Illustrated Encyclopedia of Science and Nature

A ready and authoritative home reference for students and young adults!

- Inculcates general knowledge and incites interest with detailed illustrations and more than 900 questions
- Includes topics such as space and planets, nature, the human body, science and technology and more
- Glossary section at the back of each book explains difficult terms

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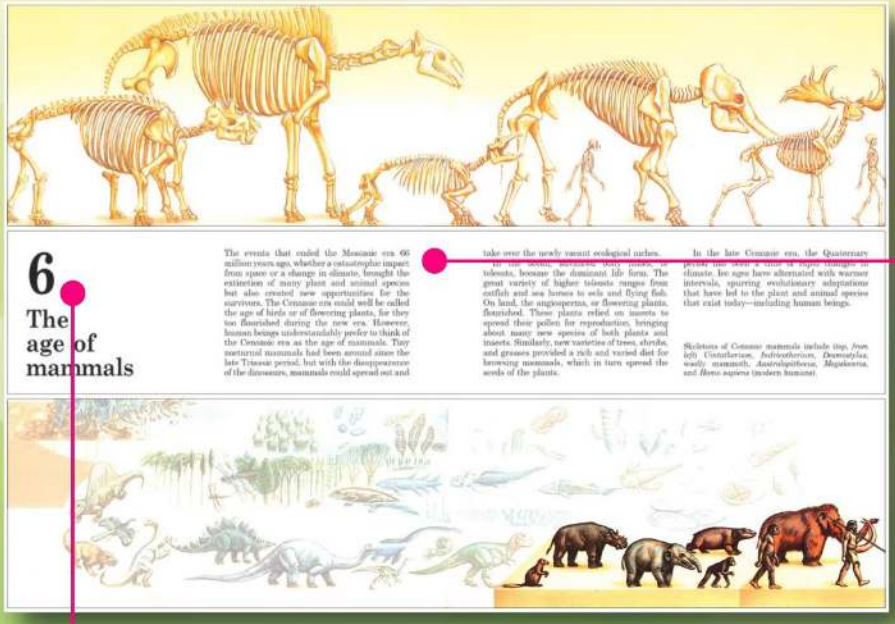
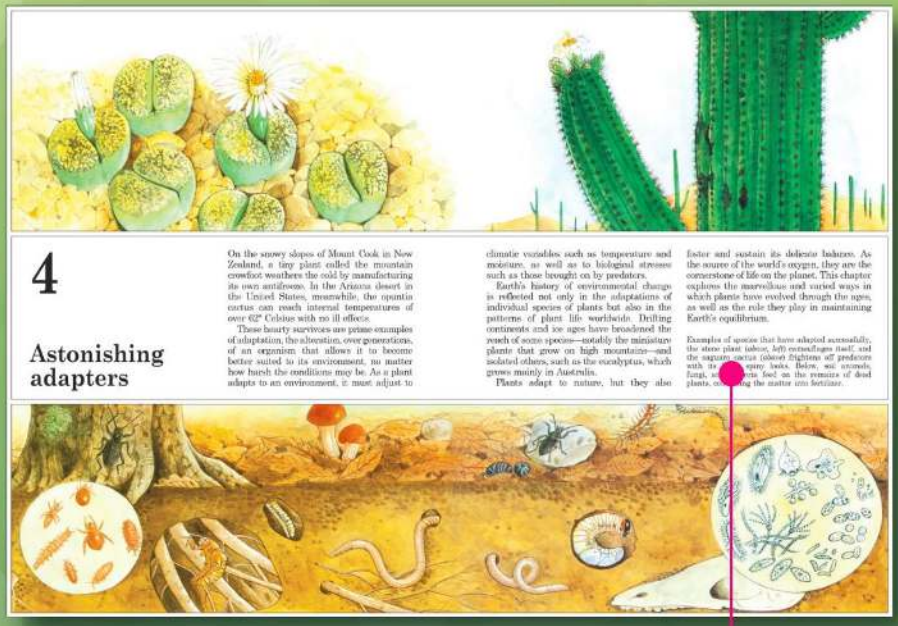
With attractive images and easy-to-follow text, the Illustrated Encyclopedia of Science and Nature provides hours of fun learning for the whole family.

