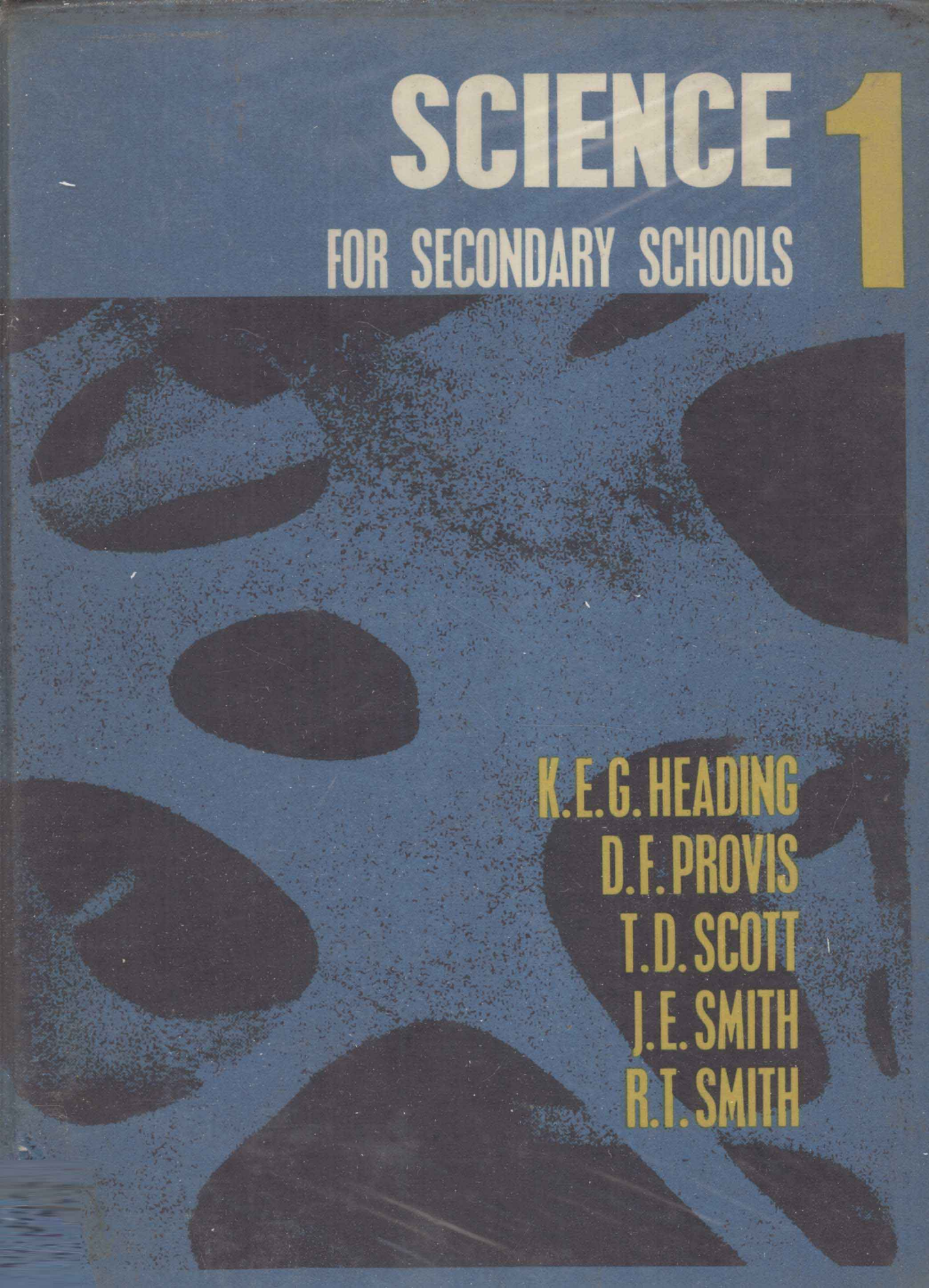
SCIENCE 1

FOR SECONDARY SCHOOLS

K. E. G. HEADING
D. F. PROVIS
T. D. SCOTT
J. E. SMITH
R. T. SMITH



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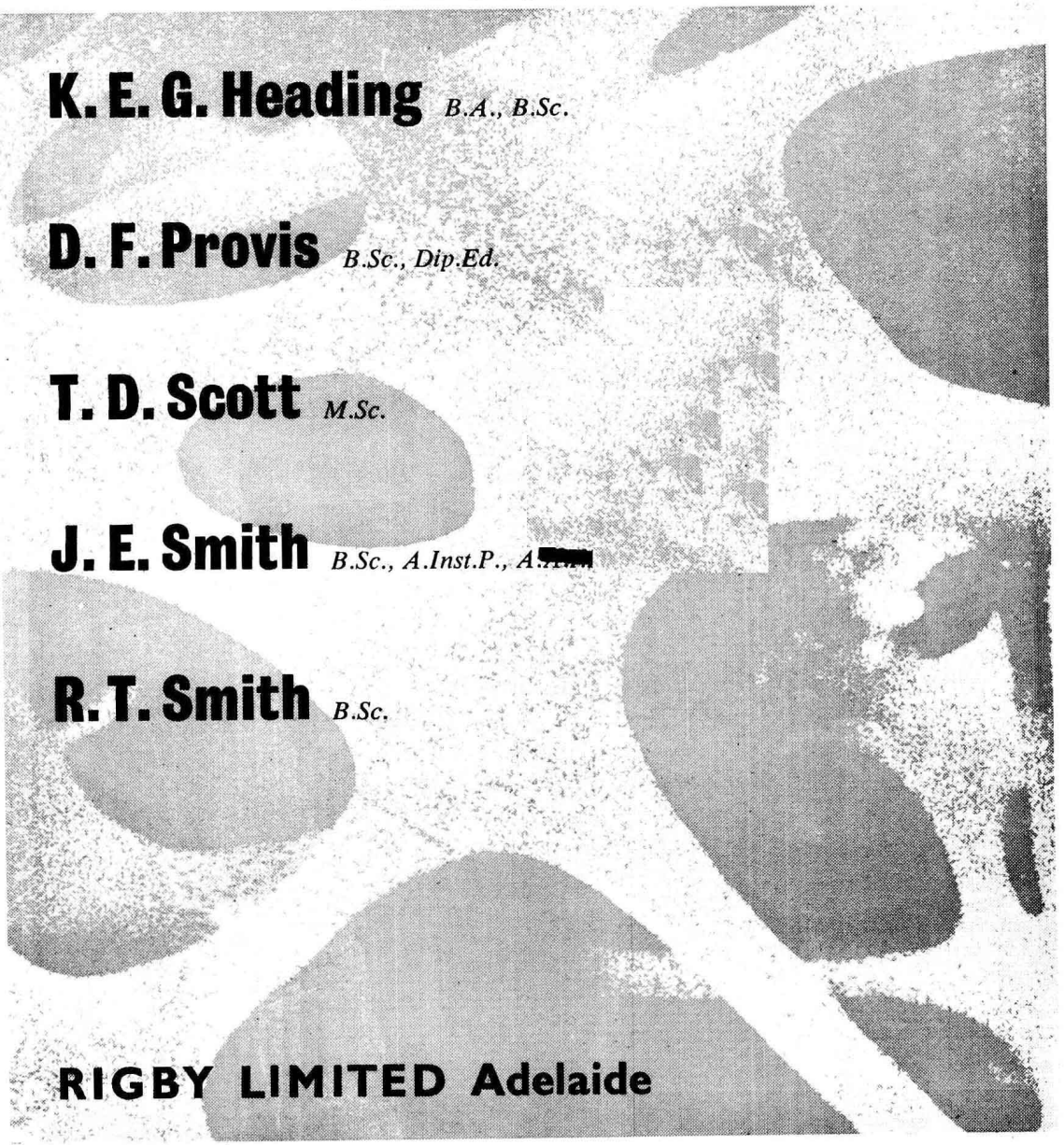

