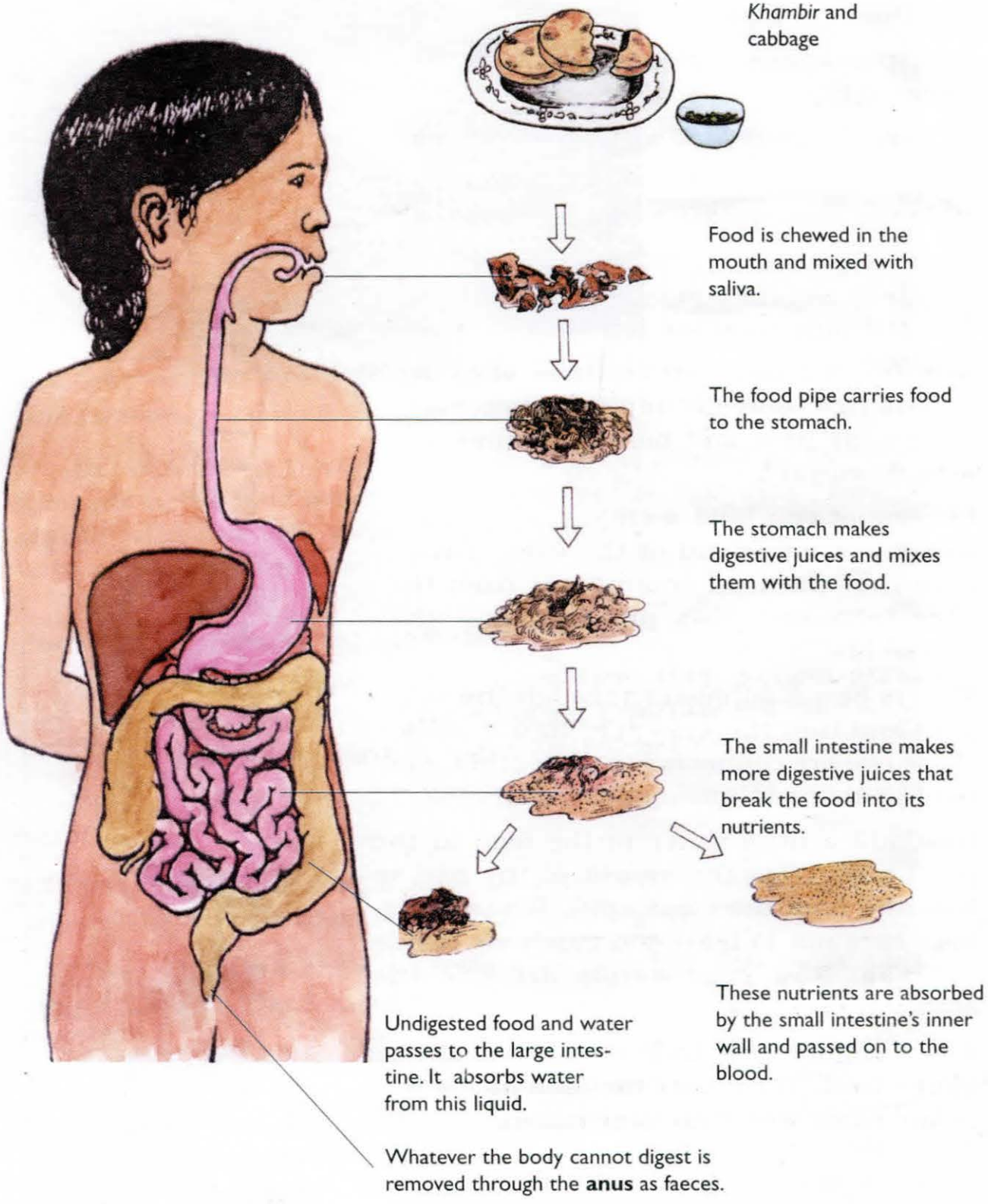
This is how food moves through the food pipe and into the stomach. In our body, these two are connected to each other, not held apart as in our model.

Now add a little water to the food in the plastic bag. Tie the mouth of the bag so that the food does not spill. While tying, take care not to leave too much air inside the bag. Now your hands are like the stomach muscles.



Now imagine how your stomach muscles churn food. Try to mix the food in the bag in the same way with your hands.

Step-by-step: the process of digestion



digestion. That's why it is important to chew your food properly."

"Yes, yes. You've told us this a hundred times. But what happens next?" Kaneez asked.

"From the mouth the food goes into the **food-pipe**. The food pipe carries this paste-like food to the **stomach**," said *Ama-ley*.

Further along the Digestive Tract

"So now you have seen how the food pipe and stomach work. What actually happens is that the stomach makes digestive juices and mixes them with the food. This forms a kind of solution. But that's not all. This liquid then moves down further into the **small intestine** and the **large intestine**," *Ama-ley* continued. "The small and the large intestine are very long tubes. They lie in our body all coiled up. The small intestine makes more digestive juices. The intestines break the food further into its nutrients. Anything not digested by the stomach is digested here.

"After the complete digestion of food, the inner wall of the small intestine absorbs the nutrients formed and passes it on to the blood. The blood then carries the nutrients to all parts of our body."

"But what happens to the food that is not digested?" Zenab asked.

"Some undigested food and quite a bit of water is left behind. These are passed on to the large intestine. The large intestine absorbs water from this liquid and sends it to all parts of the body through the blood. Whatever the body cannot digest is removed through the **anus** as faeces."

EXERCISES

Oral/Written work

1. The main organs of the digestive system are given in bold letters in your lesson. Make a list of them.

2. Pair up with a friend of yours in school or with your brother or sister at home. Take turns to put your ear next to each other's stomach before and after you eat your food. Write what you hear before and after eating.

3. Sometimes when you are sick you vomit. This contains partly digested food from your stomach, and sometimes from your small intestine. How does this food look? Try to remember and write about it.

4. What happens to the food when you chew it in your mouth?

5. Write the story of Martin, the soldier with a window in his stomach, in your own words.

6. Describe in your own words, the process of digestion in the small and the large intestines.

7. Fill in the blanks:

a. Food gives you the _____ to do things and _____ the worn out parts of your body. It also protects you from diseases.

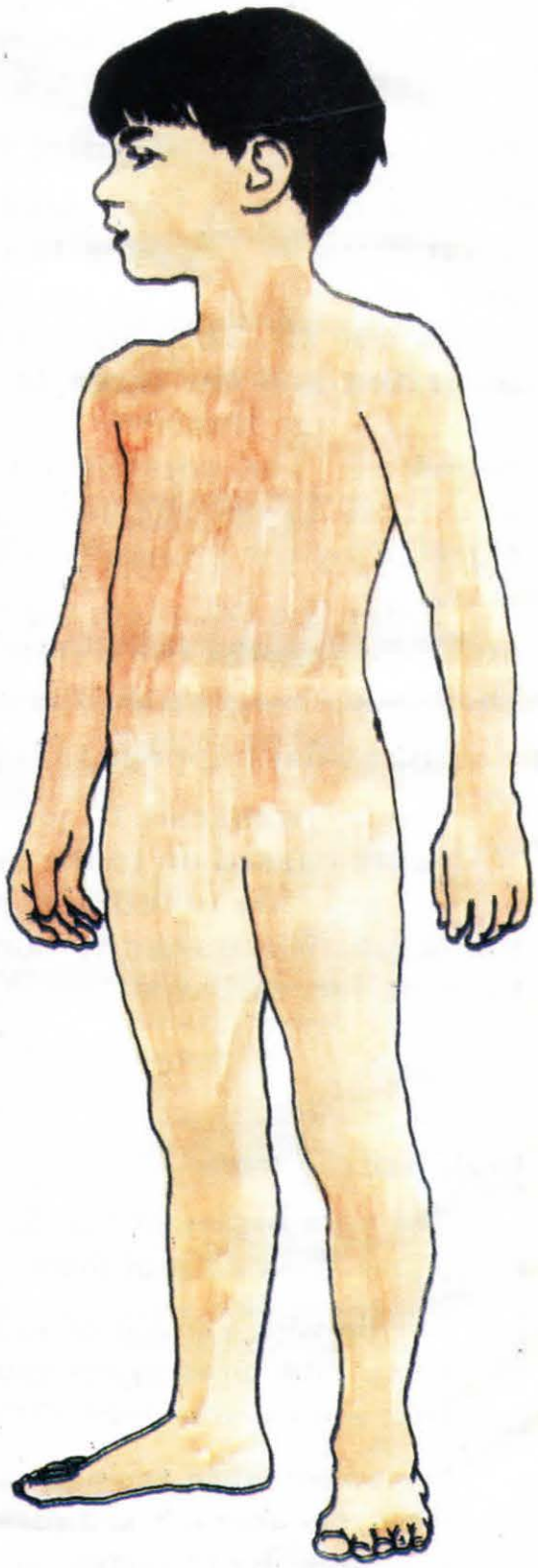
b. In the mouth, the _____ chew the food and _____ helps to make it into a paste.

c. The _____ carries broken-down food from the mouth into the stomach.

d. The _____ is a long tube where nutrients move into the blood.

e. Broken-down food particles are carried to all parts of the body by the _____.

f. The _____ is also a long tube. It absorbs water and sends it to all parts of the body through the blood.



9. Here is a picture is of Ali, Kaneez and Zenab's small brother. Draw his digestive system and label all the parts.

GLOSSARY

bits	ཁག་ཆུང་དུན།
actually	བདེན་པ། བལྟས་ཏེ་ཟིན་ན།
bandage	རྨ་ཁ་ལ་སྒྲི་བྱེད། རས།
bowl	སྐྱོར་མོ། དཔེན་སོགས།
bullet	གོ་ལི།
coiled up	ཀྱིག་འཁྲིལ་ཏེ།
digest	ཁར་ཇི་འཇུ་བྱེད།
faeces	ཀོ་ཀོ། མི་གཙང་བ།
fist	མུལ་ཏུག
flexible	གཡས་གཡོན་ལ་གཏུ་ཤན་བྱེད།
label	མིང་ཟིས་ཏེ་འབྱར་མཁན་ནི་ཤུ་གུ བྱང་བྱ།
left over	ལྷག་མ།
liquid	སིང་སིང་ཆུ་ཅོག
lump	རྡོག་རྡོག
model	དཔེ།
more or less	འགྲིག་ཟམ་ཞིག
mortar and pestle	རྨུང་ལྗང་དང་རྨུན་བྱ།
mystery	ཁ་གོ་བྱེད་ལ་དཀའས་པོ།
noise	ཀྲུ་རྩོ།
paste	ལྦག་ལྡོག ཞེར་ཞེར།
primitive	སྟོན་མའི།
recovery	ནད་ཆུལ་བྱེད། ནད་དྲངས་བྱེད།
saliva	ཐུ། ཁ་ཆུ།
scientist	ཚན་རིག་པ།
soldier	དམག་མི།
spinach	པ་ལག
step by step	ཆིར་ཆིར་ལ།
to absorb	ཞིམས་བྱེད།
to chew	ལྕད་བྱེད།
to churn	འོ་མ་སོགས་དཀྱོག་བྱེད།
to clench	བསྡམ་བྱེད།
to cure	དྲངས་བྱེད། རྒྱག་མོ་ཆུལ་བྱེད།
to grind	འཐག་བྱེད།
to heal	རྨ་ཁ་གསོ་བྱེད།ཤོས།
to peep	ཅིག་ཅིག་བལྟ་བྱེད། འཇལས་ཏེ་བལྟ་བྱེད།
to pretend	ཡིན་བསམ་བྱེད།
to repair	གསོས་བཅུག་བྱེད།
to spill	བོས་ཆ་བྱེད།
to squash	རྨྱ་བྱེད། བཙིར་བྱེད།
to vomit	བསྐྱུག་བྱེད།
transparent	ཕྱི་གསལ་ལ་རང་གསལ།
tube	བུ་རི།
to turn into	འབྱུར་བྱེད།
vertically	ཁ་དྲང་ང་སྐང་སྟེ།
worn out	ཟིན་ཏེ་ཆ་མཁན།
wound	རྨ་ཁ།

Chapter 4

SOURCES OF OUR WATER

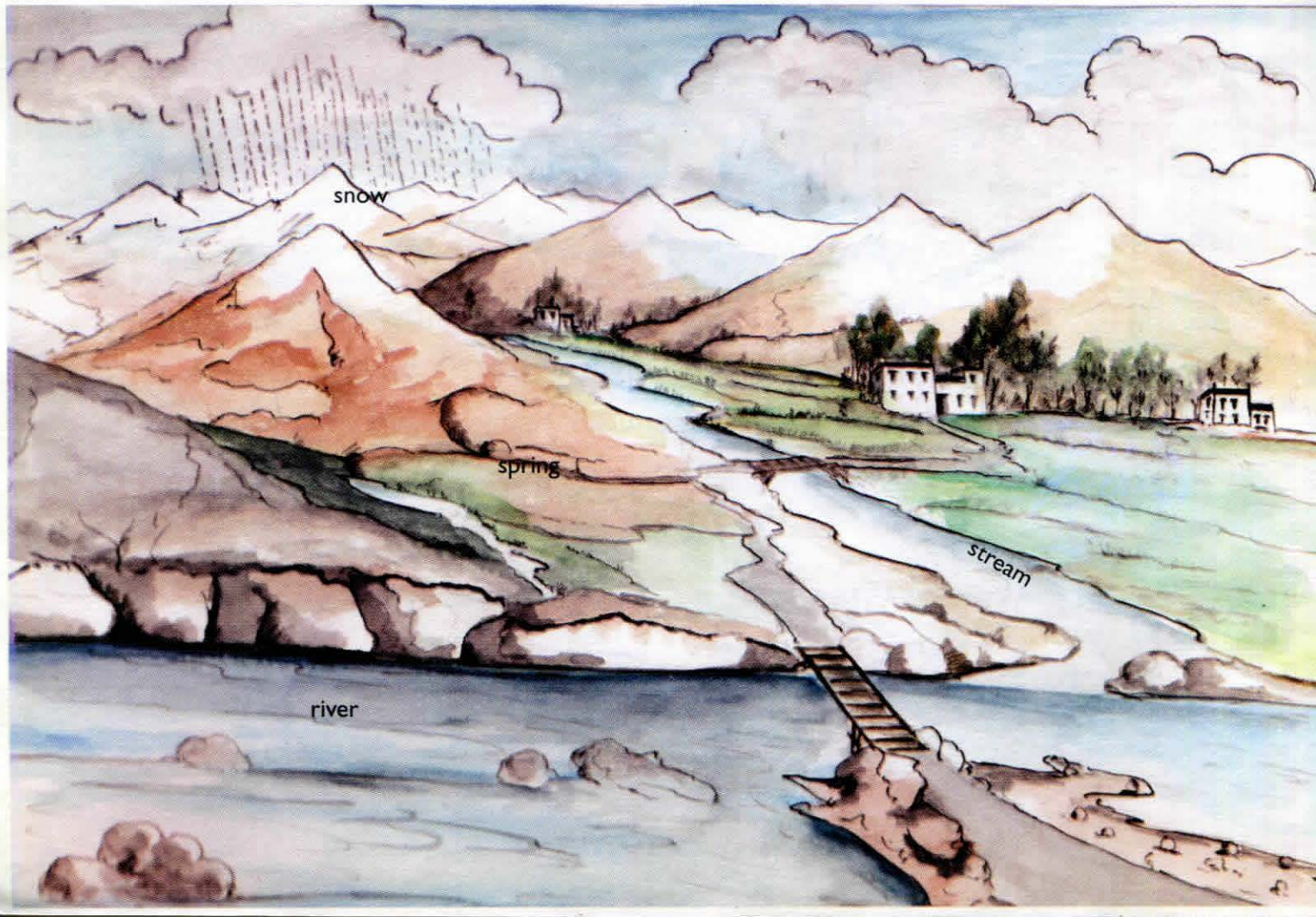
Angmo lives in Leh with her family. Her mother is worried because the water for cooking and drinking is almost finished. The water tanker has not come to their road for two days.

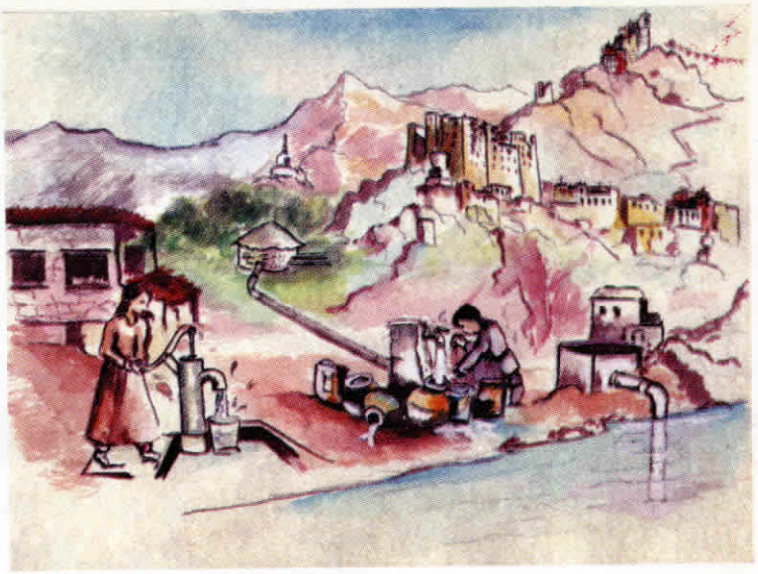
Do you know where the tankers in Leh bring water from?

