# Snake Bark Maples at UBC Botanical Garden

The maritime influence is significant at UBC Botanical Garden, as we are located on the southwestern edge of Point Grey, 100 m above Georgia Strait on the south coast of British Columbia. This creates ideal conditions for the remnant native conifer forest that defines much of the garden and for growing a wide range of *Acer* species. The Botanical Garden has been collecting maples for about thirty years, and maples of documented wild origin (i.e., seed collected in the wild and the location recorded) for around twenty. To date, we have approximately one hundred maple taxa (species, subspecies and varieties), 55 of which are of documented wild origin.

The genus *Acer* is separated into about fifteen sections, each representing major evolutionary divergences (Delendick, 1981). Three sections are represented in the British Columbia flora - Glabra (*A. glabrum*), Lithocarpa (*A. macrophyllum*) and Palmata (*A. circinatum*) - and each has representation in the garden. By far, the greatest sectional diversification occurs in Asia, where all major maple groups are represented (Van Gelderen, 1994). The David C. Lam Asian Garden at UBC Botanical Garden is home to species from most of the sections, and there are also Asian and non-Asian species in other garden components.

Among the most beautiful and interesting groups is Section Macrantha, the snake bark maples. Conservatively, there are some dozen or more species; one is native to eastern North America (*A. pensylvanicum*), while the remainder are Asian endemics. In residential gardens, this group is most often represented by the Chinese *A. davidii* (Father David's maple) and its subspecies *grosseri*, and occasionally by the Japanese *A. capillipes* (red-budded snake bark), *A. rufinerve* (grey-budded snake bark), *A. pensylvanicum* (moosewood) and the Manchurian *A. tegmentosum*. Other species are rarely encountered outside of botanical gardens and arboreta.

The most recognizable feature of the snake barks is their attractive stems. Stem striping is due to waxes that are produced and accumulate in the longitudinal fissures of the expanding bark (Oterdoom & De Jong, 1994). While

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the most common species exhibit strikingly striped stems, not all species do. To complicate matters, a few maples belonging to other groups have striped bark, particularly in youth; e.g., some forms of *A. stachyophyllum* (Section Glabra). Throughout the snake bark group, leaves are generally not very maple-like - i.e., in the sense of the "typical" maple leaf shape. They vary from unlobed to three- or five-lobed, mostly with a prominent central lobe. In some species, juvenile leaves are often significantly bigger than the adult leaves, and developmentally and seasonally heterophyllous leaves (i.e., leaves of different shape produced at different times) are not uncommon (Figure 1). Winter buds are the most reliable feature for positive identification of the group, as they are conspicuously stalked, with two pairs of valvate bud scales (Figure 2).

Bark striping is perhaps most developed in *A. davidii*, where stripes can be of varying thickness and whiteness, and are usually paired with streaks of dark green and/or wine red on a green or olive green background. This characteristic appears to be geographically related (in the UBC collection, red streaks are evident only on accessions from southern locales), but the correlation requires further investigation. On most species, the most obvious stripes occur on young shoots and gradually disappear as the outer bark becomes increasingly corky on older stems. An intermediate stage between visible stripes and their gradual obliteration by cork is sometimes seen (Figure 4), and this has been described as the "diamond bark" pattern (which both the grey- and red-budded snake barks commonly exhibit). Some stem shading is usually necessary to prolong the life of both bark stripes and the photosynthetic capacity of the stems, although this varies considerably between species and among individuals. For example, one much admired *A. davidii* in the David C. Lam Asian Garden is well over 25 years old and still has a striking green stem and clean white stripes to the ground. In contrast, no amount of shade prevents the disappearance of stripes on *A. tschonoskii* subsp. *koreanum* (Korean butterfly maple), whose beautiful white stripes on red are retained only on shoots younger than about four years old.

