Meeting Bloodroot
(*Sanguinaria canadensis*)

Craig Holdrege

Figure 1. Bloodroot (*Sanguinaria canadensis*) flowering in upstate New York in late April. (All photos in this article were taken by the author.)

In early April, I begin my wanderings through the deciduous forests in upstate New York where I live. I want to participate in the budding forth of early spring plants. The trees are bare and the air cool. The forest floor is light brown with dead leaves covering the soil. You have to get down on your knees and look carefully to discover the first plants poking out of the soil and through the leaf litter.

There is no set date on which I can know that this or that plant will appear. Clearly, the plants are attuned to the lengthening of the days. But their time of emergence can vary by a number of weeks. If it remains cold and overcast, the plants emerge later, while a burst of unfolding will accompany a spell of warm, sunny days. Ensuing cold will slow all processes down again. It's a dynamic dance of sun, elements, and the plants. And yet I do know—I can trust—that some plant species will appear earlier than others.

One of the earliest wildflowers to emerge from the rich soil of bottomland woods is bloodroot (*Sanguinaria canadensis*). Its characteristic grayish-green buds are easy to discern once you get to know them (Figure 2). The scales of the bud open and a little plant emerges. What I see is a tightly wrapped, not-yet-unfolded leaf. A tender whitish green cap begins to grow up from its center—the flower bud. The leaf encloses the flower and provides a protective mantle as the plant grows into the vicissitudes of the airy, light-filled world. Taken in its momentary appearance at this phase of its life, bloodroot is quite inconspicuous. But viewed as a process, the closed flower bud and the enwrapping leaf are powerful images of becoming. There is a palpable fullness and tension that speaks of life and development.

The upward elongation of the flower stalk continues so that it extends beyond the enwrapping leaf. If I am lucky I can see the two pale green sepals before they fall off, leaving the petals free to open (Figure 2, third image). Entering the woods on a warm and sunny mid- to late-April afternoon, my attention will quickly be drawn to the wide-open and white radiance of bloodroot's blossoms. Usually eight petals radiate out from a glowing center of golden stamens.

Figure 2. Development from bud to open flower in April; upstate New York.

The petals have an almost inexpressible soft and luminescent whiteness. Viewed from above, the flowers seem to hover several inches from the ground. The flowers open on sunny days and close toward dusk, only to open again the next morning—if it is sunny. On cloudy days the flowers remain closed or open only a little. Occasionally I catch a glimpse of a small native bee gathering pollen from the stamens.

This phase of flowering lasts only a few days to a week (or longer if the weather is cool). The petals fall off very easily—a typical characteristic of the poppy family, to which bloodroot belongs—and one hard rainstorm can remove them all. What's left, when the petals and stamens have fallen off, is the pistil in the middle of the flower. It develops over time into a narrow and upright fruit capsule that bears seeds.

Remarkably, while bloodroot is flowering, its single leaf continues to enwrap the flower stalk and only gradually begins to open. In this phase of its development, bloodroot reveals a special two-fold gesture: open luminance in the flower above, and restrained enclosing in the protective leaf below. It is this contrasting gesture that struck me many years ago when I started to notice bloodroot, and each year it continues to speak strongly.

Nature Speaking?

I just used the words "gesture" and "speak" in connection with a plant. Does nature gesture and speak? I think so, but only if we attend and are open to her utterances. Of course the gesturing and speaking are not of a human sort. They are of the earth. I can't help but see the earth, with its ever-changing garment of plants, as an activity that is expressing itself in all its utterances. The challenge is in understanding those utterances. When I attend to a plant and it strikes me in a way that I say, "Oh, isn't that beautiful," I have been touched by the plant. This being touched dwells in my life of feelings. I know I've met something real and important, but I may not be able to articulate it any further. However, the feeling remains strong and connects me with the earth and its plant life.

In my work with plants I strive to see whether I can learn to perceive the gesturing of nature more distinctly. Bloodroot is beautiful, but so is the dandelion that flowers later in lawns, or wild chicory that flowers in rich sky-blue along roadsides in the summer. What are the unique qualities of the different plants? What are they saying in their forms and colors, in the times and places in which they develop? How is the earth speaking through them?