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ABOUT THIS BOOK

This book begins a text for the first three years of secondary school science. It contains sufficient material to take the student into the second year and allow the teacher some choice of topics in the first.

The authors have been faced with the problem which confronts all who attempt to write a text for ungraded students or for students graded through a number of classes—how to make the treatment easy enough for the slower learner while including the kind of material which will challenge and stretch the most able. It is hoped the present book meets the difficulty in as large a measure as possible.

The authors have also given considerable thought to the place of a text in the teaching of science. They feel that a text should not only be easily readable, but should be developed fully enough to be self-explanatory. It should then be a ready source of information and procedure when the student is away from the classroom or the laboratory. The text should seldom be used as a substitute for the teacher. The format is designed to facilitate a clear, direct, and orderly presentation of the text: science itself is direct, uncluttered, and down-to-business.

Three concepts run through the section on biology, giving unity to the treatment—the relation of living organisms to their environment, the idea of progressive complexity of form and function among organisms, and reproduction. Emphasis is placed throughout on first-hand observation and examination.

The treatment in the text is inductive as far as this is possible in an elementary course. That is, conclusions or principles are reached after observations are made, or after consideration of data thrown up by experiment.

Consistent with the new teaching, the "particle" nature of matter has been introduced early in the course. Also equations, at times written in the ionic form, are introduced early. The learning of these should be postponed until the section on equations is studied at a later stage. The equations have been inserted at the appropriate places to facilitate revision when the course is more advanced.

It is recognized that chapter 3, "The Cycle of the Seasons," contains some difficult concepts. It is suggested that the first reading of this chapter should be for general impression and background to the environmental studies in biology. A return should be made to it at a later stage for closer study.

Most chapters contain "Things to Do." These are exercises which students might like to do in their own time. They are not a part of the course itself. At the end of Book 1 there is a section, "Working in the Laboratory." It is hoped that teacher and student will find this useful for reference at the different stages of the course.

—E.N.P.

CONTENTS

1

OUR ENVIRONMENT

You are about to begin a course of secondary school science. You will soon start to realize that science is concerned with knowing something of the world you live in. If you are to enjoy your course and get the most out of it, you must become interested in the things about you. The senses by which you see and hear and smell and feel must be sharpened so that you notice as much as possible. But merely observing things is not enough. Your mind, too, must be alert and inquiring. You should **want to know** about many of the things you notice. You should **want to understand** the changes you see taking place in your world.

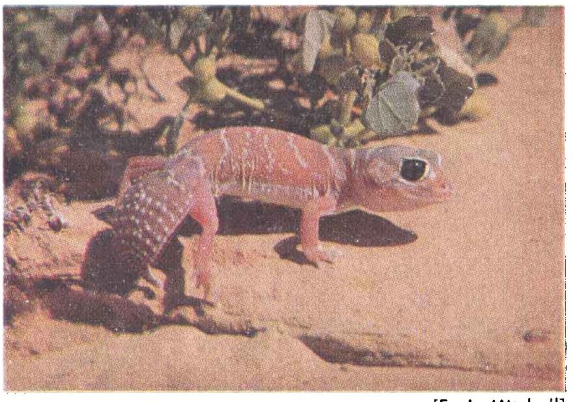
THE WORLD OF THINGS

As a first step in becoming more observant of the world you live in, you could look round your classroom and make a mental note of what is there. It is almost certain you will see some things which you haven't seen before. Observation of a thing should be followed by questions in your mind. What is it doing there? What purpose has it? What connection has it with other things which are also present?

Many of the things in a classroom are very obvious to you. You could not fail to notice the teacher, of course. The desks are obvious, too, and the chalk board, the chalk box and the chalk, dusters, windows, pictures on the wall, the cupboards, and the room heater. You don't have to wonder why these things are in the room. But if you have an inquiring mind you will want to know why all the chalk boards in the school are green or black, and the chalk usually white. You will also try to work out why the main windows in the classrooms are to the left as you sit in the rooms, and why the room heaters are constructed as they are.

Some of the things you will see by deliberately looking around are less obvious. You may not before have noticed the air vents in your room. Why have these been placed where they are? You may not have noticed the construction of the window sashes. Why do they open as they do? There may be pot plants in the room to relieve the bareness. Why are they nearly always placed on the window ledges or near by?

If you are fortunate enough to have a window seat from which you can look at the world outside, you might go on picking out the things which make up this world. There would be a great number of them. Even without your being aware of it, your mind might start sorting the things you recognize into groups or classes. This would be a good start for you, because classifying things into groups is an important part of scientists' work.



[F. J. Mitchell]

THE KNOB-TAILED GECKO *(Nephrurus levis)*

This small lizard, delicate and fragile looking, lives in the dry, harsh environment of inland Australia. How does it survive? The study of plants and animals in relation to their place of living is an important branch of science. Do you know its name? Can you see evidence in this picture of "protective colouring"?