The Botanical Garden's collection of snake barks would be considered reasonably complete by most standards, with 15 of the possible 21 taxa currently recognized in the literature represented. The two Taiwanese species, *A. caudatifolium* Hayata (Figure 3) and *A. rubescens* Hayata (Figure 5), are both represented by documented, wild collected accessions. Both are rare in gar-

dens. Their names are confused in the literature with the names *A. morrisonense* Hayata and *A. kawakamii* Koidzumi (both are synonyms of *A. caudatifolium*), and *A. morrisonense* Li (a synonym of *A. rubescens*). To make matters worse, an interesting plant in the collection came to us from a reputable Oregon nursery mislabelled *A. morrisonense*; in reality, *A. tegmentosum* - a species not native to Taiwan. The three are very different species and easily distinguished: *A. caudatifolium* has sea green, willowy branches that are faintly striped, and birch-like leaves with long, slender drip tips (hence the epithet *caudatifolium* - *cauda'ta*- means having a tail). *Acer rubescens* is a more open tree, with white striped, green stems and red twigs and petioles, and coaster-sized, lustrous, five-lobed juvenile leaves—the tips of each lobe abruptly attenuated and spreading. *Acer tegmentosum* (Figure 6) is notable for its startlingly chalky white stripes on blue-green waxy stems, and large three- to five-lobed leaves.

Despite the great distance between their respective habitats, *A. pensylvanicum* and *A. tegmentosum* are thought to be closely related. They share a number of similarities, including floral and vegetative morphologies, and are probably the hardiest species in the section. Unfortunately, UBC Botanical Garden does not currently have collections of *A. pensylvanicum* with which to make direct comparisons[1]. This will be remedied in the future, however, as there are plans to develop a **Carolinian Forest Garden** on the undeveloped hillside area north of Marine Drive, where significant collections of eastern North American species, such as maples, rhododendrons and magnolias, can be planted. The Carolinian Forest Garden will provide a showcase for these and other important plant groups whose species are shared between eastern North America and east Asia.

One hybrid snake bark maple, *A.* × *conspicuum* 'Silver Vein' (*A. pensylvanicum* 'Erythrocladum' × *A. davidii* 'George Forrest') can be seen in the Winter Garden. This cultivar is much celebrated for its excellent bark striping and vivid red new shoots, but despite its introduction more than forty years ago, it is not well known. Cultivar snake barks are more common in Europe and especially the United Kingdom, where a number are available in the trade; most of these are selections of *A. davidii.* In gardens there (and probably nurseries, as well), many supposed cultivars are unfortunately merely seedlings of said cultivars. Oddly, only a single *A. davidii* cultivar is regularly offered locally. This is the cultivar 'Serpentine', which, although somewhat more tender than most, is exceedingly attractive, with white-striped red and

green stems, red shoots and petioles, and small leaves. The Botanical Garden has a total of nine *A. davidii* accessions, including one from seed collected in Sichuan, China, that is similar to 'Serpentine'. The remaining *A. davidii* accessions are distinct, either in bark colour or leaf shape.

The Japanese species include *A. capillipes* (red-budded snake bark), *A. rufinerve* (grey-budded snake bark), *A. crataegifolium* (hawthorn or uri maple), *A. tschonoskii* (butterfly maple), *A. micranthum* (small-flowered maple) and *A. morifolium* (mulberry maple). Many of these species are represented at UBC by nursery-sourced plants. *Acer capillipes* is fairly common around Vancouver, thanks in part to the ease with which this species is grown from seed and to local nurseries that for years sold it as *A. davidii.* Despite the confusion, the two are easily distinguished on the basis of leaf shape alone. The grey- is somewhat similar to the red-budded snake bark, though the backs of *A. rufinerve* leaves have rusty hairs on the veins (Figure 7) and the young shoots are covered with a blue, waxy bloom. For some years, Dutch nursery stock of *A. rufinerve* arrived in Vancouver as *A. grosseri* (*A. davidii* subsp. *grosseri* is a particularly beautiful and much sought after snake bark).

Hawthorn maples have faintly striped stems and sport very small leaves, mostly of a shape reminiscent of *Crataegus* (hawthorn) or *Malus fusca* (Pacific crabapple). Never more than a small tree or large shrub, this tidy species deserves to be better known. Even less well known is *A. morifolium,* a poorly described species that may well be an anomalous form of *A. capillipes.* The botanical garden has a number of plants from seed collected recently on the Japanese island of Yakushima. It is premature to describe such juvenile plants, but at this age these maples look very much like young *A. rubescens.*

Of all the species, *A. tschonoskii* and *A. micranthum* look least like other snake bark maples. They are shrubs or small trees on a scale with hawthorn maple, but more spreading and vase-like in habit. Their stems are mostly light grey-brown (except the youngest growth), their leaves broad, deeply three- to five-lobed and coarsely serrated. *Acer micranthum* is the smaller of the pair, with slender drooping stems and tiny leaves. In the Asian Garden, our single individual of small-flowered maple is well hidden atop an ancient stump behind a large *A. mandschuricum* (Section Trifoliata). Our collection of butterfly maples is more numerous - with a number of wild collections from Korea and China - although we have none from Japan, to date. UBC's accessions are of the subspecies *koreanum* (also known as var. *rubripes*), which

exhibits more brilliant red new growth than subsp. *tchonoskii*, the typical form.