My way of gently approaching these large questions—which are more guides for study than occasions for definite answers—is in a sense quite simple.[1] I attend carefully to the plant. I take the time and effort to notice its characteristics and to follow mindfully how it develops. By going out to the plant with this focused attention, I get to know it. This getting to know is enhanced by bringing the plant alive in my imagination, a practice that the scientist and poet Goethe called "exact sensorial imagination."[2] I re-picture its features and development as vividly as possible—imagining how the parts unfold; beholding the processes of transformation as movement; inwardly sensing the changing textures, colors, and scents.

And I need to look at the plant in its context. Where and when is it growing, who are its neighbors, what other creatures

does it interact with? I compare it with other plants. This is key. The uniqueness of something often stands out and becomes clearer through contrasts, especially when I vividly picture what I am studying. Instead of theorizing and "thinking about" the plant in an intellectual way, I strive to observe and "think with" the plant, and thereby participate more fully in its life. All this work helps me get to know the plant as an active, transforming, and dynamic being. It opens the door, if I am fortunate, to a more intimate sense of the qualities of a particular plant species. It can—in its plant-like way—begin to speak.

A Gesture of Early Spring

In the northeastern United States you wait a long time for spring to arrive. In February it can be bitter cold and yet the days rapidly become longer. The sun's arc in the sky grows higher, and in a wind-shaded area the sun warms your cheeks. The birds that have overwintered begin to sing in the mornings, as though they are celebrating the return of the light. Nest building is still many weeks ahead.

From a planetary point of view, spring begins around March 21 in the northern hemisphere, when the days become longer than the nights. In upstate New York, snow can cover the ground well into March. Plant life appears dormant. And yet there are stirrings of life beneath the quiescent surfaces. When the nights are cold and the daytime temperatures rise above freezing, the sap begins to rise in the trunks of trees, traveling from the roots up into all the buds that later unfold. I can't see this movement, but when the maple sap harvesters insert their taps into the tree trunks, the sap slowly drips out. Inner movement precedes visible development.

Bloodroot is one of the first wildflowers of the forest floor to show that visible development. What I witness is the springing forth of plant life in a particular habitat. It is showing me what early spring means from a plant perspective. I can say this because, as I have studied other wildflowers at other times of the year, the special character of bloodroot has become all the more potent. I think of greater celandine (*Chelidonium majus*), a relative of bloodroot in the poppy family and a species that has become naturalized in northeastern forests. I discover its first light green leaves emerging from the ground soon after bloodroot's, but it does not begin to flower right away. It only flowers at the end of May into June. As the days get longer and warmer over a number of weeks, it develops many leaves in a rosette close to the ground. Subsequently, a leaf-bearing upright stem grows up from the rosette and then forms multiple branches with leaves—and at the ends, many rich-yellow flowers (see Figure 3). It comes to appearance more gradually with its multitude of leaves, above-ground branches,

Figure 3. Greater celandine (*Chelidonium majus*) flowering in early June.

and flowers. It has a growth form that you find in many wildflowers that develop over a longer period of time and flower later in the spring.

No plant that develops after early spring emerges from the ground with just one leaf and one flower. This is a quality of early spring. The earth initially sends forth plants that unfold quickly, close to the ground, and in a bold expression. In bloodroot's case the leaf enwraps the flower as an upward growing bud, the one large flower then unfolds, and only later does the leaf—in concert with the greening of the rest of the forest—develop further. The flower is like a burst of light and form that passes quickly, ushering in spring.

In the same forests there are other plants that I can find that begin to flower a little after bloodroot (and keep their flowers longer), which have a similar growth gesture to bloodroot's. Figure 4 shows trout lily (*Erythronium americanum*) and wake robin (*Trillium erectum*), both members of the lily family. Trout lily emerges with a spear-like bud formed of two leaves that enwrap a single flower, which then unfolds. Wake robin grows out of the soil with a whorl of three leaves enwrapping a single flower that then unfolds its deep maroon petals. These plants (and there are others) share a similar growth form that does not occur in plants later in the season. All issue forth in spring, staying close to the cool ground, bearing few leaves that at first serve as protective sheaths for the flower, and then flowering conspicuously with one large flower per shoot, before the greening of spring predominates.