Things are either Non-Living or Living

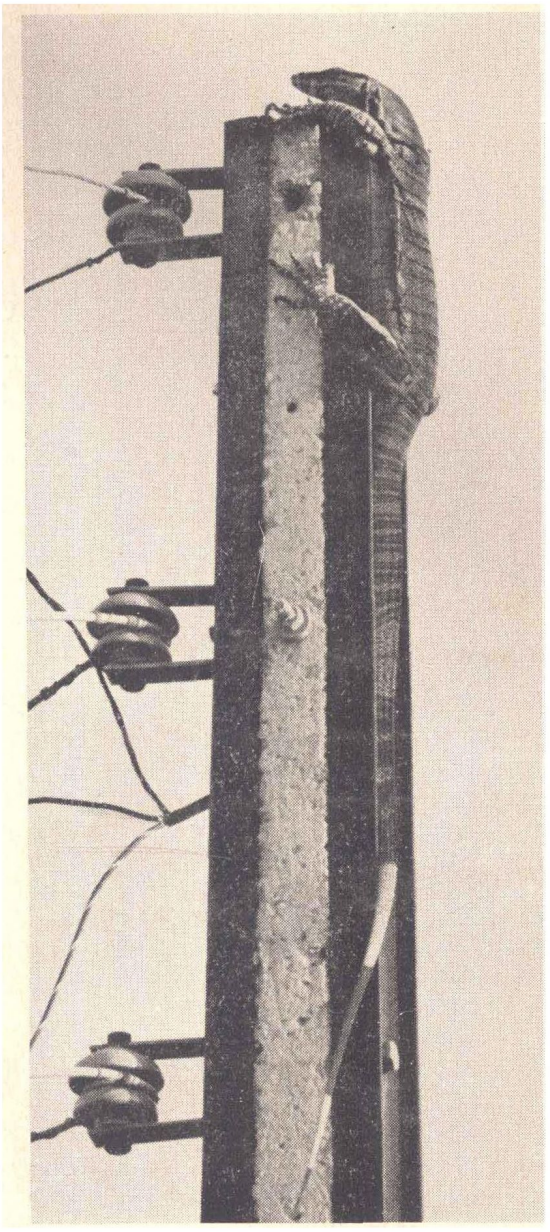
You would soon recognize that all things in the world are either **non-living** (inanimate) or **living** (animate). These are the first groups into which you would sort things. There would be no difficulty in deciding whether the things you observe in the classroom are non-living or living. Your classmates and the teacher are living. The plants growing in pots on the window ledge are living. But in what ways are they different from the other things which you recognize as non-living? This might be a teaser for you.

There are probably other living things in the room which you cannot see because they are hiding in or behind the cupboards or behind the skirting board. What might some of these be? Scientists know, too, that there are many other things living in the room—living in and on your bodies, and in the air. You cannot observe these with the naked eye because they are too small to see!

The world outside your classroom contains a countless number of non-living and living things. Try sorting them out.

Non-Living Things are either Natural or Artificial

As you begin to think about the non-living things in the world you discover that most of them exist in or on the earth's crust, in the water of oceans, lakes, and rivers, and in the atmosphere surrounding the earth. Earth, water, and air are not themselves simple, but each contains a number of other things. The earth's crust contains a great variety of minerals, rocks, and fossils. Seawater contains a number of different substances dissolved in it. The atmosphere is made up of several different gases. All these are non-living things. So are the mountains, the rockface, the ice-floe, the cave, the pearl lying in the oyster shell, the oyster shell itself, and the gum which exudes from the trunk of the wattle tree. So, too, are the planets which revolve around the sun, the sun itself, and the stars. These last are things which exist beyond our world. We could go on listing things indefinitely.



[Advertiser Newspapers Ltd.]

THE NATURAL AND THE ARTIFICIAL

The goanna was surprised in a suburban back-yard. Most people would find this picture interesting because it is unusual. But a boy or girl with an inquiring mind would want to know why the goanna behaved as it did, what the pole and attachments are made of, and why they are constructed as they are.

All the things we have mentioned above are **natural.** That is, they are part of Nature: they are **not created by man.** Science is concerned with knowing about all such things.

CANNIWAULKANINNA BORE, BIRDSVILLE TRACK, S.A.

Men wishing to establish control over a dry outback area must first obtain a supply of water. What is bore water? How is it obtained? Why is this particular water boiling hot?

[S.A. Govt. Tourist Bureau]

There is also in the world an enormous number of non-living things which are **artificial.** These have been **made by man.** From his earliest times man has created objects for himself which have been useful or pleasing. Among these have been stone and metal instruments, chariots, bows and arrows, pottery, ornaments, boats, houses, tombs.

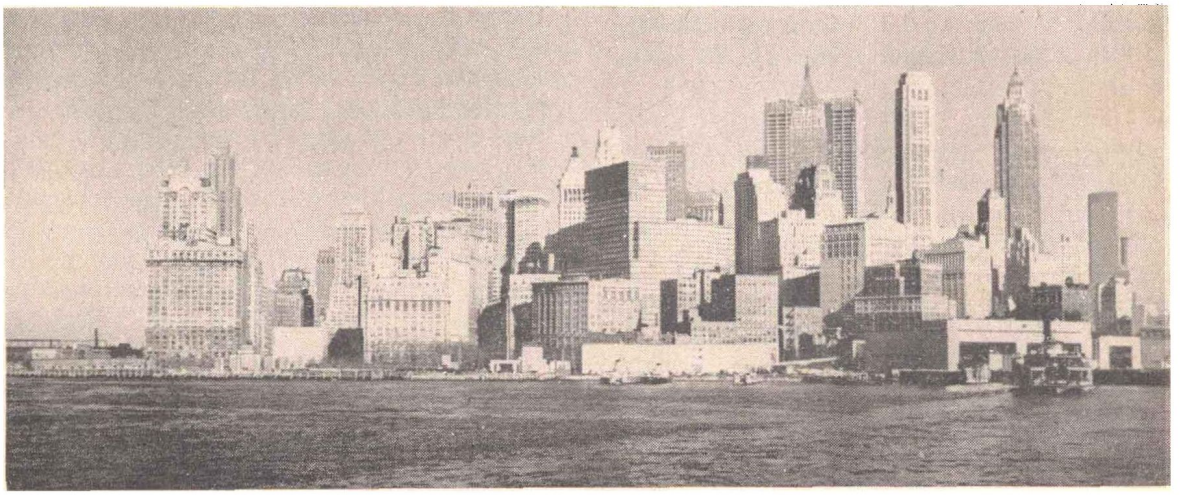
Today the number of man-made things is beyond reckoning, and it is increasing day by day. Roads, suspension bridges, skyscrapers, refrigerators, aeroplanes, submarines, engines, transistors, nylon, plastic buckets, glassware, stainless steel, paint, fertilizers, and drugs are but a few. There seems no end to man's inventiveness in creating new things to make his life easier, healthier, and more enjoyable. Perhaps you might find it interesting to make a list of the more exciting artificial things which have appeared during your own lifetime.

