Children & Flowers

by Dorothy Edwards Shuttlesworth
A Unit Study

A "Green Thumb Family" Guide

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Unit I: How Flowers Work

CHILDREN & FLOWERS

PART I: HOW FLOWERS WORK

CHILDREN LOVE things that grow. That is probably why few toys can ever hold their attention as long as a garden will. Everything about a garden appeals to them. Planting a seed is a privilege they are ready to fight for, and day after day they will come back to see if it has begun to sprout. Watching a bud unfold is another experience that fills them with wonderment. It is no exaggeration to say that the youngster who does not have his own garden or flower box, or just a single flowerpot, is being deprived of one of childhood's most treasured possessions.

A child's interest in the plant world is by no means limited to flowers. Vegetables and flowerless plants, or even grass, will absorb his attention, too, and he will give them devoted care. What attracts him to plants is that they are living things, growing, expanding, changing.

Once your youngster becomes fully aware that plants have life just as animals do, a number of questions are bound to arise in his mind if he takes nature exploring seriously. Not so easy to answer as it is to ask is this one: "What's the difference between plants and animals?"

Plants Move Too

The younger child may be satisfied with the popular answer quite oversimplified that animals are capable of motion, moving from place to place by their own efforts whereas plants cannot move. Often this answer will not do for an older child. As he thinks it over, he may realize that plants do move in certain ways.

For example: They move upward and outward as part of the growing process. Some develop runners that creep over the ground. Violets and others shoot their seeds; the dandelion is one of many plants that parachute seeds to new growing grounds, while portions of the stems of Florida moss break off and are blown about by the wind until they alight and start to grow. The water lily, like numerous other species, closes its petals each night and opens them again in the morning. (What probably impresses children even more is that the water lily floats.)

So we see there is plenty of motion on the part of plants. The older child will conclude that many characteristics observed in animals are also present in plants. Both plants and animals move; both are made up of living cells, are born, breathe, feed, grow, and reproduce themselves.

How Plants Feed Themselves

There is one vital difference between plants and animals, however, and that is in the way they feed themselves. A plant is in effect a factory which produces its own food by turning nonliving matter into living matter. This process, one of nature's wonders, is made possible by the green substance known as chlorophyll.

We often call chlorophyll "leaf-green," as it is found chiefly in leaves. When this leaf-green is worked on by the action of light from the sun, chemical changes occur which transform lifeless (inorganic) matter into life-giving and life-sustaining matter.

(Animals do not have chlorophyll, but we now find it used in all kinds of products, from toothpaste to dog food, mainly for the purpose of killing odors.)

The Leaf: Nature's Great Chemical Laboratory

If you examine leaves, you will notice that as a rule they are a darker green on the upper side than on the underside. The chlorophyll-bearing cells on the top surface are packed more closely to catch as much sunlight as possible. (As we have seen sunlight is one of the "raw materials" needed for making living matter.)

The "manufacturing" cells are protected on top and bottom surfaces by a skin, or epidermis, which is perforated with innumerable tiny holes. Each hole is surrounded by two guard-cells the only surface cells that contain chlorophyll. Through the little holes the leaf constantly takes in and gives off oxygen, carbon dioxide, and other gases as well as water vapor.

How CHLOROPHYLL Makes Food for Plants

Before the leaf "factory" can operate, it requires one more item. This is a watery solution, containing many substances, that originates in the soil, enters the plant roots, works its way up the stem and at last into the leaf.

Within each leaf, carbon dioxide much of it comes from the air we exhale is separated into carbon and oxygen. In the same way, water is broken down into oxygen and hydrogen. The leaf cells combine the carbon with the hydrogen and oxygen into a form

of sugar that will nourish the plant. It is the chlorophyll that accomplishes this remarkable feat but it can be done only when sunlight, or artificial light equal to sunlight, is shining on the plant.

In the daytime plants are our benefactors by releasing oxygen, which purifies the air we breathe. At night, though, they give off carbon dioxide, a gas which is poisonous when it is present in considerable quantity. (This explains why a room with many large house plants should be well aired at night.)

A scientist has estimated that during the course of a summer a single leaf, suitably exposed to sunlight, manufactures enough sugar to cover itself with a solid layer about one twenty-fifth of an inch thick and this is aside from protein and other food elements!

Plants Turn Toward the Sun

Your house plants will give you a fine opportunity to observe how leaves are affected by the need for sunlight, in order to continue feeding the plants. Even a small child can observe how the location of the leaves at or near the ends of branches helps expose their surfaces to a maximum of light.

The youngster can also notice the way the plants sometimes change their position according to the direction of the source of light and how, when a new length of stem grows, its young leaf bends and turns its stalk to escape, as much as possible, the shade of surrounding leaves. The leaves of nasturtiums, begonias, and others, are noticeably adept at keeping in a favorable light.