Figure 4. Trout lily (*Erythronium americanum*) and wake robin (*Trillium erectum*), two woodland wildflowers that begin to flower soon after bloodroot.

Completing Life's Cycle

Bloodroot's development does not, of course, stop with flowering. But it becomes less conspicuous, since once the petals drop, the single green leaf, flower stalk, and fruit capsule blend in with the greening surroundings of the forest floor. More and more wildflowers unfold and begin to bloom. A carpet of green forms on the forest floor. Every year I realize anew that the forest floor has its peak of illumination in May, before the trees are green. Even though the days continue to get longer, there is increasingly less illumination on the forest floor. The early flowering woodland wildflowers bring an array of colors and form into the forest before it moves into its shady summer. In mid-May the canopy of the forest begins to close overhead.

After flowering, bloodroot's single leaf unfolds fully and grows (Figure 5). Whereas the development from bud to flower progresses rapidly, with each day showing visible changes—the changes we human beings long for and are nourished by in spring—now everything slows down. I need to be more committed to stay with the slower, less eye-catching development that follows flowering. What I discover is that bloodroot's leaf blade continues to grow slowly throughout the spring and early summer, in contrast to those of many small spring wildflowers that decay soon after flowering. At first the leaf stalk is about as long as the leaf surface itself (what botanists call the leaf blade). The leaf blade is initially fairly upright and fans out into an overall roundish form that most typically (in a mature plant) has five to seven lobes. The orientation then shifts from upright to horizontal; this occurs simultaneously with the greening and closing of the tree canopy. The leaf blade takes on a slightly concave bowl shape. The flower stalk does not elongate after the petals fall off, so that the leaf now forms a canopy above the fruit capsule, just as the unfolding leaves of the trees form a canopy for the forest floor—a beautiful instance of a part mirroring a process in the whole. Moreover, I witness how bloodroot's leaf slowly changes in relation to the flower, the flower stalk, and the fruit, and how it also transforms in concert with the seasonalgreening and darkening of the forest as a whole.

Figure 5. Leaf development after flowering.

Figure 6. Seeds in the opened fruit capsule. The white structures on the seeds are the elaiosomes that ants eat (see text below).

By the end of June, the fruit capsule at the tip of the flower stalk has swollen and splits open, revealing numerous small, round, and shiny dark-brown seeds. It is always exciting to catch the seeds nestled in the capsule before they fall to the ground and disappear from sight (Figure 6). The flower stalk and capsule then dry up, shrivel, and decompose. Only the leaf is left above the ground. The leaf blade grows no more, but the leaf stalk continues to lengthen. When I go into the forest in late August or early September, the leaf blade has come to rest on the ground and the leaf begins to decay. Long before the tree foliage begins its fall transformation from green to brilliant yellows, oranges, and reds, bloodroot is no longer visible.

Pathways of Development

After I studied bloodroot for a few seasons, it became clear to me that the plant has two pathways for continuing its life over the winter and into the next spring. One is through its rhizome and roots, which remain in the ground after the leaves have wilted. The rhizome is an orange-red underground stem that has many little roots growing from it. (If you gently scrape the rhizome with your fingernail, it emits a dark red watery sap—the origin of the name "bloodroot." When the leaf stalk or flower stalk breaks, you can also see the red sap.) The rhizome grows and branches during the spring and summer, and near the end of the growing season it develops buds. Inside the buds a complete flower and a complete leaf pre-form in miniature. This most stunning development of undifferentiated tissue into a tightly compressed leaf and flower occurs completely hidden away in the protective sheaths of the bud. For me it is impossible to imagine how a plant makes a flower, with its precise arrangement of two sepals, eight petals, multiple stamens, and a central pistil in miniature, surrounded by an enwrapping, folded leaf, and all of this in such a way that the later unfolding reveals coherent and organized structures. It is beyond comprehension, and provides a healthy dose of modesty in view of the wisdom at work in a plant.

These buds of nascent life remain dormant during the fall and winter. The plants become active again in the increasing light and warmth of the next spring, when leaves and flowers sprout forth. With leaves and flowers prepared the previous year, bloodroot can unfold quickly in the spring.

