

10- Fascination of Flowers

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.

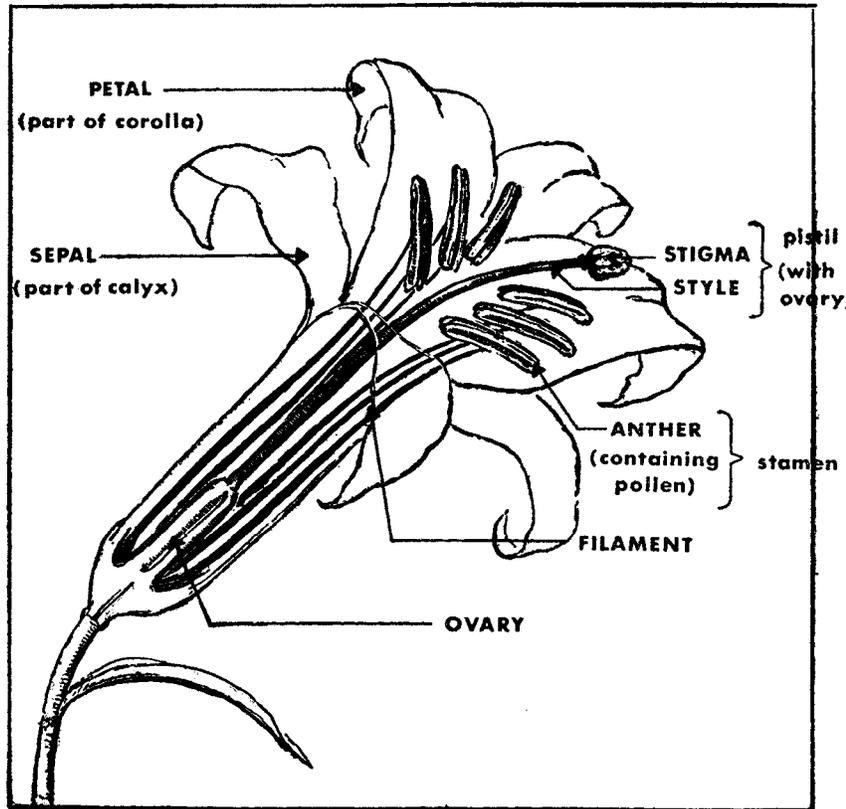
Out-of-doors there are some plants, such as one of the wild lettuces, which fix their leaves so consistently in a north-south plane that they are known as "compass plants."

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 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?"



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.

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.

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.

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 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, or 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 welldeveloped 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 scarpbasket; 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 catalogues, 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.



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.

Favorite Flowers

FLOWERS FOR A BEGINNER

If you are a beginner, there are several points you will want to bear in mind. It is important to have plants that will thrive with the amount of sun that reaches the plot you are using. It is fun to have at least a few showy flowers-such as hollyhocks or salvia-as well as flowers good for cutting. Phlox, dianthus (pinks), zinnias, and asters are a few of the many that provide generous floral decoration for your home. Plants should be ar-

ranged so that those which grow tall will be at the back of the garden; the lowest ones should be in front, or else grown to form a border.

Plan Your Color Scheme: Your child can begin to enjoy his garden well ahead of the planting season if he works out a "theme" for his plot. It may be an all-yellow color scheme (marigolds, California poppies, nasturtiums, calliopsis); or purple and white (petunias, asters, baby's breath, hollyhocks) ; or red (salvia), white (petunia), and blue (ageratum). These flowers are a few of the many annuals from which a child should choose to obtain an abundance of blooms.

Protect the Seeds: If seeds are put in the earth too early they may freeze or rot. It is therefore advisable to start some annuals, pansies, for example-indoors or in a protected seed bed, and then move the young plants to the garden when the weather is suitable. Many flower enthusiasts eliminate this step by purchasing plants from commercial growers. Pansy plants produced from seeds planted outdoors do not bloom until the end of summer.

PANSIES-PERFECT FOR CHILDREN

Youthful gardeners can ask for no more delightful flower than the pansy. Its coloring is beautiful and its markings often give it an appealing face. The dark spots at the bases of the side petals and the lines radiating from them suggest eyes and eye-lashes, the opening of the nectar tube makes a nose, and the spot near the base of the lower petal will pass for a mouth.

Many varieties of pansies may be easily raised from seed sown in the spring or early summer, and seedlings may be set out in the garden in early spring. They do better in shady areas than in full sunshine.

Pansies Are Ideal for Picking: Children love to pick flowers. This makes the pansy an ideal plant for a child, as the flowers should be picked as soon as they open, or shortly afterward. If the pansy's seeds are allowed to ripen, the plant will bloom for only a short time, its life purpose having been accomplished. Persistent picking of the blooms, on the other hand, constantly produces new buds.

How Bees Help Fertilize the Pansy: The nectar sought by bees in the pansy is contained in the spur formed by the lower petal extending behind the flower. As the insect probes the nectar well with its tongue, pollen from a flower previously visited brushes off against the stigma. At the same time the bee receives a fresh coating of pollen dust. Shortly after a pansy has been fertilized, you can notice the ribbed seed pod becoming prominent. Finally this opens in three valves, and the seeds are scattered as the edges of each valve curl inward.

TULIPS-THE NATIONAL PASSION OF HOLLAND

This famous flower was introduced into Europe from the East in the sixteenth century, and about a hundred years later became the national passion of Holland. The Dutch growers speculated in outstandingly beautiful varieties of the tulip as some people speculate in stocks! Anyone who is familiar with these lovely flowers will understand the hold they took on Dutch tulip-fanciers.

Tulips Are Planted in the Fall: Tulips are excellent material for youngsters who enjoy gardening in every season of the year. They may be put in the earth during September or October. Each bulb is formed of several layers of leaves, all of which may open above ground if the planting is done properly-with the tip of the bulb pointed upward. The leaf layers are fleshy, for they contain the food that was stored up during

the previous season. This food nourishes the flower bud in the heart of each bulb and the other growing parts. The roots, forming a thick white tassel below the bud, bring minerals and water up from the soil.

The Tulip's Spring Buds: In the spring, the anxious gardener first sees his tulip buds appear, protected by three sepals. As the bud stretches upward and becomes larger, the green of the sepals changes to the color of the petals. When the flower finally opens there is no very noticeable difference between petal and sepal. The sepals are below the petals and stand out around them, giving the flower a triangular shape. When the sun is not bright, the sepals partially close about the flower.

BACHELOR'S-BUTTONS-COMPOSITE FLOWERS

Most children love this hardy and beautiful plant, often called the cornflower. It may have special interest for them, too, if they realize it is one of the "composite" plants—a group in which different kinds of flowers are attached to one head. Those at the center of this compound flower head work for the production of seeds, while the flowers surrounding the center serve merely to attract insects.

The bachelor's-button usually has from seven to fourteen marginal flowers and they may be white, pink, blue, or purple. Each of the center flowers has a white corolla tube, enlarged toward the upper end to a purple bulb, and a purplish anther tube which is bent far over so that its tip opens toward the middle of the flower head.

GARDEN GERANIUMS-BUTTERFLIES' FAVORITE

On no other flower will you see a more obvious nectar well; that of the geranium extends almost the whole length of the flower stalk. The long narrow nectar tube explains why you often see butterflies on geraniums; this shape is especially suitable for the long-tongued insects.

Some of these plants are called "horseshoe" geraniums because of the horseshoe pattern on many of the leaves. Botanically they are not true geraniums, being the descendants of the pelargonium—a plant that was brought to England from South Africa more than two hundred years ago. These African plants were the ancestors of many of our popular garden geraniums. Other varieties have been bred; Luther Burbank, for example, created the now popular crinkled-leaf species from a single wild geranium plant that did not have the customary smooth-edged leaves.

