

Gymnosperms dominate our coastal BC forests and include our tallest trees. About 1,000 plant species of the world are gymnosperms. Gymnosperms are an ancient group of vascular, woody plants that are of major economic and ecological importance. More than one-third of them are at risk of extinction and face multiple threats from the impacts of human activities.

What are gymnosperms? The term “gymnosperm” means “naked seed”. The seed is unprotected by an ovary or true fruit in contrast to angiosperms, the flowering plants, which comprise more than 200,000 species. Gymnosperms include **conifers** such as pine and juniper, **cycads** such as sago palm (not a true palm), **ginkgo**, and **gnetales**, such as ephedra. While most gymnosperms are evergreen and keep their foliage all year, some are deciduous and drop their leaves in the fall.

Families of the **conifers** that we’ll see today are: **Araucariaceae** (monkey puzzle), **Cupressaceae** (cypress), **Pinaceae** (pine), **Podocarpaceae** (podocarp), and **Taxaceae** (yew). Conifer foliage may be scale-like or needle-like. Needle arrangements may be single, bundled, or clustered. Cones also vary from woody cones with scales (bracts) to round woody cones to berry-like arils.

Follow the numbers and directional arrows for this tour. To begin, leave the Visitor Centre, go left across the plaza to **1- weeping Nootka cypress (*Xanthocyparis nootkatensis* ‘Pendula’)**, a native of BC. Because of its unusual foliage and cones, this species seemed to be unique among the cypress family – until a close relative with similar characteristics was discovered in Vietnam in 2002.



Go right and follow the ramp from the plaza onto the gravel path and at the fork turn left and then left again. Look left at **2- Brewer’s spruce (*Picea breweriana*)**, endemic to steep slopes of the Klamath Mountains of California and Oregon. The single needles of its pendulous, weeping foliage are somewhat prickly and its cones, if present, would hang down—typical traits of spruces. Spruces are in the pine family.



Turn back, keeping the lake on your left to the floating bridge. Cross and look left at **3- bald cypress (*Taxodium distichum*)**, a deciduous member of the cypress family native to southeast USA. Notice the enigmatic woody “knees” near its base. Bald cypress knees are a magnet for differing theories among botanists as to their function, none verified. On the north edge of the lake is another deciduous member of the cypress family, the dawn redwood (*Metasequoia glyptostroboides*), which can be distinguished from bald cypress in winter by its paired opposite buds.

Continue along the gravel path through the bamboos and past towering evergreen coast redwoods (*Sequoia sempervirens*) with their flat sprays of needles and thick fibrous red bark. As you arrive at the paved walkway look left at two specimens of the cypress family with prickly awl-like needles and young green and older brown round cones. The nearer one is a cultivar and the farther one is the species of **4- Japanese cedar (*Cryptomeria japonica*)**, endemic to Japan. On the opposite side of the walkway you may compare the scale-like foliage and rounded cones of **5- giant sequoia (*Sequoiadendron giganteum*)** also of the cypress family. Their protected relict populations near Yosemite in California are in decline and vulnerable to fire and competition from other species.

Continue on the paved path into the Mediterranean garden. At the junction look left at the sprawling dwarf cultivar of **6- cedar of Lebanon (*Cedrus libani* ‘Sargentii’)**. A member of the pine family, this “true” cedar has needles in clusters. Bear left, then right onto the gravel path into the Southern Hemisphere Garden. Look left at the soft foliage of **7- Chilean cedar (*Austrocedrus chilensis*)**, a cypress family member native to Chile. Its attractive scale-like foliage is evergreen.

Continue along to the paved path, bear left, then right and look up at the striking silhouette of **8- monkey puzzle or pehuén (*Araucaria araucana*)**, native to the lower slopes of the Andes and the hardiest members of the monkey puzzle family. The female trees do not produce their cones with large edible seeds until they are about 30 years old. They have been protected in Chile since 1971.

Proceed down the paved path that curves to the right. Growing above the rock wall on the right in front of the monkey puzzle is a short-needled shrub **9- Tasmanian podocarp (*Podocarpus alpinus*)**. Its seed has a fleshy covering called an aril that is a modified cone scale. Birds eat the aril and scatter the seed in their droppings. Podocarps are the most important conifer of the southern hemisphere.