The most interesting and problematic of the snake barks is the *A. pectinatum* complex, an assemblage that presumably represents a closely related, intergrading series of species (or subspecies) and forms from central China to the Himalayas and Vietnam. It includes the following subspecies: *forrestii* (Figure 8) (west China and Myanmar), *taronense* (back cover) (west China, Myanmar and Vietnam), *pectinatum* (Figure 9) (Himalayas from Nepal to Myanmar), *laxiflorum* (Figure 10) (west China), and *maximowiczii* (Figure 1) (northwest China)[2]. Many are beautiful and make excellent subjects for smaller gardens, but there is often uncertainty regarding their correct identification. This can be explained by the prevalence of nursery-sourced plants under these names, which are often grown from garden-collected (hence, potentially hybrid) seed. Another source of confusion is the similarity of the taxa themselves; in some taxa the differences appear to be of degree, rather than of character. There are currently ten documented wild accessions of this group in the Asian Garden. It is probably premature to give them more than provisional names, as some of the accessions are still exhibiting strictly juvenile foliage, which may change significantly as they mature.

The Botanical Garden continues to acquire wild origin maples and to test the hardiness limits of species that are rare in cultivation. We await the availability of the western Himalayan *A. sikkimense* and its subspecies *metcalfii*, for example. Other Asian snake barks missing from the collection include *A. davidii* subsp. *grosseri* (north and central China), *A. laisuense* (northwestern Sichuan) and *A. tschonoskii* subsp. *tschonoskii* (Japan). Completing the collection of snake barks is one of the garden's goals; however, its completion isn't seen as an end in itself. UBC Botanical Garden and Centre for Plant Research will be able to make more significant contributions to knowledge of this group when the entire geographical range is considered and the full extent of variation can be studied. This necessitates an expansion of the collection of snake barks to multiple collections of known wild origin for all of the species we can accumulate and grow. Beyond the scientific benefits, we can look forward to new introductions of these beautiful plants to cultivation and an even greater visitor experience at the garden.

[1] There are specimens of nursery-sourced *A. pensylvanicum* on the UBC campus.
[2] Geographic ranges are approximate. The literature is often contradictory on ranges of maple taxa.

### Appendix: *Acer* Section Macrantha at UBC Botanical Garden

Names below are currently accepted species according to the Royal Horticultural Society. Following each name is the geographic distribution, or if wild source seed, the collector number and approximate collection locality, and finally, the UBC Botanical Garden accession (unique accession number - source code - date of accession).