Do you know where you get water from in your village?

SOURCES OF WATER

Ladakh gets very little rain. But there is snow in winter, especially in the mountains. Most of our water is from melting snow. This water flows down the mountains in the form of small streams, which join large rivers.





Some of the water seeps under the ground and becomes ground_water. In some places, this water comes up in the form of a spring.

We get water for all our needs from streams, rivers, ground water and springs. These are our sources of water.

In towns like Leh, water comes from many sources: the river, springs, streams, and ground water.

In Ladakhi villages, people get water from streams or springs. This water may be brought to the village by pipe.

In many villages, people dig canals (*yura*) to bring clean water from the upper part of the river or stream to the village. This water is used for drinking and irrigation purposes.

In Ladakh, people depend on water from the melting snow and glaciers.

Many other parts of India, however, get a lot of rain. In some places, the rainwater collects in ponds and lakes, or it seeps underground. People draw the underground water up through wells and hand pumps. Thus, ponds, lakes and wells are also sources of water.

In some places, people get ground water from wells.

How Does Water Become Dirty or Polluted?

Angmo and her mother were walking through a pasture below a village. Angmo was thirsty, so she just went to the stream and was about to drink when her mother stopped her, saying "Don't drink this water, Angmo. It's not clean."

"But it looks clean, Ama-ley," said Angmo.

"Yes, it does look clean, but it might not be safe to drink."

"But why?" Angmo wanted to know.

Her mother pointed uphill where they could see a village. "The village is above us. People from the village wash their clothes and dishes, and bathe in this water. Some toilets are also near the stream, so germs from them could get into the water. Look, you can see garbage like plastic packets, bottles and even an old shoe in it. Chemical pesticides and fertilisers from their fields might pollute the water too."

Remember that when water is polluted it doesn't always look dirty. We cannot see germs because they are too small, but they could make us sick. We might not be able to see or taste some chemicals but they could harm us too.

Where does your water come from? Do you know if it is really clean? Find out what different water sources there are in your village and whether they are clean enough for drinking.

EXERCISES

Oral/Written Work

1. Fill in the blanks with the correct words from among those given in brackets.

   a. Ladakh gets most of its water from _____ (wells, rain, melting snow).

   b. Many streams join to form _____ (an ocean, a river, a spring).

   c. In some places, ground water comes up in the form of _____ (springs, channels, streams).

   d. Water is drawn up from underground through a _____ (hand pump, sewing machine, tractor).

2. True or false? If the sentence is false, rewrite it to make it true.

   a. Garbage like plastic packets, bottles and old shoes pollute the water.

   b. Chemical fertilizers and pesticides from the farms do not pollute the water.

   c. All water is safe for drinking.

   d. In Ladakh, the most common source of drinking water is streams.

   e. We should not wash our clothes and dishes in sources of drinking water.

   f. In the rest of India, melting snow is the main source of water.

3. Answer the following questions:

   a. What are Ladakh's sources of water?

   b. What is underground water?

   c. Explain the different ways water can become polluted.

   d. How can we reduce pollution in our sources of water?

Things to Do

Make colourful posters to show how water and its sources get polluted. Write a message to go with it. Display your posters in public places in the village or town.

GLOSSARY

1) Take a walk in your village in groups. Walk along the streams and channels. Write down the different ways the water gets polluted. Draw a map of your village that shows at which points this is happening. Share your findings with the class. Discuss ways you could reduce the pollution.

2) At the next village meeting, share your findings with the villagers. Make a plan with them on how everyone in the village can reduce pollution.

along the streams	བྱོན་པོ་ཞུན་ནེ།
channel	ཡུར་བ། ཡུར་རྣ།
clean	གཙང་མ། བླག་མོ།
dirty	བཙོག་པོ།
dishes	ཐ་ལི་ཀོ་རེ་སོགས།
fertiliser	ལུད་བཅོས་མ།
findings	བལྟའ་སོང་སྡེ་ཚུམས་ཆ་མཁན་ཀུན།
garbage	ཁྱིམ་ས་ཆག་ཆོག
glacier	གངས་རི།
ground water	ས་འི་གཡོག་གི་ཆུ། ས་འོག་གི་ཆུ།
irrigation	ཆས་དང་ཞིང་ལ་ཆུ་གཏང་བྱས།
lake	མཆོ།
nowadays	མདང་འདི་རིང་།
pasture	སྐང་། རྫ་ཁ།
pesticide	འབུ་གསོད་སྨན།
pond	རྡོང་།
poster	ནག་ཕ་ཆེན་སོ།
purpose	དོན་དག ཐེབ།
source	བྱུང་གནས། འབིང་ས།
spring	ཆུ་མིག
stream	བྱོན་པོ།
to be thirsty	སྐོམ་བྱས།
to discuss	བྱོས་བསྡུར་བྱེ་བྱས།
to enter	འདྲེས་ས། གཅིག་གི་ནང་དུ་ཞུགས་བྱས།
to flow	ཆུ་སོགས་རྒྱུག་བྱས།
to melt	བཞུ་བྱས།
to pollute	གྲིབ། ཆུ་རླུང་སོགས་བཙོག་པོ་བྱེ་བྱས།
to reduce	ཉུང་ཟུན་བྱེ་བྱས།
to seep	ཐིམས་ཏེ་ཆ་བྱས།
to share	གཅིག་དང་གཅིག་ག་བསྟུན་བྱས།
to worry	མཆེར་ག་ཡོང་བྱས།
uphill	ཀྱེན་ལ།

Section 2
Our Natural Environment

Hints for the Teacher

Why this unit

This unit includes Wild Plants of Ladakh, Wild Animals of Ladakh, the Food Chain, and Do Plants Eat Food. It aims to develop a knowledge base of Ladakh's wild plants and animals and their inter-relationships. This will serve the children well when they have to learn biology concepts later.

"Wild Plants of Ladakh" and "Wild Animals of Ladakh" introduce a few wild plants and animals. This attempt is not to give an exhaustive list but to spark an interest in the rich natural heritage of Ladakh.

The "Food Chain" chapter shows food chains using Ladakhi examples. The aim is to encourage children to observe how living things are dependent on each other.

The chapter "Do Plants Eat Food?" describes various methods by which plants get their food. It attempts to reinforce the fact that the primary source of food for all living things is plants.

Materials needed

Animals of Ladakh: Thumbprint animals: paint or ink.
Food chain: Paper food chains: paper, scissors, colour pencils, glue, a stick, some string.
Do Plants Eat Food? How plants take in water: thin cotton cloth, mug or glass. Seeing root hair: hand lens.

Points for discussion/ clarification

Wild Plants of Ladakh

Some common wild plants of Ladakh are included. Your region may have other plants that are not in this chapter, or may lack some of the examples given. Do include other common local plants in your discussion, as children will be most familiar with these.

If possible bring specimens of plants to class. For example, ask children to bring local leaves to expand on the leaf-shape exercise.

Animals of Ladakh

The first activity asks children to name animals they know. Do not worry if children are unable to name all the animals. This chapter should not turn into a long list of names to memorise. However, here are some English and Ladakhi names in case you need them:

Hoopoe	*Utututse*
Red-billed chough	*Chunka*
Otter	*Chusram*
Fish	*Nya*
Redstart	*Sentik*
Snail	*Tung riks*
Hare	*Ribong*
Himalayan Rock laudakia	*Galchik*
Sparrow	*Ichu/Chipa*
Pika	*Rdzabra or zabra*
Red Fox	*Watse*
Snow leopard	*Shan or schan*
Kestrel	*Trha*
Ibex	*Skyin*

The lesson includes some information on wild goats and sheep. Many Ladakhis mistake these for deer. There are no species of deer in Ladakh.

Answers to the section on beaks: 1. Barheaded goose; 2. Black and white, green/purple on tail; 3. Chukar; 4. Two black bars or bands; 5. A curved, sharp beak; 6. meat; 7. Chukar; 8. a Magpie, b Barheaded goose, c Chukar, d Griffon

Answers to section on insects: a Water-skater, b Beetle, c Ant, d Ladybird, e House fly, f Moth, g Water boatman, h Dragonfly, i Grasshopper, j Caddis-fly.

Do Plants Eat Food?

The lesson deals with photosynthesis without difficult terms or the concept of gas exchange, as these will be dealt with later at a more appropriate age. Some interesting examples of parasitic and insectivorous plants are included to introduce children to the different methods plants employ to get food. Before teaching the lesson, ask around in the village to see if any cuscuta specimen is available, and bring it to class.

Chapter 5

WILD PLANTS OF LADAKH

Close your eyes. Think of any three plants that you have seen growing in or around your place.

1. Write their names in Ladakhi or in English.

2. Draw pictures of the plants. Colour them to show what each one looks like:

Plant 1	Plant 2	Plant 3
Name	Name	Name

3. Answer the following questions for each plant:

   a. How tall is it?

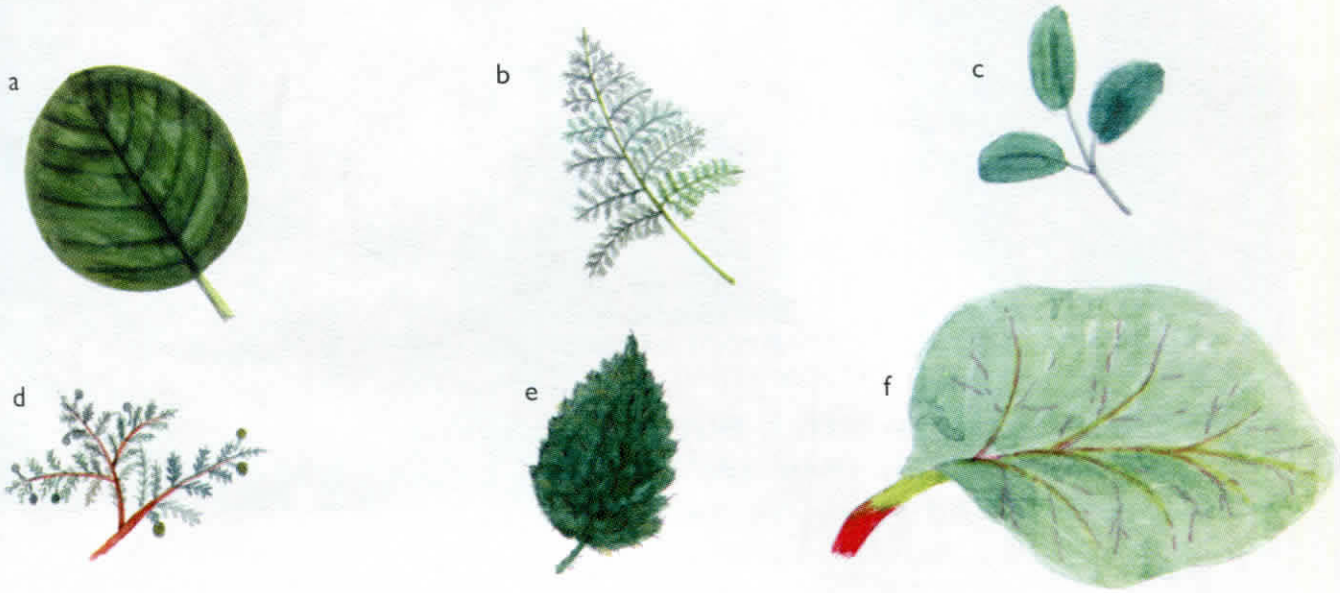
   b. Is it wild or do people grow it?

   c. Do the leaves of the plant change with the seasons? What is the change?

   d. What is it used for?

Look around. You see different types of plants. Some of them are large trees which can live for hundreds of years like the juniper. Some are small plants like the marigold which live for less than one year.

Have you observed the leaves of plants? Each type of plant has a different kind of leaf. Here are the leaves of some plants that grow in Ladakh:



Describe the shape and size of each leaf. You may some of the following words, or add other words that you know.

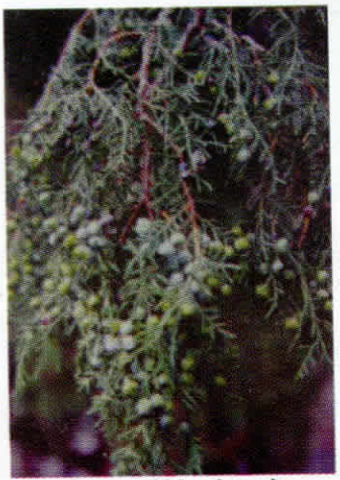
Shape: round, heart-shaped, needle-shaped

Edges: smooth-edged, wavy-edged

Size: large, small

What am I?

The leaves above belong to the plants shown below. Read what these plants have to say about themselves, and match them to the photos.



Juniper (*Shukpa*)

Alfalfa (*Ol*)

Caparis (*Kabra*)

Stinging Nettle (*Zatsot*)

Artemisia (*Burtse*)

Rhubarb (*Lachhu*)

1. My leaves are very bitter, but if you cook the new ones and rinse them for a day, then they are a very tasty vegetable. You see me spreading wide and green on bare hillsides.

What am I? _____

2. I grow on the slopes of high mountains. I have large, round leaves. They grow very close to the ground. My small pink flowers grow on a long stalk. You use me to make medicine for joint pain and broken bones. My stems are very sour, but please do not taste my leaves.

What am I? _____

3. Cows, *dzos*, and other animals eat me. I grow in villages, and you store me on your roof tops, especially for winter.

What am I? _____

4. I am found growing in dry areas, on stony slopes and along roadsides. Crush a few of my leaves and smell them — they have a strong smell. You use my stems for fuel.

What am I? _____

5. I am considered sacred by Buddhists and offered in *gonpas*. When burned, my smoke smells nice. Earlier many of us used to grow in Ladakh, but now there are very few of us left.

What am I? _____

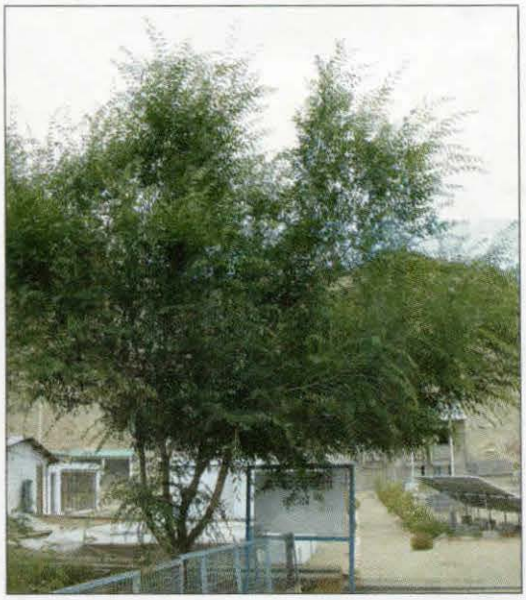
6. I can sting you if you touch my leaves as I have small stinging hairs. However, if you pluck my leaves carefully and boil them, you can make a green vegetable.

What am I? _____

Here are some more plants that grow in Ladakh. Have you seen them around your village or town?

Wild Rose (*Seya*)

You can see wild rose bushes almost all over Ladakh. The flowers are pink or yellow, and smell sweet. You use its stem for fuel, and make tools, walking sticks and basket frames from it. Picture frames made of rose stems look nice because of the red and white pattern left by the thorns. The skin of the rose fruit is sour and has a lot of vitamins.



Elm (*Yumbok*)

The elm tree grows in Nubra but is rare in other parts of Ladakh. The bark is used to make local shampoo. It has many other uses too—fuel, fodder, medicine and furniture.

Spotted Heart Orchid (*Ambolakpa*)

The roots of this rare plant look like the paw of an animal, so it is called *ambolakpa* in Ladakhi. *Amchis* use its roots to make a health tonic.

Seabuckthorn (*Tsestalulu*)

Plants have many uses. Take the seabuckthorn, which is found all over Ladakh. Every part of the plant has a use.

The **leaves** are used as fodder for donkeys, goats and sheep.

The **berries** are rich in vitamins, and are used for juice and jam, and also in medicine. Many birds also eat them.

Oil from the berry **seeds** is used in medicine.

The **branches** have long sharp thorns. So people use them on fences and walls because to keep animals from climbing over them.

The **roots** hold the soil in place and prevent it from being carried away by wind or water.

Exercises

Oral/Written Work

1. Put a tick mark to show the uses of the following plants. Remember that many plants have more than one use.

Name	Fodder	Fuel	Medicine	Food	Furniture	Others
Alfalfa						
Stinging nettle						
Juniper						
Artemisia						
Rhubarb						
Elm						
Wild rose						
Seabuckthorn						
Spotted heart orchid						

2. Given below is a puzzle called a word square. Words from this chapter are hidden in it. Answer these questions using words found in the word square.

a. *Lachhu* is my Ladakhi name. In English I am called _____

b. The berries from this bush are small and sour. You can make juice from them.

c. This is a tree from which we can make shampoo.

d. The _____ of the spotted heart orchid are used to make a health tonic.

e. _____ is grown as fodder for animals.

f. You will find this in every *gonpa*.

g. When I am in full bloom I am covered with pink or yellow flowers.

