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# LIVING

## Do you know your cones?

Holiday wreaths and other floral decorations bring many aspects of nature into our homes at this time of year. These often include fragrant pine and cedar boughs, fruit-laden winterberry holly twigs, bright red dogwood branches and a variety of different cones.



**OUR CHANGING SEASONS**  
Drew Monkman

Cones also come to our attention in winter when we watch a red squirrel adroitly shredding them into pieces as it removes the seeds within, or when we are lucky enough to observe a crossbill separating the cone scales with its scissor-like beak and meticulously extracting the food reward with its tongue. You probably even have cones on the trees in your own yard. Yet, how many of us really know what they are?

All conifers produce cones. In fact, this is where the name "conifer" comes from. It is not really accurate to call these trees evergreens, because one species, the tamarack, actually sheds all of its needles in the fall, just like a maple or an oak. We should, however, reserve the term "pine cone" just for the cones of the pine tree. The cones of the other conifers should be named according to their parent tree, be it a cedar, spruce, tamarack, fir, hemlock or pine.

Cones are simply the reproductive parts of an ancient branch of plants known as gymnosperms. Conifers form the largest group of living gymnosperms. The ginkgo tree is also a member of this branch. Gymnosperms are different from angiosperms in that they lack true flowers. The pollen grains land directly on the ovule, rather than on a flower structure like the stigma. The seeds of gymnosperms are said to be "naked," because they are not enclosed in a protective covering such as fruit. A cone is not the same as a fruit.

As with many types of flowers, cones can be either male or female. Let's look at the female cone first. These are the typical hard, brown, woody cones. The female cone consists of a central stalk surrounded by stiff, overlapping scales, reminiscent of wooden shingles. The ovules, which when pollinated become seeds, are located at the base of the inner surface of the scale. If you open up a mature cone before it falls from the tree, you can often see the seeds inside. In white pine and balsam fir, the female cones are located high up in the tree at the tips of the branches. However, in most other species, they are found lower down as well.

The male cones, also known as pollen cones, are a much smaller and far less conspicuous structure. Usually located on the lower branches, they are most often brown or reddish and resemble little spikes or buttons. They have a central axis which bears pollen-producing structures. Soon after the pollen is released, the male cones wither and drop from the tree. You will often see piles of male cones under pine trees in early summer.

Each different conifer follows its own timetable for pollination and cone development. In the case of white pines, clusters of male cones first appear in the spring at the base of new twig growth. A few weeks later, the soft, green and purplish female cones appear. At the time of pollination, they are about two centimetres long. Towards the middle of June, the male cones release their pollen grains to the wind. The pollen grains are so well adapted to wind pollination that they actually contain two air bubbles. Only an infinitesimally small amount of pollen ever makes it to the female cones, however. Most of it simply descends from the sky, turning cottage decks, shorelines and the edges of rain puddles a lemon yellow.

At the same time as the pollen is released, the female cones become receptive to receiving the airborne sex cells. The tiny cone scales open slightly and a small amount of

fluid is secreted which serves to "trap" the pollen and draw it in towards the two ovules at the base of each scale.

Having secured pollen, the scales begin to thicken and to press tightly together. The cone continues to grow, hardens and turns from green to brown. Strangely enough, the actual fertilization of the ovules by the pollen only occurs 13 months later. It then takes an additional 13 months or so for the seeds to mature and be ready for dispersal. This happens late in the summer. At this time, the scales open once again and the seeds are released. Each seed has a tiny wing which helps it to "fly" up to 200 metres from the parent tree. In all, the pollination, seed development and dispersal process will have taken more than two years. The cones themselves drop off the tree during the late fall or winter, a few months after seed release. The red pine follows a similar timetable, the only difference being that the cones usually remain on the tree until the spring or later.

Cone and seed development in all of the other conifers requires less than one year. In the case of white spruce and eastern hemlock, for example, the cones open and shed their seeds during their first fall or winter. It is quite common to see the snow near these two species littered with seeds. Spruce cones drop from the trees during this same period, but the cones of the hemlock remain on the branches until spring. White cedar cones also open in the fall and shed their seeds over several months. Tamaracks, too, release their seeds in the fall.

With balsam fir, the process is quite different. First of all, you will almost never find a fir cone on the ground. The scales themselves drop off the cone while it is still on the tree, thus liberating the seeds to the wind. All that is left is the bare, stick-like core of the cone. It can remain on the tree for several years. Balsam fir cones grow in dense groups near the top of the tree and stand straight up like candles.

In some conifers like junipers and yews, the scales on the female cone swell up and fuse after pollination. This leads to the formation of a small, soft, fleshy cone which superficially looks like a berry.

For a great holiday activity, you might want to try making your own cone wreath. Going out to gather the cones themselves is half the fun. Try to get cones from a variety of different conifer species.

You'll also need to make a cardboard base. The base can be cut into any shape you like such as a heart, a snowflake or a doughnut. You may also want to either paint the cardboard or glue a piece of felt to it. Then, using a glue gun, attach the cones to the base. If you spray the cones with water several hours before you begin, the scales will usually close. This makes them easier to work with. Glue on the larger cones first, and then fill in the remaining spaces with the smaller ones.

You can also add accents such as acorns and sumac berries. After the cones have fully dried and the scales reopened, spray the wreath with a clear lacquer. Handled with care, it will last for years and be a beautiful holiday reminder of the fascinating biology of cones.

### What to watch for the week

This year, the winter solstice will occur on Dec. 21st at 1:30 p.m. The solstice is the shortest day of the year as the sun traces its lowest and shortest arc through the sky. This event was noticed and celebrated by ancient cultures on every continent of the Earth and, in the opinion of some, was a precursor to faith. It represents the assurance that the days will once again be growing longer and spring will indeed return.

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Drew Monkman, special to The Examiner

Our larger cones (above, left to right): Norway spruce, red pine, white pine; and some of our smaller cones (below, clockwise from upper right): eastern hemlock, tamarack, white cedar, white spruce. In each photo, the dime shows scale.