Man could not create this great range of artificial things if scientists did not supply him with exact knowledge of how various materials can be used. For this reason man-made things and the way they are used are very important in your study of science.

A CITY MADE POSSIBLE BY SCIENCE

Millions of people live and work in the sky-scraper block on Manhattan Island, New York. This is a man-made environment. It was created by architects, engineers and builders working together and using knowledge provided by science. In the building of such a city, many kinds of power machines have been used. The forces produced have been carefully controlled. A great range of scientific instruments have been used. The number of man-made things used in the structures and in the fittings and furnishings would be too large to count.

[G. E. K. Williams]



Living Things are either Plants or Animals

We have seen that non-living things can be classified into the sub-groups, natural and artificial. You have probably already classified living things into **plants** and **animals.** Each of these groups is very large. Because they are living, scientists refer to them as **kingdoms.** Members of the animal kingdom range in size and shape from the merest specks of living jelly to giant eels and pythons, the lumbering elephant, and the ocean-going whale, the largest animal of all. Members of the plant kingdom vary in size and shape from very minute forms which cannot be seen unless magnified hundreds of times, to the gigantic redwood trees of North America which grow to heights of 300 feet or more.

Plants and animals are alike in that they are living. Living things have certain characteristics. They respond to particular things in the world about them. A moth responds to a bright light, a blowfly to odour. The roots of a plant respond to water. (How do you know?) The green leaves of a plant respond to light. (Have you observed this?) Many animals are sensitive to touch, a number of plants, too. (How does the sundew trap insects? What enables the sweet-pea to climb?) Plants and animals are also alike in that they pass through a **cycle of life.** The young individual feeds and grows and passes through adulthood to old age and finally dies. But before plants and animals die they produce new individuals like themselves and so hand on life. The production of new individuals of the same kind is called **reproduction. Reproduction is characteristic of all living things.**

What, then, are the **differences between plants and animals?** Your answer would probably be that animals move about while plants are fixed by their roots in the soil. But you will learn that some plants move about whereas some animals do not. There are important differences between plants and animals which will be brought out as your course proceeds. Can you think of some now?

As you would expect, science is also concerned with knowing about plants and animals.

THE WORLD OF CHANGE

Most of the things in the world are undergoing change. Sometimes the change is slow. The surface of the hard granite rock slowly cracks and frets away, and forms soil. Why? The limestone cliffs along the River Murray were at one time on the floor of an ocean. How do we know? And what has happened over the years? The gullies and ravines and gorges which we find dissecting mountain country were not always there. How have they been formed?

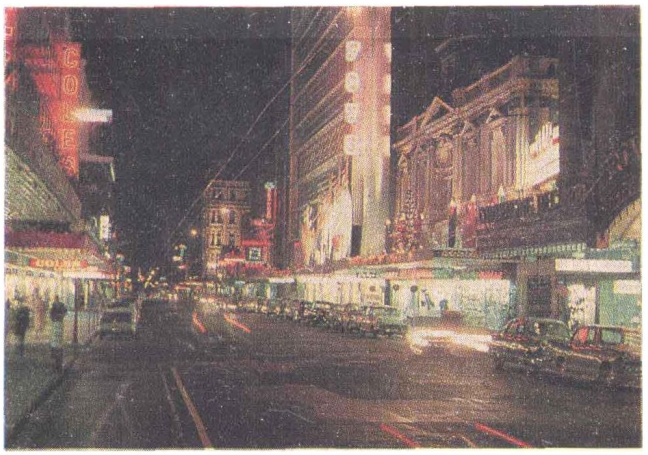
Most often change is rapid enough to be noticeable. Iron left exposed to air soon rusts. Water left in a vessel in the hot sun soon disappears. Milk, even if left in a refrigerator, soon thickens, and sours, and begins to smell bad. A plant, deprived entirely of water, soon dies. A snake may slough its skin in early summer, or a gum tree may shed its bark. How are all these changes explained?

At times, however, change may be very rapid. If you put a match to a little gunpowder on an open tray, it will burn rapidly enough, but if you ignite it in a closed space it will explode violently. Do not try it!

If you reflect a little you will see that most things you know are produced by change. In the production of artificial things man causes the changes to take place.

In many cases changes are seen as **happenings** or **events.** The growing of the moon to fullness and the waning from fullness in a monthly cycle are changes which we call events. There is an explanation for them. The coming and going of the seasons are events for which there are causes to be looked for. A strong gust of wind is something which "happens," but it has a cause. A gale whistles through the eaves of a house or "sings" on the telephone wires. How or why? The eagle about to alight, lowers his tail feathers and sets his wings near the vertical. Why? A storm happens, lightning happens, an earthquake happens, and so does the change in the weather. There is an explanation (cause) for all these changes.