R	O	O	T	S	H	I	K	S	W	O
H	R	L	O	E	O	M	R	U	E	B
U	P	Y	R	A	L	F	A	L	F	A
B	B	B	A	B	A	B	B	A	A	B
A	M	W	J	U	N	I	P	E	R	T
R	Q	S	F	C	R	N	O	L	Q	U
B	I	X	E	K	S	F	W	M	U	O
E	D	Y	M	T	T	R	I	N	S	T
M	N	O	P	H	O	G	Z	O	N	K
R	I	F	K	O	R	L	I	P	T	Z
W	I	L	D	R	O	S	E	M	I	T
G	S	O	P	N	O	X	R	O	B	Q

3. Answer the following questions. Discuss your answers with your classmates.

a. Write the names (in Ladakhi or English) of any ten wild plants that grow in Ladakh.

b. Name three plants that grow for many years, and three plants that grow for only one year.

c. Name any two plants that are used as a vegetable.

d. How would you recognize a rhubarb plant? What is it used for?

e. Write three sentences on the juniper tree.

Make a herbarium

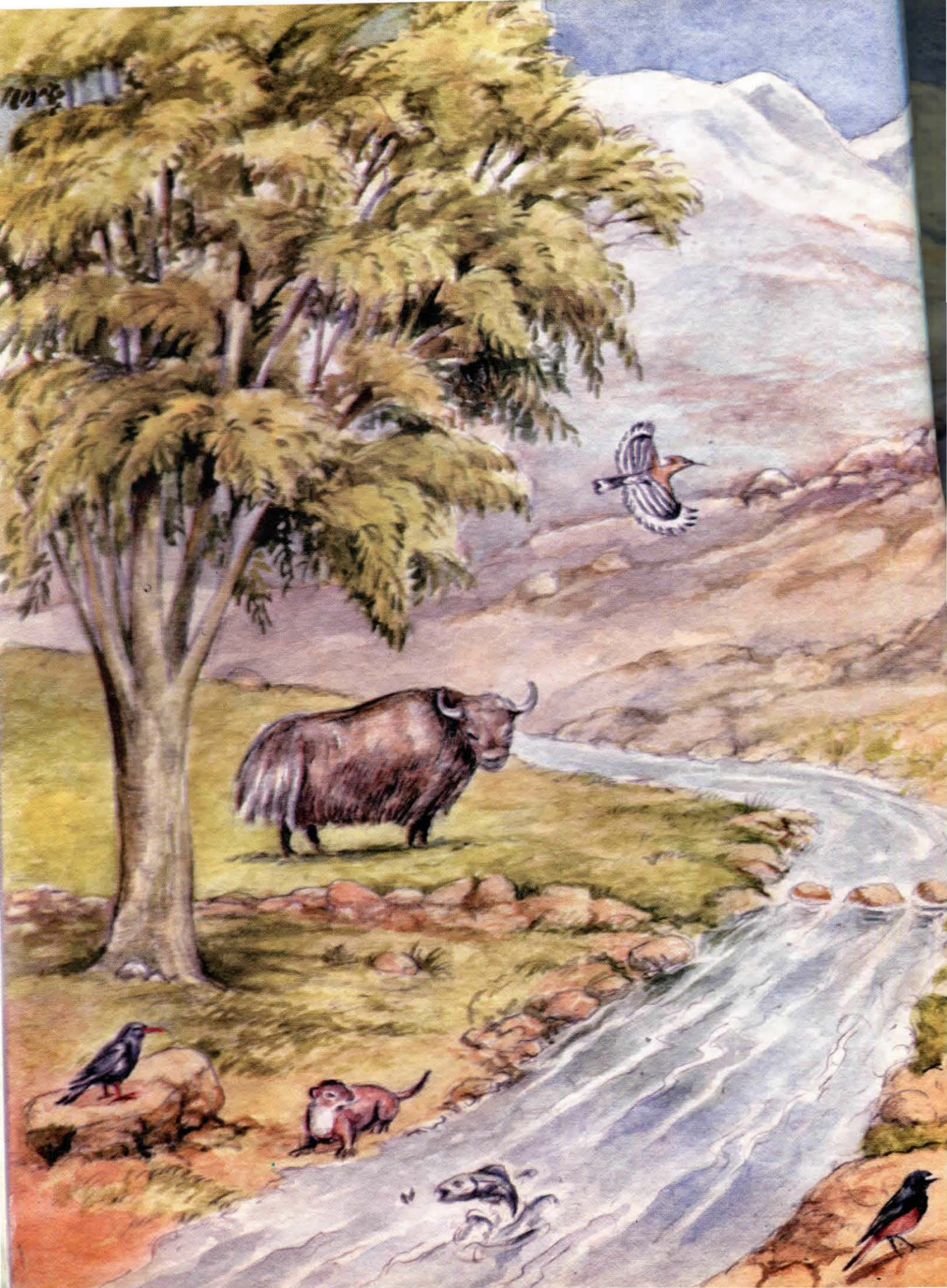
A herbarium is a collection of dried plants pressed flat in a book.

Collect leaves or leafy stems of various plants. Press them between sheets of paper. Put a weight such as a heavy book on top. Allow them to dry fully by leaving them for at least a week. When they are completely dry, stick them carefully on the pages of a drawing book.

Next to the plant, write its name in Ladakhi and/or English. Also write 2 or 3 sentences about it — for example, where it grows, how it smells, or what it is used for.

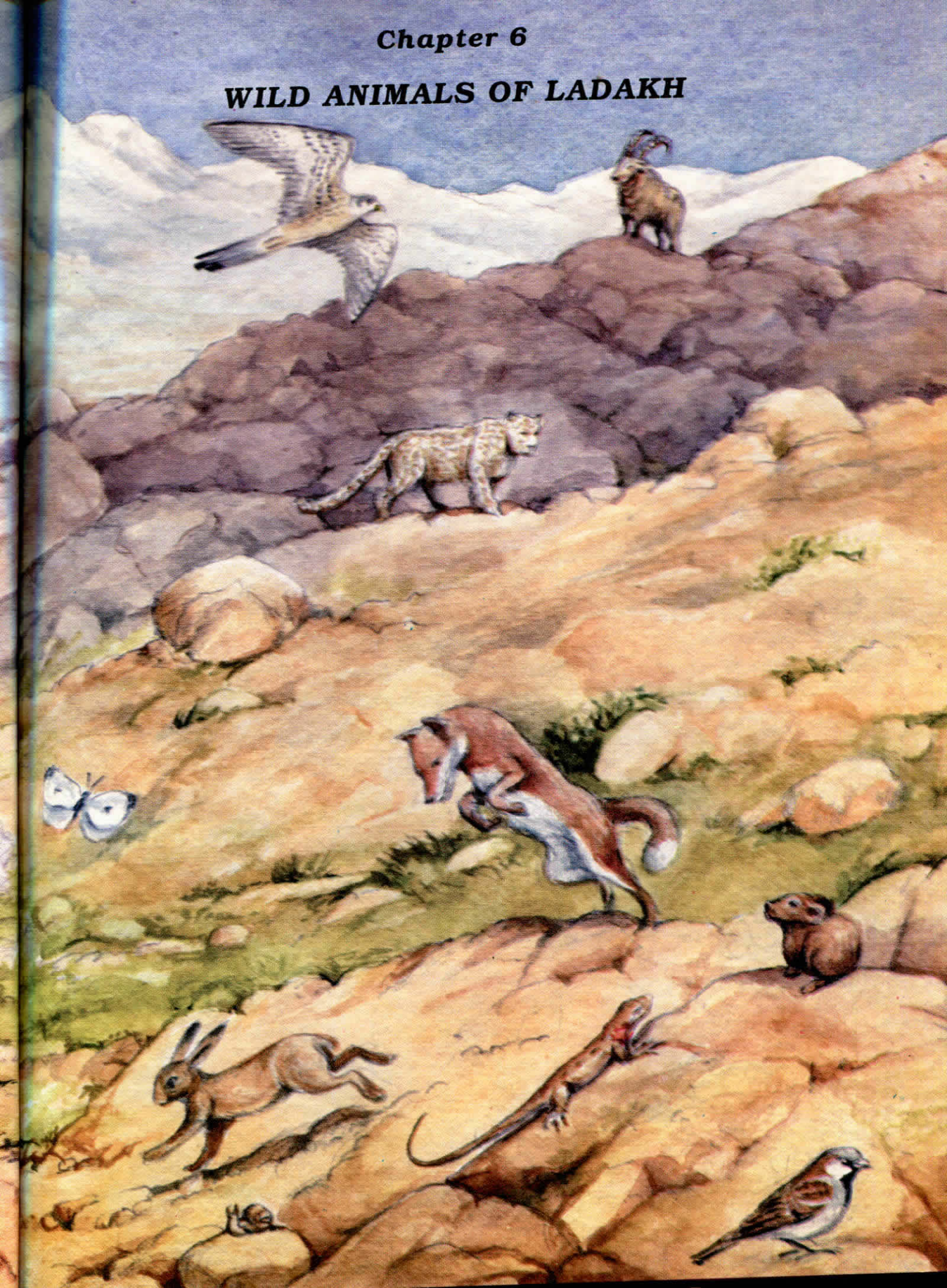
GLOSSARY

around	ཉེ་འཁོར་ལ།
bark	ལྗང་མའི་པགས་པ།
basket	རྩེ་པོ།
berries	ཚེར་ཀ་ལུ་ལུ་དང་ཤིབ་ཤི་ལུ་ལུ་སོགས།
bitter	ཁན་ཀེ།
edge	མཐའ་མ།
feathery	ཟང་ཟང་།
fence	བྱང་སྐྱེར།
fodder	རྩྭ་ཐུག
fragrance	དྲི་ཞིམ།
fuel	ཐུ་ཤིང་། བྱད་ཤིང་།
furniture	ཅོག་ཙེ་སོགས་ཅ་ལག
juniper	ཤུག་པ།
marigold	བག་རུ་མག་མལ་གྱི་མེ་ཏོག
medicine tonic	ཞེད་སྨན།
pain	ཟུག་མོ།
paw	ཁྱི་པི་ལ་སོགས་ཀྱི་རྐང་ལག
pluck	ལོ་མ་གཅད་བྱས།
rare	ཉུང་ངུན་ དཀོན་མོ།
sacred	དྲིན་ཆབས་ཅན།
season	ནམ་རྩྭ། ནམ་དུས།
smell	དྲི་མ།
smooth	འཇམ་པོ།
sour	སྐྱུར་མོ།
stem	མེ་ཏོག་སོགས་ཀྱི་རྩང་།
tall	རིང་པོ།
to carry	འཕྱང་ བྱས།
to consider	རེ་བྱས།
to crush	ཉེས་གཏང་བྱས།
to grow	ལྡན་བྱས། སྐྱེས་ཏེ་ཡོང་བྱས།
to hold	བཟུམ་སྡེ་འབོད་བྱས།
to live	གསོན་ཏེའ་ལུས་བྱས།
to match	ཆ་རྩིབས་ཤས།
to offer	ཕུལ་བྱས།
to prevent	ཆ་མི་གཏུག་བྱས། སྐག་བྱས།
to sting	རྨྱ་ལྟག་རྒྱབ་བྱས།
wavy	ཇོར་ཇོར།
wild	མ་བཏབ་པ་སྐྱེ་མཁན།



Chapter 6

WILD ANIMALS OF LADAKH



Which animals can you recognise on the previous pages? Make a list.

a. Which of these animals fly?

b. Which animals have hair on their bodies?

c. How many of them lay eggs? Which are they?

d. Name the animals you see near your village or town.

e. Which of these animals eat insects?

f. Do any of these animals have four wings?

As you can see, animals are different from each other. Some of them fly and some of them cannot; some lay eggs and some do not, and so on. Based on these differences, the world of animals is divided into different groups. We will now study some of these groups.

MAMMALS

Mammals are animals that give birth to live babies and feed them on their own milk. People, cows, cats and wolves are all mammals. Most mammals have hair on their bodies. Some have a lot of hair like the yak, and some have little hair like us! Mammals do not lay eggs.

Here are some mammals found in Ladakh.

Snow Leopard (*Schan*)

The snow leopard lives in very steep and rocky mountains. People interested in animals live for many months in tents to learn about the snow leopard. This is not easy as the animal is very difficult to see. It has a light grey coat with black markings. This sometimes makes it look like a rock on the mountainside until it moves!

The snow leopard has a long and bushy tail. In winter the leopard curls its tail around itself like a blanket. It usually eats wild sheep and goats such as the blue sheep and the ibex. It also eats other smaller animals such as marmots.

Otter (*Chusram*)

Otters are playful animals that live along the Indus, the Shayok and the Siachan Rivers. Otters are good swimmers. They can be seen diving into the water and chasing one another. Their main food is fish.

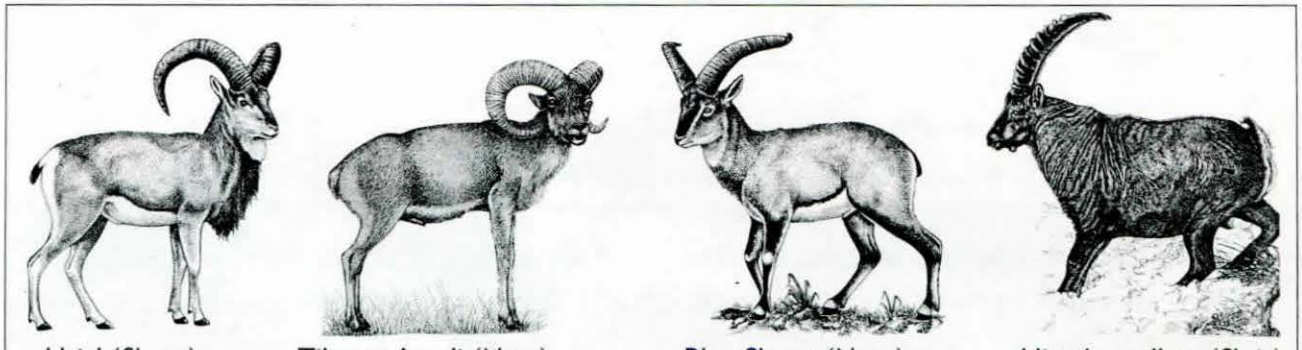
Himalayan Marmot (*Phiya*)

Could you sleep throughout the winter? No? Well, a small animal called the Himalayan Marmot does that! Marmots sleep throughout the winter months in underground holes called burrows.

In summer when there is plenty of grass, they come out of their burrows and spend most of their day eating! By autumn they are very fat and are ready to pass the winter months without any food.

Marmots can be found in many places, such as Chang-la and Khardong-la. Have you heard the marmots scream? When they feel that they are in danger, they stand up and let out a sharp whistle to warn all the marmots around. In seconds, they all run for safety into their burrows and disappear.

Wild Goats and Sheep (*Ridaks*)



Urial (*Shapo*) Tibetan Argali (*Nyan*) Blue Sheep (*Napo*) Himalayan Ibex (*Skyin*)

Look at these pictures of some male wild goats and sheep found in Ladakh. Earlier there were large numbers of these animals, but nowadays we find very few of them. In fact, there are only about 200 argali and about 1500 urial left.

You may have seen the horns of one of these animals in the *gonpa*, or at the base of a *chorten*. The females are smaller than the males

and have smaller horns. Many people in Ladakh call all wild goats and sheep *ridaks*. However, as you can see there are different kinds of *ridaks*.

Describe the horns of each male and show how each one is different from the other. For example, the horns of the blue sheep look like a motorcycle handlebar!

Tibetan Antelope (*Tsos*)

This antelope is found in the very high mountains of Changthang. It can be recognised by its long, thin and pointed horns.

People started killing the antelope for its fine thick wool. The wool was used to make very costly *tsoskhul* shawls and scarves, called *shahtoosh*. As there are only less than 500 antelopes left in Ladakh, the government has banned the killing of the animal and the selling of *tsoskhul* shawls.

Talk to the elders in your village. Ask them about the mammals they have seen. Make a large chart for your class as shown:

Name of mammal	Where was it seen?	Is it seen nowadays?	What does it eat?

BIRDS

Birds are the only animals that have feathers. What are some other characteristics of birds?

Do you know that there are more than 340 different kinds of birds in Ladakh? Let's see how many of them you know.

Beaks and How They Are Used

Birds have special mouths called beaks. The shape and size of the beak depends upon what the bird feeds on. Look at the different beaks below.

		The **black necked crane** (*cha trhung trhung*) searches for roots, insects, and fish in wet muddy soil. Its beak is long and pointed. It is our state bird.
		The **golden eagle** (*laknak*) cuts and tears the flesh of animals. It has a beak that is sharp and curved.
		The **rosefinch** (*ichu marpo* or *idmar*) eats seeds and berries. Its beak is short and heavy.

Magpie
(*kasrangbutit* or *cha trhawo*)

Chakar
(*srakpa*)

Bar-headed Goose
(*ngangpa*)

Himalayan Griffon
(*thangkar*)

Here are a few birds in Ladakh. Look at their pictures carefully. Then answer the following questions.

1. Which of these birds is a water bird?

2. Look at the magpie's illustration carefully. How many colours does this bird have? Name them.

3. Which bird is sand coloured and calls out "Tokorak-tokorak-tokorak"?

4.What special markings do you see on the head of the bar-headed goose?