Out-of-doors there are some plants, such as one of the wild lettuces, which fix their leaves so consistently in a north-south plane that they are known as "compass plants."

Some "Dew" Doesn't Fall

Going out-of-doors in the early morning, a child always notices the dew, with some such exclamation as, "Look how much dew has fallen!" But like as not the drops of moisture he calls dew, did not "fall"; they are probably water that passed out of the grass and leaves as water vapor and condensed into drops as it emerged. If the night was humid and cool, the vapor could not become part of the air as rapidly as it came out of the leaves.

What Flowers Are For

There is much that a child can learn from house plants, but the real fun of studying flowers is mostly found outdoors. There he can watch insects traveling from one bloom

PETALS ARE A FLOWER'S CROWNING GLORY

The corolla (meaning "crown") of a flower may vary in countless ways. It is made up of petals, and these have numerous colors and shapes. Sometimes, too, each petal is separate (as in the lily, left); sometimes they are joined and show only as separate points (as in the squash flower, center); and sometimes (as in the petunia, right) there is no separation whatever.

to another in quest of nectar. As he observes flowers in numbers, he will see countless interesting variations in the shapes and colors of petals and in the forms of complete flowers. But there is a purpose in flowers beyond mere looks, beautiful though they are.

A child may be old enough to understand that what flowers are really for is to continue the life of the plants that bear them; yet, looking at a blooming garden and with real curiosity in his voice, he will ask, "How do they?"

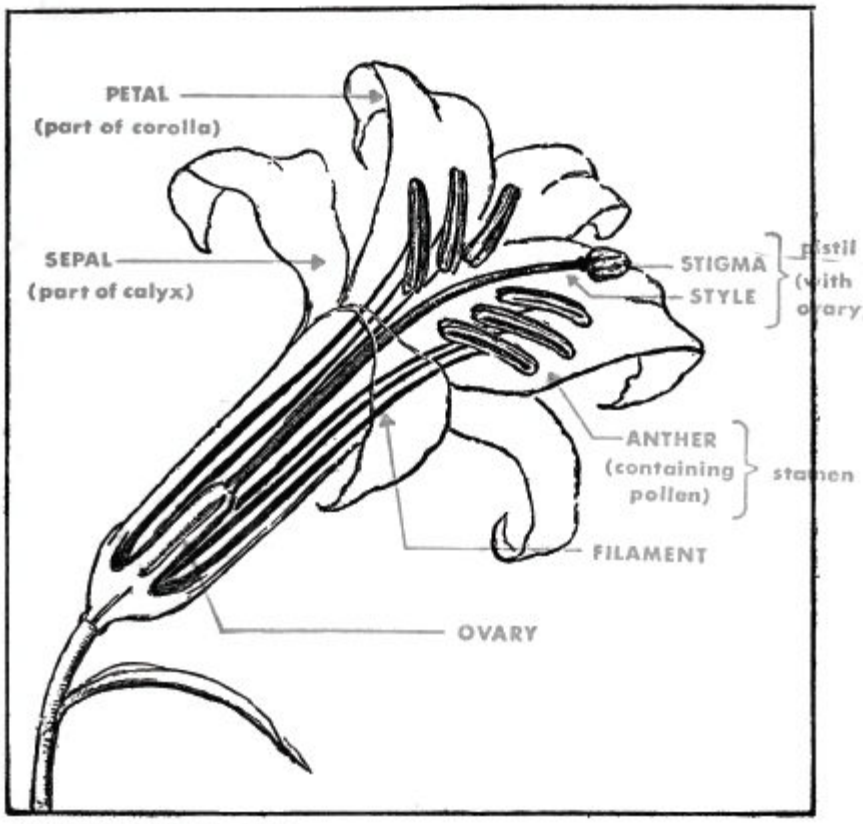
How FLOWERS Develop SEEDS

A brief answer is that flowers produce seeds. But before a flower can produce seeds, it must receive grains of pollen that will fertilize it. What is involved in the fertilization of a flower? To answer this question, we must be familiar with the different parts that make up a flower.

A SEED-PRODUCING FACTORY

All seeds are produced by flowers, but there is considerable variation in the forms of flowers. Not all types have both male parts (stamens) and female (pistil) within one blossom. Those that do are termed "perfect" flowers. This diagram of a lily (shown with transparent petals and sepals) illustrates one of them.

Here a difficulty arises: Not all flowers conform to the same pattern. Suppose, then, we consider the simplest types. One of these is the "perfect" flower such as the lily which has a pollen-bearing stamen and an ovary in which seeds develop.