Seeds Spread by Explosion: Some geraniums have depended for so long on man for planting that they have almost lost the power of producing seed. However, in the single blossoms you may sometimes discover the ovary changed into a long beaklike seed pod—a feature that reveals its relationship to the wild geranium. The seeds are dispersed by an explosive action of the pod.

How Geraniums Open: It is interesting to watch geranium flowers opening. Several buds are grouped together in a nest of specialized leaves known as "bracts." Besides having this protection, each bud is individually guarded by its own sepals. As the flower stalk grows longer and droops from the weight of the buds, the bracts often fall off. In each mass of drooping buds, the ones in the center open first. It sometimes happens that by the time those on the outside are in bloom the center flowers have begun to wither.

NASTURTIUMS AND THEIR REMARKABLE METHOD OF POLLINATION

The most remarkable aspect of the nasturtium is its special method of pollination. The five beautiful petals are set around the mouth of the long tube leading to the nectar

well. The two upper petals are erect, suggesting colorful display signs. They are marked with lines that point toward the opening of the nectar tubes. The lower petals stand out to form a landing platform for visiting insects.

Despite this, the flower is not actually designed for hospitality; it can accommodate only big insects such as sizable bees or butterflies for its pollination work, and it is able to thwart smaller, useless creatures that might creep into its treasure house of nectar. Each of the lower "landing" petals narrows to a fine strip at its inner end, making it in effect a footbridge to the nectar tube. These bridges are covered with projecting fringes and numerous little spikes that prove an effective barrier to any small creeping visitors.

Mechanized Pollination: When a nasturtium first opens, its several stamens are all bent downward. But when the pollen-containing anthers-located at the end of each slender stalk of a stamen -are ready to function, the stalk lifts up so that it is directly in the path of the nectar store. When a bee or butterfly, or occasionally a hummingbird, touches the stamens, it is sometimes bombarded with pollen. Equally remarkable is the action of the anther: No sooner has it discharged its pollen than it shrivels, making way for a new anther.

While all this is going on, the flower's three-lobed stigma lies quietly below and behind the anthers. (The stigma is located on the prolongation of the ovary known as the style.) But, once all the pollen has been shed, the stigma rises up and opens. Now the stigma operates like a three-pronged fork, and as more insects come in quest of nectar, it rakes pollen from them. Thus the ovary is fertilized and the seeds are ready to develop.

PETUNIAS AND THEIR INTERNATIONAL BACKGROUND

Profusely blooming petunias are so much a part of our American garden scene that it comes as a surprise to us to learn that they have an international background. They are the result of a cross between two species of plants from different parts of South America. The first of these, with long-tubed white flowers, was brought to Europe a little more than a hundred years ago.

Shortly afterward seeds of the second species, having small, broadtubed, red-purple flowers, were sent to the Glasgow Botanical Gardens where the two species were brought together. Today we find petunias of many colors, but red-purple and white still predominate.

Pollen for Petunias: The petunia's wonderful arrangement for pollination is one of the marvels of nature. Near the bottom of the long tube lies the stigma, with two well-developed anthers in front of it and two more-not quite so advanced-behind it. The stalks that support the front anthers are longer than those of the second pair. There is still another anther-a fifth-on a stalk shorter than all the others. This is apparently a little pollen supply held in reserve by the flower.

For about half its length, each stamen is attached to the base of the flower's tube. The rest of the stamen curves abruptly inward. This makes it snuggle up to the pistil, the base of which is set in the nectar well at the bottom of the flower. When an insect pays a visit, its tongue reaches along the flower tube toward the nectar and it presses against the stamens at the point where they curve. This causes the anthers to move about, and as they move their pollen is shaken off on the insect!

In an older petunia the stigma, standing above the empty anthers, opens into two lobes and is ready to receive pollen from other flowers.

The Petunia and the Hummingbird Moth: The most notable insect partners of petunias are the sphinx or hummingbird moths, which can often be seen hovering over these flowers in the early evening. Petunias are members of the "nightshade" family, which also includes the tomato, the potato, and tobacco. Hummingbird moths are distinctly partial to all these plants.

POPPIES-THEY FASCINATE BEES

The poppy is distinctly a bee's flower. The insects apparently delight in wallowing in the pollen that lies along the ridges of the flower's pistil.

This pistil resembles a tiny vase with a circular cover. After a poppy has been fertilized, the circular cover develops a scalloped edge. Sharp ridges run from the center of each scallop down the length of the vase-like pistil. These ridges are the outer edges of partitions. Countless seeds develop inside these partitions and, when ripe, they fall into the hollow capsule which forms the center of the pistil.

The Poppy's Seed-Shaker: An observant child is charmed to see how poppy seeds make their way in the world. As each segment of the capsule loosens at the top and curls back from the circular cover, openings are formed. The upshot is that the "vase" has been made into a perfect seed-shaker. When the wind blows on it, or when it is brushed by any passing creature, the contents the seeds-are sprinkled a little at a time in all directions.

There are a great many varieties of poppies, but only four species are commonly cultivated: the corn poppy and the opium (both of them annuals); the arctic and the oriental (both perennials).

The California poppy in its native setting blooms abundantly from February to April in the desert and the foothills. In gardens in the East you can see the shining orange flowers from midsummer until frost arrives.

IRISES-LARGE AND SHOWY

The large, showy iris, also called "blue flag," is another plant favored by bees. It has an interesting shape because of its unique style, which is divided into three branches so large and broad that they appear to be petals. These branches combined with the sepals form a tunnel through which bees pass. Between the sepals and the style are the true petals, marked with decorative purple lines.

How the Bee Maneuvers on the Iris: The bee uses the lip of a sepal for its landing platform, then pushes forward through the tunnel to the nectar well. As the insect moves, pollen that it has collected from another flower is rubbed off against the stigma, which hangs like a tent flap above the nectar well. The stigma is so fashioned that it gathers pollen from an incoming insect but turns a blank side to the departing visitor.

The small solitary bees are persistent callers; so are bumblebees and honeybees, though they seem to prefer different varieties of the iris.

ROSES-THE WORLD'S MOST POPULAR FLOWERS

It has been said that children see so many roses that they take them for granted. I doubt that this is really their attitude, as so many of them choose roses when asked to write about their favorite nature subject. Certainly the rose appears to be the world's most popular flower. It is grown wherever gardening is practiced, in all temperate

climates and in some tropical regions as well. It is also believed to be the oldest of cultivated flowers.

Though no flower is more readily identified, many people are perplexed by the question, "What is a rose?" Looking for an answer, we may be inclined to find more sense than nonsense in Gertrude Stein's famous statement, "A rose is a rose is a rose"; for the rose has endless varieties and it is neither an ordinary seed plant nor a tree. There are single blooms, having only one row of showy petals, and double blooms with their rows of petals arranged in regular sequence or in loose informal patterns.

Five Thousand Varieties of Roses: The roses' bright colors cover a wide range from white, through delicate pink, yellow to rich tones of red. As to size, they vary from dime-small miniatures to exhibition blooms seven inches and more across. Believe it or not, in the United States alone there are more than five thousand varieties, each differing in some detail. The plant is a woody shrub which may stand erect or climb on supports. It has an extensive root system that sometimes goes as deep as twenty feet into the ground.

Roses and Strawberries Are Relatives: Aside from the innumerable kinds of roses produced in gardens, there is the simple but very beautiful wild rose with its broad blossoms that display five pink petals. On a wild rose or a full-blown garden rose you can easily see the great number of stamens, about twenty, as a rule, a characteristic feature of the whole family. Usually there are a great many pistils also.

Many of our common fruits belong to the rose family; the plants include the creeping strawberry as well as the sturdy blackberry bush and apple tree. Though these plants differ considerably in size and general appearance, their blossoms have a great similarity to the rose.