***A. capillipes*** (Japan) 012825-0317-1976
***A. capillipes*** (Japan) 015357-0104-1978
***A. caudatifolium*** ETOT 0054 (near Chiayang, Taiwan) 030832-0049-1993
***A. caudatifolium*** ETOT 0021 (2220 m, Taichung, Taiwan) 030852-0049-1993
***A. crataegifolium*** WH 0737 (Japan) 027412-0545-1988
***A. crataegifolium*** WH 0908 (Japan) 027467-0545-1988
***A. davidii*** (central China) 015359-0104-1978
***A. davidii*** SABE 0517 (1300m, Hubei) 022937-0083-1982
***A. davidii*** SABE 0536 (1000m, Hubei) 022938-0083-1983
***A. davidii*** SABE 0679 (Quijiaping, Hubei) 022939-0083-1982
***A. davidii*** APW 0074 (1050m, Guizhou) 031585-0413-1995
***A. davidii*** APW 0071 (1020m, Guizhou) 031659-0413-1995
***A. davidii*** SICH 0630 (Minya Konka, Sichuan) 030257-0571-1992
***A. davidii*** 'Ernest Wilson' 025258-0538-1986
***A. micranthum*** (Japan) 017988-0317-1979
***A. morifolium*** YUKAWA 99-74 (Yakushima, Japan) 035507-5051-2000
***A. pectinatum*** subsp. ***forrestii*** SEH 68 (China) 035480-0166-2000
***A. pectinatum*** subsp. ***forrestii*** HM 1500 (China) 026482-0497-1988
***A. pectinatum*** subsp. ***forrestii*** SICH 1245 (2800m, Sichuan) 030849-0571-1993
***A. pectinatum*** subsp. ***forrestii*** SICH 1389 (3505m, Sichuan) 032171-0571-1995
***A. pectinatum*** subsp. ***forrestii*** SICH 1461 (2750m, Sichuan) 032172-0571-1995
***A. pectinatum*** subsp. ***laxiflorum*** SICH 0025 (2320m, Sichuan) 028860-0571-1990
***A. pectinatum*** subsp. ***maximowiczii*** SICH 0200 (2640m, Sichuan) 029054-0571-1990
***A. pectinatum*** subsp. ***maximowiczii*** (northwest China) 000482-0050-1969
***A. pectinatum*** subsp. ***pectinatum*** KR 1240 (Bhutan) 027416-0523-1987
***A. pectinatum*** subsp. ***taronense*** KR 2680 (3150m, Yunnan) 031586-0523-1994
***A. pectinatum*** subsp. ***taronense*** KR 3976 (3275m, Yunnan ) 033874-0523-1997
***A. rubescens*** ETOT 158 (Taiwan) 030912-0049-1993
***A. rubescens*** Taiwan BG (2420m, Taiwan) 034576-0463-1998
***A. rufinerve*** (Japan) 017987-0055-1979
***A. tegmentosum*** (Manchuria, Russia) 024614-0420-1985
***A. tegmentosum*** CBS 0016 (Changbaishan, Jilin) 034831-0626-1997
***A. tschonoskii*** subsp. ***koreanum*** Kwanak Arb (Mt. Kwanak, South Korea) 021090-0386-1981
***A. tschonoskii*** subsp. ***koreanum*** Chollipo Arb (Mt. Odae, 750m, South Korea) 031704-0348-1991
***A. tschonoskii*** subsp. ***koreanum*** CBS 00028 (Changbaishan, Jilin) 034832-0626-1997
***A. tschonoskii*** subsp. ***koreanum*** (South Korea) 034906-0598-1999
***A. × conspicuum*** **'Silver Vein' (*A. pensylvanicum* 'Erythrocladum' × *A. davidii* 'George Forrest')** 022840-0013-1983

## References and Bibliography

Bean, W. J. 1970. Trees and Shrubs Hardy in the British Isles. Eighth Edition. John Murray (Publishers) Ltd., London.

Delendick, T. J. 1981. A Systematic Review of the Aceraceae. Unpublished Ph.D. dissertation. City University, New York.

Farrar, J. L. Trees in Canada. 1995. Fitzhenry and Whiteside Limited, Markham, Ontario.

Van Gelderen, D. M., de Jong, P.C. and Oterdoom, H.J. 1994. Maples of the World. Timber Press, Portland, Oregon.

Griffiths, M. (ed.). 1994. Index of Garden Plants. Timber Press, Portland, Oregon.

Jacobsen, A. L. 1996. North American Landscape Trees. Ten Speed Press, Berkeley, California.

Mitchell, A. 1982. The Trees of Britain and Northern Europe. Collins, London.

Oterdoom, H. J. and de Jong, P.C. 1994. Structure of Maples. *In* Maples of the World. Timber Press, Portland, Oregon. pp.45-62.

Raven, P. H. and D. I. Axelrod, D.I. 1974. Angiosperm biogeography and past continental movements. Annals of the Missouri Botanical Garden 61: 539-673.

Rushforth, K. 1999. Trees of Britain and Europe. HarperCollins Publishers, London.

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**Climatological Data 2002**

| | April | May | June |
|---|---|---|---|
| Average Maximum Temperature (°C) | 11.8 | 15.0 | 19.9 |
| Average Minimum Temperature (°C) | 5.5 | 7.7 | 12.2 |
| Highest Maximum Temperature (°C) | 18.1 | 24.8 | 27.8 |
| Lowest Minimum Temperature (°C) | 1.1 | 1.5 | 7.4 |
| Average Air Temperature (°C) | 8.6 | 11.3 | 16.0 |
| Rainfall (mm)/# days with rain | 69.7/12 | 54.4/13 | 29.8/6 |
| Total Rainfall (mm) since Jan 1, 2002 | 371.45 | 425.85 | 455.65 |

Location: 49° 15' 29" N, 123° 14' 58" W
Elevation: 104.4 m
University of British Columbia, Vancouver, BC, Canada