How Does a Plant Live?

If you were asked "How does a plant live?" you might answer "You plant the seed in the ground and the plant just lives and grows." But it is not that easy.

To start with, let's put a seed in some soil in a flower pot. If we leave the soil dry, the seed will not sprout. It must have water, so we water it. Now, if we keep the flower pot in a refrigerator, the seed still will not sprout. Seeds need warmth in order to grow. They also need oxygen, just as we do. That is one reason why we must not pack the soil too tightly around the seed. If we do, air cannot get to the seed.

The first thing a germinating seed does is to send a root down into the soil. The energy necessary for this comes from food stored in the seed. The root goes into the soil and branches many times. These many roots take in water and also anchor the plant in place. The young plant also sends up a shoot, which we call a stem. This stem grows longer and longer so that when the leaves grow on it they will be in the light and air.

It is necessary for leaves to be in the light and air because that is where they make their food. A plant gets only water and minerals from the soil. Food is made in the leaves. Inside the leaves is a green material called chlorophyll, which helps to make food. A leaf has many tiny air holes on its lower side; these let in air. The chlorophyll, which must be in the light, takes carbon dioxide from this air, combines it with water from the soil, and makes sugar. This sugar is used to make starch and other foods which the plant needs. Carbon dioxide, as you know, is the gas which we breathe out.

After the plant has grown up, it produces flowers. The lower part of a flower becomes the fruit, in which the seeds are produced. There are many kinds of fruits—apples, acorns, bean pods, corn kernels, cockleburs, hedge balls, mulberries, gourds. We eat many of these fruits (for example, the bean pod) for the food stored in them, but if we plant them, that same stored food will be used by the young plants in their early growth. And that starts the story all over again.

*University of Kansas Press, Lawrence, Kansas, 1948, $7.50.*
Playing With Flowers

Usually we dislike tearing flowers to pieces. But this time we want to learn about the parts of the flower so we must take one apart. If we have only one flower, perhaps we can take some colored paper and as we take the parts from the flower, we can make a large paper model of it. Then everyone can see how a flower is put together.

Not all flowers are alike, nor do they necessarily have the same parts. For an example we could use the wild blue sage or the wild gourd. (Do not use a sunflower or blazing star because they belong to the group of composite flowers. On the sunflower, each “petal” is a flower and each little piece of the brown center is also a whole flower. So a sunflower is really a bouquet.) On our typical flower we will find some green leaf-like parts at the back of the flower. These are sepals and all of them together are called a calyx. They protect the flower while it is still a bud. Sometimes they help support the petals. If we take these sepals off we can see the base of the petals. They make up the colored part of the flower and give it beauty. They may also attract insects. All of the petals together are called the corolla. At the base of this corolla is usually a drop of nectar, on which insects feed. Some petals, like those of the wild gourd or wild blue sage, are all fastened together.

If we take these petals off we will find several small threads with yellow or brownish knobs on the end. These are stamens, which produce pollen. This is the male part of the flower. Insects, or the wind, will carry pollen to other flowers, for fertilization.

In the center of the flower you will find a pale green part with the lower end enlarged. This is the pistil, or female part. The pollen lands on the end of the pistil and grows a root-like tube down into the enlarged lower end. This enlargement is the ovary; when the pollen tube reaches the ovary, fertilization occurs, and soon afterwards, the seeds start to grow and mature.

A few flowers have special adaptations to insure their pollen getting to another flower. The wild blue sage is one of these. The corolla is large and open at the outer end, but narrows down where the nectar is. The stamens, instead of being fastened at the bottom, are attached by a hinge-like structure at about their middle. They are curved so that when an insect sticks its head deep into the flower to get the nectar, it hits the lower end of the stamen. That bends the hinge and the anther dusts its back with pollen. When the insect goes to another flower, which may be more mature and have its pistil sticking out, it rubs the pollen from its back onto the pistil.

