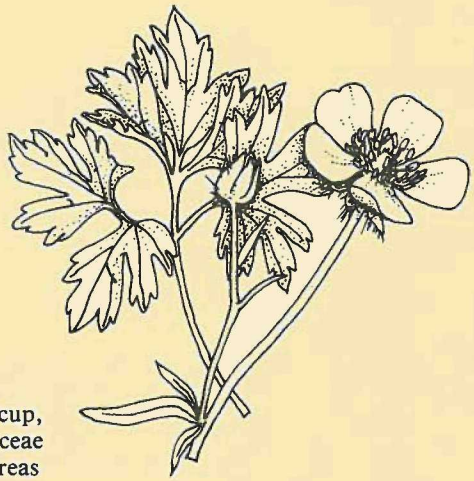
DAVIDSONIA

VOLUME 9 *NUMBER 2* *Summer 1978*

Cover:

Rosa nutkana, Nootka Rose.



Ranunculus repens, Creeping Buttercup, a member of the Family Ranunculaceae which is naturalized in the coastal areas of British Columbia.

DAVIDSONIA

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Macrofungi in The Botanical Garden

R. J. BANDONI* and W. McLENNAN**

The clearing of forested land, as has occurred during the development of The Botanical Garden, results in radical changes in populations of mushrooms and other large fungi. Since fungal assimilative structures are buried in soil or wood and are thus invisible, our observations of the changes are based on the appearance of fruiting bodies. It is possible, therefore, that many of the species are present before clearing and that they fruit abundantly in response to the changed environmental conditions. However, many of the species found in altered areas seem to fruit only under these conditions and, presumably, such species may become established only after changes have occurred. The kinds of fungi that are observed in changed areas vary somewhat with the amount of clearing and the kind of use to which the land is put after clearing. In this article, only a few of the most abundant species are discussed.

Soil that has been completely cleared of vegetation and humus generally yields large quantities of the Orange Cup Fungus, *Aleuria aurantia* (Persoon) Fuckel (Figure 1). This species is especially abundant on coarse, wet soils during the fall months, but it can also occur at other times and on land that has only partially been cleared. During the past year, for example, the species was abundant in both the Native Garden and the Asian Garden. *Aleuria aurantia* develops either singly or in crowded masses, the individual cups often reaching 10 cm in diameter. The species is edible, but is not considered choice, and it is also difficult to remove sand from the specimens. The Orange Cup Fungus fruits for several years on cleared land which is left unplanted, even after the development of alders.

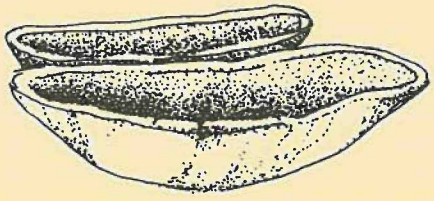

FIGURE 1. *Aleuria aurantia,* Orange Cup Fungus, has been common in the Native Garden and Asian Garden components of The Botanical Garden, x 1.

A species related to *Aleuria aurantia* and occurring on soils where there is better drainage and nutrients is the Saddle Fungus, *Gyromitra infula* Quelet (Figure 2). *Gyromitra infula* and the related species *Gyromitra esculenta* Fries both occur in the campus area surrounding The Botanical Garden. *Gyromitra esculenta*, a spring species, sometimes causes poisoning similar to that of the Amanitas. In spite of this fact, it is a highly prized mushroom in parts of Europe, because the water-soluble poisons can be removed by parboiling the specimens before preparing by conventional means. *Gyromitra infula*, occurring in the fall, is also edible but is viewed with suspicion because of its close relationship with *G. esculenta*.

