Cultivation Note

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Witch-hazel (Hamamelis Virginiana) by Garry Plunkett

Witch-hazel is one of our most common woodland shrubs, found to one degree or another in the understory of most New England upland hardwood forests. In spite of this ubiquity, witch-hazel has a rather quiet presence in the wild. Its one bragging right is that it blooms when there is almost no other color in the woods, around early November after fall foliage is pretty much over. But, even though it has the stage to itself, its floral display is hardly one that turns your head. A thicket of witch-hazel on a hillside, in "full bloom," with just the right slant of morning sunlight can have a pleasant, soft beauty about it, but the most common sensation is surprise at seeing any color at all in a rather colorless time of year.

What this shrub lacks in flower power, however, is more than made up for by its interesting natural history. First, with only a few leftover bees and gnats in the woods as pollinators, one wonders why it evolved to flower so late in the season, perhaps the lack of competition. As if to recognize this risky strategy, witch-hazel flowers have a back up—self-pollination—insects not required thank you very much. It is also curious how, when pollination does occur, the pollen delays its fertilization of the ovary. Pollen grains of most plants get right to work growing a pollen tube after they land on the flower stigma, but witch-hazel pollen hangs around until the following spring. Creating fruit for this shrub is a year long process: pollination happens in autumn, fertilization several months later in the spring, and about a year later fruits are produced. The result of this drawn out schedule is that there can be both flowers and fruit on the plant simultaneously. In fact, the generic word *Hamamelis* refers to plants that do this.

After this extended production schedule the small woody fruit capsules have a very effective distribution system, the ability to propel the two little black seeds 20 to 30 feet away. I have never experienced this, but with ideal conditions—a dry, still, suddenly warm day—one can supposedly sit quietly in a grove of witch-hazels and hear seeds rattling off dried leaves. There is an episode in *Waldon Pond* where Thoreau is inside one quiet evening and hears an occasional noise of something bouncing off the cabin. The following morning he investigates and concludes that it was night-flying witch-hazel seeds.

There are several tales to explain how witch-hazel got its name, the most plausible of which is its former use in water divining, or water "witching." The story seems plausible given the fact that the word *witch* comes from an Anglo-Saxon word, *wych*, meaning "bending." Water diviners located ground water when their special forked limbs were pulled, or "bent" toward the ground. The word "hazel" likely comes from the resemblance of witch-hazel leaves to other woodland shrubs, the "hazelnuts" *(Corylus spp.)*. Whatever the word origin, "witch hazel" to many people is not a plant at all, but rather an astringent lotion that has been made from the shrub since Thomas Newton Dickinson founded his company in 1866 in Essex, CT. This is one plant product with which I have experience. On a hot sultry day, swabbing one's neck and face with a cotton ball soaked in witch-hazel lotion is most refreshing. (A very old, almost empty bottle in my bath vanity has a hand-written price tag of 49 cents.) The company is now in Hamden, CT, still chipping the shrub, distilling the extract, and adding a dash of alcohol to produce ingredients for skin products.

Getting an eye for identifying witch-hazel comes easily. It has standard shrub growth form—usually less than twenty feet high and almost always multi-trunked. And no other woodland shrub leaf looks quite like it: smooth surface, scalloped leaf margins, an asymmetrical leaf base, and prominent feather-veined ribs. Actually, the red "witch's hat " galls found on its leaves probably identifies witch-hazel more often than leaf shape. These aptly named little cones are temporary homes to witch-hazel leaf gall aphids *(Hormaphis hamamelidis)*. When depositing their eggs, the aphids inject chemicals into the leaf, causing the growth of galls that look like tiny red witch hats. houses (and provide one more apocryphal explanation for the shrub's name). Winter identification is also not difficult. There are often frazzled looking empty fruit capsules hanging around the upper branches. The branches have the slight zigzag pattern of alternate leaf shrubs, each zig and zag ending with soft little naked leaf buds (i.e. without scales) that look like tiny deer feet. Quite often the upper stems arch over parallel to the ground, probably to help position leaves for gathering maximum sunlight in the forest understory.

Because of its quiet demeanor, *Hamamelis virginiana* seldom plays a major role in a formal landscape. For more show, there is Chinese witch-hazel (*Hamamelis mollis*) or the hybrid *(H. × intermedia)*, both of which bloom in late winter to early spring. Another American native witch hazel **(Continued on next page)**

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blooms in the spring, as its name suggests. Spring witch-hazel (*Hamamelis vernalis*) grows wild on gravel bars and rocky stream banks in the Ozark Plateau of Missouri, Oklahoma, and Arkansas, and has a red-orange colored flower.