CHRYSANTHEMUMS-JAPANESE FAVORITE

The chrysanthemum has a double flower head, numerous petals, and lovely coloring (generally red, yellow, and white). It gets wide publicity every fall as the star attraction of countless flower shows. But it is not only the spectacular prize-winning varieties that merit popularity. There are many kinds that will flourish without highly skilled care, bringing fresh beauty to our gardens in the fall when most flowers are dying.

Until fairly recently "mums" could be grown in northern climates only inside a greenhouse; but now we have hardy types that bloom out-of-doors through light frost. These perennials usually survive the winter, and each spring you can separate the new growths and replant them. Thus your chrysanthemum display can expand considerably from a very few plants.

Two Thousand Years of Chrysanthemums: Two thousand years ago, a chrysanthemum much like a colored daisy was a popular garden flower in Japan. (A figure of a sixteen-petaled chrysanthemum is used as the crest of the Japanese imperial family.) Early in the eighteenth century some of these flowers were brought to England, and China and India contributed other species. English gardeners and plant breeders went to work with them and in less than a hundred years produced new varieties bearing flowers three times as large as any of the originals.

DAHLIAS-THEY GROW EVEN ON ASH HEAPS

The dahlia, a reddish flower that originated in Mexico and Central America, is a popular show flower. Because of their size and beauty, you might suspect that dahlias

are difficult to raise. The fact is, though, that dahlias are adaptable to almost any kind of soil, if it has been properly prepared.

Clayey soil may be lightened with coal ashes or sand, plus vegetable matter and manure. A light sandy loam will produce healthy plants and exquisite blooms; gravelly fields have been known to support fine dahlia beds; and a plant may even be found growing in an ash heap where a tuber (the underground stem) has been discarded.

How to Protect Dahlia Seeds: You can raise dahlias from stem cuttings as well as from tubers. For a real gardening adventure, your youngster may enjoy trying to develop new dahlias from seeds. The project begins at the height of the blooming season, when he must be on the lookout for any particularly large, rich-colored flower. This should be tagged "For Seed," so that it will not be picked.

The chosen flower must now remain in the garden until insects have carried pollen to it and it "goes to seed." When the flower shrivels and turns brown, you tie a small paper bag over it so that you can save the seeds if the seed pod bursts.

How to Plant Dahlia Seeds: Late fall is the time for you to gather the seeds, drying them and storing them in an airtight bottle. Early in May you plant them in a box with one part soil to two parts sand mixture. When seedlings appear about two weeks later, transplant them to a sunny spot in the garden.

Until the buds finally open, the young gardener will go through the suspense of wondering whether they will be double or single flowers and what their color will be. It all depends on what pollen was carried to his flowers during the previous season.

Indoor Gardening

If you live in an apartment and cannot have a garden outdoors, you and your child can share the rich pleasures of starting a garden indoors. Bulbs are especially suitable. (Bulbs are buds made up of a stem surrounded by leaves.) You can buy them inexpensively at many department stores, hardware stores, or florist shops.

Narcissus Bulbs Are Easy to Grow: The narcissus, a popular favorite with yellow or white varieties, need only be supported in a shallow dish with pebbles or bits of broken shell, and given just enough water to show through the pebbles.

Unaided, a youngster can easily prepare a dish for a narcissus bulb, and will be thrilled at having something his very own. To enhance his enjoyment, a narcissus grows rapidly and thus rewards daily watching. Care should be taken when watering that water does not leak in where old leaves have broken off, as this causes a bulb to rot.

When it is first planted, the bulb should be kept in a dark cool place until its roots have formed. Outdoors this would take from eight to twelve weeks, but indoors only a few weeks are required. The plant should then be brought into sunlight gradually, being kept away from drafts. Two or three weeks will elapse before a flower appears.

Hyacinth, Tulip, and Crocus Bulbs: Such bulbs as hyacinths and tulips do better in soil. As bulbs have a built-in food supply, the soil need not be rich. Sandy garden soil well mixed with peat moss is excellent. A hyacinth bulb should be placed so that its top projects over the top of the pot; a tulip bulb should have its top level with the top of the soil. As for crocus and other small bulbs, they should be covered with an inch of soil.

If you keep the bulbs in a cool dark place for several weeks, the roots will be well developed before the leaf stalks begin to grow. When the roots press against the sides

of the pot or show at the bottom opening, you know that the plants are ready for a sunny window.

OTHER EASY INDOOR GARDENING TECHNIQUES

You need not limit your indoor gardening to bulbs. You have the choice of plants growing directly from roots, such as the sweet potato; from stem cuttings-begonia, geranium, or cactus, among others; and from certain fleshy leaves, such as those of the African violet. Also, many seeds thrive when they are planted indoors.

A wooden cigar box will do to give stem cuttings or leaves their start. Bore holes in the bottom and spread pebbles or chips from broken flowerpots. Then fill the box with clean sand to within half an inch of the top. Moisten the sand and press it down firmly. Make a hole in this soil for each stem cutting you wish to plant. (A pencil is a very good tool for this purpose.)

Now place a freshly cut stem in each hole, making sure that in every case you have buried at least two "nodes" - juncture point, for leaves that have been removed. Keep the little garden moist, in a cool place, and before long, roots should form at each node.

How to Propagate Plants

AFRICAN VIOLETS

You can work out an excellent arrangement for propagating African violets from leaves by using two flowerpots-one an eight-inch size and shallow, the other a three-inch pot. Cover the hole of the larger pot with a piece of crockery and partly fill the pot with sand. Close the hole of the smaller pot with a cork, and place this pot inside the larger one, filling the space between the two pots with more sand. If you keep the small flowerpot filled with water, the sand will be moist at all times. Set the base of the violet leaves in the moistened sand.

BEGONIAS AND SNAKE PLANTS

Begonia leaves may simply be pegged down with toothpicks on moist sand and slit across the main veins. Small plants will develop at the wounds. The ever-popular snake plant, or Sansevieria, may be propagated by cutting leaves into sections an inch or more in length and pegging them into moist earth. The leaves of this white or yellowish plant take root easily but grow slowly.

Any plant you are raising from leaves or stems should be covered by a glass jar or globe until it has become well rooted. The covering keeps the air immediately surrounding the plants moist; an excessively dry atmosphere would soon kill them.

GROWING FLOWERS INDOORS

If flowers interest you more, you will find that marigolds, petunias, and other plants will flourish in your window boxes. Smaller seeds should be planted about a quarter of an inch deep, and larger ones slightly deeper; allow at least an inch between Seeds. When your seedlings are large enough to handle, transplant them to window boxes or flowerpots. An excellent mixture in which to plant them at this time combines two parts garden soil, one part sand, and one part leaf mold.

Vegetables-for Decoration and Food

SWEET POTATOES

Of all the plants that can be raised from roots, the sweet potato is probably the most satisfying. It needs nothing but water. A sweet potato should be placed in a glass or bowl so that about one-third of it is in water. If necessary, you can push three tooth-picks into the plant to support it on the rim of the bowl or glass. Although this will not yield a vegetable harvest, the leaves produced are extremely decorative.

WORKING WITH SEEDS

If you wish to work with seeds, you will need a shallow tray with holes in the bottom (for drainage) to start your gardening. Place small stones or pieces of broken flowerpots over the holes; then sift soil into the box and press down firmly until the soil is within an inch of the top. If you want to try a miniature vegetable garden, you can plant such seeds as peas, beans, and radishes.

GROWING DANDELION GREENS

A child who shows real enthusiasm for gardening may derive great pleasure from growing a few indoor "crops" during the winter which may be used on family menus. However, a warm cellar is usually essential for such activity. There are several plants that will flourish in a box of earth set beside a furnace. Dandelion greens, which are a tasty substitute for lettuce, are among the easiest to obtain and raise.

Dig up the plants, including roots, before the ground freezes, and cut off a good two inches of the leafy top. Then set the roots in a box of good garden soil, and keep them in a constantly warm location-if possible, near a furnace. They require some watering but need no light.