After discovering that bloodroot has an underground branching stem, I realized that when looking at two or three of its "plants"—each with its own leaf and flower—growing close to one another (as in Figure 1), I was probably looking at just one plant, the rhizome of which had formed buds out of which the above-ground flower and leaf pairs arose. So what I might designate as "one plant" with leaf and flower will often be a branch of a larger plant from which a number of leaves and flowers have grown. A mature bloodroot plant is therefore like a small bush that has its branches underground, and the extremities of the plant—flowers and leaves—only show themselves above the ground for a period of time.

The second way for bloodroot to continue its existence is through seeds. The seeds drop to the ground near the mother plant and may germinate there in the following spring. In this case you find little seedlings with a single small, unlobed leaf growing near mature plants (Figure 7). Such a plantlet develops a small rhizome that grows and overwinters. In the following year it will likely bring forth one or two leaves, but probably not flowers. These leaves often have three lobes and don't grow as large as the leaves on mature plants. In the next year the plant is probably established enough to bring forth one or more flowers, and the leaves grow much larger and often have five to seven lobes.

Figure 8 shows a number of leaves from plants of different ages. The two small leaves (1 and 2 in the figure) stem from seeds that germinated in the current year. Leaves 3 and 4 may be from one plant (I didn't want to

Figure 7. Small leaves (about 2 cm in diameter) of bloodroot seedlings.

Figure 8. Leaves from plants of different ages; see text.

dig around and disturb the plant or plants to find out), but there were no flowers growing with these leaves. Leaf 5, which was even bigger and more lobed, also had no flower. The large and seven-lobed leaf (#6) enwrapped a flower before it unfolded. So in this group of leaves you see the stages in the maturation of bloodroot plants made visible through the increasing size and degree of lobing of the leaves. You have spread out in space what any given mature plant has gone through over the course of a few years. How old a bloodroot plant can become is, to my knowledge, not known.

Bloodroot and Ants

Many years ago I wrote a short description of bloodroot.[3] After reading the description, a biologist and former neighbor, Elliot Schneiderman, mentioned to me that ants are known to disperse the seeds of bloodroot. He briefly described this fascinating process and then remarked: you described bloodroot in its annual cycle, but don't the ants belong to the wholeness of bloodroot as well?

My immediate reaction was: of course! I had tried to show—as I have done here in greater detail—that we need to go beyond any one momentary state of the plant and begin to grasp it as a process in time. But I didn't go further, which Elliot pointed out. It is another step to view everything we call the "environmental interactions" of a plant as part of that plant, for without these interactions the organism wouldn't exist in the way it does.

Here's what I learned about bloodroot and ants: When bloodroot seeds fall to the ground, ants often arrive. They pick up the seeds and carry them to their nest. Each bloodroot seed has a small white fleshy outgrowth called an elaiosome. The elaiosome grows outside the seed coat and is not part of the germ. The ants are attracted to this part of the seed—ant larvae feed on the elaiosomes, which are rich in fats and sugars. The fast-growing larvae thrive on this nutrient-rich food.

The seed itself, retaining its potential for germination, is discarded by the ants, usually with other organic waste from the nest. As one researcher put it, the seeds are placed on "private compost heaps" and out of these seed beds tiny plants can grow the next year.[4] By collecting the seeds, the ants spread bloodroot into a larger area of the forest, and they also provide the conditions for a new colony of bloodroot to develop. In this sense the ants belong to bloodroot, just as bloodroot—as food— becomes part of the ants. This is one example of how different beings in an environment interweave and participate in their mutual lives. There is no such thing as an organism that is separate from other organisms.[5]

Being Itself Differently

So far I have painted a picture of bloodroot as a special expression and embodiment of early spring in a temperate deciduous forest environment of eastern North America. In my engagement with it, I begin to understand it as a specific activity bringing forth form and substance in ongoing transformation. Its appearing and disappearing, its becoming and wilting away, are deeply connected with larger rhythms.

Bloodroot is wholly embedded in the annual rhythm of the seasons—the changing relation between sun and a particular place on earth during a year. This is

Figure 9. Variations in the shape and size of petals in flowers that have eight petals.

its encompassing context. At the other pole there are the very local conditions of a particular place such as topography and soil. A specific plant may grow in one place for a number of years, and each year the cosmic seasonal rhythm remains virtually the same, but the local conditions of weather and habitat may change radically from year to year. In this sense, each year brings new opportunities for the mutual interweaving of plant and environment.