The yucca is another odd plant. Because the parts are hidden, the pollen cannot get from one flower to another in the usual ways. Pollination is accomplished by a moth called the yucca moth. The female gathers pollen from the stamen of the yucca, takes it to the ovary of another flower, drills a hole in the ovary and stuffs the pollen in. This will fertilize the seeds; at the same time she lays an egg in the ovary. When the egg hatches, the larva eats the growing seeds. But there are too many seeds and they grow too fast for the larva to eat them all, so about half of them mature.

The yucca, or soapweed, is found either native or cultivated in nearly all parts of Kansas.
Fall Wildflowers

In this issue, The Kansas School Naturalist presents descriptions and pictures of several common wildflowers that bloom as late as September or October. The descriptions are numbered to correspond to the pictures on pages 6, 8, and 9. A few of the descriptions also refer to pictures on the cover.

1. Arrowhead

This species, which gets its name from the shape of its leaves, grows about the edges of lakes and ponds and in moist or swampy places. Several of the white flowers are together on a spike that extends above the leaves. The arrowhead is a perennial, spreading by underground stems which bury themselves in the mud. These stems, or tubers, which are starchy like potatoes, may be roasted and eaten.

2. Cattail

Cattails grow in and near still water and can be found in almost every marshy place in Kansas. We have two kinds, the common and the narrow leaved. The latter has more slender spikes, and, as the name indicates, narrower leaves. The male flower is at the top of the spike and matures before the female, thus insuring cross pollination. The “cattail” is the female flower which has matured and produced tiny seeds in the fuzzy head. As with the arrowhead, the starchy underground stems of the cattail may be eaten.

3. Velvetleaf

This is a plant with many names, such as abutilon, pie-

mark, and butter print. The latter two names come from the shape and design of the seed pod. The species grows in rich soil, in fields and barnyards in eastern Kansas. In Asia, its original home, its strong fibers are used in making thread. The soft velvety leaves are scattered along the four or five-foot stem. The small yellow flowers are located at the junctions of the leaves and stem.

4. Flower-of-an-hour

This little annual plant is a troublesome weed in some areas, but constant cultivation will get rid of it. It grows about 10 inches high, and has many cream-colored flowers with purple centers. These look like tiny hollyhocks, as well they might, since they belong to the same family. The deeply lobed leaves are slightly hairy. The ripe pods are full of small gray-brown seeds.

5. Flowering Spurge

All over the eastern third of Kansas, in prairies, especially overgrazed pastures, grows the flowering spurge. The upright stem about two feet high is topped by a crown of small white flowers. When the three-lobed seed pods are ripe they snap open so that the seeds are thrown out with considerable force. When the stem or leaves are cut, a milky fluid is given off. The plant is somewhat poisonous; fortunately cattle do not seem to like it, although they will eat it when it is dried in hay.

6. Snow-on-the-mountain

(Cover, left center)

This is a common plant along roads and in overgrazed pastures. Growing about two feet high, it is topped with a group of small white flowers. However, most of the white that is seen is the white margins of the leaves surrounding the small flowers. The small flowers are in the center of the group of white-edged leaves, which many people mistake for a large white flower. This species, which is a relative of the Christmas poinsettia, has a milky fluid and popping seed pods such as are found in the flowering spurge.

7. Smartweed

Kansas has several species of smartweeds, all of which grow in moist places or actually in shallow water. The most common ones have either white or pink flowers. One of the pink flowered species has dense spikes of flowers. It grows about two feet high; the stems are reddish with swollen joints. In thick masses, the flowers give a pleasing border of color to the water’s edge.

8. Morning-glory

(Cover, right center)

Although there are many species of morning-glory, the flowers all resemble each other. In sandy parts of western Kansas is the bush morning-glory with its purplish flowers. It is a perennial with narrow leaves and an extremely large root. The common morning-glories of eastern Kansas are vines, mostly annual, although one grows from a heavy root like the bush morning-glory. The funnel-shaped flowers may be white, pink, blue, or purple. The ivyleaf morning-glory has three-pointed leaves instead of the usual heart-shaped ones. Its small flowers are light blue.