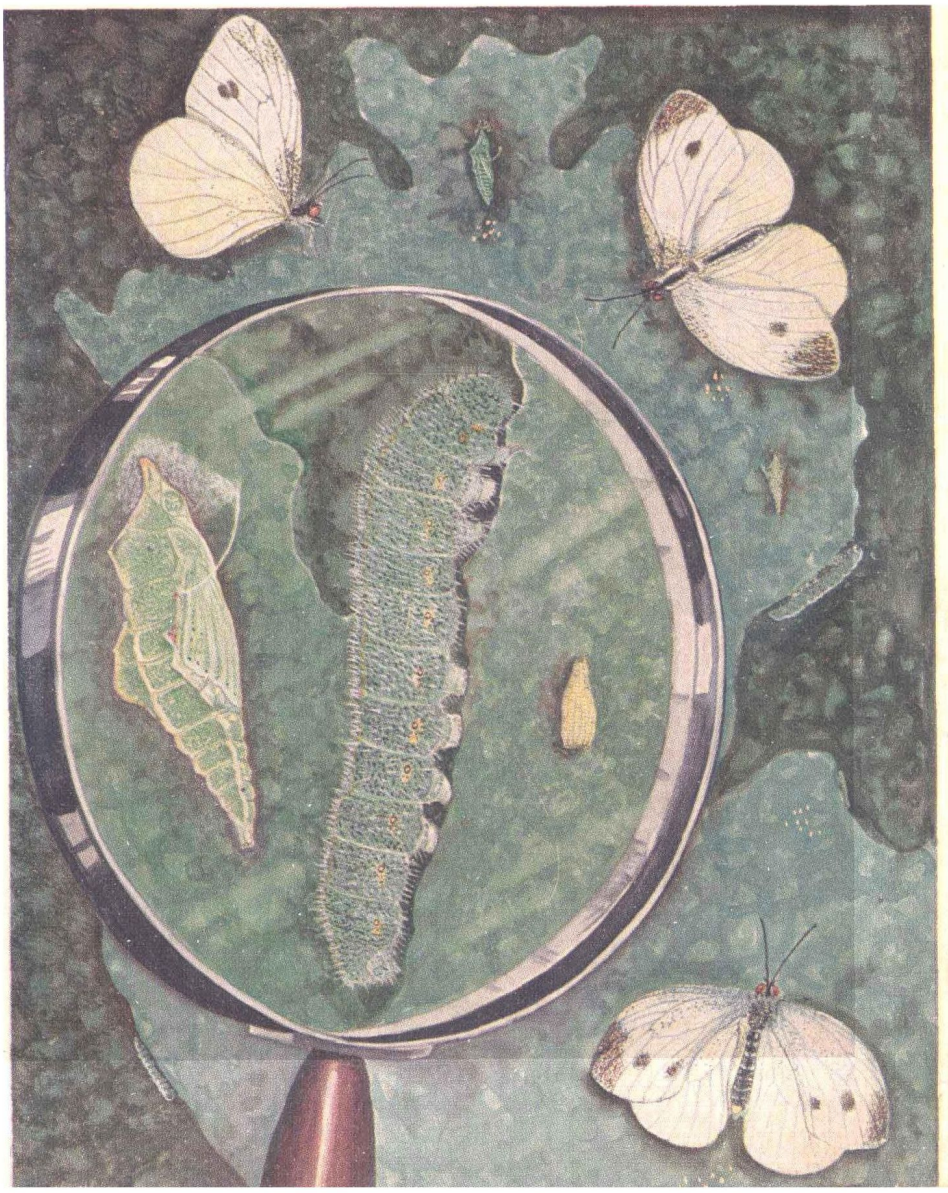
Changes are taking place about you each day. If you are to be a good student of science you will notice them and seek to understand them.



NIGHT TURNED INTO DAY

This is a photo of a portion of Rundle Street, Adelaide, taken at night. There is much in the picture to interest the inquiring mind. How is the light produced? How the colours? How the reflections? How the picture itself? Note again, a man-made environment: scientific discoveries and man's inventiveness have made this kind of environment possible.

[K. P. Phillips]



LIFE CYCLE OF THE CABBAGE WHITE BUTTERFLY (*Pieris rapae*)

Scientists study the life cycles of insects for a number of reasons. Can you think of some?

ENVIRONMENT

A living thing, whether large or small, is called an **organism.** Every organism has an **environment.** The word "environment" is an important one for you to understand. The environment of an organism is all the things which surround it and affect its life in any way. Could non-living things be part of an organism's environment? Could other living things? Could changes, and happenings, and events? Think a little before you answer the next question. Could man-made, that is, artificial things be part of the environment of plants or animals?

The place or locality where a plant or animal lives is called its **habitat.** The sea-shore, sand dunes, rocky slopes, the river bank are examples of different habitats. A habitat is a locality or region rather than an enviroment.

The Environment of Plants and Animals

You will learn in chapters 8 and 15 that there are many kinds of plants, and that they live in very different environments. It would be a valuable exercise for you to select a plant you know fairly well and work out in some detail what makes up its environment. Would the soil be important? Or the air? Or sunlight? Or moisture? Or the changing seasons of the year? Mushrooms are sometimes grown commercially in disused railway tunnels. What are the important features of their environment? We grow some plants in glass houses, others in shade houses. Why?

You will also learn (in chapters 9 and 19) that there are a great many different kinds of animals in the world and that their environments vary a great deal. Try to picture for yourself the environments of such animals as an earthworm, a cockroach, a body flea, a goanna, and pigeons which live in the big buildings of cities. What are the important things making up their environments?

Environments are Subject to Change

Think of the environment of a fish living in the sea. Does it change much? Before you answer the question you will want to know whether the fish moves from place to place or lives in a restricted habitat as some fish do. The oyster and the coral polyp live their lives in one spot. Do their environments change much from day to day or from year to year?

The mosses which in the damp winter form green mats on tiled roofs, or on stone fences, dry up and seem to disappear in the hot summer. In what important ways is the environment of these living things different from that of, say, the oyster?

A TORNADO APPROACHING DALLAS, TEXAS, U.S.A.

Science seeks to explain the happenings of nature. Note the funnel-shaped cloud and the great turbulence at the bottom of the funnel. This tornado caused destruction along a path 21 miles wide. In a storm which lasted 45 minutes, twelve people were killed, hundreds were rendered homeless and damage amounting to millions of dollars was caused.

[U.S. Information Service]

As you consider in turn the plants and animals you know well you will find that:

1 the environments of some living things do not change much from day to day, season to season, or from year to year.

Can you think of any ways in which the environment of a deep-sea fish differs from that of one living near a coral reef?

2 the environments of most living things change from day to day, from season to season, and from year to year.

You will be helped to see why this is so if you think of light and darkness, heat and cold, moisture and dryness (or rain and drought).

Living Things Respond to Changes in Environment

It is one of the characteristics of living things that they respond to their environment in a number of ways. Plants, for instance, respond to seasonal changes in environment. Deciduous trees (those which lose their leaves in winter) respond to the warmer and lighter conditions of spring. They are "awakened" from their dormant stage. First, roots move out into the warm soil, and then in a short time, buds fill, and burst, and expand into leafy shoots. Birds, too, respond to the seasonal change of spring and early summer. When the warmer weather and longer days come and food is abundant, they nest and raise their young and behave differently. Many of you would have heard the nesting blackbirds fill the morning and evening air with joyous song, which ceases when the nesting season is over.

Living things also respond to occasional changes in the environment. After the first shower of rain, garden snails come forth from their hideouts. On hot summer nights before a change comes, "flying ants" swarm round street lamps or enter the open doors of your home. On dry, hot nights the mole cricket lies silent in its hole in the earth. If the environment is changed suddenly by moisture from a shower of rain or from your sprinkler, the chirring commences and soon rises to a crescendo of sound.