Features



Each unit opener provides an interesting overview of what is covered in that unit.

Information in each book is organised into units for easy reference.

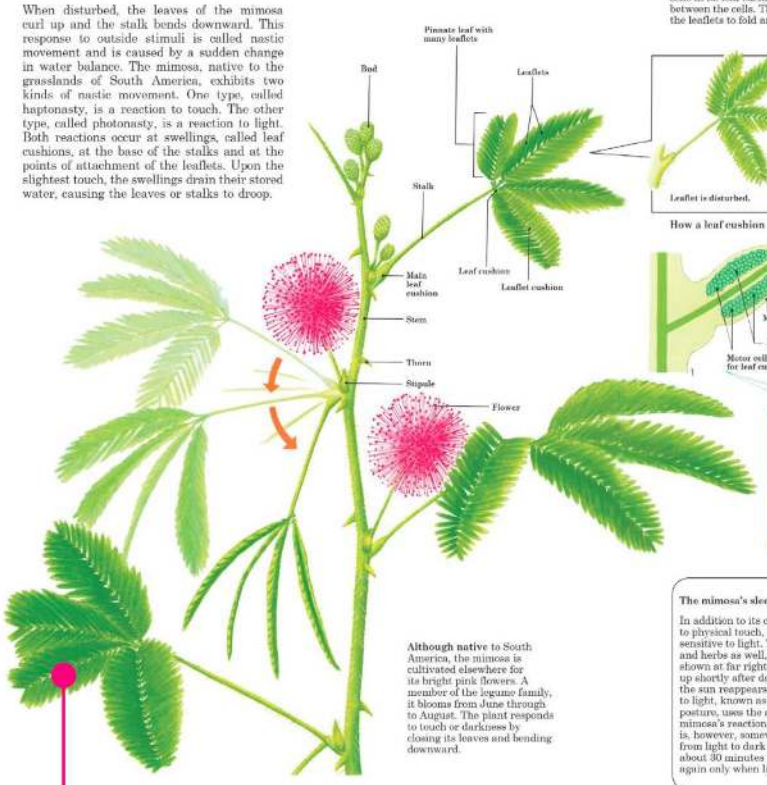


Quick facts with accompanying illustrations serve as an appetiser for what is to come in the following pages.

Contains over 2,000 pages chock-full of interesting facts!

What makes mimosa leaves curl?

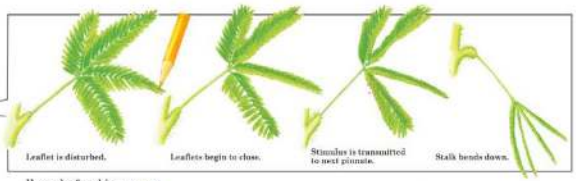
When disturbed, the leaves of the mimosa curl up and the stalk bends downward. This response to outside stimuli is called nastic movement and is caused by a sudden change in water balance. The mimosa, native to the grasslands of South America, exhibits two kinds of nastic movement. One type, called haptonasty, is a reaction to touch. The other type, called photonasty, is a reaction to light. Both reactions occur at swellings, called leaf cushions, at the base of the stalks and at the points of attachment of the leaflets. Upon the slightest touch, the swellings drain their stored water, causing the leaves or stalks to droop.



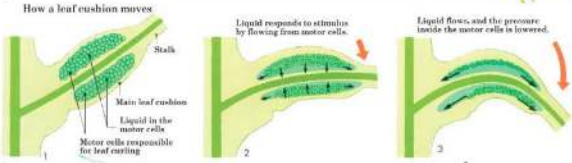
Although native to South America, the mimosa is cultivated elsewhere for its bright pink flowers. A member of the legume family, it blooms from June through to August. The plant responds to touch or darkness by closing its leaves and bending downward.

Reacting to touch

When the mimosa is disturbed, the liquid-filled motor cells in its leaf cushions leak water into the spaces between the cells. This loss of water pressure causes the leaflets to fold and the leaves to droop and wilt, all of which occurs in a matter of seconds. But it can take several hours for the mimosa to recover. The plants are so exquisitely sensitive that they were once believed to have an animal-like nervous system.