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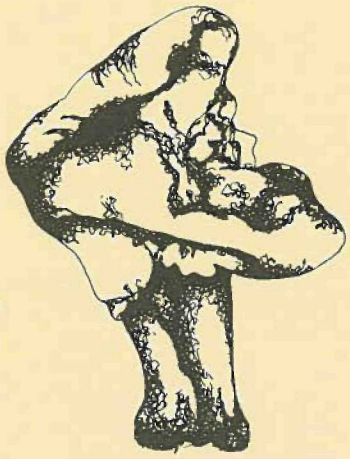


FIGURE 2. *Gyromitra infula,* the Saddle Fungus, occurs in the fall in The Botanical Garden, x1.

Several unusual fungi develop in abundance within young alder thickets in the campus area. These include a true Truffle, *Hydnotrya cubispora* (Bessey and Thomson) Gilkey (Euascomycetes), and one of the False Truffles, *Alpova diplophloeus* (Zeller and Dodge) Trappe (Basidiomycetes: Figure 3). Fruiting bodies of the truffles are generally hypogeous (developing below the soil surface) and are difficult to find. In Europe, pigs and dogs are trained to locate the extremely valuable truffles of commerce, the current price of which is approximately $400.00 per pound. However, both *Hydnotrya cubispora* and *Alpova diplophloeus* fruit at or near the surface and their fruiting bodies are easily found. *Hydnotrya* fruit bodies reach a maximum of approximately 6-7 cm in diameter, and consist of a much-folded, lobed structure which is whitish in color. *Alpova diplophloeus* has small tuber-like fruit bodies which are mostly less than 2 cm diameter and brownish, although they may have a reddish cast to them. *Hydnotrya* can be found in the spring but it is most abundant in the fall, as is the *Alpova.* Both species develop for several years in young alder thickets, then disappear.

Several wood-decay mushrooms are common in the fall months for some years after land is cleared; they are still developing in the sodded area adjacent to The E. H. Lohbrunner Alpine Garden. The most abundant of these species is *Pholiota terrestris* Overholts (Figure 4), which fruits from late summer through early winter. The light tan to brown fruiting bodies become pale and viscid during the prolonged wet weather of late fall. They are present either in very large clusters or in small groups, and the assimilative structure develops in buried wood. *Pholiota terrestris* is edible, but is not considered choice.

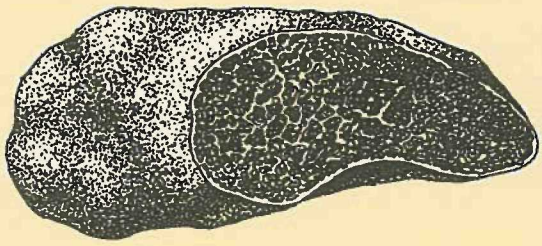


FIGURE 3. *Alpova diplophloeus,* a False Truffle, x 2.

Two mushrooms which grow in the same habitat as *Pholiota terrestris* and which superficially resemble one another are *Naematoloma fasciculare* (Hudson ex Fries) Karsten (Figure 5) and *Pholiota malicola* Smith and Hessler. Both species have yellow fruiting bodies that have an orange cast on the surface when young and both have a partial veil, but *N. fasciculare* has purple-brown spores whereas *P. malicola* has rusty brown spores. *Naematoloma fasciculare* is common in woodlands and can be found growing directly on trees and stumps as well as on buried wood. This species is called the Sulfur Top or Sulfur Tuft, and, with age, the color changes to pale yellowish while the gills often have a greenish cast. It has an extremely bitter flavor which is unpalatable, and the deaths of several children in Japan have been attributed to ingestion of this species. *Pholiota malicola* lacks the bitter flavor and does not show the color change that occurs in *N. fasciculare*. The odor of our variety of *P. malicola* resembles that of green corn, but the edibility of this species is not known.

FIGURE 4. *Pholiota terrestris,* a wood decay mushroom which is often found growing from buried wood on cleared land, x 1.

