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Cypress Provincial Park, Domain of the Heathers: an Introduction

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In any forest, below the trees are the shrubs, and like the trees they are woody and long-lived. Shrubs are much shorter than trees, of course, and they also have many stems rather than a single trunk. At Cypress Provincial Park, where I often lead nature walks, the most common shrubs are members of the Ericaceae or heather family. This family includes not just the true heathers with their small narrow leaves, but many other plants that most of us do not recognize as heather relatives at all - plants like blueberries, and rhododendrons. Even the arbutus trees that grow along the seaside bluffs, down below at Lighthouse Park, belong to this family.

Almost without exception, the dominant shrubs on the North Shore mountains and across coastal British Columbia are of the heather family, and the accessibility of Cypress makes it an ideal site for investigating this family. They have basically cornered the market throughout the coniferous forests, the alpine ridges, and the boglands. The exceptions are places such as damp mountain flower meadows, marshlands, and open sites where the forest has been removed by logging or fire. In these open, sunny sites the most important shrubs are members of the rose family - plants such as salmonberries (*Rubus spectabilis*), blackberries (*Rubus* sp.), and thimbleberries (*R. parviflorus*). But once the coniferous trees regain their territory, the understory returns to the heather group.

The most important shrubs in the park are the blueberries (*Vaccinium* sp.), of which there are four different kinds: Alaskan blueberry (*V. alaskaense*), oval-leaf blueberry (*V. ovalifolium*), black blueberry (*V. membranaceum*), and bog blueberry (*V. uliginosum*). The Alaskan one is by far the most common species. It produces the familiar purple berry with a gray coating, and is the type most often seen all across our coastal mountains. The oval-leaf blueberry differs from the Alaskan in only minor details, but it is much less common. They both grow intermingled, and the berries have the same taste. Even some botanists consider them to be merely different varieties of the same species. The leaves of both forms are blunt, bluish-green, with the margins

Hypopitys monotropa – Kent Brothers photo

almost smooth and, to the naked eye, look identical. The black blueberry, however, is quite different. It does not reach as low an elevation as the others, being restricted to levels higher up the mountains. The berries are larger, and shiny black, with no hint of the gray coating so characteristic of the others. Most people consider the taste to be superior, too. The leaves are also quite different being deep green with toothed margins, and a somewhat pointed tip. The blueberry of commerce, which is grown in the Fraser Valley, is a different species again. This is the high-bush blueberry of eastern North America (*V. corymbosum*). It is not native to our area, although it often escapes and becomes wild near commercial blueberry fields, but it never reaches higher altitudes. The bog blueberry is very rare at Cypress, although there are a few individuals at Yew Lake. It grows very close to the ground and the blunt leaves are much more gray-green than those of any of the other species. A fifth species may also grow on the higher peaks - the Cascade blueberry (*V. deliciosum*). It is a shrub of alpine slopes, is much like the Alaskan blueberry, but grows close to the ground and branches more. Tall individuals of the Cascade, and short ones of the Alaskan are difficult to distinguish from each other.

Closely related to the blueberries is the red huckleberry (*V. parvifolium*). It is very common on the lower slopes of Hollyburn Ridge, but at the level of Cypress Park is largely replaced by the blueberries. It seems to be dependent on the presence of rotting wood, and often grows on well-decayed logs and stumps. The bright red berries have a pleasantly tart taste, although care must be taken not to mistake them for the fruits of toxic plants.

Other heather family members are salal (*Gaultheria shallon*), and its small relatives, western teaberry (*G. ovatifolia*) and mountain teaberry (*G. humifusa*). On the higher peaks and ridges grow the pink and white mountain heathers (*Phyllodoce empetriformis)* and *Cassiope mertensiana*) as well as the crowberry (*Empetrum nigrum*). In boggy sites and around the edges of lakes there is Labrador tea (*Ledum groenlandicum*), and also swamp laurel (*Kalmia microphylla*). Growing with the blueberries on forested slopes, although less abundant, are white rhododendron (*R. albiflorum*), false azalea (*Menziesia ferruginea*), and copperbush (*Cladothamnus pyrolaeflorus*).

Salal, with its wide, leathery, evergreen leaves is a shrub more common at lower altitudes. Its long clusters of juicy purple berries, although sweet, are often covered in hairs. They are not really berries at all, being structurally different, and are referred to by botanists as fleshy capsules. On Vancouver Island, the collecting of salal branches for floral displays adds several million dollars to the economy. Its relatives the teaberries are dwarf plants with tiny red berries. The western teaberry grows in drier sites, and the mountain teaberry in marshy spots.

The two heathers are plants of open rocky bluffs and ridges - places of extremes. There is very little soil here, and the open, exposed conditions result in extremely dry conditions during the summer. These are the micro-deserts of the snow forest, and special adaptations are called for. The dark green leaves of the pink heather look very much like those of a small coniferous tree in the pine family. They are tough, narrow and needle-like. All these features are methods for holding onto that precious water which is so hard to obtain. The lower side of the leaf

also has edges that are rolled under, reducing the surface area of that side even more. It is here that evaporation is the highest, for the underside has microscopic pores that plants use for air intake. Carbon dioxide, used to build sugars and cellulose, is taken in, and water vapor escapes. The white heather is even more adapted to harsh conditions. Although the two tend to grow together, the white one is able to extend its range to higher, more extreme altitudes. The leaves are thick, short, and pressed closely against the stems, affording still greater protection.

