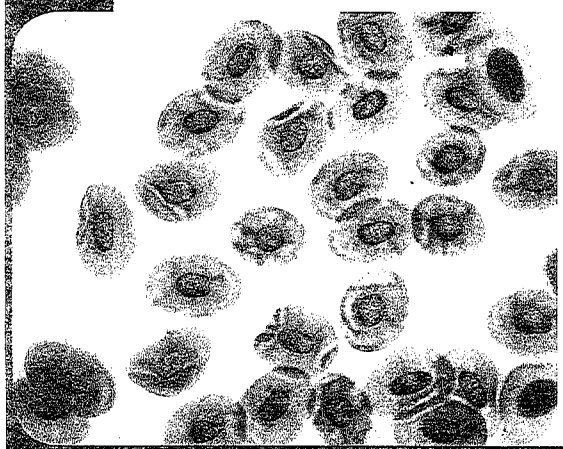
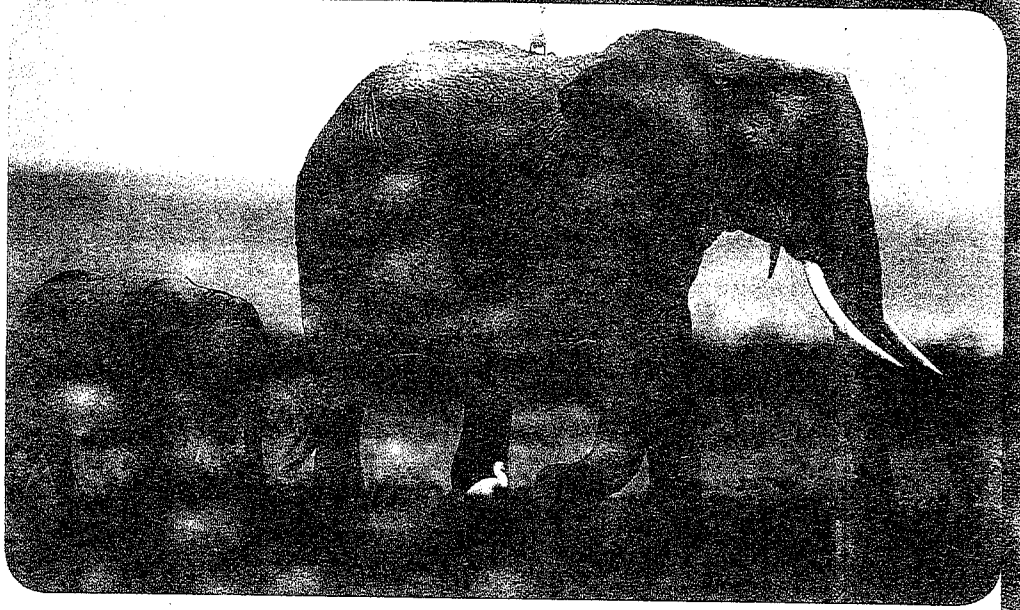
The Code of Life

Why does a dog have puppies and not kittens? Why do a hen's eggs hatch into chicks instead of ducklings? Why does an acorn grow into an oak tree instead of a sunflower? And why does a human give birth to a human baby rather than to a baby horse? All these living things follow the laws of nature.

While the various creatures on Earth may seem different, they all have something in common: each living thing is made up of tiny units, called cells. Cells are the building blocks of life. Just as bricks are stacked to build a wall, cells are the bricks that build a living creature. The larger the organism, the more cells it contains.



These cells make up the blood of a frog.



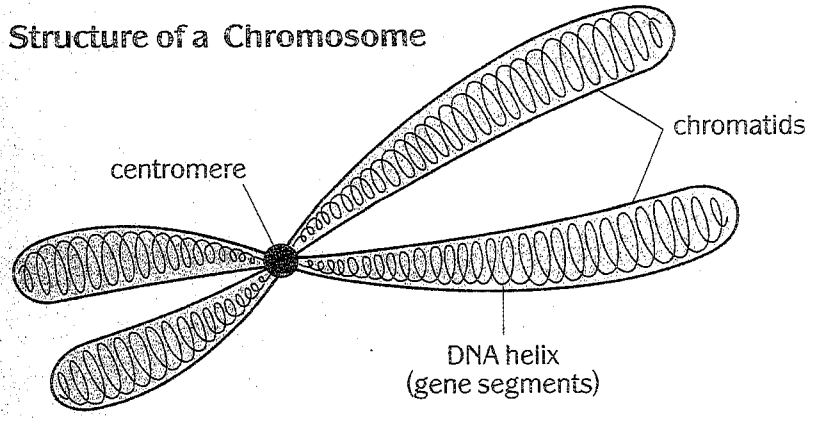
Like all animals, these elephants are made up of cells. As the baby elephant gets older, its body produces more cells and grows larger.

So in a sense, all living things—from a tiny ant to a flowering dogwood tree to an enormous whale—share a common thread: the cells that compose them. And yet, there are distinct differences. A mouse looks very different from an elephant, and a spider in no way, shape, or form resembles a giraffe. Even creatures within the same species look different from one another. You would not confuse a Great Dane with a Chihuahua or a dachshund. And you most likely do not look like any of your friends.

Your body is made up of trillions of cells. Can you imagine how many cells there are in the largest creature on Earth, the blue whale? It can grow to more than 100 feet (30 meters) long!

Your Instruction Manual

If all living things have cells in common, then what makes organisms so different? The key is what's inside the cells: genetic material, called DNA (deoxyribonucleic acid). DNA is the working part of the chromosomes, small rodlike structures in cells that contain genes, the units of heredity. Genes carry the information that determines the characteristics of a cell and the instructions for making new cells. Many new cells are formed as a baby grows into an adult. New cells are also formed when different parts of the body are damaged and need repair.



This is the structure of a chromosome in a cell preparing to divide. The cell has copied all of its DNA, and each chromosome exists in the form of two rod-shaped parts, called chromatids. The two identical chromatids contain DNA—genetic material—coiled into a spiral, or helix. The centromere holds the two chromatids together.

The information in DNA is "written" in a special chemical code. Each living thing has a unique code. Scientists have been learning to read the DNA code. They are using this knowledge to help treat diseases that are caused by genetic errors. Uncovering the mysteries of DNA has also helped scientists trace our ancestry. DNA has even become a useful tool in solving crimes.

Although the differences in genetic code make us quite diverse, most of the code is almost exactly the same in all living things—viruses, bacteria, plants, animals, and humans. In fact, the code of life, which holds the secrets to all our differences, also holds the answer to the many ways in which all forms of life are so much alike.