When I am mindful of this dynamic interplay, it becomes clear that bloodroot does not develop according to some strict set of rules. Rather, bloodroot becomes itself and maintains itself through the environment, and continually shifts its activity in relation to changes in the environment. So, for example, when it is cloudy and cool for a number of days, I find the flowers closed; there is little transformation. When a few sunny warm days follow, the flowers unfold, pollen is offered up to the native bees, and fruit and seed formation begin. The plant relates to those specific circumstances in a way that accords with its way of being. At the same time, the ways in which bloodroot can grow differently in different circumstances are an expression of the vital plasticity that allows it be itself differently.

> *It seems as if the day was not wholly profane,*
> *in which we have given heed to some natural object.*
> ~ Ralph Waldo Emerson[8]

One of my favorite activities is to go out and look at various stands of bloodroot to see if—and how—they differ from each other. What surprises does bloodroot have in store? I'll start with what is typical: Bloodroot flowers usually have eight petals, the lower four being somewhat larger and rounder than the upper four. The petals are often regularly spaced so that you can discern a square formed by the lower petals and an offset square of the narrower petals, which grow in the space between the lower petals (see Figure 9, flower on the left). Beautiful embodied geometry. Again and again I see this pattern. When I attend to the flowers on many different plants, the more I look the more I see that not only does the overall size of the petals on different plants vary, but the shape and arrangement of the petals as well, as Figure 9 illustrates.

Beyond that, if I look at enough different flowers, I notice that the number of petals occasionally varies. Figure 10 shows a few such variations that I have found in plants in a wooded area beside a creek that I often visit—flowers with nine, ten and twelve petals. Others have found plants with as few as three and as many as twenty petals.[6]

Surprising variations such as these reveal a kind of playfulness, an abundance of possibilities that a species can display. By being open to the surprises that a plant offers up, we experience another facet of its dynamic nature. I think that philosopher Susanne Langer rightly saw it: "Every discovery makes the living organism look less like a predesigned object and more like an embodied drama of evolving acts, intricately prepared by the past, yet all improvising their moves to consummation."[7]

Many habits of thought can get in the way of our seeing the drama of a plant's life. One is the tendency to pay most attention to "typical characteristics." Then the norm in my mind overshadows the richness and variability that the plant shows in its development and forms. Another hindrance is the drive to want to "explain." In our modern scientific age, this usually means discovering the spatial antecedents of any given phenomenon that contribute to its coming into appearance. What genes or hormones or environmental cues "cause" the plant to form a bud at a particular time? This kind of questioning can lead to