The common Inky Cap, *Coprinus atramentarius* (Buillard ex Fries) Fries (Figure 6), occurs with the above species, especially in or adjacent to the young alder thickets or along the edges of the cleared forest. This species is abundant on campus during the wet months of late summer and fall, as is the Shaggy Mane, *C. comatus* (Muller ex Fries) S. F. Gray. Both are eaten, although *C. atramentarius* is known to contain an unusual toxin with "antabuse" -like activity. Symptoms of acute intoxication may occur if an alcoholic beverage is consumed when *C. atramentarius* is eaten. These symptoms generally are followed by nausea and vomiting. The symptoms can also appear if the mushrooms are eaten and the alcoholic drink is consumed later, even up to 48 hours afterwards.

The Honey Mushroom or Shoestring Mushroom, *Armillariella mellea* (Fries) Karsten (Figure 7), sometimes grows on dead wood or from the roots of trees in lawns but is more common on dead trees or on the ground in woods. This species, which kills many kinds of plants and lives on the dead remains, was especially abundant in the Asian Garden during the past fall. The cap color is the source of the name "Honey Mushroom", while the second common name is derived from the flattened, shoelace-like strands which it produces. The strands, called rhizomorphs, often develop between the bark and wood of infected trees and can be seen by stripping away the outer bark. *Armillariella mellea* can be eaten and it is a favorite among many mushroom collectors, but it is not highly regarded as an esculent in Europe. Infrequently, ingestion of this mushroom causes nausea and vomiting.

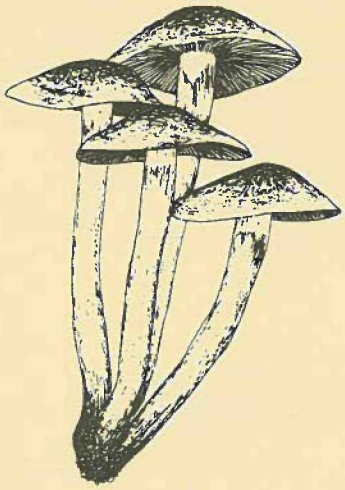


FIGURE 5. *Naematoloma fasciculare,* Sulfur Top or Sulfur Tuft, x 1.

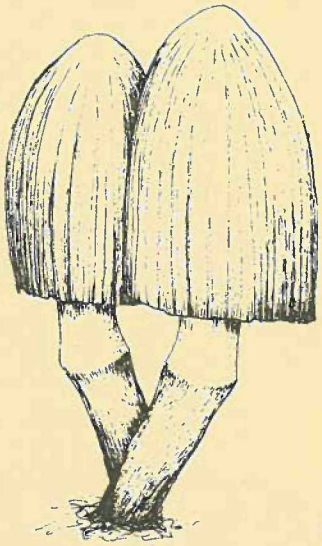


FIGURE 6. *Coprinus atramentarius,* Inky Cap, x 1.

FIGURE 7. *Armillariella mellea,* Honey Mushroom or Shoestring Mushroom, x 0.75.

A number of common woodland mushrooms develop in the less disturbed areas of the Botanical Garden, where much of the native vegetation remains. These include the Chantarelle, *Cantharellus cibarius* Fries; the Gemmed Amanita, *Amanita gemmata* (Fries) Gillet; the Brown Chantarelle, *Paxillus involutus* (Batsch ex Fries) Fries; and our commonest Bolete, *Boletus zelleri* Murrill.

Cantharellus cibarius is a valued mushroom in Europe and is also heavily collected locally. It is common on Point Grey from mid-July through late October or November, but it is often overlooked. This species occurs in well-developed conifer forests in the province, and has been present in the Native Garden during the past three years. It is commonly associated with broad-leaved trees in some regions. In July the fruit bodies can be found on or adjacent to trails, often hidden by overhanging branches of Salal. The more abundant and larger fruiting bodies of September and October are typically scattered among the conifer trees. *Cantharellus cibarius* can be recognized by its coarse, ridge-like gills that branch frequently and are strongly decurrent (Figure 8), its cap form, and yellow color.