5. What kind of beak does the griffon have?

   a. a long, straight beak

   b. a thin, sharp beak

   c. a curved, sharp beak

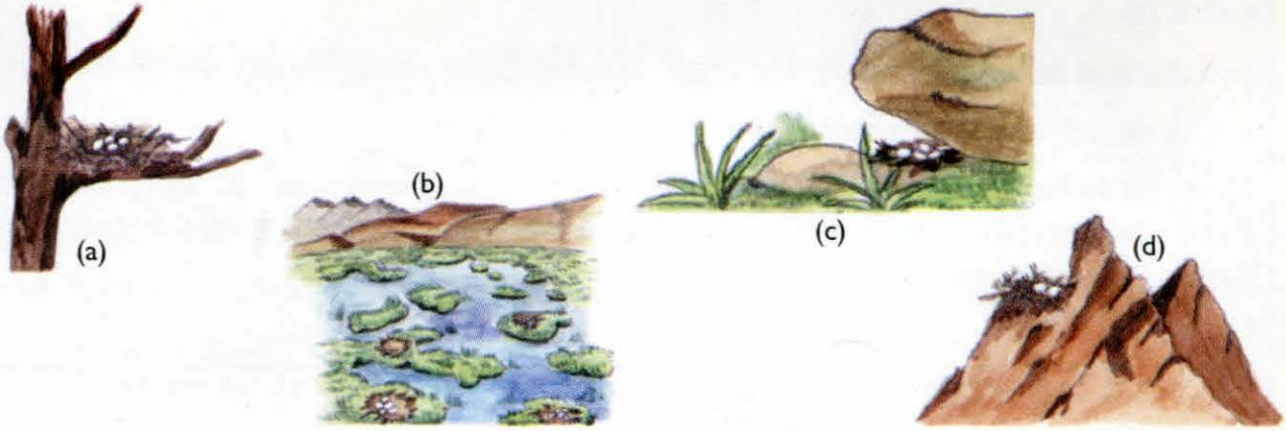
6. What do you think the griffon eats?

   a. seeds

   b. meat

   c. insects

7. This bird is the size of a hen. You can see it walking and running on the ground looking for seeds. Do you know which one it is?

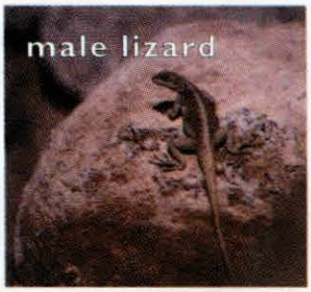


8. Match the bird to its nest: Chakor, Bar-headed goose, Griffon, Magpie.

REPTILES

Reptiles are animals with scaly skins. They lay eggs. They are cold blooded, which means that when it is hot outside their body temperature gets warmer and when it is cold outside their body temperature gets colder.

Himalayan Rock Laudakia (*Sgalchik* or *Ltsangspa*)



Have you seen a grey lizard sitting on a rock enjoying the warmth of the sun? Sometimes you can even see it move its head up and down. If it sees you, it will disappear under a rock! This is the Himalayan Rock Laudakia.

The female Himalayan Rock Laudakia has orange on the sides of the neck, so some Ladakhis call it the *lama sgalchik*. The male is larger than the female, with dark marks on its back and a long tail. Some people fear lizards but actually they are harmless.

What do lizards eat? Watch one to find out.

INSECTS

Insects are animals with six legs. Some have wings and some do not.

Look at the common insects below.

1. Practise saying their names till you know them. 2. Match each of the sentences given below with one of the insects. 3. How many of them are there in the chart that you made?


water skater

a. My legs are very long. I skate on water like you skate on ice.

b. I am black and have a hard covering.

c. We work together and help each other carry food. You can easily see us walking in a line in the fields.

d. I am small and round. I have a red body with black spots.

e. I sit on your food and could make you ill.

f. I look like a butterfly but come out at night.

g. My back legs are long like oars and they help me swim. I eat insects and fish.

h. You call me "helicopter." I live near ponds and eat mosquitoes and other small insects.

i. I am green. I love to eat leaves. When you disturb me, I hop and jump away.

j. When I am fully grown, I will have wings. Before that I looked like a worm and lived in water. I covered myself in a case made of leaves or sand and small stones.

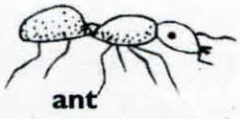

moth

caddis-fly


caddis-fly larva

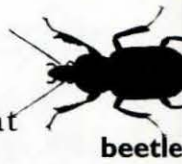

house fly


water boatman


ant


grasshopper


drago


beetle


ladyb

EXERCISES

Oral/Written work

1. Name one mammal that

a. sleeps throughout winter

b. usually eats wild sheep and goats

c. was killed for its fine, thick wool

d. swims very well

2. Name three wild goats or sheep found in Ladakh.

3. Solve the riddle: What am I?

   a. I am a bird. I call out "toktorok, toktorok." I eat seeds.

   b. I am a wild mammal. My wool was used to make shawls and scarves.

   c, I am an insect. I walkon water.

4. Who eats what? Draw a line to show who eats what.

Snow Leopard	Grass
Lizard	Ibex
Chakor	Fly
Otter	Sugar
Ant	Grain
Marmot	Fish

Go for a walk around your school in pairs and look for insects. Take your notebook and pencil with you. How many different kinds of insects can you find? Be careful not to harm them. Have you found insects whose names you do not know? Try to find out their names (or make up your own names for them!). The names that you give them could be based on some of the special characteristics that you observe in them. Make a common chart for the class like this one:

Name of the insect	**Drawing**	**Features: colour, size, etc**
Ant		*Black, I found it on alfalfa*

5. Name any two differences between:

   a. snow leopard and rosefinch

   b. Himalayan Rock Laudakia and grasshopper

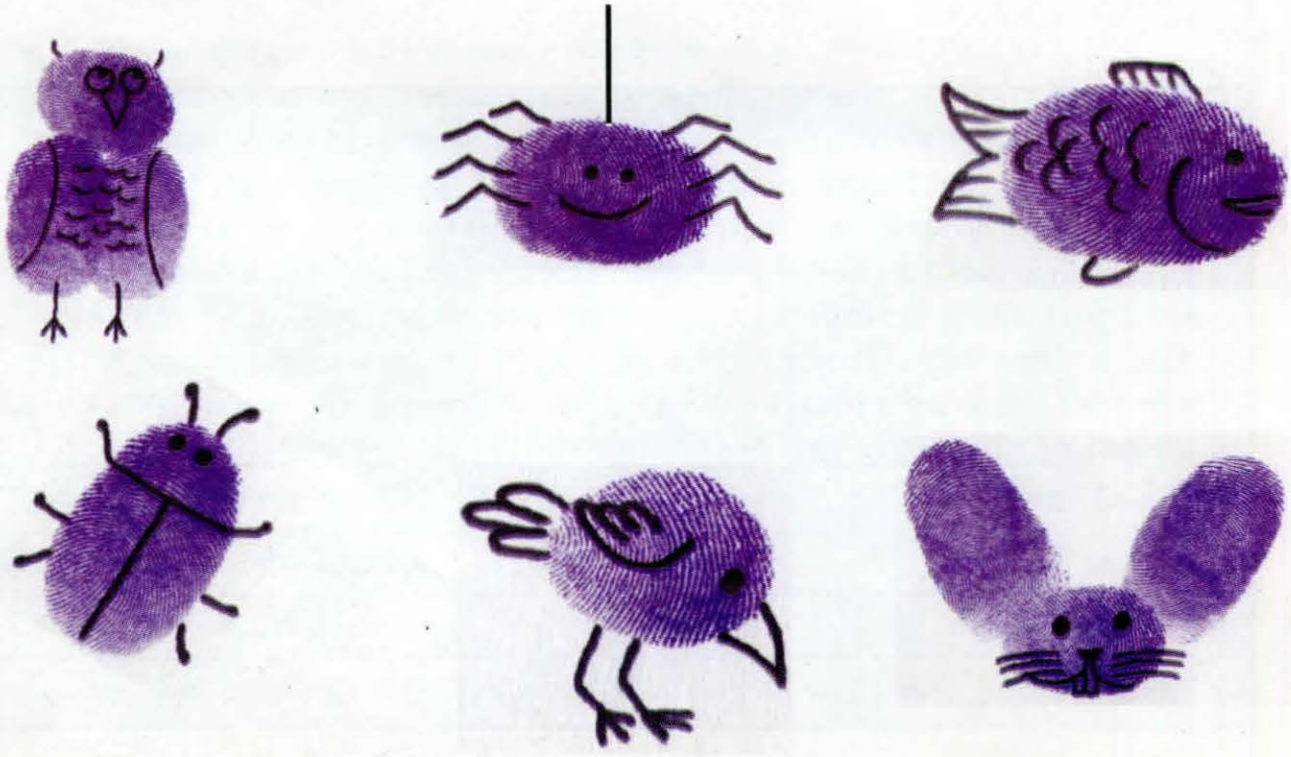
6. In the word square below, find the names of two mammals, one bird, and three insects. They appear from left to right or top to bottom.

D	R	A	G	O	N	F	L	Y
P	U	C	O	T	T	E	R	Z
E	R	A	C	T	Y	U	R	W
K	I	N	B	E	E	T	L	E
L	A	T	T	R	X	O	H	Y
S	L	M	R	E	A	G	L	E

Now that you have found the names, write two sentences about each one.

Things to Do

Make thumb print animals. Dip your thumb into paint or ink and make a thumbprint on paper. Add a few lines to make it into any animal. Here are a few examples. Have fun!



GLOSSARY

alfalfa	འོལ།
autumn	སྤྱོན།
ban	དགག་བྱ།
beak	ཁ་སཆུ།
burrow	སའི་ཡོག་གི་ཚང་མ།
bushy	ཟང་ཟང་།
characteristic	ཁྱད་ཆོས།
curved	ཀུག་ཀུག
elders	ཚན་པ་ཀུན།
feather	བྱ་སྤུ། གཤོག་པ།
flesh	ཤ།
harmless	གནོད་མི་སྐྱེལ་མཁན།
horn	རྭ་ཅོ། རུ་ཅོ།
lizard	ཆལ་ཅིག་ཡང་ན་རྩངས་པ།
mammals	འོ་མ་འབྱང་མཁན་གྱི་ཝེམས་ཅན།
marking	རྟགས།
oar	ཤིས ·ཀི་སྒྲལ་བྱས་ཀྱི་ཁྲེམ།
otter	ཆུ་སྤྲམ།
plenty	མང་པོ། ཉན་ཉན། ཐང་ཐང།
previous	སྔོན་མའི།
scaly	ཕ་རར་ཇེ་རེ། ཕར་ཇེར།
scarf, scarves	མཚོ་སྐྱེས།
steep	གཟར་པོ།
sweet calls	སྐད་བདེ་མོ། སྐད་སྙན་པོ།
through the winter	དགུན་གང་པོ།
thumbprint	མེ་རྟེ།

to build	བརྩིག་བྱས།
to chase	དེད་བྱས།
to curl	འཁྱིལ་བྱས། བསྡིལ་བྱས།
to depend upon	བརྟེན་ཏེ་ལུས་ཤེས། ཡང་གཅིག་གི་ཀ་རབ་ལས་བྱས།
to dip	ཆུ་སོགས་ཀྱི་ནང་ལ་ཐུག་བྱས།
to disappear	ཤོར་ཆ་བྱས། མེད་མཁན་ཆ་བྱས།
to dive	མགོ་པི་ཀློག་གཏད་བྱས། མགོ་བཙུགས་ཏེ་ཆུའི་ནང་ལ་མཆོངས་བྱས།
to divide	ཁག་ཕྱད་བྱས།
to feed	བསྐལ་བྱས། ཁར་ཇི་གཏད་བྱས།
to lay eggs	བྱུལ་གཏད་བྱས།
to recognise	ངོ་ཤེས་ཤེས།
to scream	ཀྱ་རྡོ་ཤོར་བྱས།
to search	བཙལ་བྱས།
to skate	གངས་མི་ཀ་སྐྱེར་གོན་ཏེ་འཕྱད་བྱས།
to swim	ཆུ་རྒྱལ་གཏད་བྱས།
to warn	ཤང་བསྐུལ་བྱས། (ཏེ་རེ་ཏེ་ཟེར་བ་ཅོག་སས།)
usually	མང་ཆེའ།
warmth	དྲོད།
whistle	ཕྱུ་ར།
wing	གཤོག་པ།

Chapter 7

THE FOOD CHAIN

The children of Rogchen in Changthang were playing a game with pebbles in the afternoon sun. Suddenly one of them looked up and shouted, "Look! The cranes have come!"

At once, the children started singing together:

Cha Trhung Trhung karmo

garzhik top!

"White crane

Please dance for me!"

The Black-necked cranes (cha trhung trhung) came flying down to the children. One of them said, " We have come here to Tso-Kar from very far away. We are very hungry."

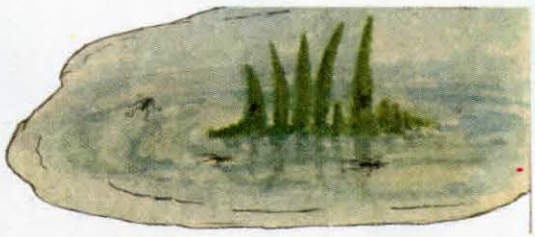
"Come, you can eat some of our bread," said a child.

One of the cranes replied, "Thank you, but we do not eat bread. We eat insects, fish and tubers."

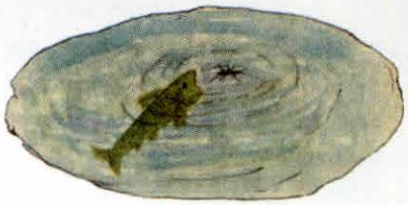
Tso-Kar is a large lake in Changthang. Many plants, insects, fishes, birds and animals live in and around it. These animals and plants depend on each other for their food.

In the lake water, there are many small green plants. They make their own food in the presence of sunlight.

These plants are eaten by small water insects.

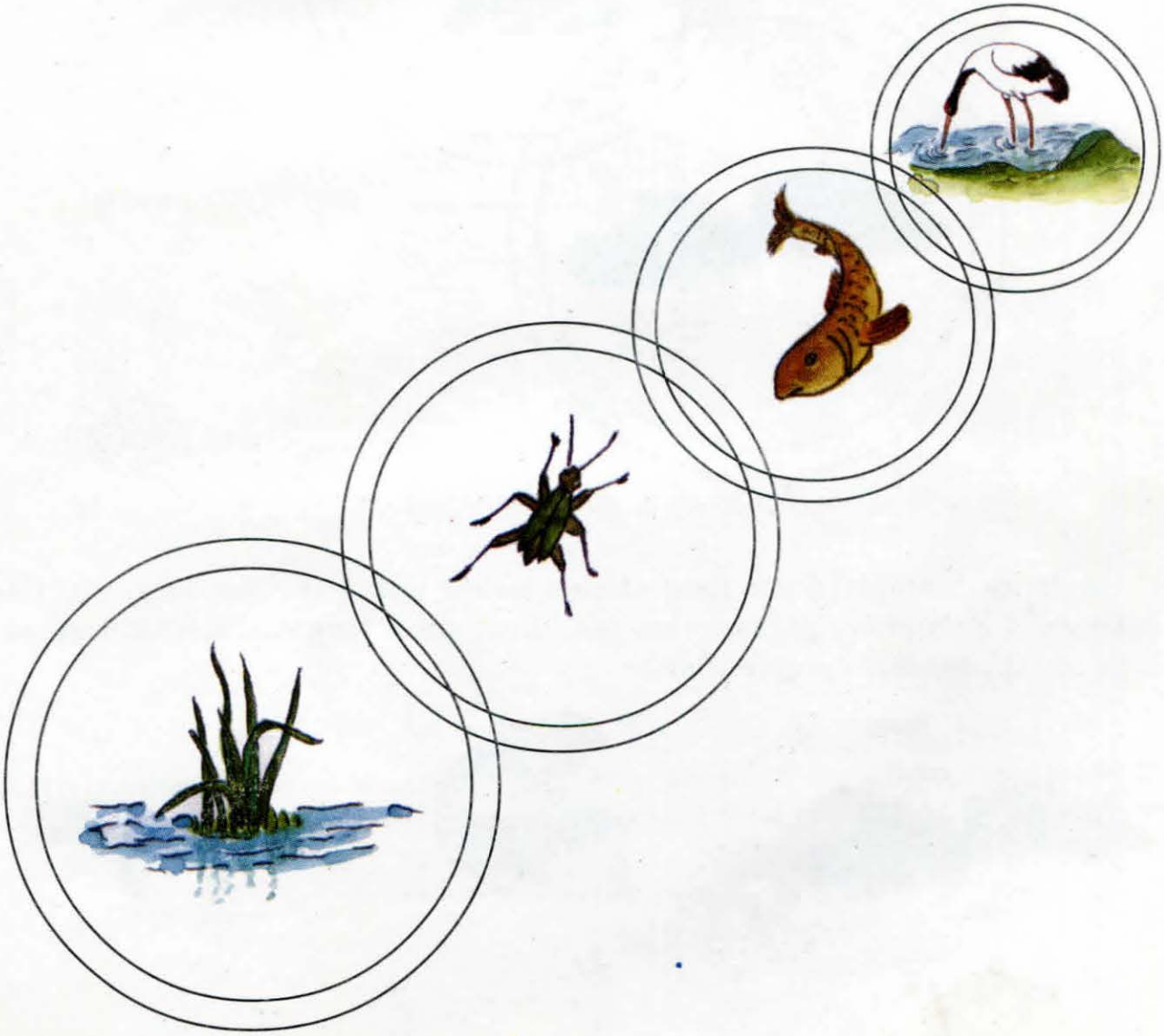


These insects are in turn eaten by fish.