If you look closely at the flowers of blueberries, salal, and the two heathers you will see that all of them are shaped like little bells. This shape is designed to protect the delicate organs within from being damaged. Only a small opening is exposed to the outside air, but it is large enough to permit access by pollinating insects. During rainstorms the water runs down the sides of the bell without entering the flower. It has a built-in umbrella, and does not have to close the way a dandelion does.

Labrador tea and swamp laurel are only found in wet boggy places as well as on the edges of small lakes and ponds. They are the shrubs of the most acidic and nutrient-poor sites of all, and are more characteristic of true bogs such as Burns Bog, Richmond Nature Park, or Camosun Bog. The cold acidic water of bogs is only slowly absorbed by many plants, and so, many of the species adapted to those wetlands have developed water conserving techniques - methods to survive in what is essentially an aquatic desert. Both these shrubs have tough leaves that resist desiccation. Since most evaporation from a leaf usually occurs from the lower surface, it is here that you are likely to see those special water- conserving mechanisms. Labrador tea alleviates moisture loss by having its margins inrolled and its underside covered by a dense coating of orange, wooly hairs. Swamp laurel leaves have a gray, waxy coating on their lower surfaces, and the upper sides are thick, dark green, and shiny. Recent genetic research has shown that Labrador tea is closely related to rhododendrons. Swamp laurel bears pink, open flowers that look similar to some rhododendrons, but possess a unique feature that is found in no other native flowers. The petals have pits that are readily seen as small bumps on the underside of the flower. Before they mature, the stamens curve over, and the pollen-containing anthers at their tips are held in these pits. When mature, they spring up, dusting appropriate pollinating insects. Since some species of insects eat pollen, this mechanism probably helps the swamp laurel to protect its pollen from such predators as well.

The white rhododendron is a true rhododendron that grows on the slopes of the coastal mountains. It, however, is a very unusual rhododendron, not closely related to other species. The dark green, shiny leaves, and the white flowers look very much like those of an azalea. Azaleas are technically also rhododendrons, but their flowers have five stamens, whereas the true rhododendrons have ten. Although it looks azalea-like, our shrub has ten stamens. Rhododendrons bear their flowers at the branch tips, but the white rhododendron is unique in that regard also, for its flowers are produced lower down on the branches.

The false azalea, besides being a mountain shrub, is also found at sea level. It too is closely related to rhododendrons, and the pale green or blue-green leaves look very much like those of an azalea, hence the name false azalea. But the flowers, however, are nothing like those of an azalea. They are small coppery bells, shaped like blueberry flowers.

Phyllodoce Empetriformis – Kent Brothers photo

Copperbush is a shrub of the Coast Mountains, and Cypress is essentially at the extreme southern end of its range. A few outlying examples have been found in the Cascades and Olympic Mountains, but it is very rare south of British Columbia: you will never see any on your hikes to mountains south of the Fraser River. In contrast it is a common plant on the North Shore mountains. The narrow, blunt leaves of copperbush are a shiny green, which contrasts strikingly with the flowers. The five widely spreading petals are a bright coppery orange shade.

Also growing in the dense shade of our mountain slopes is a very strange heather indeed. This does not look anything like its relatives that we have just described. In fact it is not even a shrub, but a herb - a herb that is not even green. It is a pale cream shade, usually with some orange coloration to the flowers, as well. This is the pinesap (*Hypopitys monotropa*), and its lifestyle is a good illustration of the interconnectedness, and the interdependence of living things. The pinesap is not green because it has not chlorophyll, and it has not chlorophyll because it is a parasite. But it is a strange type of parasite, because it does not take its food directly from the tree roots which surround it but from mushrooms, mycorrhizal mushrooms, which are associated with those roots. The glucose manufactured by the needles of the forest canopy is transported to the mushrooms, and the pinesap then takes it from the mushrooms.

It is very apparent that heathers and their relatives are the bushes of the rainforest and the mountain summits, but why is this so? The complete answer to that question is unknown, but part of the answer has been ascertained. The rain of our raincoast leaches many minerals from the soil, depositing them in the subsoil where plant roots are unable to access them. Other nutrients are locked up in the trunks and branches of the surrounding trees. This situation produces a soil environment that is acidic, and nutrient poor. Those same trees also shade the forest floor, and their fallen needles are slow to decay, increasing the acidity even further. The reverse situation occurs after a forest fire, or large blowdown. The resources locked up in the trees are now released, and the ground is now open to the sunlight. For a few decades before the conifers re-assert their dominance there is an interval when light-loving plants that favor rich soil can thrive. When the forest canopy returns, however, those plants are starved of light and food, and the dominance of the heathers returns.

Heather family shrubs are adapted to poor, acidic soils, where there are few minerals other than iron. Many are also at home under dense shade. Why they are so adapted may be a result of the fungi that occupy their roots. Most trees and shrubs depend upon mycorrhizal fungi for their survival. These fungi are attached to the roots and gather water along with dissolved minerals, that they deliver to their hosts. In exchange, the fungi are supplied with sugars produced by the host's leaves. Many of the large mushrooms that grow on the forest floor are the reproductive structures of such fungi. The fungi of the heathers, in contrast, are entirely microscopic, and are probably much better adapted to adverse sites than are those of other shrubs. Their success in accessing limited resources also works to the advantage of the heathers with which they are associated, explaining in part why this domain belongs to them.

This single family of shrubs is almost synonymous with the west coast environment. Almost every stable habitat belongs to it. The few exceptions to this situation are disturbed sites, alpine meadows, marshes, and swamps. The overwhelming dominance by one family of flowering plants is another little known wonder of the environment in which we live. But why this is so, is still only dimly understood.

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