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The other simple type is a plant which bears two different types of flowers the pussy willow is an example; one flower bears only the pollen-laden stamens while the other flower bears the ovary. In this case, we might call the flower with the stamens the "male" flower while the flower with the ovary is the "female" flower.

The Parts of a Flower and What They Do

It is a great help, in understanding how a flower functions, for a child to look at a diagram in which flower parts are pointed out. If he has a diagram

illustrating a perfect flower (as shown here), he will find:

The ovary a well-protected structure in the center of the flower. In it are the ovules which contain egg cells, destined to become seeds. (Some ovaries contain a single ovule; others have many ovules.) The ovary has a rather slender stalk, extending upward, and known as

The style. At its top, the style expands into a broadened tip with a sticky surface a perfect trap for pollen. This expanded tip we call The corolla (meaning "crown") of a flower may vary in countless ways. It is made up of petals, and these have numerous colors and shapes. Sometimes, too, each petal is separate (as in the lily, left); sometimes they are joined and show only as separate points (as in the squash flower, center); and sometimes (as in the petunia, right) there is no separation whatever.

The stigma. The combined stigma, style, and ovary form a complete pistil.

Also within the flower are

The stamens. A stamen consists of

The filament. This is a slender stalk, on the top of which rests The anther which encloses a powder (nearly always yellow)
that we know as

The pollen. The pollen grains are formed by the division of cells within the anther. In our typical flower the pistil and the stamens are surrounded by

The corolla, composed of petals. This word, meaning "crown," is well chosen, for the corolla is the most beautiful part of the flower. In many flowers it is made up of separate petals; in other flowers the squash flower, for one the petals are joined together and show only as separate points. Then there are still other flowers the petunia and morning-glory are among them which have a corolla all in one piece, without any separation of the petals. In any event, the petals are encircled by

The sepals. All together, the sepals make up

The calyx, which serves to protect the flower, especially in its budding stage. The sepals, which are really specialized leaves, vary in size, shape, and number in different kinds of flowers. Often the sepals are green, as on the rose; but sometimes as in the case of the tulip you find them the same color as the petals. On some kinds of plants sepals fall off as soon as the flower opens; on many others roses and apple blossoms, for example these leaves remain even after the seeds have ripened.

How THE SEED STARTS

The first step in the development of a seed is for pollen to reach the flower's stigma. The pollen may be blown into the stigma from the anther of some flower. What happens more commonly is that an insect, going from one flower to another in search of nectar, gets pollen on its body and the grains later rub off on a stigma.

Once a pollen grain has become attached to the sticky surface of the stigma, it quickly forms a tiny tube much like a root hair.

This tube forces its way down the style to reach an egg cell in the ovule. As soon as the tube makes its connection with the egg cell, the life-germ in the pollen slips through the tube to combine with the life-germ in the egg cell. Thus the seed starts, developing on food furnished by the plant and on warmth given by the sun.

How THE SEED Is NOURISHED AND PROTECTED

A fully developed seed is the embryo of a new plant, with food stored around it in a form that can be used whenever new growth begins. One of the amazing things about seeds is that the stored food remains usable even though new growth does not start for weeks, months, or even years! (This dormant period varies, of course, with different kinds of seeds.) The embryo and the food supply are protected by one or more layers of the ovule.

Nuts and Tomatoes Are "Fruit": In some seeds, such as peas and beans, the food supply is stored within certain parts of the embryo itself. In other plants, corn and wheat for example, the food is stored around, rather than in, the embryo. And still other plants develop elaborate structures about their seeds. These structures are called "fruit" apples and pears are familiar examples. When a scientist speaks of a "fruit," he may be referring to the ripened ovary of any kind of plant, be it the pod of a pea, a hard nut, a juicy tomato.

There are many opportunities for examining seeds for example, when you are preparing dinner. To a hungry diner, peas, beans, and corn are food; to a nature explorer, they are seeds! A child is thrilled to see the first sprouting of the plant embryo after he plants a few seeds in a glass with moist soil. If the seeds are placed just inside the glass, they can be seen sprouting.

How Flowers Attract Insects

When a child learns that pollen is transferred from one plant to another by messenger insects, he may wonder what attracts an insect to flowers is it their sweet scent or the color of their petals? This is the kind of problem that scientists still ponder and sometimes debate about. For many years it was a generally accepted "fact" that the chief value of color in flowers was to attract insects.

Scent Is the Attraction: Along came a scientist who had made a study of the insects' pollinizing role. He pointed out that bees and other flower-visiting insects have poor vision but a well-developed sense of smell. He also demonstrated that in addition to the colors that we can see, some flowers emit ultraviolet rays. Though these rays are not visible to our eyes, insects can see the rays as well as, or even better than, the colors which our eyes perceive. His over-all conclusion was that color is, at most, only incidentally responsible for bringing insects to flowers.