The ideal garden setting for native witch-hazel is in part sun to light shade, and moist, slightly acidic, organically rich soil. Partial sunlight produces the best flowering, but avoid full sun. The spring bloomers can stand alone in a landscape but *Hamamelis virginiana* works better with multiple specimens planted together. Transplanting is easy and can be done in spring or fall. Since witch-hazels are difficult to propagate it is best to use nursery stock. Quite the hardy shrub, once established witch-hazel needs only a little early spring pruning.

Hamamelis virginiana is an excellent choice, if not a requirement, for an authentic New England woodland wild space. Its demands are few, it has respectable golden fall foliage, and it is well behaved with a modest growth rate. When you stroll with a friend through your private woodland, witch hazel is not the shrub that you will be showing off, but it is one that you'll enjoy talking about.

Sources:

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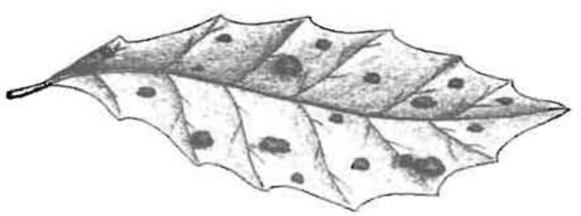

Woolly oak galls made by Gall Wasp

(Galls Continued from page 1)

(2) Fungi. Plants react to certain microscopic invaders by producing a localized overabundance of cells. In the case of crucifers infected with the Club-Root pathogen (recently reclassified as a protozoan), root cells can swell up to five times their normal size, and potato-like structures develop on the normally fibrous roots, but only in acidic soils. Azaleas may become infected with a fungus that causes leaf and flower galls to develop in the spring. Juniper/Eastern Red Cedar frequently sport a woody, brown, spherical gall patterned like a soccer-ball, an inch or more in diameter. These galls look like they are a normal plant part, but in fact they were initiated by the presence of a fungus that causes the disease, Cedar-Apple rust. During the first warm spring rains, the fungus in these galls on Juniper bursts forth with long, orange, finger-like spore-bearing structures which release spores that blow to leaves of plants in the apple family, where they cause yellow pimples, then orange blisters. To complete its disease cycle, spores from apple must return to and infect Juniper, where galls will again form.

(3) Nematodes.

Certain root-inhabiting nematodes, such as the Cyst, and the Root knot nematodes, penetrate plant roots and stimulate cells right around their head to increase many times their normal size. These provide a long-term feeding site for these sedentary nematodes. In the case of the Root knot nematode, root cells surrounding these giant cells are incited to proliferate wildly, forming visibly-large, protective root galls (the 'knots') around the nematodes.

(4) Bacteria.

Of the several bacteria that produce galls on plants, *Agrobacterium tumefaciens* stands apart as the *piece de resistance* of host modification by a pathogen. The disease it causes is Crown Gall, although just about any plant part of many plant species may be afflicted.

The bacteria enter a fresh wound. In response to chemicals released by plants when wounded, the bacteria are inspired to inject, from their Ti (tumor inducing) plasmid a piece (called T-DNA, or tumor DNA) into the plant cell's nucleus where it inserts itself into the plant's DNA, where it then stimulates the synthesis of growth regulators that make those intruded plant cells into tumor-producing cells. These divide excessively, no longer under the control of the plant (or the originating bacteria.) A rough-surfaced, often convoluted gall develops, and sometimes may enlarge to the size of one's fist.

As intriguing as this is, we need to avoid bringing plants with Crown Gall disease into our gardens and, if found there, they should be meticulously removed and discarded in the trash, not the compost pile. Nursery plants with Crown Gall are not permitted to be sold, and fields can be banned from further cultivation of plants or produce which would ordinarily be transported off-site.

A fascinating side story is the connection between this bacterium and genetic engineering, as it paved the way for inserting into plants the genetic material from diverse sources. Utilizing the ability of *A. tumefaciens* to insert functionally its nuclear material into a plant, scientists developed procedures to use its Ti plasmid by first removing the undesirable part that induces tumors, and attaching genes with desired traits from all sorts of other plants and even animals. The bacterium then does its magic and inserts this new genetic material into a host plant. In fact, now techniques allow the insertion of the genetically-engineered Ti plasmid directly into a plant cell, bypassing the need to use the bacterium as the vector.

So the ingenious mechanisms devised by parasites to live off the work of plants have now been used by humans, the ultimate parasite, in an attempt to enhance their health and society.

This ability of various invaders to take up residence in plant organs may give new meaning to Stephen Foster's words, "be it ever so humble, there is no place like home".