Living Things Adapt Themselves to Environment

The history of life in the world shows that a large number of living things have become extinct. It is thought that many of these were not able to adjust themselves sufficiently to their environment as it changed slowly over long periods of time. It is also thought that those which have survived and are today

THE ENERGY OF A STORM

The kinetic energy of hurricanes and tornadoes is enormous. The picture shows a part of a suburb of Kansas City, Missouri, U.S.A., after a tornado had struck. On one side of a street, the homes were left standing, but on the other side, most buildings, including a shopping centre and high school, were battered to rubble.

[U.S. Information Service]

especially fitted to live in their environments have made suitable adjustments over thousands, even millions, of years. These are said to be **adapted to their environment.**

[F. J. Mitchell]

THE AUSTRALIAN GROUND GOANNA

It is seen here in its natural environment. Over a very long period of time, the goanna has made adjustments to its way of life which have enabled it to live successfully in its environment. Turn to page 2, where a goanna of a different species is seen out of its natural environment!

[F. J. Mitchell]

AN ENVIRONMENT WITH LITTLE CHANGE

The harlequin fish lives in a very restricted environment. It is a cave dweller, and may live all its life in one cave. This picture was taken by flash-light. Note the different forms of algae, some bearing float bladders.

Sometimes the adaptation is seen in the living thing itself. It may be in the shape or structure, or in what the organism does. The cactus tribe of plants can live in the most arid regions. Why can they? Some plants have a climbing habit; these often have large leaves. What are the advantages of their habit and form? Birds have feet and beaks adapted to their modes of living or feeding (see page 186). The "yabbie" lives in the water during its breeding season. As the water dries up, it burrows deep into the mud where it may live for years protected from the dry environment above. When water returns the yabbie emerges from its hole to feed and breed again.

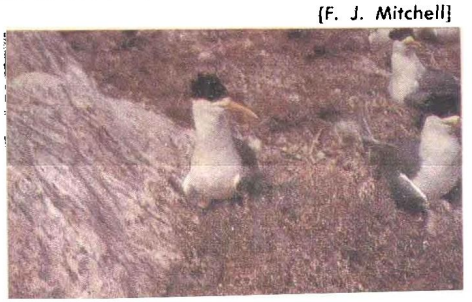
At other times the adaptation occurs in the life cycle. In Central Australia rain may fall only once in several years. When it does it soon dries up and the ground remains moist only for a few weeks. Yet after each rain the desert is a wonderland of plants and flowers! The plants which survive in this kind of environment are **ephemerals,** that is, plants whose life cycles are so short that they germinate, grow, flower, and produce seeds in a few weeks. For many years people living in the dry north of Australia were puzzled by the sudden appearance of a fresh-water shrimp in the water holes which filled after rain, and dried out again in a few days. The mystery was solved when scientists discovered that the shrimp had an extremely short life cycle, and produced eggs which were particularly resistant to heat and dryness.

If you look closely at the world of living things you will find a ceaseless struggle going on for survival. Plants compete with one another for "living space." Animals live on plants and on one another. Some remarkable adaptations are seen which give some animals an advantage in their hunting and allow others to avoid or escape their enemies. The praying mantis, one of the most savage of the predatory insects, is coloured like the plants it lives among, and is stick-like in form. As it stands motionless in wait for its prey, it blends perfectly with its surroundings, and only very sharp eyes can detect it. You should look for examples of **protective colouring, protective form,** and **protective behaviour,** for these are adaptations to the environment.

PROTECTIVE COLOURING IN THE CRESTED TERN

Crested terns nesting on South Neptune Island (S.A.). In the picture are an egg and a well-developed chick. Can you find them? The colouring of the chick blends in very well with the environment.

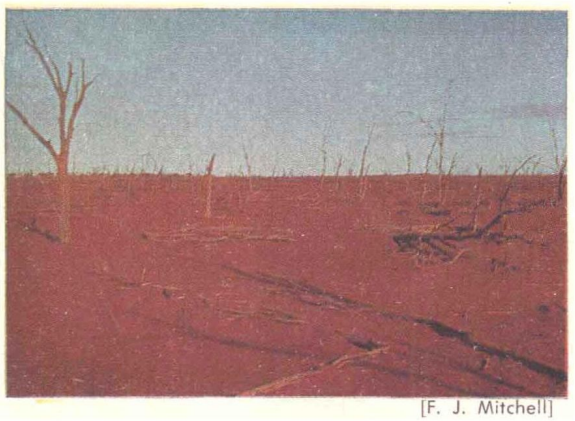
[F. J. Mitchell]



Environment of Man

Through the ages man has struggled with his environment in order to subsist. Certain needs had to be met or he would die. He needed food and water, and protection from heat or cold. These were common features of all environments. Outside the common features, environments differed a great deal. Because the Eskimo could think, and because he could create, he has learnt to live in frozen arctic wastes. He keeps himself warm by dressing in fur-lined clothes made from the skins of bears and seals. He makes his igloo from blocks of ice. The walls of ice prevent the escape of heat. His family sleeps together in the igloo, getting warmth from one another. He has also learnt to live on a diet which is largely fat. What else makes up the Eskimo's environment?

In many ways man has learnt to change his environment to suit his needs. The opal diggers at Andamooka make dug-outs in the ground to live in. The natives of New Guinea living in swampy areas build their houses on stilts. The squatter in the Australian outback builds his station home with wide verandas, sinks bores to get a water supply, and plants trees around the homestead. The suburban dweller selects a site which pleases him, builds a home which he thinks will be comfortable, and surrounds it with gardens and spacious lawns. The person who chooses to live in a flat on the 57th floor of a skyscraper sees to it that the flat has every "mod. con." The modern conveniences are likely to include radio, TV, and air-conditioning. The civic authorities provide parklands, public gardens, playing fields, swimming pools, theatres, art galleries, museums. All of these could be part of the city dweller's environment. Notice that the more "civilized" our environment becomes, the greater the number of artificial (man-made) things it contains. To be convinced of this you need only look at what is in your sitting room at home. By changing his environment to suit his needs, man extends control over it.



[F. J. Mitchell]

THE DESTRUCTION OF AN ENVIRONMENT

Grasses, saltbush, mulga and other trees once grew in this area north of the Flinders Ranges, and provided a natural environment for kangaroos, emus, and brush turkeys. Men entered the environment with grazing animals. Can you suggest some possible causes of the desolation?