Since that time, countless observations and experiments have shown that insects are attracted by the scent of flowers. In the course of one of his famous experiments, for example, Luther Burbank worked patiently to develop a petunia that would have fragrance. He knew that he had succeeded at last when he saw several bees hovering over one of the plants in a large bed of his experimental petunias. He quickly verified the fact that this particular plant's flowers were perfumed.

How POLLEN Is CARRIED FROM PLANT TO PLANT

It is vital for insects to visit flowers for, as we have seen, they carry pollen from plant to plant and thus help bring about the fertilization of flowers. Corn and all other plants known as "grasses," and most cone-bearing plants such as pine trees- depend on the wind to convey their pollen.

Breeding Flowers: But sometimes man takes a hand in pollinating plants, especially when he wishes to create a hybrid, for a variety of reasons, by "crossing" the pollen of two different species in the same family. This may be done to increase the hardiness of a beautiful but fragile plant, or to make the colors of flowers more vivid.

Crossing different kinds of plants calls to mind the name of **Luther Burbank.** He will undoubtedly be remembered for all time as the great genius among plant breeders; it was he who made the science of "training plants to work for man" really practical. He made countless improvements in vegetables as well as in flowers; bigger and better potatoes, sweet corn that matures early in the season, luscious blackberries on thornless bushes, and freestone plums of excellent flavor and texture, are just a few of them. There is no

secret about the methods he used to bring about his "miracles" with plants. These methods have often been described, and a book by Mr. Burbank (Partner of Nature) telling about his work is exciting reading.

How Seeds Are Scattered

One of the most intriguing aspects of the flower story involves the ways in which seeds are scattered. Many children get their first notion of seed dispersal when they blow at a dandelion "gone to seed." Each seed, attached to a filmy parachute, flies away.

Other times, say after a country hike, a youngster may find his clothes (or his dog's fur coat) covered with sticktights or cockleburs seeking transportation with their sharp little hooks. If he realizes these "burs" are seeds, unconsciously trying to use him or the dog as a means of reaching new growing grounds, he may find the job of prying them loose less tedious.

Other Ways That Seeds Travel: Although the seeds that are dispersed by the wind are the most conspicuous ones, we can observe other ways they travel. Some plants, including violets, pansies, and touch-me-nots, shoot their seeds. Water lilies and several other water plants bear seeds that manage to float to some desirable growing spot without becoming water-soaked.

180,000 Seeds from a Plant: Countless seeds are unsuccessful, as a youngster may realize when he throws the burs into a scrapbasket; but this is of little importance as the number of seeds borne by each plant is incredibly large. Charles Darwin reported counting the seeds of an orchid; he found more than six thousand in a pod. As there were thirty pods on the plant, the total number of prospective seedlings from this parent would be something like 180,000!

A Garden of His Own

The modest blooms children raise themselves will easily thrill them as much as, if not more than, the most spectacular plants to be seen at a flower show. Window boxes and other indoor planting can give city youngsters some of the joy of raising plants; but families with land at their disposal have endless opportunity for engaging in one of the most solidly satisfying of all occupations working in a garden.

An important point for you to bear in mind is that a youngster may be only casually interested in a family project whereas if he is given a small plot of his own, the chances are that he will tend it with conscientious zeal. He enjoys having the power to decide

what is to grow in that special piece of earth, he finds new delight in poring over seed packets and catalogs, and he is stimulated by the challenge of trying to bring his plans to a successful conclusion. He is not likely to ask for advice or help but he will probably welcome a little of each if it is offered tactfully.

ANNUALS, BIENNIALS, AND PERENNIALS

In planning his garden, a youngster will find annuals, biennials, and perennials from which to choose. Most plants that flower the same season they are sown are usually included with the annuals in flower books. However, the true **annual** is a plant that not only flowers the first season, but, if left to itself, dies in the fall.

Biennial plants may flower during their first season, but more often do so the next year. Unless they are given special treatment by the gardener during their first season, biennials die after their second season.

Perennials with the exception of woody types die down to the ground in the fall. But the roots continue to live, and new branches and flower stems are thrown up for years.

TREES, SHRUBS, AND HERBS

Another interesting point for the young gardener is that most flowering plants belong to one of three general forms: trees, which have large, erect stems; shrubs, with stems that are smaller and bushy; and herbs, with stems that are more or less soft, and with little woody tissue. We most commonly use the term "herb" to describe plants valuable for medicinal purposes or for their flavor or sweet scent. Nevertheless, the majority of flowers (domesticated as well as wild), grasses, and weeds are herbs.

This Study is Continued in...

Unit II: Favorite Flowers for Children

Unit III: Ferns, Mosses & Fungus

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Growing Gardens, Growing Kids