GROWING RHUBARB

Rhubarb will thrive under cooler conditions. A temperature of about 50 degrees is best; but the atmosphere should be moist and the plants should not be in a draft. To provide an occasional winter pie or breakfast fruit, dig up clumps of rhubarb root in November; you can allow them to freeze under natural conditions or in a freezer. Then store them in a cool place and plant portions from time to time in a box of earth or sand. Tender young shoots will grow from the nourishment stored up in the roots.

Young Dirt Farmers

There is something about working with earth that is deeply satisfying to boys and girls-and out-of-door vegetable gardening provides a splendid combination of physical exercise plus the challenge of producing food from the soil.

When space is limited, we sometimes feel it is best to "bother" only with flowers. However, a small corner devoted to vegetables can give youngsters a wonderful sense of accomplishment. I know of two ten-year-old boys who raised radishes, lettuce, corn, string beans, tomatoes, beets, and carrots in one plot just six by ten feet. They were able to make substantial contributions to the table, and the only help their parents gave was in the spading.

RADISHES-A FAST CROP

Radishes are a special boon to young gardeners-particularly those with limited planting space. Some radish seeds may be mixed in with seeds of other vegetables, perhaps beets and carrots, for they pop up above ground in a few days. Thus the planted rows are almost immediately marked, and weeds cropping up between them can be dealt with promptly. Another good point about radishes is that they mature in a month

or so and can then be pulled out and eaten-while the slower-growing vegetables continue to develop and occupy space vacated by the radishes.

CORN-A SOMEWHAT PUZZLING PLANT

Even children who do not aspire to raise their own vegetables are likely to be interested in growing corn. Corn is a universal food favorite. Not only that-it is something of a symbol of our American heritage-of lessons learned from the Indians and the bountiful harvest that inspired our traditional Thanksgiving.

Corn is in a class by itself and something of a puzzle. What is the silk tassel comparable to on other plants? Are those green husks that encase each ear regular leaves? How do the green husks differ from the long narrow leaves that hang loosely from the stalk? Is each kernel of corn a seed, or is the whole cob a seed? And why do we sometimes find tiny, undeveloped kernels among others that are fully ripe?

Early Development of the Corn Plant: If a child could observe the progress of a corn plant, he would see that when it first appears above the ground, its leaves are wrapped in a colorless sheath in a pointed roll. These leaves soon spread apart. Growth is slow; but presently the main stalk becomes visible-and once above the ground, it stretches up rapidly.

The main stalk develops more leaves and also ears which are located at the leaf joints, or nodes, where the stalk is hollowed out in order to hold the ear more snugly. The ear is actually on a branch stalk, and the leaves of this stalk are those that are wrapped around the portion we call the "cob." It is on the cob that the seeds, or kernels, will develop.

Flowers-the kind bearing pistils-now appear in pairs along the sides of the cob, and the corn "silk" develops. Each strand of silk is really a pistil, with the stigma at the upper end of a very long style (the prolongation of the ovary) . In order to secure pollen, this silk, or pistil, must extend from each flower to the tip of the cob, and beyond the leaf wrapping.

How the Corn Plant Is Fertilized: Meanwhile brown tassels have appeared at the top of the main stalk. These are the plant's flowers which bear stamens and produce pollen. The tassel is made up of many florets, each having two anthers hanging from it; half of each anther is a little bag of pollen grains. When the pollen is ripe, this bag opens and the grains fall on the silk below. The ends of the silk are now branched and covered with fine hairs, to catch the pollen.

After "landing," a pollen grain goes on a remarkable journey through the entire length of the corn silk until it reaches the ovule. Now that the ovule is fertilized, it will develop into a kernel or seed. If a strand of silk from one of the flowers does not receive a pollen grain, no kernel will develop. An ear with some of these undeveloped kernels is called "imperfect." If pollen from another variety of corn reaches the stigmas of the silk, the ear shows a mixture of the two kinds of kernels.

Self-Preservation in the Corn Plant: Corn stalks are so tall and slender that heavy winds can damage them seriously. Yet the structure of the plant provides some defense against wind. The cylinder-like stalk with its pithy center is sturdier towards the base, as the hard nodes, or joints, occur closer together there. Towards the top the nodes are farther apart, allowing the stalk to bend with the wind and recover.

The leaf structure also affords protection against the wind. The true roots go deep into the soil, but even so they are inadequate for holding a tall heavy plant upright

in a windstorm. However, aside from these roots the corn has other roots about the base of the plant-they suggest a tentlike frame-which hold the stalk erect.

PUMPKINS-SOURCE OF DELICIOUS PIES

Every year harvest pictures remind us that corn and pumpkin are constant garden companions. A child may guess that these two vegetables are planted together because one grows high while the other barely rises above the ground. The real reason, however, is found in the nature of the respective roots: The pumpkin is a shallow-rooted plant, whereas the true roots of corn go deep into the earth. The consequence is that the two plants do not fight each other for minerals and water.

The Classic Beauty of the Pumpkin: The fruit of the pumpkin plant, being the source of jack-o'-lanterns and delicious pies, rather overshadows its flower and foliage. The rugged, broad-based leaves, with their three to five lobes, form a decorative design of classic beauty. The delicately curved tendril on the pumpkin vine is worth observing. Possibly the tendrils are a holdover from a remote past when pumpkin vines lifted themselves off the ground, as certain gourd vines do today. Occasionally you may notice a pumpkin vine reaching out as it climbs on the edge of a field, over mounds of earth or fences as if it were actually a climbing plant.

Pumpkin Seeds: At first a young pumpkin is held up by a stiff stem, but as it grows heavier it rests on the ground. If you cut across a green pumpkin, you will notice that instead of a cavity inside, there are a number of partitions within which seeds are borne. (A cucumber has much the same arrangement.) As the pumpkin ripens, the partitions around the seeds become stringy a very different texture from the "meat" that forms a thick solid layer between the skin and the inner chamber.

The pumpkin is a plant that requires no aid from man aside from planting. Another favorable trait is that it helps to check obnoxious weeds.

Weeds Are the Farmer's Enemy

The child who has a chance to work in a garden develops a new respect for nature-the greatest farmer of them all. As he comes to realize what labor and skill go into producing plants, he looks appreciatively at natural "crops" that no man has aided. He concludes that although these plants which cover the countryside may be attractive and have certain uses, they are nothing but weeds if they spring up where they are not wanted.