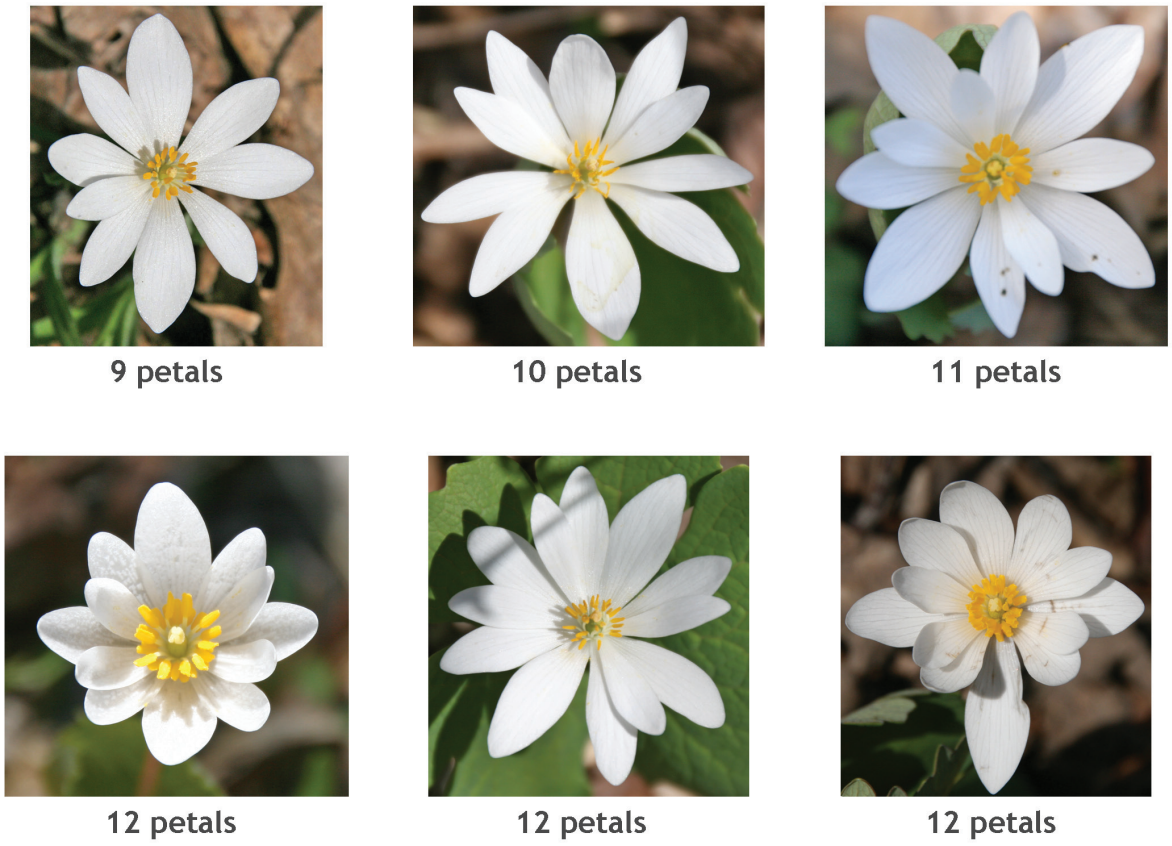

Figure 10. Variation in the number and shape of petals in different flowers.

interesting discoveries, but the discoveries cannot be taken as explanations. They simply expand our knowledge of the drama of life.

To see the drama, I need to literally come to my senses and immerse myself in the variety of phenomena. I inwardly participate in the dynamics of process and transformation, and weave the instances of surprising formations into a growing picture of the plant. In all its expressions, the plant can help me leave normative abstractions behind. With an open attentiveness and an active mind, I can begin to participate in the wisdom that informs the plant world. And, to paraphrase Emerson, nature shows herself as never profane when I have truly given heed to the concrete appearances of life, letting that life come to life within me.

Notes

1. For more in depth discussion of my approach, see: Holdrege, Craig. 2005. "Doing Goethean Science." *Janus Head* vol. 8, no. 1, pp. 27–52 (available online: https://natureinstitute.org/txt/ch/goethe_sci.pdf); Holdrege, Craig. 2013. *Thinking Like a Plant.* Great Barrington, Mass.: Lindisfarne Books.
2. Goethe, J. W. von. 1995. *Scientific Studies.* Princeton: Princeton University Press, p. 46.
3. Holdrege, Craig. 1999. "Bloodroot Through the Year." *In Context* #2, pp. 12–13
4. Beattie, Andrew. 1985. *The Evolutionary Ecology of Ant-Plant Mutualisms*. New York: Cambridge University Press, p. 3. See also: Pudlo, Ronald J. et al. 1980. "Population consequences of changes in an ant-seed mutualism in *Sanguinaria canadensis*." *Oecologia* vol. 146, pp. 32–37.
5. Holdrege, Craig. 2000. "Where Do Organisms End?" *In Context* #3, pp. 14–16. Available online: http://natureinstitute.org/pub/ic/ic3/org_and_env.htm
6. See: Johnson, Roswell H. 1909. "Aberrant Societies of *Sanguinaria* and *Trillium*." *Torreya* vol. 9, no.1, pp. 5–6.

   Spencer, Warren P. 1944."Variation in petal number in the bloodroot, *Sanguinaria canadensis*." *The American Naturalist* vol. 78, no. 774, pp. 85–89.
7. Langer, Susanne. 1967. *Mind: An Essay on Human Feeling* (Vol. 1). Baltimore: The Johns Hopkins Press, p. 378.
8. Emerson, Ralph Waldo. 1983. "Nature" (Essays, Second Series). In *Emerson's Essays and Lectures*, New York: Library of America, p 382. (This essay was first published in 1844.)