9. Milkweed

There are many kinds of milkweeds, blooming from spring to late fall. One of the most colorful is the butterfly bush. It grows in clumps and each stalk is tipped with a cluster of orange-red flowers. Milkweeds are better known for their pods and the “silk” tufts which float the seeds through the air. The pods may be used in many ways as decorations in the schoolroom, but be sure they are empty before they are brought in-
doors. The "silk" too, may be used under glass as a background for plant pictures.

10. **Mullein**  
(Cover, bottom right)

In the eastern half of the state these tall plants are commonly found in waste areas. They are biennials, forming a rosette of leaves the first year. In the second season the tall stems and flowers develop. Kansas has two common species, the flannel mullein, with a long flower spike and large furry leaves, and the moth mullein, with small flowers growing on almost leafless branches. The flannel mullein is sometimes called Indian tobacco, because of its similarity to the common tobacco plant.

11. **Detail's-claus**

This plant grows best in the sandy soil of western Kansas, but has moved eastward along the streams. It grows about a foot high and has yellow or white flowers, sometimes spotted with purple. The most interesting part of the plant is the fruit, which is tender when young and may be made into pickles. It is large at one end, but the other end curls out into a long hook. The two parts of the hook cling together until the fruit ripens; then the dry hardened parts spread apart and curl inward. Each curl is needle sharp at the end.

12. **Horsemint**

These plants have many names, among which are bergamot, bee-balm, and Monarda. There are several species, some of which are annual, although the largest one is a perennial. It grows two to four feet tall in thick clusters, flowering from late summer to fall. The purple flowers are especially attractive to bumblebees. The horsemint seems to prefer rocky hillsides, but is often found in rich soil along streams. The crushed leaves have a strong minty taste.

13. **Wild gourd**

Well known along roadsides and railroads, the wild gourd, or buffalo gourd vine, which grows as long as 30 feet, is found in dry plains soil over most of Kansas, but is more common westward. The yellow flowers are tube shaped, with the round young gourd at the base of each flower. When ripe the gourds are striped yellow and green, but as they dry they become almost a uniform light brown to tan. It is said that the dried fruit may be crushed and used as a substitute for soap.

14. **Compass plant**

This yellow-flowered plant, which grows five or more feet tall in prairies all over the eastern two-thirds of Kansas, is often mistaken for a sunflower—and indeed it belongs to the same family. One difference is that the ray flowers of this plant produce seeds while the disk flowers are sterile, just the reverse of the sunflowers. The name **compass plant** comes from the fact that the leaves stand with their edges stiffly north-south. The species is also known as rosinweed, from the resinous gum given off when the stem is broken. It is said that Indian and pioneer children used this resin as chewing gum.

15. **Sunflower**  
(Cover, top)

No Kansan needs to be told about the sunflower, although he may not realize that there are many species of sunflowers in the state. The most common one is an annual which produces a lot of seeds that are valuable winter food for birds. In fact, the heads may be gathered and kept for stormy weather, to be placed where the winter birds can find them. In the sunflower, the brownish disk flowers produce the seeds, while the yellow ray flowers are sterile.

16. **Broomweed**

In the fall in eastern Kansas, when a pasture seems completely yellow, this is due to broomweed. It grows about two feet high and has so many branches that a single plant looks a little like an upside down broom. The small yellow flowers are so numerous that the whole plant may appear yellow. The plant is an annual, but hard to control because of the many seeds and the fact that cattle do not eat it. Small plants may be brought into the schoolroom, dried, and used in vases until they become too brittle.