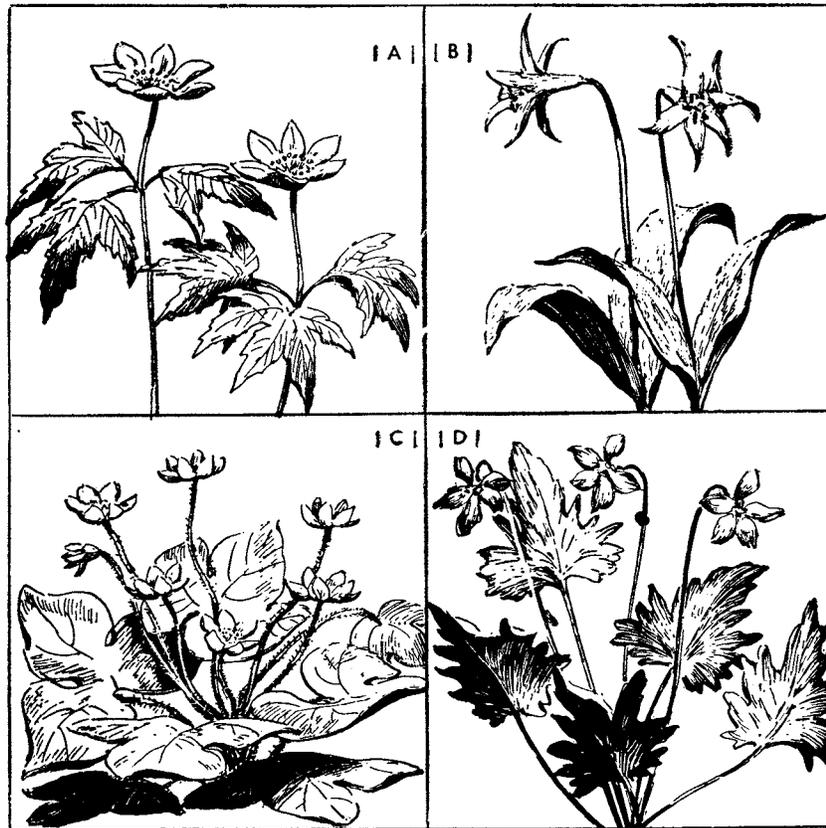
WEEDS-PESTS THAT MAY BE BEAUTIFUL

Children are sometimes perplexed about weeds. We usually speak of them with disdain or annoyance, yet the flowers that some produce are as lovely as those we carefully tend in a garden. It is not the looks of the weeds that disturb us; their ability to produce fantastic numbers of seeds makes them a nuisance in little gardens, and a serious problem to farmers.

Members of the composite family, which includes daisies and goldenrod, are among the chief offenders; bindweed (a morning-glory), devil's paintbrush, and others swell the ranks. Because of their attractive flowers, many types of weeds were intentionally brought to America from Europe, where they had been kept in check by the nature of their surroundings-farms, forests, and cities. In the great open spaces of America they ran wild, and today they are more of a pest than a pleasure.

Wildflowers to Look for in Springtime

People in the tropics are fortunate in having flowering plants throughout the year, but few northerners would exchange the joy of hunting the first spring flowers for all the luxury of endless blossoms.



[A] THE WOOD ANEMONE—Sometimes it is called "windflower" because of the way it sways in spring breezes.

[B] THE YELLOW ADDER'S TONGUE—It is known by several names; "trout lily" properly identifies it, for it is a member of the lily family.

[C] THE HEPATICA—Each flower is covered with a soft, hairy coat.

[D] THE COMMON BLUE VIOLET—Besides the lovely spring flowers, in summer it bears small greenish flowers beneath its leaves.

As you search for the elusive hepatica, trillium, and other flowers that appear soon after the last snows have melted, you may wonder how it is that these flowers are on hand in so short a time after the end of cold weather. After all, daisies, irises, and many others will not bloom until summer, and still others—such as asters and chrysanthemums—wait almost until fall.

Is it only the warm weather that brings forth flowers? If so, why do plants have such varying timetables? Here is the answer: Tests have shown that plants react differently to the amount of daylight they receive. Some are stimulated to bloom by short days and long nights.

At first it sounds contradictory to say that hepaticas and other early spring flowers are "short-day" blossoms—they make their appearance as days are growing longer! However, they have actually been formed the previous year. Formation takes place

underground; when the temperature becomes favorable, these flowers rise up into the light and air.

On a quest for early spring flowers, you are likely to observe that many of them are white. Later in the season you will find more color. There is a definite reason for this. Flowers formed underground are white to start with because no pigment has been developed. When they are exposed to light, many of these flowers take on various hues, among them blue, red, or yellow.

HEPATICAS CLOSE FOR THE NIGHT

One of the earliest flowers of spring, the hepatica must be hunted among the decaying foliage of the previous fall. As its blossoms grow they rise about three inches above the brownish leaves of the year before, and the new leaves may appear very soon after. The petal-like sepals are white, pink, or bluish-lavender. Young blossoms close during the night and on dark days; older ones remain open all the time.

You are most likely to find the wood anemone, a member of the same family as the hepatica, along the borders of woodlands. The anemone is an inch or more taller than the hepatica; its flowers are white or delicate purple.

ADDER'S TONGUES ARE LILIES

Yellow adder's tongue favors moist woods and brook sides, though it sometimes grows in open fields in the East. White adder's tongue is common in the West and South. The small bell-shaped flowers appear in early spring, but the leaves, pale green mottled with brownish purple, are found carpeting large irregular areas long after the blossoms have gone. The yellow adder's tongue, though a member of the lily family, is often called "dogtooth violet."

VIOLETS-NOT ALWAYS SHY

In the true violet family there is a "dog" violet found especially in the sandy soils of the Northwest. This is a low, creeping species with light purple flowers. Fairly widespread also is the downy yellow violet which blooms almost anywhere in low ground. It is tall in comparison to most violets-sometimes as high as seventeen inches.

As for the common violet, you may find it almost anywhere in low ground. As a rule, the deep green heart-shaped leaves usually grow a little taller than the flowers. In marshes, however, the flower stalks are longer than the leaf stalks and the flowers are exceptionally large. The flowers of the common violet range from rich purple to light violet. There is also a rare variety which is white with purple veins.

TRILLIUM FOR THREEFOLD

The season for trillium begins in April with the poetically named wake-robin, a species that produces purple, red, and sometimes purplish flowers. There are other species, but it will be June before you find the white large-flowering trillium. It is this handsome kind that flower-fanciers often cultivate.

The trilliums grow mostly in damp, rich wood soils. You can help children in identifying these flowers if you explain the meaning of "trillium," which comes from the word triplum, meaning "threefold." These flowers always have three petals and the plants have three leaves and three sepals.

JACK-IN-THE-PULPIT-MINIATURE PREACHER

No plant is easier to remember and recognize than jack-in-the-pulpit, for to an imaginative child the club-shaped flower head does represent a miniature preacher, while the spathe (a bract or modified leaf) forms his pulpit.



[A] JACK-IN-THE-PULPIT—Its flowers are well hidden in the depths of the "pulpit." This plant is related to the skunk cabbage.

[B] THE WHITE TRILLIUM—Though this charming member of the lily family belongs to woodlands, it is also a successful garden flower.

[C] THE DANDELION—At the left of the drawing is a flower head at its height of blooming. At the right is a flower head gone to seed.

Moist woods are the best place for locating this plant. When it first pushes through the earth it looks like a pointed peg. Inside the pointed and mottled sheath are the leaves, rolled lengthwise and forming the point. The club-shaped spathe is at the center.

As the leaves grow and open, flowers develop at the base of the spathe. There are two different kinds; greenish, round pistillate flowers, packed like berries on the stalk; and tiny, almost white flowers, which bear the pollen. The two kinds grow on separate plants. You may sometimes find both types on the same plant, with the pollen-bearing kind set above the others. In such a case only the pollen-bearers function.

By the time summer comes around, the "pulpit" falls away from Jack, revealing shining green berries formed from the pistillate flowers. In August, when the leaves may have also disappeared, you will find that the berries have turned a brilliant scarlet.

CACTUS-NOT JUST A DESERT PLANT

We usually associate cactus plants with the desert. Some cacti, though, thrive in such contrasting localities as the high South American Andes and the Pine Barrens of New Jersey.

Many varieties of this hardy, spiny plant have been adapted for indoor gardens, so you don't have to be anywhere near a desert to enjoy the flowers of a cactus. Cacti may bloom in your home any time during the year-not just in the spring as the desert plants do.

It is in the springtime that we see desert plants at their best. Outstanding are the pink, yellow, and rose blooms of the prickly pear, the white flowers of the giant sahuaro, and the yellow blossoms that form a ring about each round column of the barrel cactus.

Storehouses of Water: Most children are fascinated by the curious forms that cacti take. They can see some of these plants in the hothouses of botanical gardens, and they are very likely to wonder about their lack of leaves. Actually the cacti do very well without leaves.

"Leaf-green" in their thick fleshy stems takes care of manufacturing their food, and the absence of leaves prevents the water inside the plants from evaporating. They store water in the stems to such an extent that they can survive periods of drought for an amazingly long time. Many people lost in the desert owe their lives to these natural water tanks.