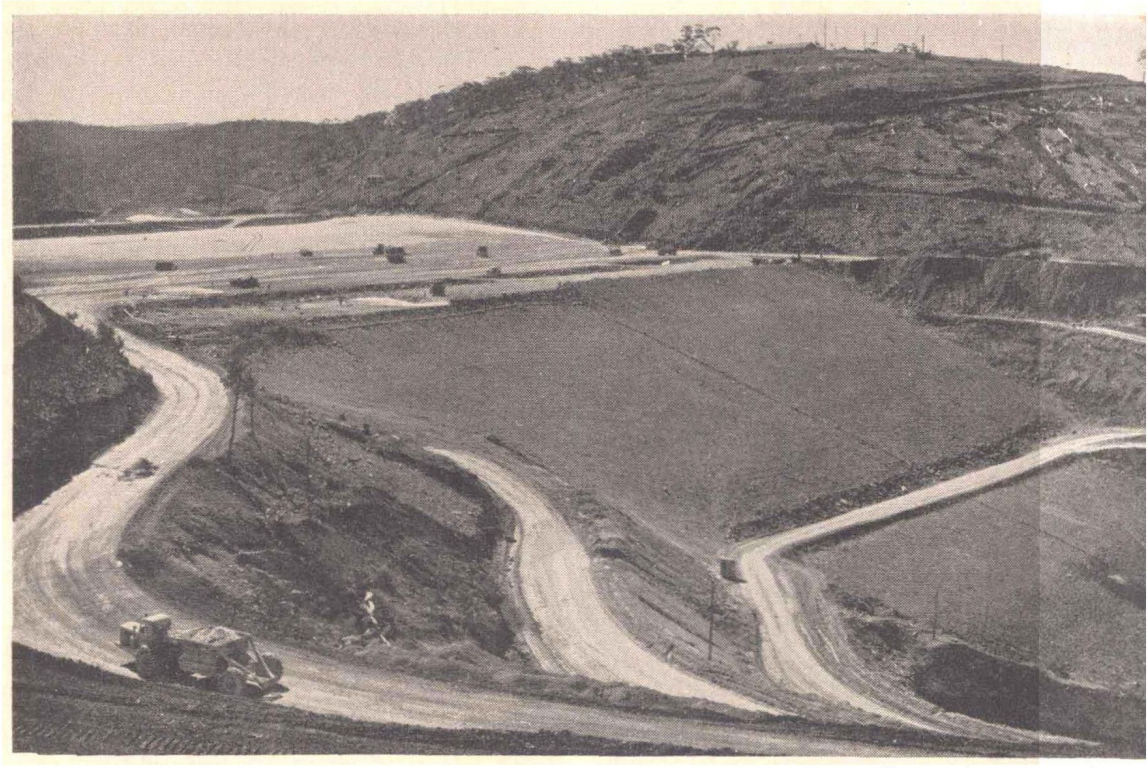
Science is interested in preventing and repairing this kind of damage.

MAN INVADING THE DOMAIN OF THE FUR SEAL

The picture at left shows fur seals in their natural environment (off South Neptune Island). The picture below shows a geo-surveyor looking for rock specimens in the same area. For him, it is an artificial environment.

How is each equipped for living underwater?

[F. J. Mitchell]



[Snowy Mountains Authority

MAN MODIFIES HIS ENVIRONMENT

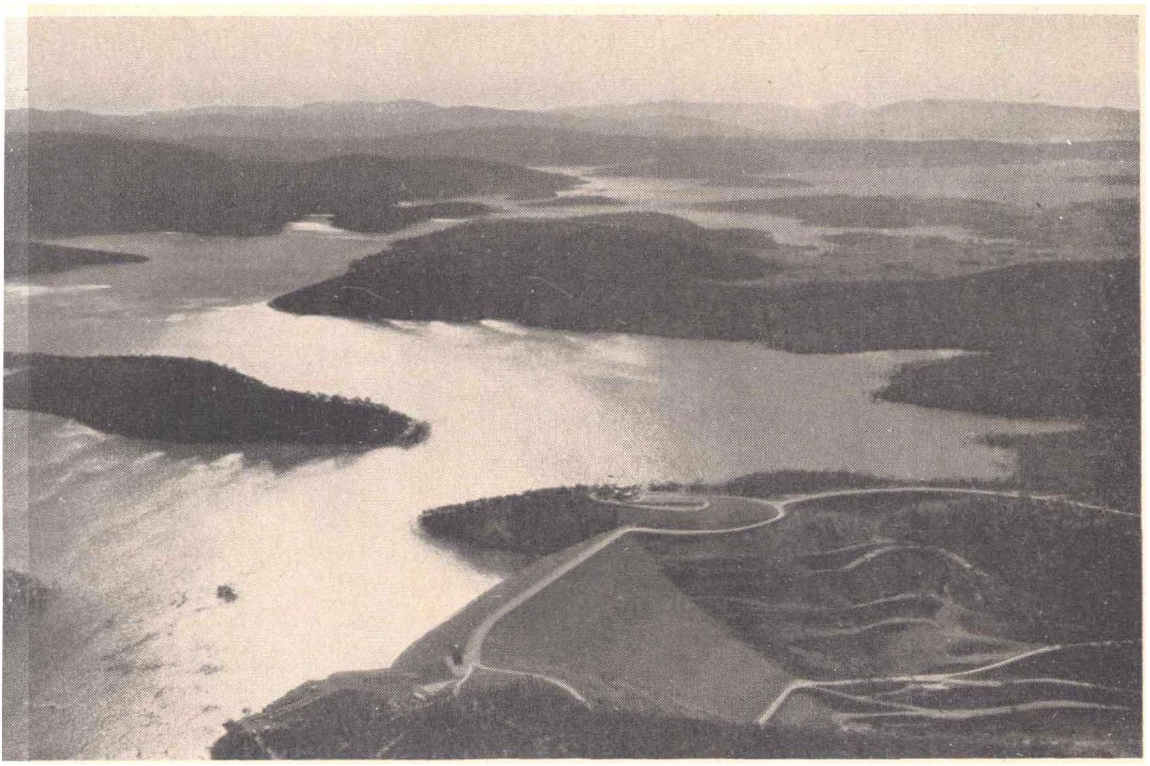
The pictures on this and the opposite page show part of the huge Snowy Mountains Water Conservation Scheme.

On this page, the Eucumbene Dam is shown being constructed on the Eucumbene River. The dam was built of earth and rock. When finished it was ½ mile thick at the base and 381 ft. high. Great machines tore rock and earth from mountain sides and brought it here. The invention of machines has enabled man to produce and control vast forces. He uses these forces to do his work.

