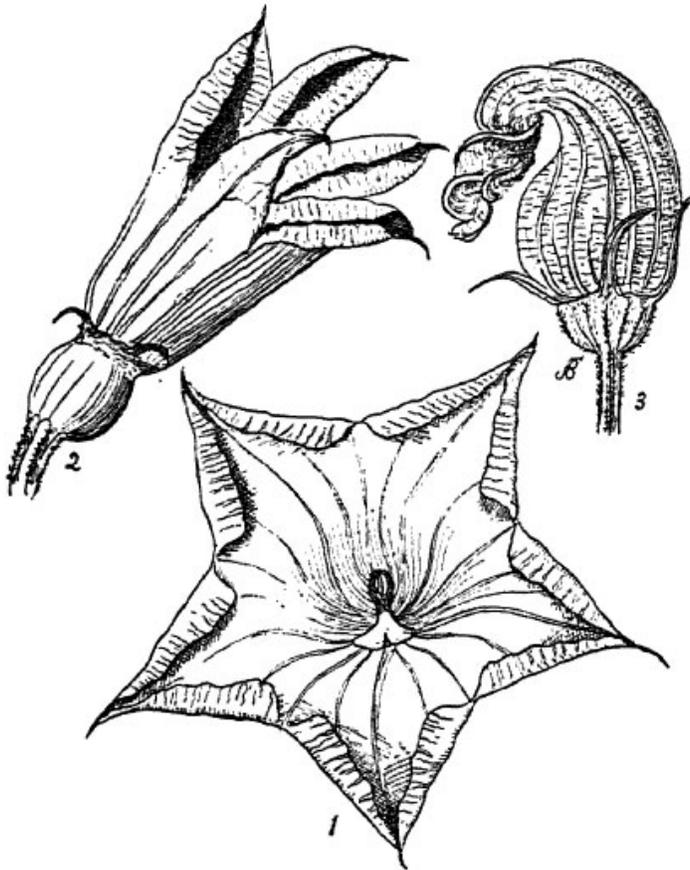


The Pumpkin

By Anna Botsford Comstock

If the pumpkin were as rare as some orchids, people would make long pilgrimages to look upon so magnificent a plant. Although it trails along the ground, letting Mother Earth help it support its gigantic fruit, yet there is no sign of weakness in its appearance; the vine stem is strong, ridged, spiny and purposeful. And the spines upon it are surely a protection under some circumstances, for I remember distinctly when, as children, bare-footed and owning the world, we "played Indian" and found our ambush in the long rows of ripening corn, we skipped over the pumpkin vines, knowing well the punishment they inflicted on the unwary feet.

From the hollow, strongly angled stem arise in majesty the pumpkin leaves, of variously lobed patterns, but all formed on the same decorative plan. The pumpkin leaf is as worthy of the sculptor's chisel as is that of the classic *acanthus*: it is palmately veined, having from three to five lobes, and its broad base is supported for a distance on each side of the



The closing of a pumpkin flower

1. Staminate flower beginning to close; note the folded edges of the lobes. 2. Pistillate flower nearly closed. 3. Staminate flower closed and in its last stage.

angled petiole by the two basal veins. The leaves are deep green above, paler below and are covered on both sides with minute bristles, and their edges are finely toothed. The bristly, angled stem which lifts it aloft is a quite worthy support for so beautiful a leaf. And, during our childhood, it was also highly esteemed as a trombone, for it added great richness of quality to our orchestral performances, balancing the shrillness of the basswood whistle and the sharp buzzing of the dandelion-stem pipe.

Growing from a point nearly opposite a leaf, may be seen the pumpkin's elaborate tendril. It has a stalk like that of the leaf, but instead of the leaf blade it seems to have the three to five naked ribs curled in long, small coils very even and exact. Perhaps, at some period in the past, the pumpkin vines lifted themselves by clinging to trees, as do the gourd vines of today. But the pumpkin was cultivated in fields with the maize by the North American Indians, long before the Pilgrim Fathers came to America, to make its fruit into pies. Since the pumpkin cannot sustain itself in our Northern climate without

the help of man, it was evidently a native of a warmer land; and, by growing for so long a time as a companion of the corn, it has learned to send its long stems out for many feet, resting entirely upon the ground. But, like a conservative, elderly maiden lady, it still

wears corkscrew curls in memory of a fashion, long since obsolete. Occasionally, we see the pumpkin vines at the edge of the field pushing out and clambering over stone piles, and often attempting to climb the rail fences, as if there still remained within them the old instinct to climb.