Plant Survival in the Desert: In humid regions plant species are largely assured of survival by their great numbers. In deserts, where plants are comparatively sparse, they have evolved a number of defenses to keep humans and animals from preying on them. Notable are the spines, thorns, and toughness of the cactus. Other plants depend on bitterness or unpleasant odors, a few on poison.

Aside from cacti, the desert offers many other colorful floral displays. Visitors from near and far are attracted every year to desert areas-the vicinity of Bakersfield in California, for example -to see lilies, poppies, violets, primroses, and verbenas blooming in a riotous profusion of brilliant colors.

The Charm of Summer Blossoms

DANDELIONS-PERSISTENT WEEDS

This golden-headed flower, one of the most persistent of all weeds, is occasionally a source of income to youngsters, who earn money by helping rid lawns of dandelions. In early summer dandelions can provide a lot of fun for children. The youngsters can whistle through the hollow stems, or make dandelion curls of them; they may even pretend to tell time by the number of puffs required to blow away all the seeds on a ripened stem.

The Adaptable Dandelion: Children have done such things to dandelions for ages, man has tried his best to exterminate them, animals have grazed on them, other plants have attempted to crowd them out-all in vain. The dandelion has had extraordinary success in surviving. One of the many reasons for its survival is its adaptability to circumstances. For example: In a meadow of tall grasses the plant sometimes reaches a height of two feet-and more; but on a lawn the flower stem may be less than two inches tall, saving the flower head from the blades of the lawn mower!

The Dandelion is a Composite Flower: The dandelion belongs to the great family group that we call "composites"-a word that comes from the Latin and means "made up of parts." Aside from the dandelions, the composites include asters, thistles,

and a great many other kinds of flowers. All have compound flower heads (the term "head" is commonly used for a cluster of flowers) .

Petals and Buds in the Composites: Some of the composites have a disk in the middle of the flower head. This disk is made up of tiny tubular florets, and around it are brightly colored ray flowers, or petals.



[A] THE WHITE DAISY—One of the best-known wild flowers of America, this plant originally was an immigrant, coming from Europe with early colonists.

[B] THE BUTTERCUP—It is sometimes called "crow's-foot" because the shape of its leaf suggests a bird's claws.

[C] RED CLOVER—It has an unusually long period of blooming. Flowers may be found from April until November.

[D] COMMON MILKWEED—Its small, purplish-brown clustered flowers, rich in nectar, are especially attractive to insects.

The dandelion belongs to another type of composite which has a petal-like part on each flower. In a just-opened dandelion you can see the buds at the middle all curving slightly toward the center. They are also shorter and a darker yellow than the outer florets, for they are younger. The flower head is well protected by long bracts; shorter bracts near the stem curl back, forming a frill.

How the Dandelion Opens and Closes: Dandelions close on dark days and at night. It is often eight o'clock before they begin to wake up, and it may take a full hour for the golden head to be completely opened. When all the florets on a head have blossomed, the dandelion closes for good until its seeds are formed. Each seed is

equipped with a fluffy, parachute-like head. When this head is dry it can "parachute" the seed to new growing ground.

How the Dandelion Got Its Name: You need a good imagination to see that the notched edges of dandelion leaves resemble lions' teeth; but that is what they looked like to someone in France who named the plant dent-de-lion, whence we get our name for it.

FROM "DAY'S EYE" TO DAISY

This flower, which has much in common with the dandelion, is a great favorite with children. Like the dandelion, it is an amazingly persistent weed; and it is also a composite. At its center we find numerous short, yellow, tubular disk flowers.

These are surrounded by twenty or more ray flowers-"petals" to children, who love to pull them off one by one with "he loves me, he loves me not." If you look closely at these ray flowers you will see that each has a pistil which shows a two-part stigma at its base. The flowers ripen many seeds but they lack the traveling equipment of the dandelion.

In the yellow daisy, commonly called "black-eyed Susan," the purple-brown disk flowers form a conical, button-like center for the orange ray flowers. Still more color is added to the flower when brilliant orange pollen appears.

Like the dandelion, the daisy opens in the morning. It owes its name to this trait-people in Old England called it "day's eye," which finally became our "daisy."

BUTTERCUPS-SOMETIMES THREE FEET HIGH

Growing as they do in the same fields, buttercups and daisies are commonly associated in children's minds. There is an essential difference, however; whereas the daisy is a composite, the buttercup is a single flower. The five (and sometimes more) wedge-shaped petals are slightly curved, giving the flower its cuplike form.

"Do You Like Butter?": The bright yellow color of the buttercup gives it a shiny finish which in bright sunlight quite easily reflects on another surface. That is why the answer is nearly always positive when a child follows the old custom of holding a buttercup under a playmate's chin to see if he "likes butter." (If yellow is reflected on the chin, the answer is "yes.") Outside the reflecting petals are five sepals, about half the length of the petals and pale yellow with brownish tips.

There are many different kinds of buttercups; the common one of fields and meadows is properly called the tall buttercup. It may grow as tall as three feet! Though you are likely to find buttercups as early as May, they bloom through August and sometimes until frost appears.

LUCKY CLOVER

Among our most popular superstitions is the one that promises good luck to the finder of a four-leaf clover. It is a fact, however, that the clover plant is good fortune for all of us.

25,000 to the Inch: In addition to being a valuable food crop for horses and cattle, clover has an almost magical way of bringing fertility to the soil. The secret of this power lies in the little swellings-sometimes called root tubercles or nodules-that you will find on the rootlets. Each swelling is occupied by bacteria, so many that 25,000 of them, lined up, would cover only an inch of space.

These bacteria extract nitrogen, a valuable chemical fertilizer, from the soil and change its form so that clover can absorb it. When a crop of clover is harvested, the roots remain in the ground with their precious supply of fertilizer. This is one reason why farmers, in rotating their crops, plant clover every few years.

Collecting Clovers is Fun: It is fun for a child to make a collection of clovers, for there are many attractive species, including crimson, red, white, rabbit-foot, buffalo, and yellow. Both leaves and blossoms can be kept for several years when pressed between pieces of wax paper or cellophane. It is even possible to become an expert at finding the rare four-leaf clover to add to one's collection. These leaves turn up here and there in the midst of stalks with three leaflets.

The three-leaved grouping is the customary one and has given the plant its scientific name, trifolium ("three-leaved"). To find the out-of-the-ordinary stalk with four leaflets, you need to practice looking for a square pattern in a carpet of triangles. Stand erect and scan the clover design; where one four-leaf specimen is found there are apt to be more.



[A] **QUEEN ANNE'S LACE**—These flowers, grouped in lacy, geometric designs, seem especially suited for decorations in "modern" settings.

[B] **GOLDENROD**—The different kinds of goldenrod vary somewhat in form, but all are easily recognized by their masses of small golden flowers.

[C] **WILD ASTERS**—This beautiful fall flower is sometimes called "Michaelmas daisy" because it blooms near Michaelmas Day.

[D] **SWAMP SUNFLOWER**—Because its leaves were once used for making snuff, this plant is known also as "sneezeweed."

MILKWEED AND ITS STRANGE SECRETION

This plant has two products that fascinate children: its milky juice of rubber-like composition and its skeins of shining silk. To see the "milk," all they need do is break the stem of the plant or cut across a leaf.

The "milk" is a special secretion-not the sap of the plant. If you cut across the stem and then blot the end so that you can see the details clearly, you will find that the liquid oozes from a dark green ring around the hollow stem. On a plant that is only partially broken or gashed, the "milk" soon heals the wound.

Murder by Milkweed: The extremely complex flowers growing at the junction of the milkweed's leaf stem and plant stem are fertilized mostly by bees. Every once in a while one of these insects loses its life on the flowers! It is actually trapped by the anther, and this is how: Instead of being free, the pollen is held in paired sacs that are joined in a V-shape. The bee, busy collecting nectar, may stand in the V, and the little sacs of pollen-producing anthers may close on its legs. If the grip is too tight, the insect cannot free itself.