It would be a mistake, however, to think that man's environment is limited to the things immediately around him. Ships and aeroplanes and motor cars are taking people thousands of miles in a short time. Radio and television are bringing the remotest parts of the world close to him. Nor is his environment limited to what is in this world and what goes on in this world. Because he can think, and feel, and wonder he is influenced by sight of the heavens, the moon, the sun, and the blaze of stars at night. Through space exploration he is now beginning to control an environment beyond the earth. The cosmonauts who have orbited the earth lived for a time in a strange and exciting new environment. The cosmonaut who for the first time left his space capsule, and, tethered by a rope of nylon, floated in orbit alongside the capsule, experienced a still newer environment. How strange and eerie it must have been! And scientists are hopeful that in the not-too-distant future men will step out of space capsules on to the moon, and for a short time live in an exciting, new environment which is natural in the sense that man has not created it, but artificial in the sense that man has had to **discover, think,** and **invent** in order to experience it.

THE MEANING OF SCIENCE

Science comes from a Latin word "scientia" meaning **knowledge.** Though it is true that science means knowledge, this is only part of its meaning. Science is also a **method of discovering** knowledge. But what kind of knowledge? And what kind of method?



[Snowy Mountains Authority]

THE CREATION OF A HUGE LAKE

The lake formed by the Eucumbene Dam holds 3,890,000 acre feet of water when full. This water is used to generate electricity (see chapter 6) and is released into the River Murray. Hundreds of miles downstream, it is used for irrigation and other purposes by gardeners, orchardists, and farmers.

Science is Knowledge of a Particular Kind

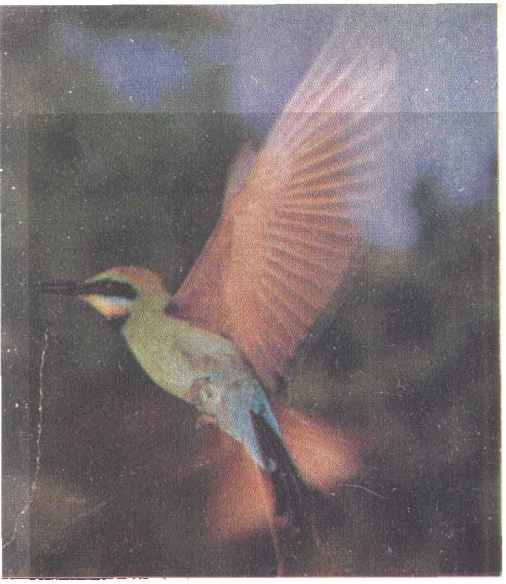
Scientific knowledge is knowledge of things, their structure, and composition, and their behaviour as they undergo change. We have learnt that things may be non-living (natural and artificial) and they may be living (plants or animals). Scientific knowledge is also knowledge of the cause of the changes which take place in and beyond the world.

Science is a Method of Discovering Knowledge

Some of the knowledge which we call scientific is discovered by accident: we make a chance observation or we "stumble upon" a discovery. On the other hand a great deal of scientific knowledge is discovered by deliberate and planned searching. Let us take examples.

Example of Discovery by Accident Suppose you are a bird-lover. Your rambles through the bushland have resulted in your knowing a great deal about the birds of the area and their nesting habits. One day as you walk along a creek bed you are astonished to see a rainbow bird (you may know it as the bee-eater) emerge from a small hole in the bank only a yard or two away. You investigate and find that a few inches inside the hole there is a nest with eggs in it. **You have "stumbled upon" an interesting discovery.** You would not have believed that the beautiful tree-dwelling rainbow bird which you had so often seen sweeping gracefully down on insects could have built its nest in a hole in the ground!

To "stumble upon" discoveries you need to keep your senses alert.



THE BEE-EATER OR RAINBOW BIRD *(Merops ornatus)*

The bird is checking flight to catch an insect before returning to its tree-branch.

Men studied closely the flight of birds before they themselves began to "fly" in machines. Modern flight has enabled man to enter an environment which for millions of years belonged only to bats, birds and insects (creatures with wings).

[Michael K. Morcombe]

Example of Discovery by Deliberate Search

But suppose instead that one day in early summer you are watching the rainbow birds flying from the high branches of trees down over the creek and back again. They are feeding on insects. Then you notice that one bird alights on the bank and stays there. After a while it returns to a tree. Soon afterwards you notice a bird walking on the bank in the same place. It also returns to a tree. You are set wondering. You wonder more when you notice that it is the same bird which revisits the bank. Here you have a question or a problem on your hands: "Why is this bird behaving thus?"

Your interest is strong enough to cause you to look for an answer. Because you are interested your mind begins to suggest possible explanations. You have often wondered where the rainbow birds nest. Could it be that they nest on the ground?

All your observation is now centred on the one bird. You keep it constantly in sight. After a time, to your astonishment, it visits the bank and disappears from sight. You have made an intelligent guess that it may be nesting on the ground. Your interest in the problem impels you to check or test the accuracy of your guess. You climb across the creek and find the bird emerges from a hole in the ground which is its nest hole!

Here you have a deliberate investigation which leads to new knowledge. You can recognize in it a number of steps:

1 An observation is made which raises a question or a problem.

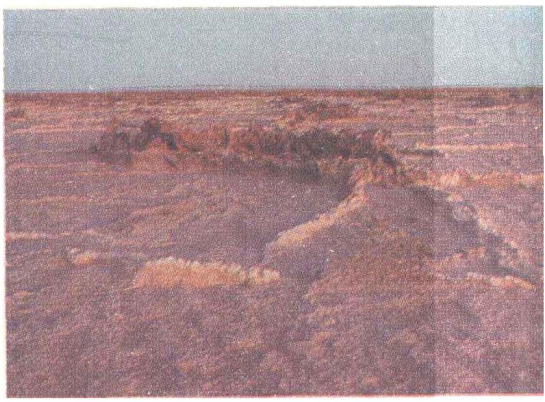
2 The mind offers a possible explanation. (scientists call the possible explanation a hypothesis.)

3 The hypothesis (possible explanation) is tested to see whether it is correct.

A FOSSIL LEAF IN SURFACE SANDSTONE, MT. EBA, S.A.

To geologists and botanists, fossils embedded in rocks are like pages from a story book. What kind of story do they tell?

[F. J. Mitchell]



[F. J. Mitchell]

A STRANGE ENVIRONMENT!

This unusual picture is of Lake Eyre, S.A., at the place where Sir Donald Campbell laid out the track for the Bluebird's attempt on the world speed record.

Where did the salt come from? What causes the crusting you see? The brown colour is dust caught on the salt encrustment. The purple colour comes and goes on the lake: it is due to the rapid growth under suitable conditions of one-celled algae (plants). Lizards and ants also live on the lake. Lake Eyre, then, is a suitable environment for some living things!