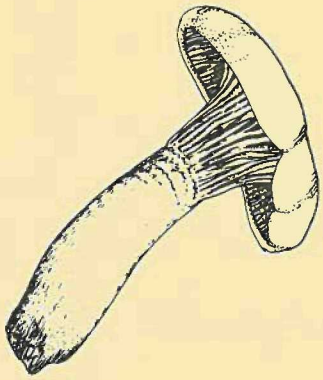


FIGURE 8. *Cantharellus cibarius,* Chantarelle, x 1.

Like the true Chantarelle above, the Brown Chantarelle, *Paxillus involutus,* is a mycorrhizal fungus living in symbiotic association with forest trees. *Paxillus involutus* (Figure 9) is our most abundant forest mushroom in the fall, and it also occurs along boulevards in association with birch trees. The tan to brown fruiting bodies have strongly decurrent gills, but they are knife-like rather than as in *Cantharellus cibarius*. The margin of the cap is strongly inrolled (involute) and the color rapidly changes to dark reddish-brown wherever bruises occur. This species is sometimes eaten but it is of poor quality, and it can cause relatively severe poisoning if eaten raw.

The commonest of the Amanitas on Point Grey is *Amanita gemmata*, which is abundant on the campus during summer and fall. Its usual habitat is in association with Douglas Fir, especially where the trees are well spaced. The pale yellowish caps (Figure 10) generally are covered by wart-like remnants of the universal veil, and a well-developed volva is also present. In wet periods, the "warts" are washed away by rain; in dry months, the partial veil typically adheres to the cap margin rather than to the stipe. In the latter case, the absence of a "ring" or annulus on the stipe may cause difficulty in identification. This species is closely related to *Amanita pantherina* (de Candolle ex Fries) Schumacher, the Panther Agaric, but it is not as toxic as that species. *Amanita pantherina* is collected infrequently on Point Grey, but is abundant on Vancouver Island in habitats similar to those occupied by *A. gemmata.*

Boletus zelleri (Figure 11) occurs with Douglas Fir, both in the forests and in cultivated areas. It is one of the first Boletes to appear in the fall and is generally the last to disappear in the winter. The dark brownish surface of the cap is usually dusted by an inconspicuous whitish bloom; beneath the brown layer, the color is distinctly red. The flesh and pore surfaces are pale yellowish, and the stipe is streaked with red. *Boletus zelleri* is an excellent edible species and it can be collected in abundance. However, many of the specimens are riddled by insect larvae, especially during dry periods or late in the season.

Other boletes common on the campus include several species of the genus *Suillus*. These are associated with specific tree varieties, such as introduced pines and larches. *Suillus luteus* (Fries) S. F. Gray (Figure 12) is one of the common species associated with pines. This species is called the Butter Mushroom, Slippery Jack, Peg-top, etc., and has a thick, glutinous veil covering the young caps. The flesh is pale yellowish, the stipe and pores are yellow, and the cap surface is brown or reddish-brown. The brownish color of the cap stems from the thick glutinous layer and an annulus of similar color typically is present.

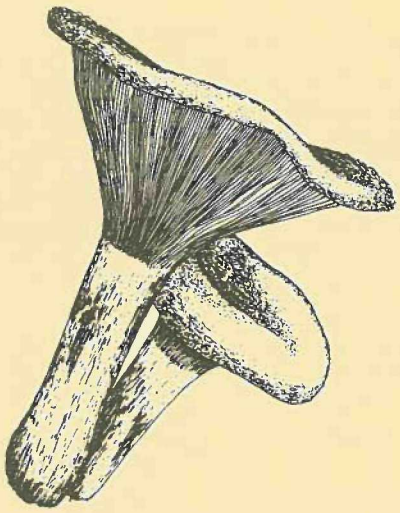


FIGURE 9. *Paxillus involutus,* Brown Chantarelle, ×0.75.