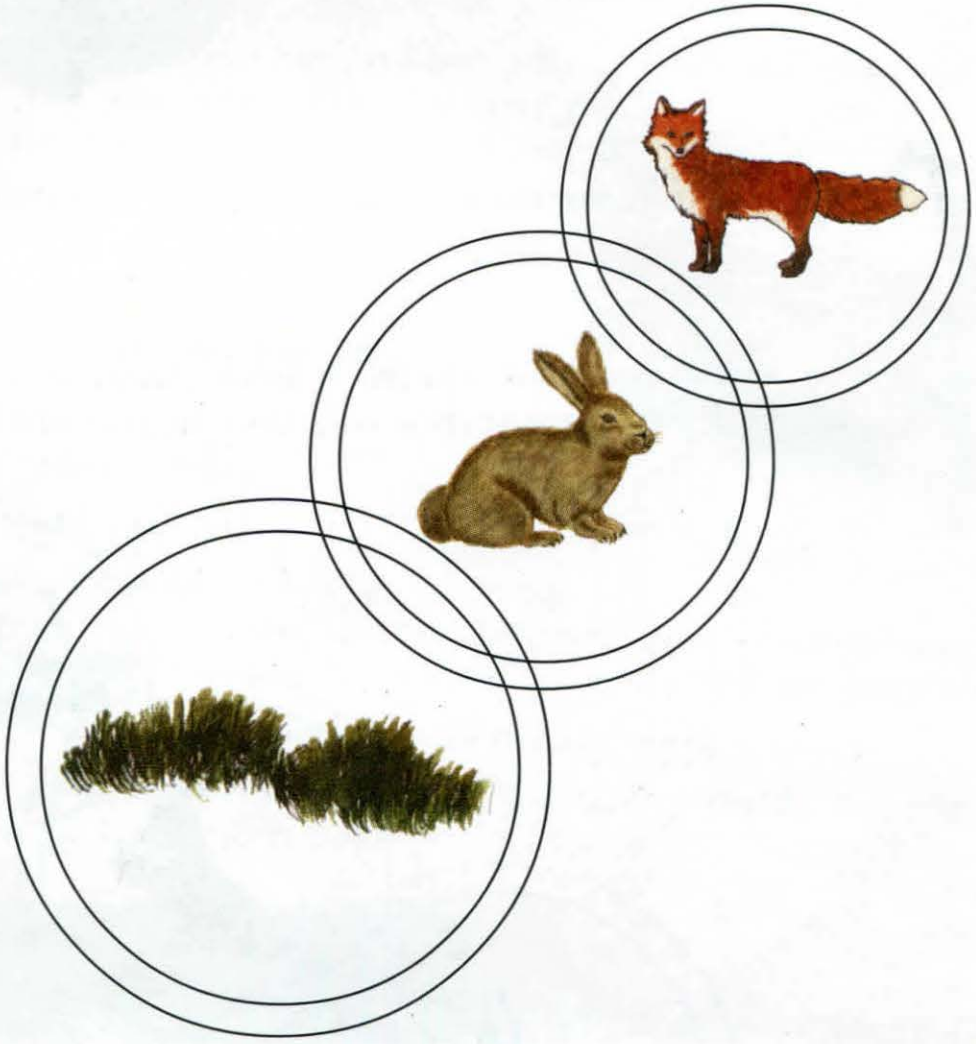


The fish are then eaten by the Black-necked crane.

This is a **food chain**. A food chain is a series of living things connected together in the order of who eats what.



Look at this food chain. The woolly hare and the red fox are found in Ladakh. The grass is eaten by the hare. The hare is eaten by the fox.



Activity: Complete the food chains below using the words given. Use each word only once: grass, pika, fox, ibex, snow leopard, alfalfa, human, blue sheep, insect, magpie, fish.

1)

Grass ____ ___

2)

_____ _____ _____ _____ _____

3)

_____ goat _____

4)

grass _____ wolf

5)

grass _____ lizard _____

6)

insect _____ otter

Activity: Walk around your school. Make a list of all the plants, insects, birds, lizards and other animals that you see. Make food chains that connect some of them.

Care for the Cranes!

You know that the Black-necked crane is the state bird of Jammu and Kashmir, our state. It is a large bird. If you stood next to one, it would probably be taller than you! The Black-necked crane has a long neck. What is the colour of its neck? The name of the bird will give you the answer! The body of the bird is light grey, and it has a red mark on its head.

There are very few Black-necked cranes (less than 6,000 in number) in the world today. Some Black-necked cranes have been coming for many years in summer to the lakes in Changthang to lay their eggs. However, in the last few years, fewer birds have been coming here. The number of people in this area has increased and this has perhaps disturbed the birds. Besides, dogs and wolves sometimes steal the eggs.

If the Black-necked cranes disappeared from Ladakh, how would you feel?

EXERCISES

Oral/Written Work

1. Answer the following questions:

   a. What do the Black-necked cranes eat?

   b. What is a food chain? Give one example.

   c. Write five sentences about the Black-necked crane.

2. Choose words from the given list and make as many food chains as you can:

   a. snow leopard, fish, goat, worm, fox, chicken, leaf, wolf, insect, grass, magpie, hare

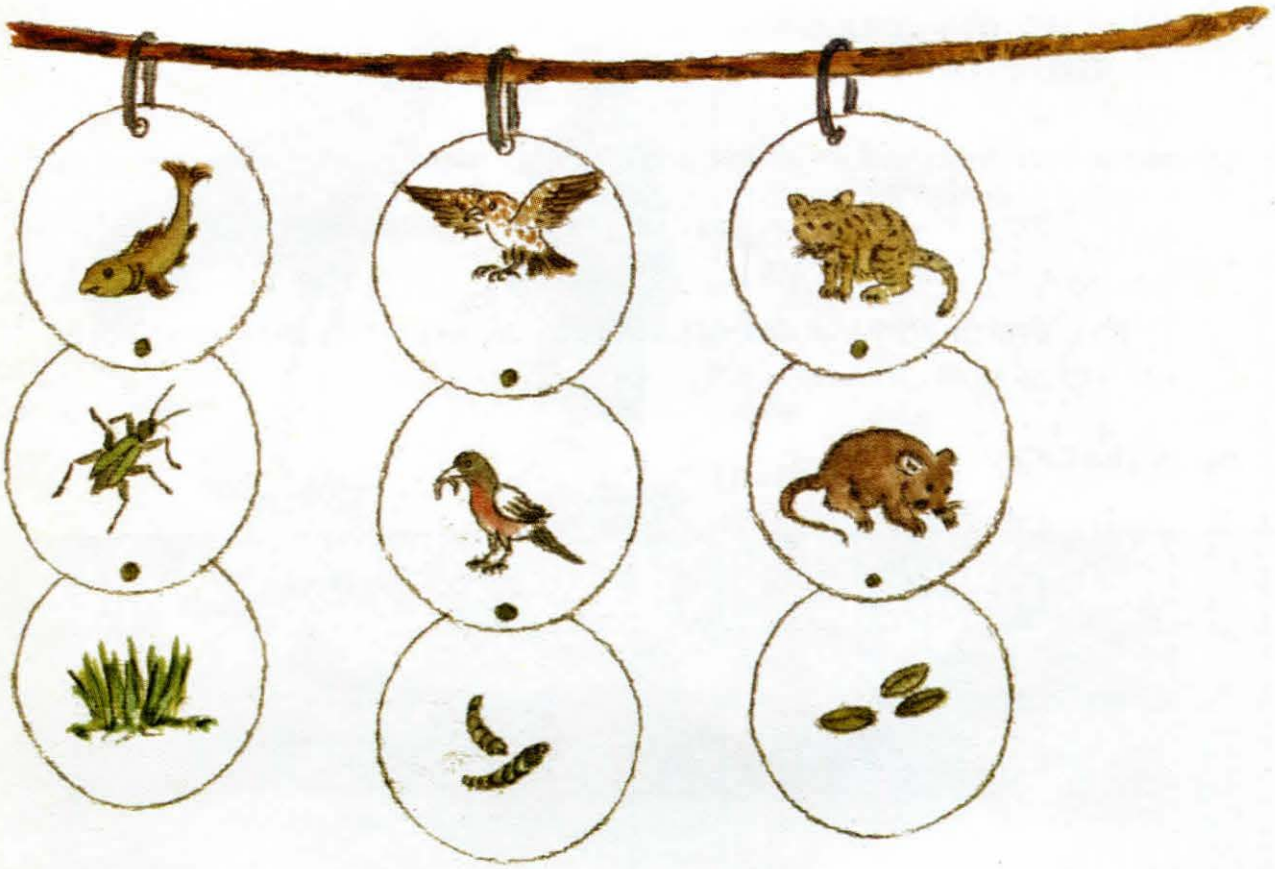
   b. Which of these animals are meat eaters, grass eaters, or both?

3. Match the following columns:

Column A	Column B
a. *Tso-kar* is a	grass
b. Black-necked cranes feed on	for their food
c. The woolly hare eats	lake in Changthang
d. Animals and plants are dependent on each other	insects and fish

Things to Do

You have already made a list of food chains seen around your school. Using them make colourful paper food chains as shown below and hang them up in your classroom.



GLOSSARY

at once	དེན་ན་མལ་ལ།
connected	འབྲེལ་མཐུད་དེ།
crane	བྱ་ཁྲུང་ཁྲུང་།
disappear	མེད་མཁན་ཚ་བྱས།
down	གཡོག་ལ་ ཐུར་ལ།
hare	རི་བོང་།
hungry	ལྟོགས་རི་ ལྟོགས་ཏེ།
increase	མང་ད་ཆ་བྱས།
insect	འབུ་ཙི་ག
pebble	རྡོ་ཆུང་དུན། ཕག་མ།
presence	ཡོད་ཚ་ན།
to decay	རུལ་བྱས།
to fly	འཕུར་བྱས། འུར་བྱས།
to look	བལྟ་བྱས།
to reply	ཏྲི་ལན་གཏང་བྱས།
to rot	རུལ་བྱས།
to shout	ཀུ་རོ་གཏང་བྱས།
to steal	བཀུ་བྱས།
together	མཉམ་ཡོ། མལ་ཅིག་ག
tuber	ཨ་ལུ་སོགས།
woolly	སྤུ་ཅན།

Chapter 8

DO PLANTS EAT FOOD?

In the last chapter, on the Food Chain, you read about what different animals eat. You saw that all the food chains that you have studied begin with green grass or plants.

Like animals and all other living things, plants also need food to grow. But have you ever wondered where plants get their food from? Have you ever seen a tree eating food? No? That is because they don't eat food. Instead most of them make food themselves. Only some of them depend on other plants or insects for food. Let us find out the different ways plants take in food.

Making Food For Themselves

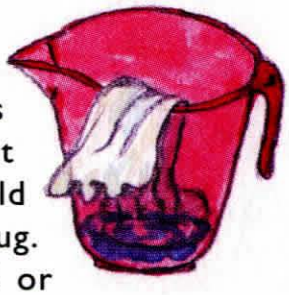
* Have you ever noticed that almost all plants have green leaves?
* Have you ever wondered why?

Most plants have green leaves because the thing that gives them green colour also helps them to make food. Just as we need many things to make our food, plants also need many things to make their food. One of them is water.

* Have you ever watered any plants?
* Do you know where leaves get water from?

Water rises up!

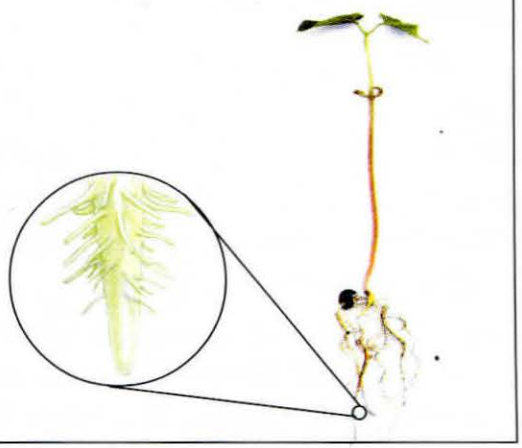
Take a mug with a little water in it. Hang a dry soft cotton cloth in it so that its lower tip just touches the water. The rest of the cloth should hang out of the mug. Leave this for 10 or 15 minutes. After some time, you will find that the water has risen up the cloth and wet it. So you know now that water can rise upwards. But the process in plants is different and more complicated. It is not simple as with the cloth.



The roots of plants absorb water from the soil and some tubes inside the plant carry it up to the leaves.

Observe roots

Dig up a small plant carefully so that its roots are intact. Look at the roots carefully under a hand lens. Do you see some fine hair-like things just above the tip of the root? The roots absorb water through these root hairs.



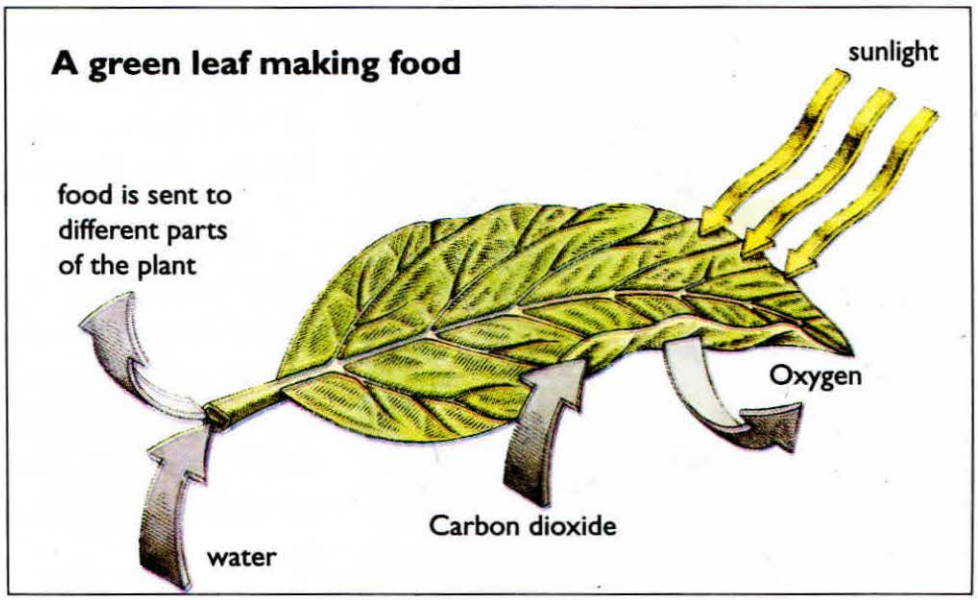
Plants also need a gas called carbon dioxide to make food. This gas is present in the air all around us. It is colourless and does not have any smell. so we are not able to see, smell or feel it. But the leaves in plants take it in and use it to make food.

The third important thing is sunlight. Plants get energy in the form of sunlight from the sun. That is why food-making in plants happens only during the day.

During daytime, when there is sunlight, the green part in leaves help carbon dioxide and water combine together to form food. This food is stored in leaves. At the same time, another gas called oxygen is given out. These leaves form the cabbage or spinach that we eat, and the grass that many animals eat. Plants use the food from their leaves for their growth, flowering and fruit too.

But this is not all. Just as we need many different nutrients for a balanced diet, plants also need some more things.

A green leaf making food



These are mostly minerals. The roots in plants absorb minerals from soil along with water.

Plants that Depend on Other Plants

Some plants do not make their own food at all. They just live on other plants and depend on them for their food. These are called parasitic plants. You may have seen a yellow plant that looks like wire or string entwining itself around other plants. It is mostly found growing among onion plants. This plant is not green and cannot make its own food. It depends on its host plant for all the food it needs.

Most parasitic plants do not have any leaves or green parts. They take food, water and minerals too from their hosts. But some parasitic plants do have leaves. They make their own food, but depend on their host for water and minerals.

Some Plants Eat Insects Too

Can you imagine, some plants eat insects too! These insect-eating plants grow in wet, marshy places where the soil does not have the minerals they need.

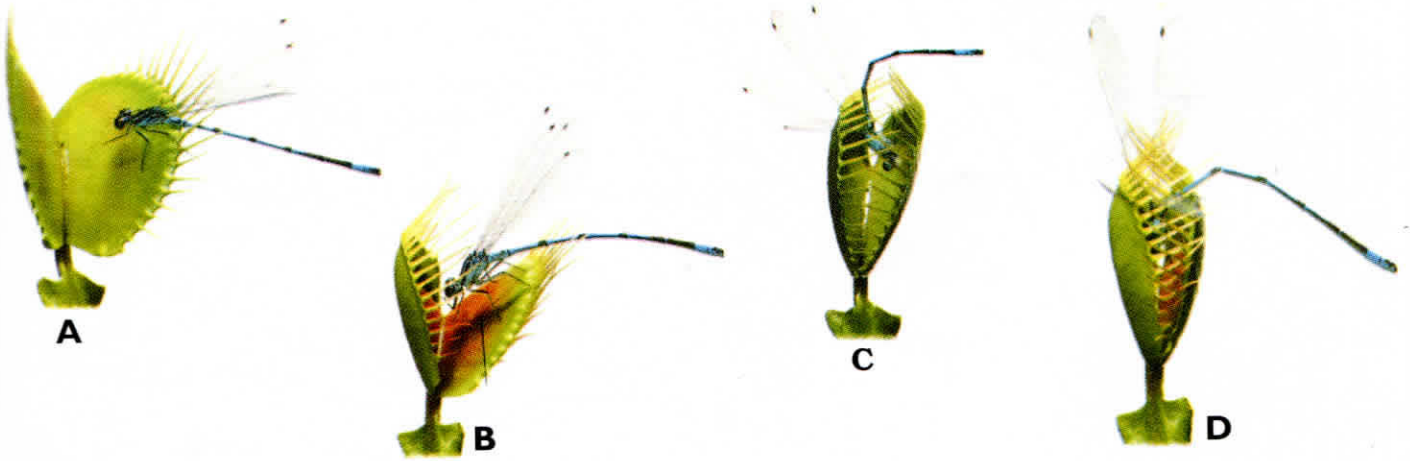
These plants have green leaves and make their own food just like other plants. But they eat insects for all the minerals they need.