But though its foliage is beautiful, the glory of the pumpkin is its vivid yellow blossom and, later, its orange fruit. When the blossom first starts on its career as a bud, it is enfolded in a bristly, ribbed calyx with five stiff, narrow lobes, which close up protectingly about the green, cone shaped bud, a rib of the cone appearing between each two lobes of the calyx. If we watch one of these buds day after day, we find that the green cone changes to a yellow color and a softer texture as the bud unfolds, and then we discover that it is the corolla itself; however, these ribs which extend out to the tip of the corolla lobes remain greenish below, permanently. The expanding of the flower bud is a pretty process; each lobe, supported by a strong midrib, spreads out into a five-pointed star, each point being very sharp and angular because, folded in along these edges in one of the prettiest of Nature's hems, is the ruffled margin of the flower. Not until the sun has shone upon the star for some little time of a summer morning, do these turned-in margins open out; and, late in the afternoon or during a storm, they fold down again neatly before the lobes close up; if a bee is not lively in escaping she may, willy-nilly, get a night's lodging, for these folded edges literally hem her in.



The staminate blossom of the pumpkin, showing the anther knob at the center. A bud of the staminate flower; and a closed blossom at the right. Photo by Verne Morton

The story of the treasure at the heart of this Starry, bell-Shaped flower is a double one, and we had best begin it by selecting a flower that has below it a little green globe—the ovary—which will later develop into a pumpkin. At the heart of such a flower there stand three stigmas, that look like liliputian boxing-gloves; each is set on a stout postlike style, which has its base in a great nectar-cup, the edges of which are slightly incurved over its welling sweetness. In order to reach this nectar, the bee must stand on her head and brush her pollen-dusted side against the stigmas. Professor Duggar has noted that in dry weather the margins of this nectar-cup contract noticeably, and that in wet weather the stigmas close down as if the boxing-gloves were on closed fists.

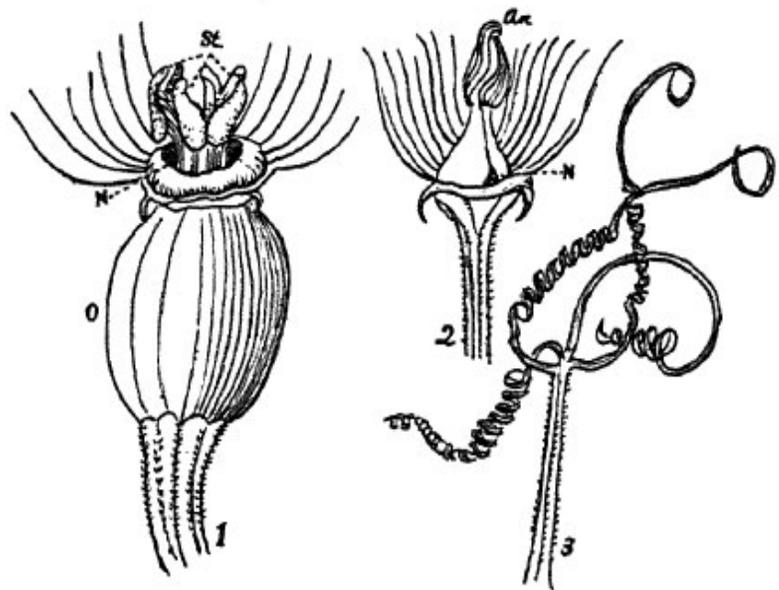
The other half of the pumpkin-blossom story is to be found in the flowers which have no green globes below them, for these produce the pollen. Such a flower has at its center a graceful pedestal with a broad base and a slender stem, which upholds a curiously folded,