17. **Goldenrod**

Nearly everyone knows the golden-rod; the tiny yellow flowers arranged on the many branches give the plant an appearance that has been compared to a flaming torch. There are several species in the state, with the flowers arranged in flat topped clusters, spikes or cones. While usually thought of as weeds, goldenrods are sometimes used as garden flowers. The rubber content of the leaves is considerable, and it has been suggested that goldenrod might some day be cultivated for its rubber content.

18. **Aster**

There are so many species of asters that it would be difficult to try to describe them all. In general, they are small perennial plants with white or purple flowers. In most cases nearly the whole plant bears flowers, but a few have spikes. The first leaves to appear in the spring are large and broad, but these usually die before the plants mature, and the leaves of the mature plants are small. Asters are among the best of the wildflowers for bouquets.

19. **Blazing Star**  
(Cover, bottom left)

There are several species in the state, all of which have beautiful purple spikes of flowers. At least one species is found in every part of the state, so the "Kansas gayfeather" is a well known flower. In some species the spike is solid, but others have the flowers in small ball-shaped clusters along the stem. All have heavy roots, from which stems grow up. In early days extracts of the roots of these plants were used as medicine.

20. **Snakegourd**

Throughout the eastern half of the state, this perennial grows in woods and shady places, producing clusters of small white flowers until November, or even December when the weather is mild. The bee in the picture will show how small the flowers are. The plants, which usually grow in clumps from one to four feet tall, are sometimes used in home gardens. They are slightly poisonous, causing "trembles" or "mild sickness" in livestock grazing on it.

21. **Thistle**

The rose-purple flowers of thistles are common fall sights in nearly all parts of Kansas. Most of the species, either annual or biennial, look alike. Nearby leaves. Each "flower" is really a mass of many tiny flowers, each producing a seed which when ripe has a tuft of silky hairs on it. The nodding thistle, introduced from Europe, grows to a height of about five feet, but most of the others are about two to three feet tall when mature.

22. **Chicory**

About three feet tall, the plant has large leaves near the base of the stem and small leaves on the upper stem. The light blue flowers usually close before noon, the plant then becoming inconspicuous. The chicory was introduced from Europe as a garden flower, but it has been successful in establishing itself as a wildflower in many parts of this country and is found sparingly throughout the east half of Kansas and occasionally westward.
Fall Bouquets

Each fall we wonder what plants or plant parts we can bring into the schoolroom to add interest. Bittersweet berries are commonly used; but how about mixing a little cedar with them? Find a female cedar tree with an abundance of blue berries. If the berries fade, you may put a spot of blue paint on each. Cedar becomes extremely dry so keep it away from fire and don't let Christmas tree lights touch it. Although we have no native pine trees in Kansas, many pines have been planted, so you may find a branch with cones to place in a vase.

Wahoo or burning bush is a small shrub whose berries resemble those of bittersweet. It is common in the woods of eastern Kansas and makes a good bouquet. Greenbrier, a vine, has deep blue berries found in clusters, which last a good while in a bouquet. Sumac heads will last a long time, although the colorful leaves soon fall. The common buckbrush, which grows along roads and in pastures, keeps well, but the berries soon lose their bright color. If you can find some water lily pods, they add greatly to a bouquet, either plain or painted. Milkweed pods are equally good. Another plant that is less known is Eryngium, or rattlesnake master. It looks like a thistle and has purple, spiny heads which will keep all winter. The flower stalks of blazing star may be dried and kept in a vase.

One of the most permanent ways to keep flowers and grasses is to press them in newspapers under a heavy weight, changing the newspapers every day so the plants will dry. When they are thoroughly dry and pressed flat, you may take a picture frame, remove the cardboard back, place a sheet of white cotton, or a lot of milkweed silk, on the cardboard and arrange the grasses and flowers on the cotton to make a picture. You may use butterflies in such a picture. When you have everything arranged the way you want it, place the glass and frame in position and fasten the cardboard in place.

If anyone is interested in seeds, he may make an attractive picture by gluing the seeds on a board. He should use dark seeds to outline a vase and then glue the brighter colored ones around like the petals of a flower. With imagination and plenty of seeds one can make all sorts of permanent pictures. They should be varnished when completed.