How a leaf cushion moves




Main leaf cushion when leaf is open


Main leaf cushion when leaf closes

The mimosa's sleeping posture

In addition to its closing and drooping response to physical touch, the mimosa is extremely sensitive to light. This is true of some grasses and herbs as well, such as the wood sorrel, shown at far right. The leaves of the plant close up shortly after dark and stay closed until the sun reappears the next day. This reaction to light, known as photonasty, or sleeping posture, uses the same mechanics as the mimosa's reaction to touch. Its reaction to light is, however, somewhat slower. When moved from light to dark a mimosa plant will take about 30 minutes to close. The plant will open again only when light hits the leaf cushions.


Day (*top*) and night (*bottom*)


The wood sorrel opens in daylight (*top*) and closes up at night (*bottom*).

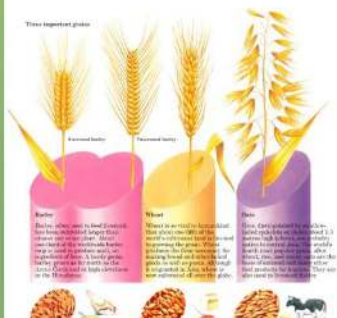
Detailed and accurate illustrations

Where possible, photographs complement the illustrations, making concepts easier to understand and remember.

Why are grains so important?

Without the nutritious fruits of the grassy plants known as grains—especially maize, wheat, rice, barley, oats, and rye—much of the world's population would face starvation. Indeed, no other family of food plants feeds as many people or do the grasses.

Within the grass family, however, there is considerable variation from one edible plant to the next. Maize and rice differ most obviously from the other grains mentioned above. Significant differences also exist among wheat, barley, oats, and rye. These grains vary not only in character, size, shape, and hardiness, but in the extent of their cultivation and the uses to which they are put. This page takes a brief look at three of these vital crops.



Glossary

Alga (pl. *algae*) *Algae* comprise a group of primarily aquatic organisms that can make their own food through photosynthesis. Some have a single cell, but some, such as kelp, are multicelled. Some, in association with fungi, form lichens. All algae could in the broadest sense be considered as part of the plant kingdom, but one Monogram algae are thought to be a separate kingdom with protists.

Alpine Used to refer to plants living at high mountain areas above the timber line.

Alternation of generations The regular change in the form or the method of reproduction in an organism from one generation to the next.

Annelid An organism with a simple cell belonging to the genus *Annelida* or a related group.

Angiosperm Any member of the plant kingdom that produces seeds that are enclosed in an ovary. Flowering plants fall into two subgroups: angiosperms and gymnosperms.

Annual Any plant that completes its life cycle—germination from seed, maturity, and production of seed—within a single year. See also Perennial.

Anther The part of a stamen that makes and bears the male gametes, or pollen.

Antheridium The male reproductive organ in fungi, mosses, fungi, and algae.

Anthocyanin A pigment that produces colours in the red, blue, and violet range.

Antipodal cell One of three cells found in the embryo sac of an angiosperm at the opposite end from the micropyle.

Apical meristem See Meristem.

Archegonium The female reproductive organ in ferns, mosses, fungi, and algae.

Areole A bristle-like structure on the epidermis of cacti, also called an areola.

Arrowroot The edible starch of certain fungi, roots and of a group of hybrids [illegible] ing the soil.

Asexual reproduction Any sexual spores in a sac-like cavity.

Aster (pl. *asters*) A cyclic chamber in certain fungi within which spores develop.

Asexual reproduction The asexual, or apogamic, generation or the alternation of generations.

Auxin A plant hormone that is involved with the growth of cells.

Awn A bristle-like projection found on the glumes of grasses; also called an arista.

Bioherbicide A plant-based [illegible] technique in which a plant

Conjugation A form of sexual reproduction in which a male gamete fuses with a female gamete to form a zygote.

Cork A layer of protective tissue that replaces the epidermis in trees. Dead cork cells form the bark of trees.

Corm A swollen underground stem similar to a bulb.

Corolla The petals of a flower. The corolla lies inside the outer and helps protect the developing reproductive parts.