The common Gemmed Puffball, *Lycoperdon perlatum* Persoon, is abundant on the campus and in the Botanical Gardens. This species is not associated with any specific plant and, in fact, has been observed to grow up through a narrow crack between blacktop and a sidewalk in the University Village. *Lycoperdon perlatum* is edible if collected before the flesh (gleba) has changed from white to yellow. However, care should be taken not to confuse this with species of *Scleroderma*, such as *S. cepa* (Vaillant) Persoon. This *Scleroderma* is also abundant on the campus and it is mildly poisonous. *Scleroderma cepa* fruiting bodies have a thick peridial layer and a coarse rooting base (Figure 13). When cut, the centre of the gleba is generally purplish, with the color becoming more intense after exposure to air. *Lycoperdon* fruiting bodies function as natural bellows when the spores are mature. The peridium is thin and flexible, and there is only a small opening at the top (Figure 14). When raindrops strike the peridium, spores are puffed through the opening. Sclerodermas, on the other hand, have thick, relatively rigid peridial walls when mature. The upper portion splits irregularly or cracks and falls away, exposing the spore mass.

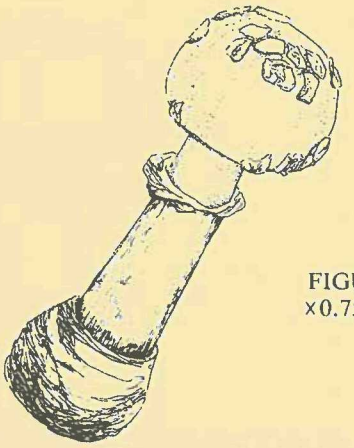


FIGURE 10. *Amanita gemmata,* Gemmed Amanita, x0.75.

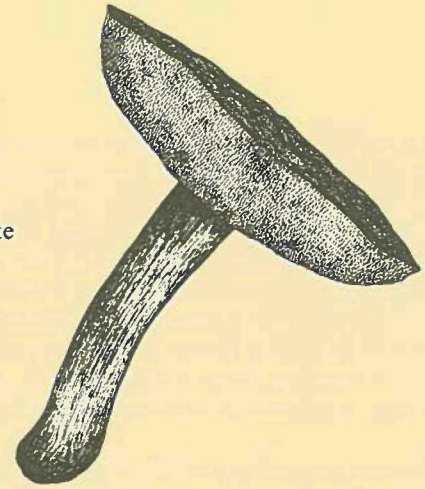


FIGURE 11. *Boletus zelleri,* the commonest Bolete in The Botanical Garden, x 1.

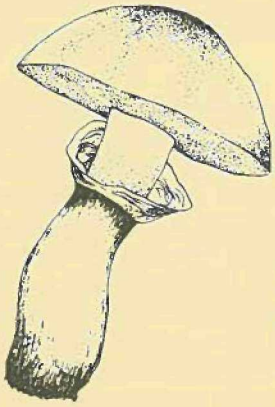
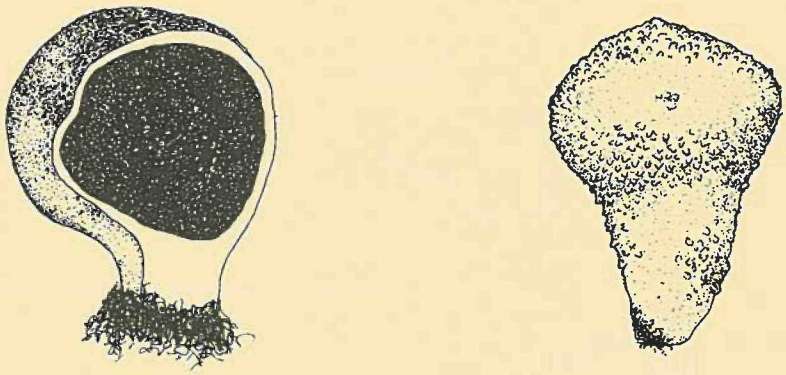


FIGURE 12. *Suillus luteus,* the Butter Mushroom or Peg-top, x 1.