The picture here shows a pitcher plant. Its leaves grow into the shape of pitchers and trap insects in them. The plant makes juices that digest them. The pitcher plant doesn't grow in Ladakh. Can you think why this is?

EXERCISES

Oral / Written Work

1. **Fill in the blanks with the correct word from the brackets:**
   a. Plants absorb water through their_____. (stem, leaves, roots, fruits)
   b. The green part in the _____makes food in plants. (fruit, leaves, stem, roots)
   c. The gas that helps plants make food is _____.(oxygen, carbon dioxide, carbon, none)
   d. Carbon dioxide and _____ combine together to make food in plants. (oxygen, sunlight, minerals, water)
   e. Some plants eat insects to fulfill their _____ requirements. (water, vitamin, mineral, oxygen)
   f. _____ plants depend on their hosts for their food. (parasitic, green, insect-eating, all)
2. In autumn all the leaves of plants fall. So how do you think they survive without making any food? Discuss in class.
3. You have read how green leaves in plants make food. Now write about the process in your own words.
4. Go around your village and find out if anybody has the yellow wire-like parasitic plants growing with their onion crop. Ask them about it. Do they feel it is harmful for their crop? What do they do to get rid of it? Write down your discussion in detail.
5. Here are four pictures of an insect-eating plant called the Venus Flytrap. Describe what is happening in the pictures.



GLOSSARY

cabbage	བན་གོ་ཕྱི།
carefully	གུ་ལེའུ། ཞུན་དག་བྱོ་སྟེ།
during	དེ་དུས་ལ།
hand lens	ཅ་ལག་གུན་ཆེན་མོ་མཐོང་བྱས་ཀྱི་ཤེལ།
host plant	དེ་ལག་ཚྭགས་གུན་གा་གུན་ཡང་རིག་ གིས་ཟའད།
intact	མ་ཆག་ག ག་ང་མ
marsh	རྩྭ་ཅན་གྱི་འདམ་ཀ་ལག
minerals	ཇས། གཏེར་ཇས།
to absorb	འཐུང་བྱས། སིམས་ཤས།
to combine	བསྡེ་བྱས།
to depend	རག་ལས་ཤས། བརྟེན་ཏེ་འདུག་བྱས།
to dig	བྱུ་བྱས། བརྐོ་བྱས།
to entwine	གཅིག་དང་གཅིག་ལ་འབྲེལ་བྱས།
to observe	མད་རྒྱལ་ག་བྱོ་སྟེ་བལྟ་བྱས།
to require	དགོས་ཤས།
to rise	ལྟག་ག་ཆ་བྱས།
to wonder	དྲི་བ་བསམ་བྱས།

Section 3
Our Manmade Environment

Hints for the teacher

Why this section

This section includes chapters on Waste and on Making a Warm Building. It aims to sensitise children to current environmental issues in Ladakh.

"Waste" introduces children to the concept of waste, problems like land and air pollution, and ways to minimise it. The concept is explained by looking at traditional life in Ladakh where there was minimum waste. Now with changing lifestyles and increasing consumerism, waste management is becoming a serious issue. In Ladakh, especially in towns like Leh, waste disposal has already become a problem.

The NCERT curriculum recommends that children of Class 4 learn about types of housing and how they are suitable for their respective climates. The chapter on Making a Warm Building deals with the use of solar energy to keep buildings warm, since Ladakh is bestowed with bright sunshine even in winter. This chapter explains how buildings can use this energy for heating rather than burning fuels that pollute the air.

Materials needed

Making a Warm Building: Model of school building: enough bricks, sticks or wood, or match boxes to make a model of the school.

Waste: Parachute activity: square pieces of cloth, some string, small stones

Points for extra discussion/clarification

Waste: Nowadays milk, oil, and juice are often sold in packaging made of three layers: aluminium foil, plastic, and paper. Since this packaging has many layers, it is very difficult to get rid of: it does not decompose, and if burned, the metal does not burn, and plastic creates harmful smoke. This is an example of one product: it is easy to think of more.

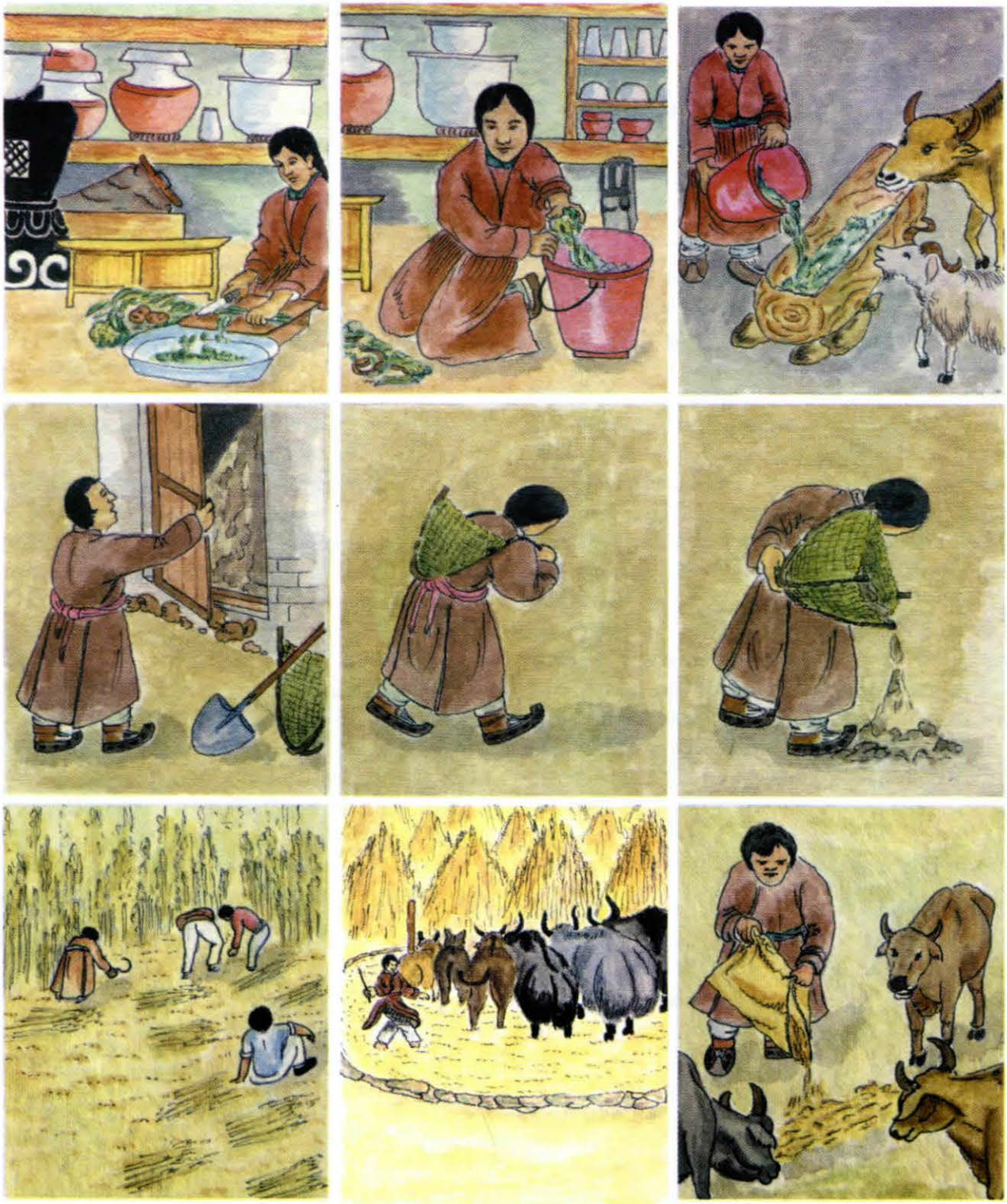
The second activity, seeing connections between animals, humans and fields, is based on traditional village life in Ladakh. The idea is to get children to think about how people's needs were few and were met from the land. Very little was wasted, and things that might be considered "waste" from one process were used as useful inputs for some other activity.

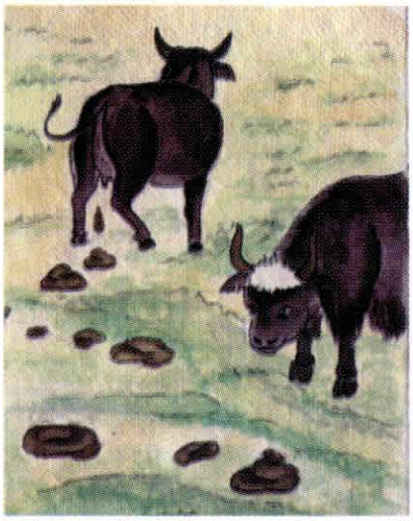
When discussing the illustration that shows how long things take to decompose, you can mention to the students, that in a place as dry as Ladakhi deserts, things may take much longer to decompose.

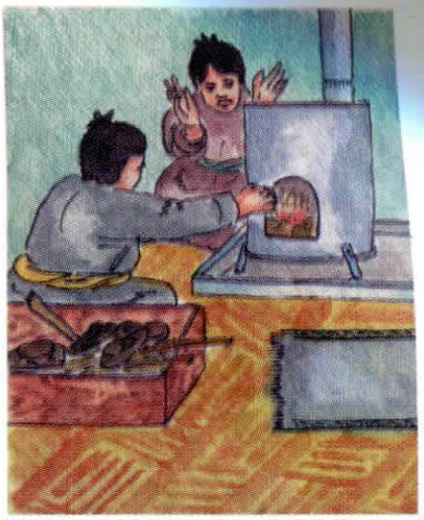
Making a Warm Building: The box on greenhouses discusses how greenhouses help keep buildings warm in winter with the additional benefit of providing fresh vegetables in winter.

Chapter 9
WASTE

Look at the pictures below showing some daily activities in Ladakhi villages. Explain what is happening

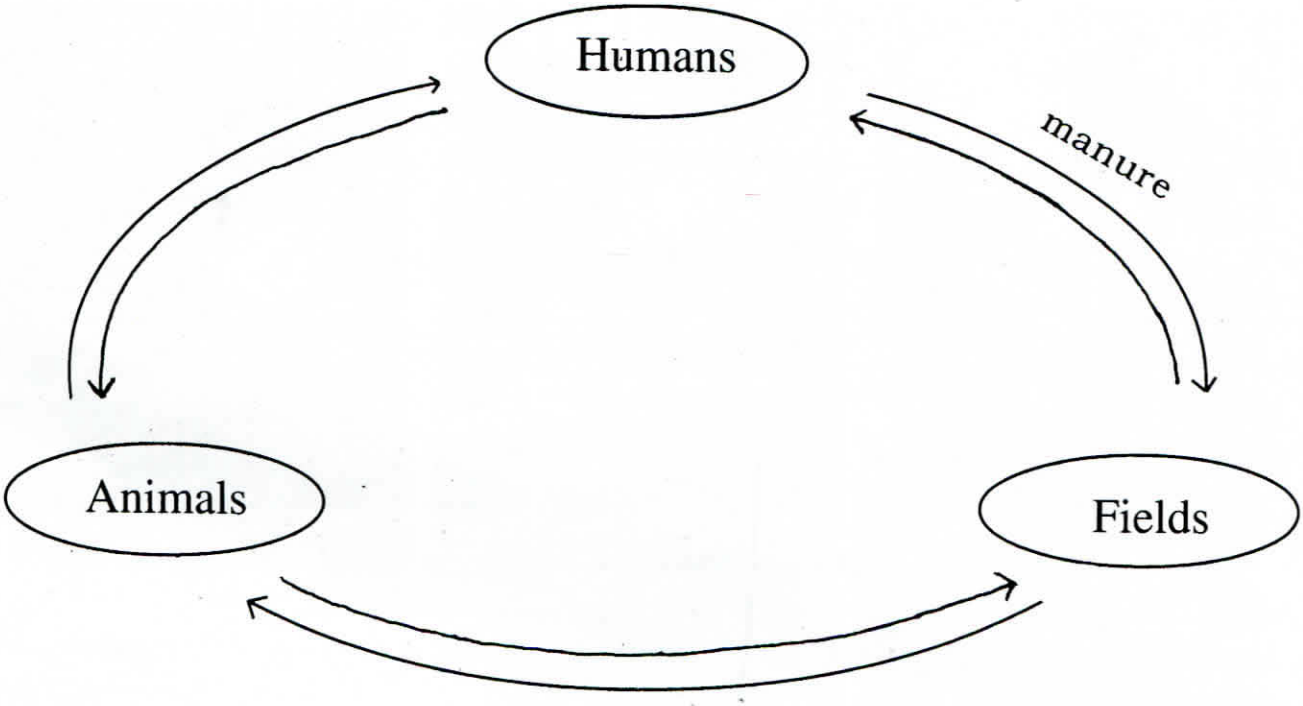






In most Ladakhi homes almost all waste is re-used. For example, vegetable leaves and peelings are fed to the animals. Animal dung is used for manure and fuel. Even human faeces becomes useful manure in Ladakhi toilets. This manure is spread on the fields before sowing. Thus animals, humans and fields are closely connected.

Look at the picture of traditional Ladakhi life. Then look at the diagram above. Arrows with labels show what animals, human beings and fields give to each other. One example is shown for you: humans give their manure



to the fields. Label the other five arrows to show some things that humans get from animals, animals get from fields, and so on.

Therefore, you can see that in a traditional Ladakhi village, almost every kind of waste from one thing becomes useful for something else. Almost nothing has to be thrown away.

What is Waste?

When we have no more use for a thing we throw it away. We call this waste. Have you ever thought of what happens to the things that you throw away? Where do they go?

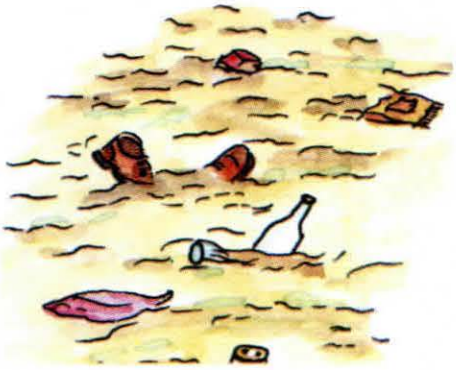
You have seen things like old shoes and plastic bottles and packets lying around your village. Do they look different after many months?

You have also seen leaves, sticks and fruit peelings on the ground. Do you see them after many months? Do they look different?

Things like leaves, sticks and peelings decompose, which means that they completely become part of the soil after some time. The bacteria in the soil break them down and turn them into soil. They then become food for other plants and animals.

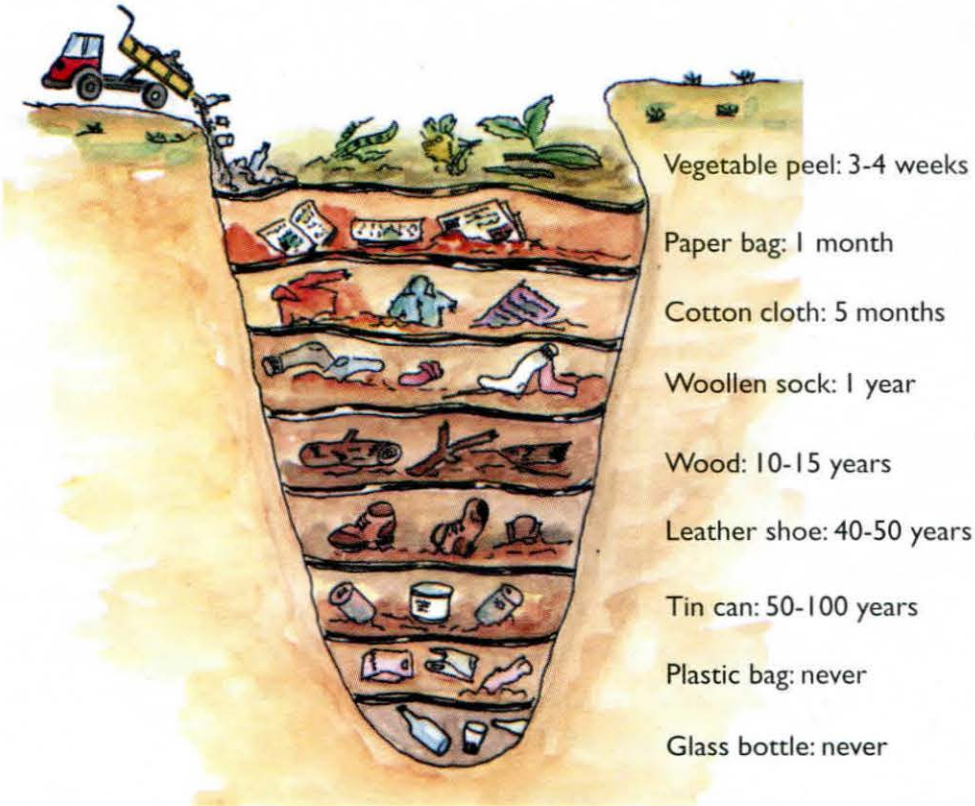
However, things like old shoes, plastic bottles and packets will not decompose even after many months. Thus, some things become part of the soil after a short time. Others take many months or years.