Milkweed for Life Jackets and Aviators: Once the milkweed flower has been fertilized, the seed pod begins to grow. The fully developed pod bursts apart at the seam, and you can see the brown, overlapping seeds inside with exquisite silk attached to one end of each seed. When the silk is dry, each fluffy mass of threads parachutes off in the breeze carrying a seed with it-in some cases for a very long distance.

Milkweed floss has been used commercially to stuff life jackets; it is more buoyant than cork-and to line aviators' uniforms, as it is six times lighter than wool, and just as warm.

QUEEN ANNE'S LACE-BEAUTIFUL YET TROUBLESOME

This plant is very beautiful, as its name suggests, but it is also a very troublesome weed. You are likely to find it in waste places and fields almost anywhere. It is also called the wild carrot, and it is really closely related to the garden carrot. On a fully grown plant, the yellowish root is six inches long or more; but it isn't good to eat.

The Flower Cluster: Each large flat flower cluster, with its radiating pattern as fine as lace, is made up of many small flower clusters, each in turn with a stalk of proper length to fit into just the right place in the medallion pattern. These small flower clusters each have twenty or thirty tiny white blossoms in a rosette design.

If you look down at one of the large flower clusters, you will notice that the outside blossoms have small bracts-the special leaves which, in this case, resemble the petals. These are larger than the petals and create a pleasing border effect for the complete cluster. Often you will find a single wine-colored floret in the center on its own stalk.

When Queen Anne's lace begins to wither, each of the small clusters curves inward until the whole unit suggest a tiny bird's nest. Thousands of seeds develop on each plant, and many live to germinate.

GOLDENROD-ANOTHER COMPOSITE FLOWER

From early summer to late fall you can see these bright yellow flowers on dry, sandy roadsides, along moist riverbanks and seashores, at the edges of woods, in sunny meadows, in mountainous regions, and on flat barren plains. In all these localities there are many kinds of goldenrod-more than fifty all told.

The goldenrod is another interesting example of a composite flower. Each flower head is very small, but the plant makes a bright showing because the florets are set close together. On each delicate branch there is a procession of ray flowers with short but brilliant banners, and a few tubular disk flowers that open out like bells. Look at the disk flowers closely and you will see in them the pollen tubes or yellow two-part stigmas.

Insects of many shapes and sizes carry the goldenrod's pollen far and wide for it.

ASTERS-ATTRACTIVE TO BEES

Like goldenrod, asters are to be found in all sorts of places, and there are numerous species. They too are composites, but the flower heads are different in form from the goldenrod. At the center of their circular flower heads there are yellow disk flowers that turn a dull purplish color as they age.

These disk flowers yield an abundance of nectar, and you frequently see bees, small butterflies, and beelike flies visiting them. One of the most beautiful and best known is the New England aster; it is widespread throughout the eastern United States and is frequently cultivated. Its numerous flowers, blooming from August to October, vary in hue from pale violet to deep purple.

SOME SUNFLOWERS ARE TWELVE FEET HIGH

Because of its size, this giant plant serves best of all to show us the make-up of a composite flower. One wild species, the "tall sunflower"-is common to swamps and the borders of wet meadows. It grows as high as twelve feet and has a flower head about two inches across. On the common garden sunflower the flower head may have a width of ten inches.

First to unfold are the wide, flaring ray flowers that are largely responsible for the sunflower's spectacular appearance. There may be two or three rows of these. When they are a few days old, you can see inside them a circle of florets from which ripened pollen and stigmas have already disappeared. Below the florets fertilized seeds are now developing.

Inside this circle is another composed of florets where coiled back stigma lobes protrude from the anther tubes. Next, moving toward the center of the flower head, you may see several rows of florets in which pollen is just being pushed out; and within this ring may be florets with the anther tubes still closed. At the center are buds with the inmost few still covered with the green spear points of their bracts, or specialized leaves.

Sunflower Myths: Children who have not had a chance to observe sunflowers may be interested to know if it is true that these blossoms twist on their stems in order to face the sun all day. This widely circulated story is charming but not particularly accurate. Some of these giant flowers have been observed turning with the sun to a certain extent when they first unfold-but not after they grow heavy with seeds.

Another published observation is that many turn for their last few weeks of bloom to the east and remain that way. Watching those that grow in my neighbor's garden-they are planted, by the way, to raise seeds for her winter bird-feeding station-I have not seen any evidence of the flower heads following the sun. The direction they usually face is south.

Wildflower Bouquets and Gardens

Part of the joy of flowers comes from picking them and arranging them in enchanting bouquets. Unfortunately, we are limited for the most part to garden plants.

Many wild species have become so rare that they are protected by law; others, such as wild roses and asters, though plentiful, wilt quickly after they are plucked.

WHAT FLOWERS TO CHOOSE

Despite these limitations, we still have some excellent material for wildflower bouquets. The common blue violet is one of the very few spring flowers not on the "protected" list of most states, and in summer, buttercups, daisies, black-eyed Susans, goldenrod, and Queen Anne's lace lend themselves to charming floral decorations.

When you have a chance to pick wildflowers, it is best to cut them with scissors or regular garden clippers. Later, the stems should be cut on a slant with a sharp knife. Then, if they are left in a pail of water for a few hours or overnight, they may regain much of their freshness.

GROWING A WILDFLOWER GARDEN

Few hobbies are more delightful than a wildflower garden. With very little trouble you can transplant daisies, black-eyed Susans, and certain other hardy species, making them thrive close to your home. You can usually move even the rarer plants, such as red trillium, violet, and wild geranium, if you take along a generous amount of earth. As a matter of fact, many commercial growers specialize in quite rare plants; you can obtain the wildflowers in this way when it is not feasible to take them from their native growing places.

How to Press and Mount Plants

Pressing wildflowers is still another way in which children can get pleasure from them. They can also have a world of fun arranging the flowers in attractive groupings and framing them as wall pictures. You will again want to stress to youngsters, before they do any picking, that only plants that are plentiful should be taken. It is well for children to make a habit of asking their parents about protected wildflowers before doing any picking. The parents can then check conservation laws with local authorities.

Techniques for Pressing Flowers: When you collect plants for pressing, keep them damp until you are ready to place them under pressure. You can manage this by taking a few damp newspapers on a collecting trip and carrying the plants between the pages. For ease of handling, you can roll up the papers-not too tightly, however, or the leaves may crack.

When you are ready for pressing, place a piece of newspaper about twelve by eighteen inches on the floor, and lay plants or flowers on top of it. As you may want to frame them later on, take care to arrange petals, and leaves in natural positions. A violet, for example, usually looks more natural if pressed in profile. A few buds with the full-bloom flower and some leaves make a complete story and an interesting composition. Make sure that no plants overlap during the pressing.

How to Dry Out Plant Moisture: Now that you have laid out the plants on newspaper, cover this arrangement with a layer of newspaper equal in thickness to the thickest part of the plant or plants below. Add layers of plants and paper until your entire collection is taken care of. Over this pile, place a board or other flat object equal in size to the newspaper, and on top of this put weights such as books, rocks, or other heavy things. If the weight is not heavy enough, the plants will wrinkle.

Change the paper or move the plants to a dry location every day for at least four days-then less often, for about ten days. The more rapidly the plant loses its moisture, the better its delicate colors will be preserved.

How to Mount Plants: To mount a plant you need a piece of glass as large as the specimen you are preparing. Cover the glass with a thin coating of glue diluted a bit with a drop or two of vinegar. Place the dried plant on the glue (to get the glue on one side) , then quickly transfer the plant to a piece of mounting paper. Now you are ready for framing. If a plant is too delicate for this treatment-it may curl when it is picked up from the glue-you can mount it by placing thin strips of gummed paper at intervals across the stem.