elongate knob, that looks like some ancient or primitive jewel wrought in gold. The corrugations on its surface are the anther cells, which are curiously joined and curved around a central oblong support; by cutting one across, we can see plainly the central core, bordered by cells filled with pollen. But where is the nectar well in the smooth cup of this flower? Some have maintained that the bees visit this flower for the sake of the pollen, but I am convinced that this is not all of the story. In the base of the pedestal which supports the anther knob there appear, after a time, three inconspicuous openings; and if we watch a bee, we shall see that she knows these openings are there and eagerly thrusts her tongue down through them. If we remove the anthers and the pedestal, we shall find below the latter, a treasure cave; it is carpeted with the softest of buff velvet, and while it does not reek with nectar, as does the cup which encompasses the styles of the pistil, yet it secretes enough of the sweet fluid so that we can taste it distinctly. Thus, although the bees find pollen in this flower they also find there, nectar. The pumpkin is absolutely dependent upon the work of bees and other insects for carrying its pollen from the blossom that bears it to the one which needs it, as this is the only way that the fruit may be developed.

And after the pollen has been shed and delivered, the flower closes, this time with an air of finality. The fading corolla looks as if its lobes had been twisted about by the thumb and finger to secure tightness; and woe betide the bee caught in one of these prisons, unless she knows how to cut through its walls or can find within, sustenance to last until the withered flower falls. The young pumpkin is at first held up by its stiff stem but later rests upon the ground.

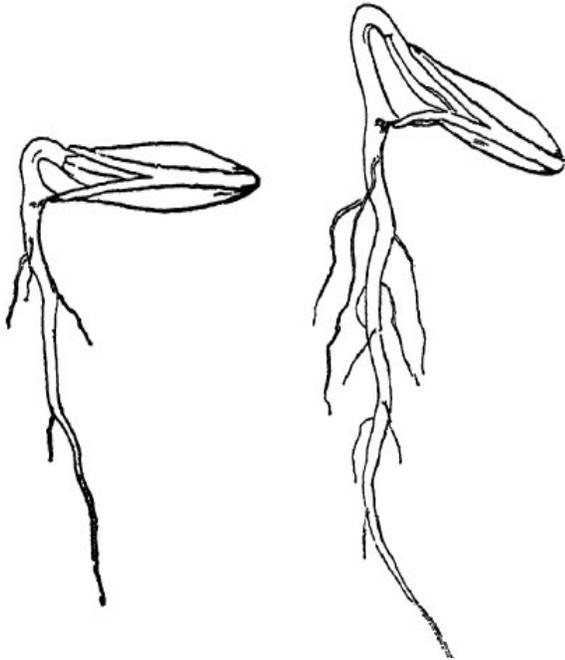
The ripe pumpkin is not only a colossal but also a beautiful fruit. The glossy rind is brilliant orange and makes a very efficient protection for the treasures within it. The stem is strong, five-angled and stubborn, and will not let go its hold until the fruit is over-ripe. It then leaves a starshaped scar to match the one at the other end of the fruit, where once the blossom sat enthroned. The pumpkin in shape is like a little world flattened at the poles, and with the lines of longitude creased into its surface. But the number of these longitudinal creases varies with individual pumpkins, and seems to have no relation to the angles of the stem or the three chambers within.

If we cut a small green pumpkin across, we find the entire inside solid. There are three fibrous partitions extending from the center, dividing the pulp into thirds; at its outer end each partition divides, and the two ends curve in opposite directions. Within these curves the seeds are borne. A similar arrangement is seen in the sliced cucumber. As the pumpkin ripens, the partitions surrounding the seeds become stringy and very different from the "meat" next to the rind, which makes a thick, solid outer wall about the central chamber, where, within its "groined arches" are contained six rows of crowded seeds, attached by their pointed tips and supported by a network of yellow, coarse fibers—like



1, Base of pistillate blossom; O, ovary which develops into the pumpkin; N, nectar cup; St, stigmas. 2, Base of a staminate blossom: N, opening into the nectar cup; An, anthers joined, forming a knob. 3, Pumpkin tendril

babies supported in hammocks. All this network, making a loose and fibrous core, allows the seeds to fall out in a mass when the pumpkin is broken. If we observe where the cattle have been eating pumpkins we find these masses of seeds left and trampled into the mud, where, if our winter climate permitted, they could grow into plants next year.

