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LIVING

Sex in the trees

In late April, tree flowers are very much in evidence, and their story is fascinating

OUR CHANGING SEASONS
Drew Monkman

One of the easiest ways to follow spring's march toward summer is by observing the changes in the trees. Already, the crowns of many species appear less open, as buds swell, tree flowers emerge and leaves begin to appear, giving a gauzy look to the treetops. The unseasonably warm weather this month has advanced leaf and flower development by at least two weeks.

Unless you are in the habit of looking closely at trees all year around, you may think that the buds just show up somehow in the spring. However, most trees actually form their buds during the summer, usually in August. Because buds are not very apparent in the fall and winter, they tend to go unnoticed. But, as the weather begins to warm up in the spring, the buds that have been waiting dormant all winter start to swell and, consequently, become easier to see.

Before going any further, we should consider what a bud actually is. A tree bud is an ultra-compressed package consisting of next year's leaves, stems, and sometimes flowers. These structures are folded, pressed together and covered by a waterproof coating of scales. The role of the scales is to protect the bud against winter cold and drying. In the spring, when the weather warms, the buds open and send out a flower and/or a new leaf-bearing shoot. Multiple leaves and flowers can emerge from one bud. The shoot will grow into a twig and, during the summer, new buds will appear, all ready to open the following spring

I sometimes have my students track the changes in a specific bud over the course of the spring season. They take note of things such as when the bud begins to open, whether leaves or flowers (or both) emerge and how long it takes before the leaves reach full size. This is a wonderful way of really observing and appreciating at a micro level the all-too-fast arrival of spring.

If you are interested, start by finding a large, unopened bud of a species such as an ash, which has not yet shown a great deal of change. Attach a string or piece of tape to the twig to remember which bud you're going to observe. Visit the bud several times a week or more, especially as you start to see changes. This usually happens when the weather warms up considerably. You might also wish to photograph the buds and emerging flowers and leaves at each visit. You will be amazed at all of the plant material that comes out of a single bud!

The flowering and leafing-out of trees is closely associated with temperature. Spring can be said to be "early" or "late" depending on the date that leaves and flowers emerge. These dates can vary by several weeks from one year to the next. However, the order in which the different species come into leaf and flower is always the same. Leaves and flowers emerge based on how much heat the tree has accumulated. Botanists measure the heat in "growing degree days." The most basic definition of a growing degree day is the number of degrees that the average daily temperature is above a baseline value (usually 10 C). For example, a day with a high of 23 C and a low of 12 C would contribute 7.5 growing degree days. For sugar maple, flowering occurs in May after 30 to 55 growing degree days. As I write this column, however, I can already see signs of maples flowering on April 20.

In these days of late April, tree flowers are very much in evidence. Their story is fascinating. Like the perennials in your garden, trees need flowers to produce seed for the next generation. Whether a tall pine or a little striped maple, all trees have flowers.

Drew Monkman, special to The Examiner

Terry Carpenter, special to The Examiner

Two caterpillar-like catkins of a trembling aspen (left). Each catkin is composed of dozens of male flowers. Right, leaves emerging from a bud.

Some trees, such as cherries, have flowers with both male and female reproductive parts in the same flower. Other trees have separate male flowers and female flowers. Both types may be on the same tree (birch) or an entire tree may be either male or female (willows).

Unlike birds, insects and mammals, trees are rooted in place and cannot attract a mate. To overcome this obstacle, they have developed pollen. Although pollen is often compared to sperm, it is really more like a minuscule, male reproductive tract. When a pollen grain adheres to the stigma of a female flower, it actually produces a penis-like tube which, if accepted, grows quickly, penetrating down into the ovary. Once this tube is in place, sperm from the pollen grain descend down the tube and into the ovary, where they can fertilize the eggs.

As with all forms of life, however, the female is far from passive in this coupling. She is able to chemically detect what pollen is going to be acceptable. If it doesn't meet her requirements, she won't allow a pollen tube to form and penetrate the ovary. For example, the tree's own pollen is usually rejected, as is pollen from a different species of tree.

Being unable to move, trees have evolved ingenious methods of getting their pollen from male flower on tree A to female flower on tree B. Most trees in our area use wind to transfer their pollen. This list includes elms, beeches, ashes, red and sugar maple, oaks, birches, poplars, willows and aspens. But, because wind is so unreliable — it may blow from the wrong direction or not at all — trees that use this mechanism have hedged their bets by producing astronomical quantities of pollen. Take the birch tree, for example. Each of the many-flowered catkins — the caterpillar-like structures that hang from the tree in the spring — produces about five million pollen grains. The tree may have thousands of these catkins. Wind-pollinated species also bloom before the leaves emerge because, if they didn't, the leaves would shield the flowers from the wind and make it more difficult for the pollen to reach the stigmas. Wind-pollinated trees often have male flowers that hang like caterpillars, or tassels, in order to take advantage of the slightest puff of wind.

When May arrives, other intermediaries will be called upon to help trees in the process of sexual reproduction. Species such as cherries, serviceberries and certain maples call upon insects as couriers. Take, for example, apple trees. They have harnessed bees as their mating agents by developing flowers whose shape, colour, scent and food rewards are tailored to these insects. The flowers' bright white or pink colour and lovely perfume are like beacons, advertising to bees from afar, and inviting them to come for delicious rewards of nectar and pollen. As the bee roams the flowers' surface, feeding on nectar, it becomes dusted with pollen, which it scrapes from its body into special baskets on the legs. The pollen will be fed to the larvae back at the hive. However, some pollen remains on the insect's body hairs, and is inadvertently transferred to the stigmas of other flowers on other apple trees that the bee visits.

As you watch all the insect activity around an apple or cherry tree later this spring, take a moment to reflect on this wondrous accomplishment of evolution. The tree, for its part, has tailored every aspect of its flowers to attract insects. In turn, the insects are totally dependent on flowers for their own existence. Their bodies and behaviours are perfectly adapted to take full advantage of everything the flower has to offer. Neither organism can exist without the other. In essence, insects designed the flowers and the flowers designed the insects.

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