FIGURES 13 and 14. Fruiting bodies of *Scleroderma cepa* (left) and *Lycoperdon perlatum* (right), both x 1. Note the thick outer layer of *Scleroderma* compared with the thin and flexible one of the mature *Lycoperdon.*

The two questions most commonly asked concerning mushrooms are: "What is it?" and "Is it edible?". The answer to the first question is not always easy, since mushrooms are among the most difficult of organisms to identify. The number of mushroom species is very large and, conversely, the number of monographs is very small. Most of the available mushroom books treat no more than a small fraction of the species of any area. Accurate identification of most species requires careful microscopic examination, because macroscopic features are not reliable for characterizing many species. Finally, the number of mycologists specializing in mushroom taxonomy is very small (there are less than half a dozen in Canada, and they are in the eastern provinces). The mushrooms of British Columbia have received little study; there are no monographs or checklists for the province — or for the west coast of North America.

Answers concerning edibility also are difficult to give in many instances. First, any statement on edibility should be based on accurate identification. Next, the variations within mushroom species and between human beings must be considered. Some commonly utilized species, the cultivated mushrooms for example, can be eaten by almost all individuals. Other mushrooms (e.g., the Honey Mushroom) are regularly eaten by many people, but cause nausea and vomiting in certain individuals. Other mushroom species considered to be reliable table forms infrequently cause gastero-intestinal disturbances.

A final point should be made concerning poisonous mushrooms. Statements as to the number of poisonous species vary widely in popular books on mushrooms. In recent years, studies conducted at the University of Washington have revealed a rather large number of toxic species for this region. These include potentially fatally-toxic species as well as those causing mild gastero-intestinal disturbances. The sporadic appearance of a species in a given area has led many mycologists to believe that some poisonous mushrooms were of limited distribution. For example, *Amanita phalloides* (Bulliard) Fries has been responsible in recent years for a number of cases of poisoning in North America. The species was previously essentially unknown from this continent. In British Columbia, we are aware of only two species with similar toxins. *Amanita verna* (Fries) Quelet, or a similar form, occurs in the Nanaimo area, and *Galerina autumnalis* (Peck) Singer and Smith is common on Point Grey and probably elsewhere in the province. Less toxic mushrooms, such as *Amanita gemmata, A. muscaria,* and species of *Clitocybe, Inocybe,* and *Psilocybe* of varying degrees of toxicity occur on the campus.

For those who interests are largely concerned with mushrooms as food, it is wise to stick to a few "tried and true" species that can be recognized with little difficulty. With help, the novice collector can learn to recognize some of the choice edible species listed below (all occur in the Lower Mainland region):-

Cantharellus cibarius, the Chantarelle
Pleurotus ostreatus Fries, the Oyster Mushroom
Morchella spp., the true Morels or Sponge Mushrooms
Boletus zelleri, Suillus luteus and similar Boletes
Lycoperdon perlatum, the Gemmed Puffball

These species are described and illustrated in a number of popular books on mushrooms.

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The Genus *Rosa* in British Columbia

Member of the Family Rosaceae

ROSA ACICULARIS Lindley subsp. SAYI (Schweinitz) W. H. Lewis
Prickly Rose

ROSA ARKANSANA T. C. Porter in Porter & Coulter
Low Prairie Rose

ROSA CANINA Linnaeus
Dog Rose

ROSA GYMNOCARPA Nuttall in Torrey & Gray
Baldhip Rose

ROSA NUTKANA K. B. Presl
Nootka Rose

ROSA PISOCARPA A. Gray
Clustered Wild Rose

ROSA RUBIGINOSA Linnaeus
Sweet Briar

ROSA WOODSII Lindley
Woods Rose

Natural Distribution and Habitat

The genus *Rosa* consists of more than 100 species distributed throughout the Northern Hemisphere, about 18 species are native to North America and, of these, six may be found in British Columbia. There are also two European species which have become naturalized in the province. Natural hybridization and other factors often make firm recognition difficult. Future studies may reduce the number of species recognized.