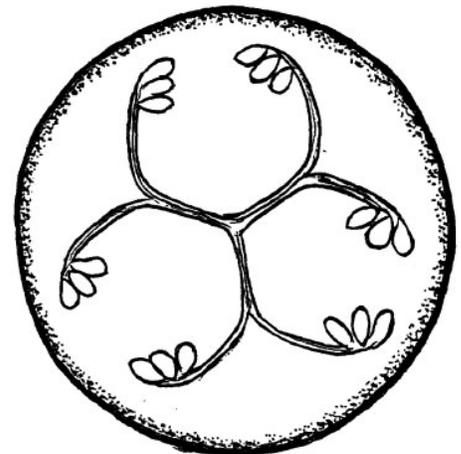


A squash plant breaking out of the seed coats at the left. The operation further progressed is

The pumpkin seed is attached by its pointed end; it is flat, oblong and has a rounded ridge at its edge, within which is a delicate "beading." The outside is very mucilaginous; but when wiped dry, we can see that it has an outer, very thin, transparent coat; a thicker white, middle coat; while the meat of the seed is covered with a greenish, membranous coat. The meat falls apart lengthwise and flatwise, the two halves forming later the seed-leaves and containing the food laid up by the "pumpkin mother" for the nourishment of the young plant. Between these two halves, at the pointed end, is the germ, which will develop into a new plant.

When sprouting, the root pushes out through the pointed end of the seed and grows downward. The shell of the seed is forced open by a little wedge-shaped projection, while the seed-leaves are pulled from their snug quarters. In watching one of these seeds sprout, it is difficult not to attribute to it conscious effort, while it is sturdily pulling hard to release its seed-leaves. If it fails to do this, the seed shell clamps the seed-leaves together a vise, and the little plant is crippled.

Both squashes and pumpkins figure in the spicy Thanksgiving pies, but the chief value of the pumpkin crop in America is as food for milch cows; it causes a yield of milk so rich, that the butter made from it is as golden as its flesh. But the Halloween jack o'lantern appeals to the children. In this connection, a study of expression might be made interesting; the turning of the corners of the mouth up or down, and the angles of the eyebrows, making all the difference between a jolly grin and an "awful face."



Section of a pumpkin just after the blossom has fallen. Note how the seeds are borne.

Pumpkin Observation

This work may be done in the garden or field in September or early October; or a vine bearing both kinds of flowers, leaves and tendrils may be brought to the schoolroom for observation. The lesson on the pumpkin fruit may be given later. A small green pumpkin should be studied with the ripe one, and also with the blossoms, so as to show the position of the seeds during development. This lesson can be modified to fit the cucumber, the melon and the squash.

The Pumpkin Vine and Flowers Observations

1. How many different forms of flowers do you find on a pumpkin vine? What are the chief differences in their shape?
2. Look first at the flowers with the long slender stems: What is the shape and color of the blossom? How many lobes has it? Is each lobe distinctly ribbed or veined? Is the flower smooth on the inner and the outer surface? Are the edges of the lobes scalloped or ruffled?



Partially closed pistillate blossom at the right, showing the stigmas and the nectar-cup at the center. Note the young pumpkin and the beautiful leaf; note also the angular, spiny stems. Photo by Verne Morton.

3. What do you see at the bottom of the golden vase of this flower? This yellow club, or knob, is formed by the joining of three anthers, one of which is smaller than the others. Do all the pumpkin flowers have this knob at the center? Look at the base of the standard which bears the anther-knob, and note if there are some openings; how many? Cutoff the anther pedestal, and describe what is hidden beneath it. Note if the bees find the openings to the nectar-well and probe there for the nectar. Do they become dusted with

pollen while seeking the nectar?

4. What color is the pollen which is clinging to the anther? Is it soft and light, or moist and sticky? Do you think that the wind would be able to lift it from its deep cup and carry it to the cup of another flower?