FOR YOUR LIBRARY: Zim and Martin, Flowers (A Golden Nature Guide), Simon and Schuster, New York, 1950, $1.00. If your bookstore does not have it, the address of Simon and Schuster is Rockefeller Center, New York 20, N.Y.

Seed Travelers

Did you ever stop to think that seeds may be travelers? And that they may have a regular method of getting from one place to another? Perhaps you have scolded your dog for getting into the cockleburrs. Poor dog, when he brushed past the cockleburs, they hooked onto his fur and took a hitchhiking ride. This is one of nature's methods of spreading seeds. If you examine a cocklebur closely, you will see that the little spines are really hooks. When these hook onto the fur of an animal, the seeds may be carried a long distance before the animal can get them loose. Another interesting thing about the cocklebur is that it has two seeds in it. One of them will sprout the next spring; the other will not sprout until the second spring. Thus we will have plants from one cocklebur during two different years.

In the western half of Kansas devil's claws are common weeds. Their seed pods ripen and spread open with two long, curved, hooked claws. They are just the right size to snap around a cow's leg and be carried away. As the cow walks, the seeds are loosened and shatter out. These claws sometimes become packed around the cow's leg and have to be removed. Also in the western two-thirds of the state you will find the puncture vine. It often grows on playgrounds, so many children are acquainted with it. It grows flat on the ground, and the hard-spined seed pods stick into any thing that steps on it or runs over it. Automobile or bicycle tires may carry these seed pods a long distance.

If you have ever walked through the weeds near a creek, you have probably had to pick "stick tights" from your clothes. These are the fruits, or seed pods, of various weeds. They have tiny hooks or barbs on them. Spanish needles are long and slender, with bristles on one end. Bur marigolds have flat, triangular fruits with two or three barbed spines on the large end. Beggar's lice are small and round, covered with little hooks. The tick clover has a flat, oval fruit which sticks with its flat side to your clothes. They are really little bean pods so there may be several seeds in one. You could almost make a seed collection by just walking through a weedy patch of woods. A seed collection, showing how each seed or fruit travels, is a good project for a school.

Perhaps you have watched a squirrel hide acorns or walnuts in the ground, hoping that he will find them again. Many are never found, so they grow and become trees. Thus, a squirrel is a good animal for planting tree seeds. Many other animals do the same thing when they store food for the winter. Birds also
distribute seeds; they eat the fleshy part of a fruit, but many of the seeds are not digested and are passed off from the body some distance from the place where they grow. Among the seeds spread by birds are cedar berries, hackberries, grapes, strawberries, plums, and wild cherries.

Most of us have taken the “silk” from milkweeds and turned it loose in the wind, or blown it to see how long we could keep it up in the air. The brown seeds may be carried that way for great distances. Dandelion seeds with their little parachutes are carried by the wind, as are the seeds of the false salsify, which looks like an overgrown dandelion. Other seeds with parachutes are aster, goldenrod, blazing star, ironweed, thistle, cattail, and clematis. The maple has still another device to aid in spreading its seeds by the wind. It has a propeller-shaped “wing” which causes the seed to whirl as it falls. In that way it takes longer to fall, so may be carried farther away. Similar to the maple are the box elder, ash, elm, and basswood. The basswood fruits hang by a long stem from their “wing.”

Water may also carry seeds long distances. Many kinds of nuts, as well as sycamore “balls,” may float or be rolled by running water. The seed pods of the water lily are full of air pockets and will float to some other part of the lake to start a new group of plants.

There is still another way that seeds may travel, although not so far. Some plants “shoot” their seeds. The wild cucumber, a spiny vine, develops pressure in the fruit until the seed is forced out. Snow on the mountain, New Jersey tea, wild geranium, violets, and some peas throw their seeds. In these, drying pods suddenly break open, throwing the seeds out. Some of the seeds may be thrown five or six feet.