Cortex The layer of tissue that lies between the epidermis and the vascular tissue.

Cotyledon (*n. seed leaf*), which is either single or one of a pair, that is the first leaf of a plant. The cotyledon is in the seed of the plant in embryonic form. It envelops the embryo, or seed leaf, nearest to the seed, the plant is a monocotyledon; if a pair of cotyledons sprout, the plant is a dicotyledon.

Crossbreeding The breeding of two individuals of different species or varieties in order to produce a hybrid.

Cross-fertilization The fertilization of an ovum by the sperm from a different individual of the same species.

Culm A jointed stem, usually found in grasses, such as bamboo, and sedges.

Cupule A cup-shaped outgrowth in mosses and liverworts that contains the gametes.

Cuticle A layer that covers and is secreted by the outermost layer of cells of an organism. In botany, a cuticle is a thin film covering the plant except [illegible] water loss.

Deciduous Shedding the leaves seasonally, and being leafless for part of the year. Maple and apple trees are both deciduous trees.

Dicotyledon Any member of the group of flowering plants belonging to the angiosperms that bear two seed leaves in the embryo. Most trees and many cultivated plants are dicotyledons.

Dioecious Having male flowers on one individual plant and female flowers on another individual plant of the same species.

Diploid (*2n*) Having two sets of chromosomes.

Drupe Any fruit developed from a single ovary, with an outer skin, a pulpy middle layer, and a hard shell around the seed.

Embryo The young plant usually contained in a seed.

Endodermis Tissue made up of a single layer of cells surrounding the vascular bundles of plants.

Endosperm (or *albumen*) A [illegible] of starches or oils within most cells. Often the chloroplasts are attached to the endosperm reticulum.

Endosperm The storage tissue in the seeds of most angiosperms that provides food for the embryo.

Enzyme A protein that triggers and speeds up chemical reactions within cells.

Epiphyte A plant that lives above the ground on trees, absorbing nutrients and moisture from the air. Many mosses and orchids are epiphytes.

Eremiparous A tree or shrub that has leaves or needles all year round. The leaves are evergreen.

Family A group of related genera; related families form an order. See also Classification system.

Fascicle A group or cluster of needles, leaves, or flowers. Pine needles grow in fascicles.

Filament The stalklike part of the stamen, bearing the anther at its tip.

Fruticose A shape found in fruits.

Fruit The seed-bearing part of a plant. Fruits are not necessarily edible or fleshy.

Functionality A [illegible] plapsed is restored.

Fungi A group of organisms, including mushrooms and moulds, that lack chlorophyll and therefore cannot make their own food. Many fungi are parasites that live on plants or animals. Fungi used to be considered part of the plant kingdom, and are still considered plants in the popular sense, but scientists now classify fungi in their own kingdom.

Fusicoccin The stalk attaching the ovule, and later the seed, to the ovary wall.

Gall An abnormal swelling on plants caused by insects or a similar female flower found on some plants, such as figs.

Gamete A mature sexual reproductive cell, either a sperm or an egg, that unites with another cell to form a zygote.

Gametophyte The generation in an alternation of generations that produces gametes.

Gamma (pl. *gammas*) A unit of vegetative, or asexual, regeneration in mosses and liverworts that, when separated from the parent, develops into a new plant.

Genus A distinct unit of hereditary material. A genetic line in established, where genes are passed on over successive generations.

Genus (pl. *genera*) A group of related species; related genera form a family. See also Classification system.

Germ cell A sexual reproductive cell.

Glucose A basic sugar found in most plant tissues that is used to make starch, cellulose, pectins, and other carbohydrates.

Gluten The of a grain of [illegible] beneath the inflorescence of grasses and sedges.

Gulgi bodies A series of organelles in a cell, often linked to the endoplasmic reticulum.

Gonidium Any of the algal cells in a lichen.

Grafting In botany, inserting a small part of a plant to be cultivated, called the scion, into a closely related stock plant, the stock, so that the cultivated plant will grow there permanently.

Gramen (pl. *gramia*) One of the structural units of a chromosome.

Ground meristem See Meristem.