Some Plants Have No Green Parts

Knowing as we do how vital "leaf-green" is to the growth of plants, the mushroom and other fungi that develop without a trace of green seem rather mysterious to us. No wonder that generations ago, when not too much was known about plant life, people stood in superstitious awe of the magic "toadstools," which seemed to spring out of nowhere and were sometimes good food and sometimes poisonous. When you are on a woodlands hike with your youngster, especially in late summer or early fall, you can get a lot more out of your trip if you watch for members of this fungus family growing wild.

WHAT FUNGI FEED ON

Lacking leaf-green, mushrooms are unable to manufacture starch, sugar, and other elements, and must absorb them from dead wood, withered leaves, or soils enriched by remains of plants. They are the kind of fungi we know as "saprophytes" (living on dead or decaying matter), and they are valuable plants because they prevent forests from becoming choked with dead wood. As mushrooms and other fungi absorb tissue from stumps and old logs, the wood softens and falls apart.

FUNGI THAT PREY ON LIVING THINGS

The other kinds of fungi, the "parasites," take their food from the cells of living things. These fungi are often dangerous enemies to the plants and animals on which they grow. It is a parasitic fungus that causes "potato blight"; another is responsible for the costly disease known as "wheat rust." The simplest forms of parasitic fungi that take their nourishment from animals are the bacteria that cause diphtheria, typhoid fever and other serious diseases.

MUSHROOM SPORES INSTEAD OF SEEDS

As mushrooms have no flowers, a child may wonder what they do about seeds. Flowerless plants have their own special kind of "seed." Microscopic in size, it is called a "spore." After landing in a favorable growing place, the spore of a mushroom develops rapidly into a threadlike form. From this a whole mass of threads grow out for weeks or even months, until there is enough tissue to produce a fruiting body-then, with startling suddenness, the mushroom appears!

PRECAUTIONS AGAINST POISONOUS MUSHROOMS

Mushrooms are usually abundant in damp, wooded spots, as they do not need sunshine. If we happen to be in one of these localities, we may be tempted to find some mushrooms suitable for eating. It is a temptation best denied. Unfortunately some people rely on tests that are supposed to indicate when a species is poisonous-they believe such mushrooms turn a silver spoon black or change color when bruised. None of these tests are of the slightest value. A number of characteristics do help to distinguish the poisonous from the nonpoisonous species, but only an expert should attempt to draw the distinction for eating purposes.

Mosses Favor Moist Places

There is a shrub known as the "flowering moss," but you can be sure it is not really moss-no moss bears flowers. The so-called flowering moss merely suggests moss in a superficial way because of its appearance.

Mosses, like mushrooms, produce spores. The moss spore grows a branched green thread on which leafy buds soon appear. They develop further into leafy stems which in turn produce rootlike projections-not true roots. Some of the plants bear eggs at their leaf tips while others produce sperms. Wind, or films of water supplied by rain or dew, may bring sperm and egg together. After fertilization they develop delicate upright stalks on which spore cases full of green-colored spores will form.

THE MOSS AS A COMPASS

In June you can generally see mosses in all stages of development. Usually you find moss only in rather moist places, on woodland floors and on rocks and tree trunks where strong sunlight does not penetrate. The American Indians commonly used this bit of nature lore to determine their direction-moss usually grows on the northern side of tree trunks where there is least exposure to sunlight.

THE BEST-KNOWN MOSS

What is probably the best-known moss has several names: common hair-cap, bird wheat, or pigeon wheat moss. It grows not only in woods but in open fields and meadows as well as in all parts of North America; it is found also in Europe and Asia. It is rather a large moss with stems a foot long, and in fall or winter you will see it as a greenish-brown mass of bristling stems.

By the arrival of summer the new growth tips these with vivid green. During dry spells the small leaves shut lengthwise into mere threads and huddle against the stem to prevent their moisture from evaporating. After a rain they open up again. In Europe this moss is used for making small brooms and for mattresses.

Ferns, Fronds, and "Fiddle Heads"

Most children love ferns as much as they do flowers. Ferns lack colored petals, but by way of compensation they have gracefully shaped fronds, or leaves, that are a delight to the eye from the time they come through the ground and uncoil like a watch spring until the divided leaves are fully developed. While the leaves are still partly coiled they are called "fiddle heads," as their shape resembles the top of a violin.

FERNS FOR DECORATION

Ferns are frequently cultivated and used for decoration; consequently a fernery makes a very rewarding project. To begin with, the ground for a fern garden should be dug up and treated with well-rotted leaves and humus. When you transplant specimens from the woods, take a large ball of earth with each plant, and water the ferns well for several days after each planting. Give the ferns the same conditions of shade and sunshine, as far as possible, as they had in the natural state.

Among the most attractive species are the Christmas fern of the East and its close relative, the sword fern of the West. They are very similar in appearance-except that the sword fern grows much larger.

FERNS AND THEIR SPORES

Ferns, like the mosses and mushrooms, produce spores. Some ferns also have a creeping underground stem, called a "rootstock," which pushes forward and sends up new fronds each year. One species is known as the "walking fern" because new growth

is started where the tips of the fronds come in contact with ground or rocks. Look closely at a Christmas fern in early spring and you will notice on the underside of some of the leaflets a double row of circular, raised fruit dots, looking like pale blisters.

Later on these "dots" turn brown, and by the middle of June masses of pinpoint-size globules push out from under them. Each globule is a case packed with spores so tiny that even under a magnifying glass they look like yellowish powder. By July the brown covers have shriveled into irregular scrolls but still cling to the ferns.

Fronds and Frondlike Foliage: Not all fronds are fertile. The infertile ones-those without the fruit dots-are much prettier. Coming back to the fertile fronds, the brown spots are not always recognized as being covers of spore cases; many people take them for fungus growths. Another cause for confusion is that Queen Anne's lace and other plants with frondlike foliage look enough like ferns to be mistaken for them. A good test in case of doubt is to examine the center of the plant to see if the leaves are rolled into a coil. If they are, you are almost certainly looking at a fern,

How to Make Fern Prints

You can press fern fronds by using the methods described for flowering plants (page 332). A child will also enjoy making blue prints of fronds, and here is how it is done:

You can buy sheets of blueprint paper in any store which sells artists' supplies. Keep the paper in the dark at all times; the safest course is to keep it rolled and wrapped up in other paper. You will also need a picture frame with a glass and tight-fitting cardboard back. Then you can cut the blueprint paper into sheets the size of the picture frame-always being careful to avoid exposing the blueprint paper to light.

Finally, take two shallow pans, each somewhat larger than your sheets of blueprint paper, fill them half full with cool water, and add a teaspoon of hydrogen peroxide to one of the pans of water. Now your equipment is complete.

PRINTING THE FRONDS

A bright sunny day is best-but not essential-for your blueprinting operations. Working in a dimly lighted room, place the picture frame, glass down, on a table and remove the cardboard back. Place the ferns on the glass, and lay over them a sheet of blueprint paper with its greenish-blue side down, against the ferns. (Fronds that have been pressed for a day or two may give better prints than those freshly picked.)

Now replace the cardboard and fasten it firmly. The frame is ready to be exposed to sunlight at a window or outdoors-from two to five minutes depending on the intensity of the sunlight. After exposure, remove the blueprint paper from the frame and let it soak in the pan of clear water. In a few minutes, after the background of the fern has turned white, transfer the paper to the other pan of water to which the peroxide has been added. In this second bath-which fixes the print-the background will turn a deep blue and the outline of the frond will appear in white.

You can now remove the paper, wash it again in the clear water, and dry it. Dry the print between blotting paper or paper towels and leave it for several hours pressed between books or other heavy objects until it is completely flat and dry. This project can be managed even by a fairly young child, and the process can be used not only for ferns but for a collection of all kinds of leaves as well.