Cross the bridge and stop at the top of the rise. Look around you for several types of pines. A key feature for identifying pines is the number of needles in a bundle, most commonly 2, 3 or 5. Filling the raised bed on the right is a 2-needled pine, *Pinus mugho*. Nearby in the bed on the left is a young specimen of **10- ancient pine (*Pinus longaeva*)**, one of the 5-needled pines known as foxtail or bristlecone pines. Beyond it are two Rocky Mountain bristlecone pines (*Pinus aristata*), which have characteristic white resin flecks on their needles. Bristlecone pines live in near-desert locations at high altitudes in USA, grow slowly and live to be thousands of years old.

Enter the Heather Garden through the rocky grotto to the right. As you walk through the heathers, notice foliage on the low flowering plants that may remind you of conifer foliage. There are needle-like leaves on the heaths (genus *Erica*) and scale-like foliage on the true heathers (genus *Calluna*). Several small conifers in this garden are dwarf cultivars of the genus *Picea*, the spruces. Touch them carefully to feel the prickly foliage typical of spruces.

Bear left and cross the stone bridge to the rock wall on the opposite side of the paved path. At the wall touch the foliage of the **11- Sargent's weeping hemlock (*Tsuga canadensis* 'Pendula')** to notice how soft it is compared to spruce. To its left is the soft "pettable" foliage of the cultivar *Pinus strobus* 'Radiata', another 5-needled pine. Continue left to the junction.

At the left corner is **12- threadleaf sawara cypress (*Chamaecyparis pisifera* 'Filifera')** of the cypress family with graceful scale-like foliage and interesting bark. Nearly opposite across the path to the right is the evergreen hedge enclosing the Perennial Garden. This is **13- Irish yew (*Taxus baccata* 'Fastigiata')**, a member of the Taxaceae or yew family and the same genus as our local native Pacific yew. The foliage and seeds are poisonous but the seeds are borne in a red aril (a modified cone scale) and eaten and spread by birds.



From here you may return to the Visitor Centre or continue with the tour.

To see more gymnosperms, turn right and proceed along the rock-walled paved path and head up the hill. Look for two firs on the left of the path, Nikko fir (*Abies homolepis*) and beyond it **14- Pacific silver fir (*Abies amabilis*)**. Its single needles are blunt and soft to touch and can be retained for decades. The largest known living *Abies amabilis* grows in Cypress Provincial Park, BC. Firs have cones that sit upright on the branches as can be seen to the right near the top of **15- Caucasian fir (*Abies nordmanniana*)**. Continue on up the hill.



As you approach the crossroads to the lower path of the Sino-Himalayan garden you will pass a mature grove of native conifers, Douglas-fir (*Pseudotsuga menziesii*). Continue straight through the junction and at the next junction turn right and follow the arrows to **16- dwarf joint fir (*Ephedra gerardiana*)**, a gymnosperm that is not a conifer but a gnetales. The jointed, nearly leafless stems are common to the 50 species of ephedra native to dry areas of the world. The green stems are photosynthetic. Reduced scale-like leaves may be visible at the nodes. Ephedra contain alkaloids that have been used for millennia as medicines but which can also be quite toxic.



Across the path is **17- weeping maidenhair tree (*Ginkgo biloba* 'Pendula')**, a cultivar of an ancient gymnosperm with a unique fan-shaped leaf. Found in the wild in a limited area of south China, ginkgo is dioecious, with male and female as separate trees, and deciduous, with saffron-yellow leaves in autumn. Its edible seed forms within an odorous fleshy coat.

Behind you at the opposite corner of the junction is **18- coffin tree (*Taiwania cryptomerioides*)**, one of Asia's largest trees. It is native in fragmented populations from Taiwan to Vietnam. As with some other species of the cypress family, its mature and juvenile foliage may be different. Its foliage is more needle-like or awl-like when immature, becoming more scale-like in maturity.

With the *Taiwania* on your right, proceed downhill on the path to the next junction, turn right and continue to the junction at the Rhododendron Walk, just past the Korean pavilion and left to **19- Japanese larch (*Larix kaempferi*)**, a deciduous member of the pine family which bears its needles in clusters. Continue down the Rhododendron Walk to return to the Visitor Centre.



To have a look at one more type of gymnosperm, a cycad, please visit Bloedel Conservatory in Queen Elizabeth Park. Cycads are too tender to live outdoors year-round at VanDusen.

For more information on gymnosperms, please visit the VanDusen library or look at these websites.
<http://herbaria.plants.ox.ac.uk/bol/conifers>
<http://www.kew.org/science-conservation/index.htm>
<http://www.conifers.org/zz/gymnosperms.php>