5. Describe the calyx behind this pollen-bearing flower. How many lobes has it? Are the lobes slender and pointed?

6. Find one of the flowers which has below it a little green globe, which will later develop into a pumpkin. How does this flower differ from the one that bears the pollen?

7. Describe or sketch the pistil which is at the bottom of this flower vase. Into how many lobes does it divide? Do these three stigmas face outward, or toward each other? Are the styles which uphold the stigmas short or long? Describe the cup in which they stand. Break away a bit of this little yellow cup and taste it. Why do you think the pumpkin flowers need such a large and well-filled nectary? Could insects get the nectar from the cup without rubbing against the stigmas, the pollen with which they became so thoroughly dusted when they visited the staminate flowers?

8. Cut through the center of one of the small green pumpkins. Can you see into how many sections it is divided? Does the number of seed clusters correspond with the number of stigmas in the flower? Make a sketch of a cross-section, showing where the seeds are placed.

9. What insects do you find visiting the pumpkin flowers?

10. Carefully unfold a flower bud which is nearly ready to open, and note how it is folded. Then notice late in the afternoon how the flower closes. What part is folded over first? What next? How does it look when closed?

11. Describe the stems of the pumpkin vine; how are they strengthened and protected? Sketch or describe a pumpkin leaf.

12. Describe one of the tendrils of the pumpkin vine. Do you think that these tendrils could help the vine in climbing? Have you ever found a pumpkin vine climbing up any object?

The Pumpkin Fruit Observations

1. Do you think the pumpkin is a beautiful fruit? Why? Describe its shape and the way it is creased. Describe the rind, its color and its texture, and tell how it protects the fruit. Describe the stem; does it cling to the pumpkin? How many ridges in the stem where it joins the vine? How many where it joins the pumpkin? Which part of the stem is larger? Does this give it a firmer hold?

2. Cut in halves crosswise a small green pumpkin and a ripe one. Which is the most solid? Can you see how the seeds are borne in the green pumpkin? How do they look in the ripe pumpkin? What is next to the rind in the ripe fruit? What part of the pumpkin do we use for pies?

3. Can you see in the ripe pumpkin where the seeds are borne? How are they suspended? How many rows of seeds lengthwise of the pumpkin? Of what use could it be to the pumpkin to have the seeds thus suspended within it by these threads or fibers? What is left of a pumpkin after the cattle have eaten it? Might the seeds thus left plant themselves?
4. Is the pumpkin seed attached at the round, or the pointed, end? Describe the pumpkin seed its shape and its edges? How does it feel when first taken from the pumpkin? How many coats has the seed?



A closed pistillate flower of the pumpkin. Photo by Verne

5. Describe the meat of the seed? Does it divide naturally into two parts? Can you see the little germ? Have you ever tried roasting and salting pumpkin and squash seeds, to prepare them for food as almonds and peanuts are prepared?
6. Plant a pumpkin seed in damp sand and give it warmth and light. From which end does it sprout? What comes first, the root or the leaves? What part of the seed forms the seed-leaves?
7. Describe how the pumpkin sprout pries open the shell to its seed, in order to get its seed-leaves out. What happens if it does not pull them out? Which part of the seedling pumpkin appears above ground first?
8. How do the true leaves differ in shape from the seed-leaves. What is the use of the seed-leaves to the plant?

*Ah! on Thanksgiving day, when from East and from West,
 From North and from South come the pilgrim and guest,
 When the gray-haired New-Englander sees round his board
 The old broken lines of affection restored,
 When the care-wearied man seeks his mother once more,
 And the worn matron smiles where the girl smiled before,
 What moistens the lip and brightens the eye?
 What calls back the past, like the rich Pumpkin pie?
 Oh, fruit loved of boyhood! the old days recalling,
 When wood-grapes were purpling and brown nuts were falling
 When wild, ugly faces we carved in its skin,
 Glaring out through the dark with a candle within!
 When we laughed round the corn-heap, with hearts all in tune,
 Our chair a broad pumpkin—our lantern the moon,
 Telling tales of the fairy who travelled like steam.
 In a pumpkin-shell coach, with two rats for her team!*

—J. G. WHITTIER