If you wish a good project for your class, you could bring in almost ripe, ball-like fruits of snow on the mountain and place them in a covered box where it is warm. They will soon begin to pop. Or it may be more fun to leave the box open and see how far the seeds will be shot.

WEEDS are generally defined as plants that grow where they are not wanted; some plants, like dandelions or Johnson grass, may be cultivated in one area and treated as weeds in another. Which of the wildflowers described in this issue are weeds?

NEARLY EVERYONE in Kansas knows that the sunflower, which is included in this issue, is the state flower of Kansas, but do you know the state flowers of our nearest neighbors—Arkansas, Colorado, Iowa, Missouri, Nebraska, New Mexico, Texas? Answers on page 16.

THE PRINTS for the flower pictures in this issue were made by Robert Stapleford, science teacher in the Hoxie, Kansas, high school and summer graduate student at the Kansas State Teachers College of Emporia. He made the glossy prints from Kodachrome transparencies in the wildflower slide collection of the college. The Kodachromes were taken by various members of the biology staff of the college, most of them by Dr. Ted F. Andrews. The sketches of pages 5 and 15 were drawn by Robert F. Clarke, graduate student in biology.

TENTATIVE SCHEDULE OF FUTURE ISSUES: December 1955—Snow; February, 1956—Spring Wildflowers; April, 1956—Turtles of Kansas; October, 1956—Rocks and Fossils; December, 1956—undecided; February, 1957—Grasses; April, 1957—Summer Wildflowers.

IF YOUR ADDRESS will be changed before the next issue, be sure to let us know. The Kansas School Naturalist is sent by second-class mail, which cannot be forwarded.
SOME THINGS TO DO

Make a fall flower calendar; make a list of insects found on and near the fall wildflowers; find out when the fall wildflowers go to seed; find out which seeds are eaten by birds, and which birds eat them; find out which seeds are borne in such a way that they will be above the snow so that birds can get them; find out what animals other than birds eat the seeds; make a seed collection; make a collection of pressed flowers; make a display of the leaves, flowers and seeds of the same species of plant; plant some of the seeds in soil in a flower pot or box and keep in a warm sunny place.

Find some native wildflowers that you think would improve the appearance of the school yard, and transplant them to the school yard. Be sure to dig up the main roots (sometimes these are quite extensive) and bring in some of the soil in which the plants were growing. Be sure to get permission from the owner of the land from which you get the plants. Not all plants will live, but most of them will; if you continue the plantings for a few years you will have an excellent wildflower garden right on your own school grounds. You can start it this fall.

If you have suggestions for any future issue, please send them to the editor in plenty of time.

PLANs ARE UNDER WAY FOR THE
1956 WORKSHOP IN CONSERVATION

First Section
June 4 to June 22, 1956
Credit—2 or 3 semester hours, graduate or undergraduate.
Geography and climate of Kansas, soil erosion and conservation practices, water resources, grass as a resource, wildlife conservation, bird banding in Kansas, the school yard as a conservation laboratory, conservation of wildflowers, field trips, discussion groups, projects.

Second Section
June 25 to July 13, 1956
Credit—1, 2, or 3 hours for 1, 2, or 3 weeks, graduate or undergraduate.
This section will be devoted to production of teaching materials, particularly in the field of wildlife conservation. Several scholarships are available. For information, write the director, John Breukelman, KSTC, Emporia, Kansas.

STATE FLOWERS
Arkansas Apple Blossom
Colorado Rocky Mountain Columbine
Iowa Wild Rose
Missouri Hawthorn
Nebraska Goldenrod
New Mexico Yucca
Oklahoma Mistletoe
Texas Bluebonnet

ONE WORD OR TWO? Some dictionaries spell it “wild flower” and others “wildflower” so either is correct. The Kansas School Naturalist prefers it spelled as one word.