Grumpaceous A plant that bears 'naked' seeds, or seeds that are not enclosed in an ovary.

Haploid (*n*) Having one set of chromosomes.

Hemitelonic-ish bacteroid The usual state of a parasitic plant that insects could use the host plant.

Hermaphroditic Term of a plant or animal that has both male and female reproductive organs.

Heterosporous plants A life cycle in which the alternating generations are distinctly different in size and shape.

Homology The presence, in two or more plants or animal groups, of structures that have the same ancestry but different functions. The stamps and leaves serve are homological structures.

Hormone A substance, such as auxin, found in plants that controls the growth of plant tissue.

Humus The part of the soil that is made up of decayed leaves and other organic matter.

Hybrid An individual plant produced by pairing of different species or varieties.

Hymenium A fertile layer consisting of asci that lines the cavities of a fungus or the gills of a mushroom.

Hypha (pl. *hyphae*) One of the threadlike, branched filaments that make up a fungal mycelium.

Hypocotyl The part of a plant embryo that connects the seed leaves to the radicle and develops into the rest of the stem.

Inbreeding Reproduction using the male and sperm from the same or closely related individuals.

Inflorescence A cluster of flowers arranged on a single axis.

Integument A protective skin or coat that develops from the bases of an ovule and encloses it almost entirely.

Intine A type of fructose stored in the roots of certain plants.

Introduction The [illegible] process, such as reproduction, that is used to introduce plant material into the soil of the organism or an artificial environment.

Isomorphic A life cycle in which alternating generations appear very similar in structure.

Lacunae The flattened, bladelike portion of a leaf.

Lanthanide A glumes (a stipe formed by photosynthesis, and [illegible] leaves. A parasitic mosses of a plant, shed originated and protected in cultivation.

Leaf (pl. *leaves*) Usually an essential organ of a plant, where photosynthesis and transpiration take place. Leaves may vary widely in shape and size.

Lenticel The layer of a pair of leaves below each flower or a grass inflorescence.

Lenticel A pore in the waxy layer of the bark of a tree, or on roots, stems, and leaves, through which gases are exchanged.

Lichen A dual organism that is formed by the symbiotic association of a fungus and an alga.

Manifold A common organ shared in lichens and fungi.

Meristem The growth tissue of plants, made up of actively dividing cells. **Apical meristems** is the growth tissue at the apex, or tip, of a root or shoot; **ground meristem** produces the pith and the cortex.

Mesophyll Tissue that forms the internal parts of a leaf.

Micropyle The tiny opening in the outer layer of an ovule, through which the pollen tube enters.

Mitochondrion (pl. *mitochondria*) A specialized structure in cells that produces enzymes and metabolizes fats and proteins.

Monocotyledon Any member of the group of angiosperm plants that has a single cotyledon, or seed leaf, in its embryo. Monocotyledon include grasses, palms, and lilies.

Monoecious Having the stamens (the male organs) and the pistils (the female organs) in the same individual plant but in separate flowers.

Motor cell A cell that contracts on impulse that results in motion.

Mould A fungus that produces a distinct coat-like effect in the form of a furry covering, on dead or decaying

A glossary at the back of every book provides a quick explanation to terms encountered in the book.

The Illustrated Encyclopedia of Science and Nature lets you explore a wide range of topics such as space and planets, nature, the human body, science and technology and more!

Books 1-5

Learn about Earth and its place in the solar system, the amazing geological formations of Earth, the evolution of life and many more interesting facts about our home planet.

1. Space and Planets
2. Earth and its Features
3. Evolution of Life
4. Geology and Change
5. Weather and Climate

Books 6-10

Learn about the world of animals and plants and how they make their home on Earth! Explore interesting behaviour of living things and discover the secrets of how certain animals and plants survive in their environment.

6. Plant Life
7. Aquatic Life
8. Insect Life
9. Animal Behaviour
10. Ecology and the Environment

Books 11-15

Peer deeply into the world of matter, learn about the forces in the universe that affect the behaviour of all objects on Earth, find out how our bodies work and discover how machines make our lives easier!

11. Matter and Chemistry
12. Energy and Physics
13. The Human Body
14. Machines and Inventions
15. Transport and Navigation