Others just lie on or in the soil and do not become part of it. They cannot be used by plants or animals.



When will these things decompose and become part of the soil?

Nowadays, we buy many things from the market which are made of plastic, glass, tin, rubber, etc. When large quantities of these things are thrown away, they slowly pollute the land and water. Things like used batteries and old medicine poison the land and water. Sometimes we burn wastes such as plastic and rubber. This causes poisonous gases to pollute the air.

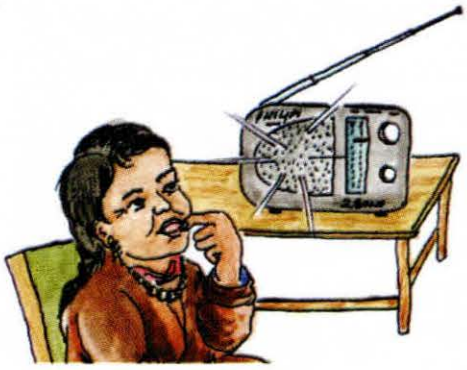


Activity

Take a walk through your village/town. Make a list of the waste that you see lying around. Come back to the class and fill in the following table:

Waste in our village	What it is made of	How long it will take to decompose
Old shoe	*Leather*	*40-50 years*

The Ban on Plastic Carry-bags



Tsering Angmo was shocked as she listened to the evening news over the radio. "A cow in Skara died after it was operated upon today. The cow had stopped eating for a few days and was in pain. The doctor who did the operation said that there were six kilos of plastic in the stomach of the cow."

The next morning Angmo went to a meeting of her village women's group. When she reached the meeting place, she found all her friends talking about the poor cow. All of them had listened to the news the previous evening. Many women spoke out:

"The news was very sad. But why did the cow eat all that plastic?"

"Nowadays many people in Leh throw away their waste food in plastic bags. When the cows try to eat the food inside, they also eat the plastic."

"Why is there so much plastic here nowadays?"

"When we were young, we always took a cloth bag to the market. These days, if you go to three shops, you walk out with three or more plastic carry-bags!"

"That's right. Now these carry-bags are all over the place. They are in our streams and fields, and you see them floating down the Indus. If there is a breeze, you see them flying about!"

"Yes, my fields are getting spoiled by plastic!"

"We'd better do something now. Otherwise our land and water will be full of plastic, and our animals will keep eating it."

"Yes, let's talk to the other people too. We can also talk to the government. Then we could decide what to do."

The year was 1998 and the members of the Women's Alliance of Ladakh, the government, and other people's groups, along with shopkeepers of Leh, supported the ban on the use of plastic carry-bags in Ladakh.

How can we manage our waste?

1) Reuse!

"Don't throw me out. You can use me again by storing water in me! I can be washed in a factory and used again if you give me to a rubbish collector."

"Don't throw me out. You can grow a plant in me!"

Think of other uses for any three things that you would otherwise throw away.

2) Repair!

"Before you throw us out, see if you can repair us and use us again."

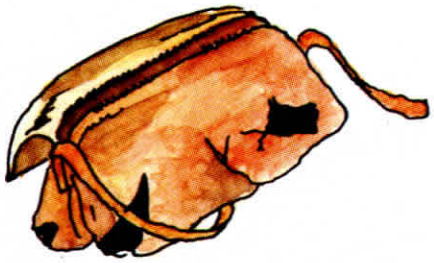
3) Recycle!

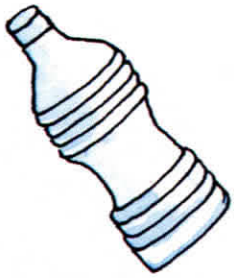
"If you sell us to the plastic and tin collectors, we will be made into new plastic and tin again in a factory!"

4) Reduce!

"Look at our packaging. Some of us come in plastic, some in glass, some in tin and some in paper. Sometimes we are wrapped in many layers! Choose those among us whose packaging is less polluting!"

Look at the pictures below. Which of these things could you reuse, repair or recycle?





EXERCISES

Oral/Written Work

1. Fill in the blanks with the following words:

dung, decompose, waste, animals, faeces, pollute

a. Vegetable leaves and peels are fed to _____

b. Manure for the fields is got from _____ and _____.

c. In traditional Ladakhi life there was hardly any _____.

d. Plastic bags _____ rivers, streams, and fields.

e. Things that become part of the soil are things that _____

2. The word DECOMPOSE is given below. For each letter, think of something that starts with that letter and also decomposes. One example is done for you. [Hint: think of food, articles of use, dead animals and plants.]

D

E

C —— *carrots*

O

M

P

O

S

E

3. What does the word "decompose" mean? How does it happen?

4. Why should we reduce the use of plastic, glass, tin, batteries and food packaging?

5. When were plastic carry-bags banned in Leh? Why was it important to ban them?

Things to Do

Many toys can be made from waste like match-boxes, matchsticks, tins, paper boxes, buttons, thread and cloth. Can you think of some toys? Here is one example that you can make in class:

Parachute

Take a small piece of plastic or cloth.

Cut it so that all four sides are equal to make it a square.

Take four pieces of strings which are equal in length and tie them to the corners of the cloth/plastic as seen in the diagram. To the other end of the strings tie a small stone.

Now your parachute is ready to fly. Roll up the parachute and throw it up into the air. (Make sure you move out of the way!)

The parachute will come down slowly because of its wide surface.

GLOSSARY

all over	གཡ་རྒྱུད་སྣ།
almost	ཉ་ལམ།
amongst	ནང་ནས།
breeze	ལྟུང་བསིལ།
cloth bag	རས་སྒྲིག
completely	གང་པོ། གང་མ། ཚ་ཚང་།
decompose	རུལ་བཅུག་བྱས།
disc	ཀྱིར་ཀྱིར་ལེབ་ལེབ་ཞིག
dry	སྐམ་པོ།
each other	གཅིག་དང་གཅིག་ལ།
frog	སྦལ་བ།
husk	བོ་དང་ནས་ཀྱི་པགས་པ་ཡང་ན་སོ་བ།
knot	མདུད་པ།
leap	མཆོངས་བྱས།
loop	གུག
lying around	མཐའ་མའ་འཕང་སྟེ་ཡོད་བྱས།
manure	ལུད།
mud	ཀ་ལག
peels	ཚོད་མ་དང་ཁ་ཟས་ཀྱི་པགས་པ།
poison	དུག
quantity	གྲངས། འབོངས།
shock	མཆོར་ཁ་ཡོང་བཞིན་ཉ་ལས་ཤེས།
string	སྐུད་པ།
thus	དེ་ཕིའ།
to ban	དགག་བྱ་གཏད་བྱས།
to burn	མེའ་དུག་བྱས།
to cover	བཀབ་བྱས།
to decide	ཐག་བཅད་བྱས།
to degrade	རུལ་བྱས། ཚ་ལུ་བྱད་བྱས།
to float	ལྷིང་བྱས།
to leave it	ཅབ་འབོར་བྱས།
to repair	ཞིག་གསོ་བྱེ་བྱས།
to reuse	ཡང་ལྷབ་སྟེ་བཀོལ་བྱས།
to throw	འཕང་བྱས།
to wrap	བཏུམ་བྱས།
waste	ཁྱིམ་སྣ། ཆག་ཆོག

Chapter 10

MAKING A BUILDING WARM

It was morning assembly time in the village primary school. The Head Teacher made a special announcement. "Today I have some good news. Our primary school will become a middle school starting next year. We will add classes 6 to 8. We plan to make a new building for these classes. I know the primary classrooms are very cold. Therefore, I have asked Mr. Phuntsog, who is an engineer, to talk to us about how to make our new building warmer. He will speak to all of us tomorrow."

The next day Mr. Phuntsog arrived at the school. All the children and teachers had gathered in the school compound to welcome him. He carried small planks of wood with him, which he placed on a large table. "Today, we will make a model of your new school building," he said. The children were very excited. They had never made a model of a building before. They listened with great interest.

> Make a model of your school. You can use a variety of things, depending on the size of the model: mud bricks, sticks, and small pieces of wood, even match boxes.

"We shall see how we can make our buildings warmer in winter," said Mr. Phuntsog. "But first tell me, how do all of you keep your homes warm during winter?" he asked.

Stobdan replied, "My family sits around the *bokhari*. All the other rooms are very cold." Paldan added, "In my house we have a glass room which is warm during the day. But at night it is very cold."

Mr. Phuntsog continued his talk, "That's right! Glass rooms and

bokharis help to keep us warm in winter. But there are problems with both of them. When we use a *bokhari* we use a lot of fuel. The rooms without them remain cold. The glass that is used in glass rooms is very thin. So it loses heat quickly at night."

"Ladakh has cold winters, but there is no need for our buildings to be cold. This is because we are lucky to have a clear sky and bright sun most of the time. We must make our buildings in such a way that we use the heat of the sun to keep the rooms warm."

"But how do we do that?" asked a class 4 student.

Mr. Phuntsog replied, spreading out a plan of the new building on the ground, "That's simple. We must remember a few things when we build. **The building should face south.** This is because in Ladakh in winter, the south walls get most of the sunshine. Therefore, the rooms that we use most often should have large glass windows facing south. Which rooms in the new building do you think should face south?"

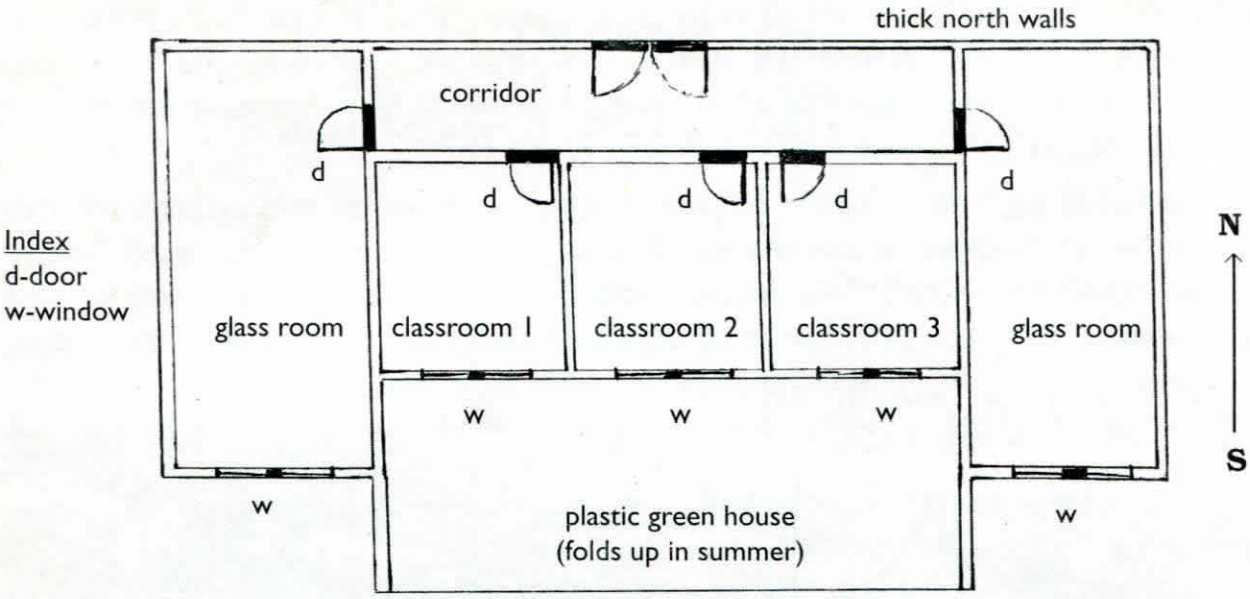
"All the classrooms!" answered Razia.

"And the office and library too," added Angmo.

> Find out which rooms of your school building face south. Are these warmer in winter?

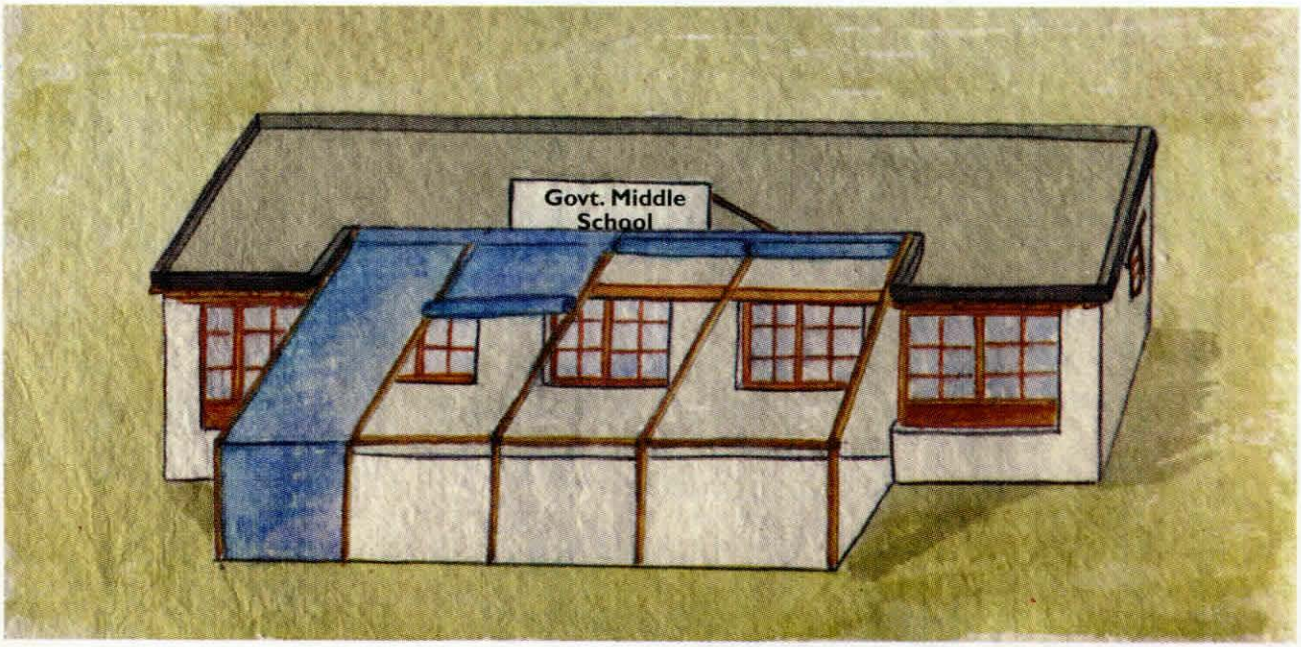
"Excellent!" said Mr. Phuntsog. "The doors of all the rooms should open on the northern side. We can make a long corridor on that side. We can make the building even warmer by **making the walls very thick.** Thick walls keep the heat inside the building. We should also make a thick roof out of mud and wood."

Mr. Phuntsog placed the planks he had brought to make five rooms. With a thick pen he wrote N for north, and S for south. He drew windows on the south wall.



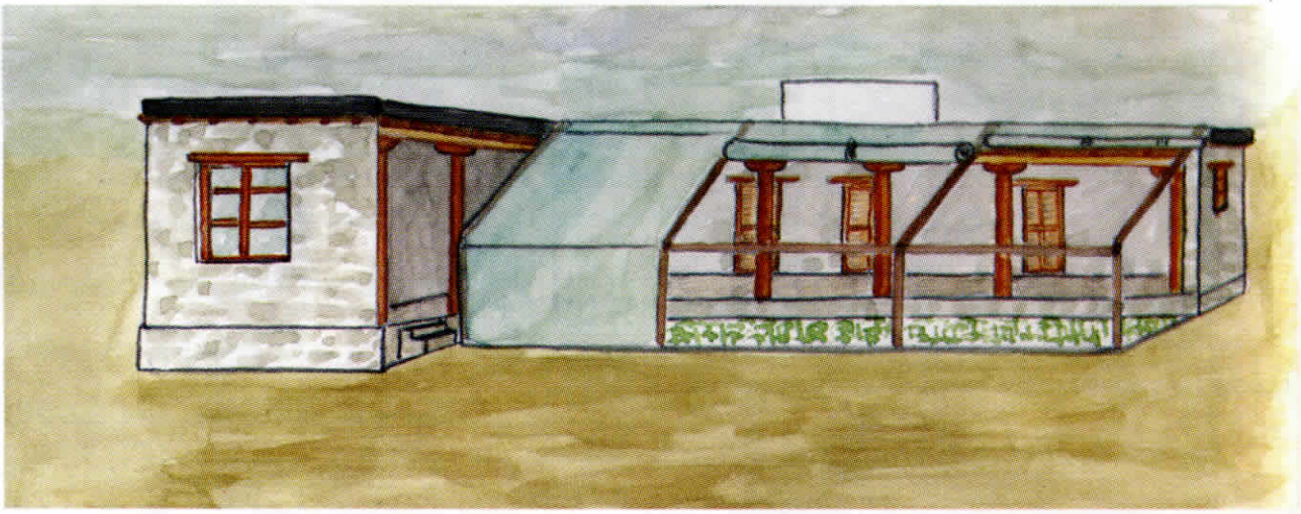
Plan of the New School Building

"Now one more thing to remember. When we feel cold, we wear a few clothes on top of each other. This keeps us warm because the air between these layers is kept warm. Similarly, when we make a wall, we could make a second wall a few inches away from the first one. The space between the two walls is filled with some material like straw, sawdust, waste paper or even used plastic. This is called insulation and keeps the building much warmer. Finally, hot air always rises. So if there are any openings in the roof they should be kept closed when not in use. This will keep the rooms warm."



"Sir, it sounds as though our new building will be very warm, but how can we make our old primary classrooms warmer?" asked little Ali of class 3.

"Good question! The best thing you can do is to make a greenhouse on the south side. In winter, you can put the polythene sheets of the greenhouse down. This will keep your classrooms warm during the day. You can grow vegetables or flowers inside it too. In summer the sheets can be rolled up."



When the talk was over, the Head Teacher thanked Mr. Phuntsog. All the children clapped loudly, as they thought about their new school building that would keep them warm in winter.

EXERCISES

Oral/Written Work

1. Answer the following:

   a. How are houses in Ladakh normally kept warm during the winter?

   b. Why does a glass room lose heat quickly at night?

   c. What things must we remember to build a warmer house?

   d. How can an existing building be made warmer?

   e. Why should all the openings on the roof be closed in winter?

2. Match the following columns to make a complete and true sentence.

Column A	Column B
a, A glass-room is warm during the day	rises.
b. Hot air	but becomes cold at night.
c. Buildings should face south	can be made in the north.
d. Store rooms	chaff, straw and paper, etc.
e. For insulation we can use	to remain warm in winter.

3. Fill in the blanks with the correct word:

repaired, *bukharis*, winter, south side, inside, insulation

a. A greenhouse should be built on the _____ of a house.

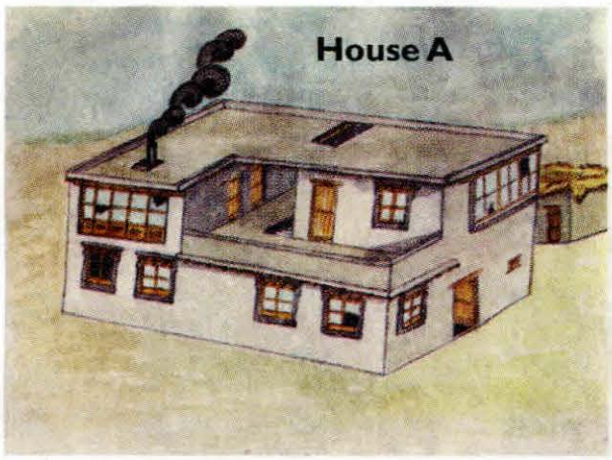
b. Glass rooms and _____ help keep us warm in winter.

c. Two walls with _____ in between is warmer than one wall.

d. The south walls get most of the sunshine in Ladakh in_____.

e. Thick walls keep the heat _____ the building.

f. Broken windows should be _____ before winter begins.



House B

Here are two houses, A and B. Choose from the list given below and mark out what is wrong with A, and what are the good features in B:

Big glass windows on the south

Door is left open

Doors and windows are well closed

Glassroom on the north

Stairwell is covered

Windows are broken and glass is missing

Barn for straw connected on north side

Skylight and stairs open to sky

Space around *bukhari* pipe

Shed for animals' *tangra* in the north side of the building

Greenhouse in winter on the south

House A remains _____ in winter even though it has a *bukhari* (warm/cold).

House B remains _____ in winter even without a *bukhari* (warm/cold).

Discuss how these features affect the temperature of a house in winter.

GLOSSARY

announcement	བྱེད་བསྒྲགས།
barn	ཞུག་རགས་སོགས།
compound	གྲུང་བསྐོར་གྱི་ནང་ཁྲག་གཅིག
corridor	ནང་གི་སྲོལ།
excellent	མཐ་རྒྱལ་བ།
feature	བྱེད་ཆོས།
insulation	ཚོད་སྐག་བྱས།
material	རྫས།
mud bricks	ཀ་ལག་གི་བག་བྱ།
often	ཡང་དང་ཡང་། མང་པོ།
openings	བྱ་གང་།
plank	སྐྲང་ལེབ།
quickly	མགྱོགས་པ།
sawdust	ཤིང་ཐེ།
shed	དང་རྣ།
skylight	ཐོག་སྐར།
space	བར།
stairwell	སྐོལས་སྐོལ། ཁ་ཏོག་གི་ཚ་སའི་སྐོལ།
straw	སོག་མ། ཞུག་མ།
to arrive	སྐྱེབ་བྱས།
to be excited	སྐྱིད་པོ་ཆོར་བྱས།
to be rolled up	སྒྲིལ་བྱས།
to clap loudly	ཤེད་ནང་ལག་རྡབ་གཏང་བྱས།
to gather	འཛོམ་བྱས།
to lose	མེད་མཁན་ཆ་བྱས། ཡལ་བྱས།
to remain	ལུས་ཤས།
to remember	ཡིད་དུ་བྱོ་བྱས།
to spread out	ཐར་བཏིང་བྱས།
to wear	གོན་བྱས།
to welcome	ཞེབས་བསུ་ཞུ་བྱས།
variety	སྣ་ཚོགས།
waste paper	ཤུག་ཚད། ཤུ་གུ་ཐན་མི་ཐོགས་མཁན།

Section 4
Our Universe

Hints for the teacher

Why this section

This section gives some basic knowledge of the sun, moon and stars, and reinforces that our earth is not the centre of the universe. These topics are often very interesting for children. We have all seen these heavenly bodies in the sky, but the reality of how big and how far away they are is amazing. In class 6, children will study day and night and the seasons in much more detail, but these are difficult concepts to visualise. Thus, in class 4, students should get the basic idea of huge round bodies circling around each other and spinning at the same time. If they master these ideas now, they can build on them later into understanding more complex relations.

The chapter is written so as to encourage students (and teachers too!) to observe natural phenomena and relate their own observations to the scientific information that we learn about from books.

Being the final section of class 4 science, this chapter will be taught around the same time as the globe chapter of social studies which is also the final section. Thus the two sections will reinforce each other.

What is your role?

It is useful for children to relate their own observations to the information given about the sun, moon and stars. All the observations suggested in the chapter are easily seen from Ladakh, but of course not during school hours. The teacher and students should take a few minutes in the evening at their own homes to look at the night sky for the things mentioned, and then the next day discuss what they saw in class.

The moon is in its crescent phase just before and after the new moon (which is approximately the beginning of the traditional months of both the Muslim and Buddhist calendars). So, before teaching this unit, find out the date of the next new moon. Three days before it, tell children to look for the crescent moon in the east in the evening time. Each day for about six days, ask them whether they saw the moon. When they have, ask whether they saw the full circle of the moon dimly along with the bright crescent. Chances are good that it will be visible one of the evenings. This helps us understand—to see with our own eyes—that the moon does not ever change its actual shape from being a big ball.

Of course, the moon is often visible during the day also, so ask children to point it out if it is visible during school time.

The two constellations given are easy to find. The Big Dipper is up in the sky at all times for viewers in Ladakh. Look north any evening, and it will be large and clear. Only if there is a high hill blocking the view to the north, then the Big Dipper may be hidden. Again, students cannot observe stars during school time, but you can ask them to look in the evening, and then discuss their observations the next day in class. Ask if they were able to use the pointer stars to find the North Star. Orion is also a very large and clear constellation, but it is visible only in the winter and spring.

Encourage children to tell about what they observed, even if it is not exactly what you asked them to look at. They may ask questions that you do not know the answers to. Do not be afraid of this: they will admire your honesty if you say you do not know the answer and will try to find out. The whole process of observation and wondering about what one sees is an important part of the scientific process. It the foundation of science: people looked at the skies or other phenomena, asked questions to which nobody could give answers, and were thus inspired to find out.

Chapter 11

THE SUN, MOON AND STARS

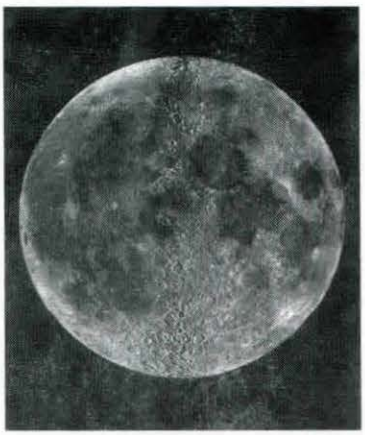
Look at the sky. What do you see in the sky in the daytime? What do you see at night?

Standing here on the earth and looking at the sun, moon, and stars, it would be easy to think that the earth is the centre of the universe. Ancient people thought that the sun, moon and stars were circling around them. But now we know that the earth is circling around the sun.

The Moon

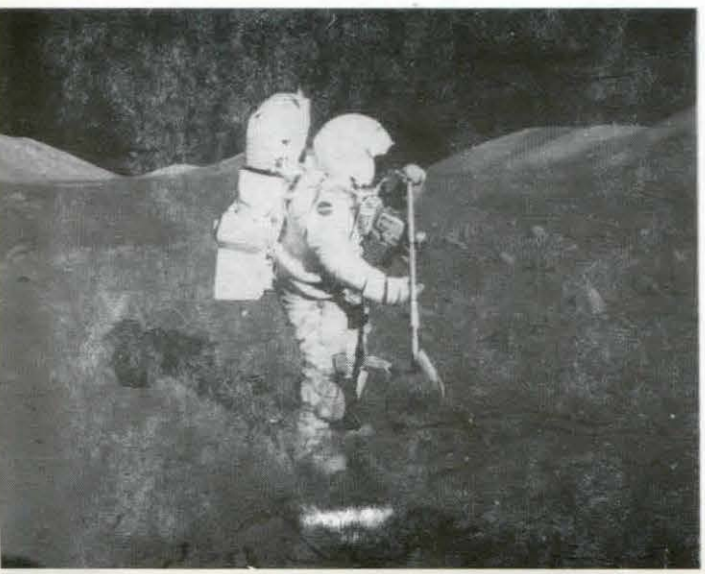
Did you see the moon last night or yesterday?

The moon does not shine by itself. The light we see coming from the moon is just sunlight shining brightly on the moon. The moon is a big ball like the earth. Its shape does not change. The rest of the moon is always there, but it is so dim that we can't see it next to the bright part. This is why it looks as if it has different shapes on different days.



The moon as seen through a telescope

Sometimes you see the crescent moon in the evening. Look carefully. You may be able to see the whole circle of the moon dimly along with the bright crescent.



Between 1969 and 1972, people landed on the moon several times to collect rocks and do scientific research. After 1972, it was decided that the journey was too dangerous and expensive, and since then nobody has gone to the moon again.

The Sun

Have you seen the sun rising and setting? Where does it rise? Where does it set? It looks to us as if it is moving around us. But actually it is not. It is our earth that moves around the sun and spins continuously. Night comes when our location on earth is facing away from the sun. The earth keeps spinning towards the east, so as our location turns towards the sun. Then we see the sun seem to rise from the east. It becomes day-time for us. During the day, while the earth continues to spin, our location starts to turn away from the sun. Then night begins again.

Night in Ladakh

Sunrise in Ladakh

Mid-day in Ladakh

The sun looks like a huge fiery ball. It looks to us to be the same size as the moon, but it is not. It is actually much bigger than the moon. It looks the same size because it is 400 times farther away from us than the moon is. The sun is about 15 crore km away from the earth, while the moon is about 384,400 km away. The sun is our greatest source of energy. It gives us light and heat.

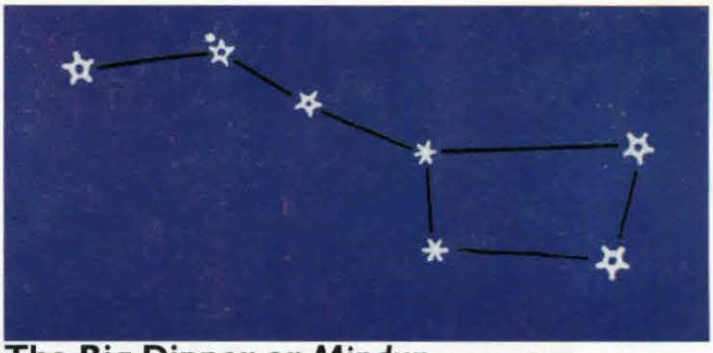
The Stars

Did you know that the sun is actually a star? Each star is a fiery ball like the sun. They look small compared to the sun because they are so much farther away from us than the sun is. Our earth circles around the sun, so the sun is our own star. The other stars are very far away. Some of them are much bigger than our sun. Some are smaller.

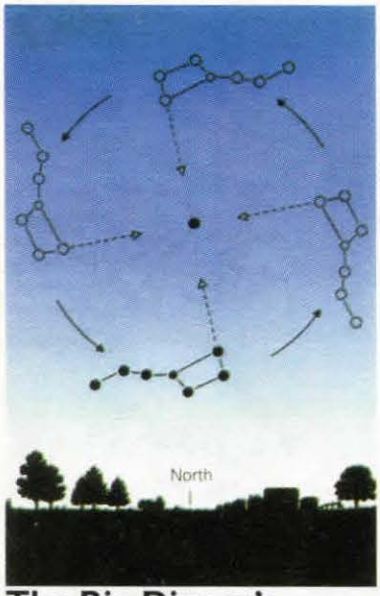
People have always looked up at the night sky, and given names to constellations, groups of stars in the sky that look a bit like pictures. Because of the rotation of the earth, the stars, like the sun and moon, seem to rise in the east and set in the west every night. Also, some stars are visible only in certain seasons.

The North Star is visible to the north every night of the year whenever the sky is clear. It is not the brightest star that we can see.

Circling close around it is a bright constellation called *Mindun* in Ladakhi. In English it has different names like the Great Bear and the Big Dipper (because it looks like a *thumbu*). If you have a high mountain to your north, there may be some nights when you cannot see it.



The Big Dipper or *Mindun*



The Big Dipper's pointer stars always make a straight line to the North Star.

If you can see *Mindun*, you can find the North Star. Two stars of this constellation are the "pointers", and always form a straight line with the North Star. In the past, people travelling on the ocean used the North Star to find north and then the other directions.

Another easy-to-find constellation is called Orion the Hunter in English. It is visible in winter and early spring. In summer, Orion is up in the sky during the day-time, so we cannot see it. When it is visible, the three stars of Orion's belt are very noticeable.

Have you ever observed that the stars look much brighter when you are in a very dark place? Our eyes cannot see so many stars when we are near a bright light or when the moon is full. During the day we cannot see the stars at all because the sun is so bright.

Rural Ladakh is one of the best places in the world to look at the stars, because our air is clean and dry, and we do not have many bright lights. When you are Delhi you can see only a few stars. Why? Because

the air is so dusty. Also, anywhere you go at night, bright lights shine on you and light up the sky, disturbing your view. Because Ladakh's air is so clear, scientists have installed a big telescope at Anle in Changthang in order to see stars and other distant objects clearly, and to learn more about them.

EXERCISES

Oral/Written Work

1. People first landed on the moon in _____.

   (1869 / 1969 / 1996 / 2001)

2. a. How far away from us is the moon?

   b. How far away is the sun?

   c. Taking the answers of questions 2a and 2b above, tell how much farther away from us the sun is than the moon. Find out it by doing division.
   (40 / 140 / 400 / 4000)

3. Does the moon have its own source of light? Where does the light of the moon come from?

4. Why is rural Ladakh a good place to look at stars?

5. Which star is up in the sky every night of the year? Is it the brightest star?

6. Which constellation helps us find the North Star?

True or false? If the sentence is false, rewrite it to make it true.

1. The sun circles around the earth.
2. The moon is a big fiery ball.
3. The constellation Orion is visible in summer.
4. The sun is a star.
5. It is very easy to send people to the moon.
6. Scientists have installed a big telescope in Leh because there are plenty of bright lights around.

GLOSSARY

ancient	སྔོན་མའི།
approximately	ཚོད་ཚོད་ཅིག ཐེག་ཚད་ཅིག
constellation	སྐར་མའི་པོ་ཙི།
crescent	ཟླ་བ་ཆུང་ངན།།
crore	བྱེ་བ།
danger	འཇིགས་རི།
dim	སྒུན་སྒུན། ཐིབ་ཐིབ།
dusty	ཐལ་ཚུལ་ཅན།
expensive	ཀུས་པོ།
fiery	མེ་ཙོགས། མེ་ཅན།
next to	ཉོའ།
research	བརྟགས་དཔྱད།
rural	གས་ཡུལ་གྱི།
shape	དབྱིབས། བཟོ་ལྟ།
since then	དེ་ནས་ཐང་ལ།
spinning	ཁོར་རིན་ཞིག
straight	ཁ་དྲང་།
sun rising & setting	ཉི་མ་ཤར་བྱས་དང་ཏ་སྐས་ཤས།
telescope	སྐར་མ་ལྟ་བྱས་ཀྱི་ཅ་ལག
to circle	གི་རི་རི་འཁོར་བྱས།
to install	བཙུགས་བྱས།
to land	སའི་ཀ་བབས་ཤས།
to travel	གནས་གཅིག་དང་གཅིག་ག་ཆ་བྱས།
towards	ཕྱོགས་ལ།
universe	འཇིག་རྟེན།
view	མཐོང་གསལ། མཐོང་བྱས།

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