Rosa acicularis subsp. *sayi* is found in open woods, thickets, on hills and banks throughout the interior of British Columbia from Hope east, except in very arid areas. The species is circumpolar in the boreal coniferous forest in North America, Europe and northern Asia. *Rosa arkansana* is common in open woods in the eastern part of British Columbia from Fort Nelson to Pine Pass and east to Chetwynd and Clayhurst. The range is from New York west to eastern British Columbia, and south to Montana, New Mexico and Texas. *Rosa gymnocarpa* is present in moist to usually dry woods and on more rocky exposed places from near sealevel to about 600 m throughout southern British Columbia as far north as latitude 52°N. Over the range it occurs from sealevel to about 1800 m from southern British Columbia and northwest Montana south to the west of the Continental Divide to southern Idaho, then south in and west of the Cascade Mountains to the Sierra Nevada, California.

Rosa nutkana is present from sealevel to moderate elevations in thickets where the soil is fairly rich, and also along the borders of salt marshes and on coastal bluffs. The species is widely distributed along the coast of British Columbia, on the Queen Charlotte Islands, and in the Interior as far north as about latitude 56°N. The range is coastal from Alaska and British Columbia south to northern California, and inland east in the Rocky Mountains to Utah and Colorado. *Rosa pisocarpa,*

FIGURE 15. *Rosa gymnocarpa,* Baldhip Rose, which is common throughout southern British Columbia. This species is distinguished by the absence of floral parts on the mature hips.

a woodland species, occurs in thickets, along stream banks, and in wet places at low elevations, often along the seashore, in southern British Columbia, where it occurs chiefly on Vancouver Island and in the lower Fraser Valley as far east as Yale. The range is from the southern Mackenzie District south to southern California and northern Mexico east of the Pacific Coast ranges, and east to the Great Plains as far as Manitoba, Wisconsin, Iowa, western Oklahoma and Texas. *Rosa woodsii* is usually present in moist places along stream banks and around ponds in the foothills and lowlands east of the Cascade Mountains and in the Peace River District of British Columbia. The range is British Columbia and Saskatchewan south to eastern Oregon, Nebraska, west Texas and northern Mexico.

The two naturalized species both are found in the coastal area of British Columbia. *Rosa canina* is naturalized in thickets and along roadsides at low elevations. It occurs naturally in Europe as far north as 62°N, western Asia and North Africa, but has become naturalized in North America west of the Cascade Mountains, in northern Idaho, and in parts of the eastern United States. *Rosa rubiginosa* is naturalized along roadsides, in pastures and waste places on the coast at Victoria and in New Westminster. It occurs naturally in Europe, mainly on calcareous soils, as far north as 61°N, and in western Asia to northwest India, but has become naturalized in North America from British Columbia south to northwestern California west of the Cascades, in the eastern United States, and is occasionally found elsewhere in North America.

Description of the Genus Rosa

Erect to somewhat lax perennial shrubs, often with scandent stems, a few centimetres to several metres tall, more or less prickly, seldom unarmed, often with a pair of prickles (the infrastipular prickles) at or just below the node. Prickles are modified hairs from the epidermal surface of the stem which have become woody. Prickles of all grades from fine to massive may be present on some stems. In roses the infrastipular prickles are often much larger and stronger than the others. Thorns, on the other hand, arise from leaf axils and are modified stems, which often bear leaves or flowers as evidence of their origin. In the British Columbian species of *Rosa* the prickles are straight to more or less strongly curved or hooked, 3-6 mm long, round to flattened, occasionally much dilated and flattened at the base, and vary from slender and often weak to stout and well-developed. The infrastipular prickles may be absent or not clearly differentiated from the others or much enlarged and often flattened at the base.

Stems slender to stout, green, brown or gray, glabrous to glandular, erect to arching. The flowering branches are often unarmed. First year suckers are usually more prickly than the ordinary branches.

Twigs light green becoming reddish, reddish-brown or gray with age, glabrous or glaucous to densely glandular-hispid. Pith relatively large, whitish-green or brownish, and rounded. Leafscars alternate, low, narrowly and shallowly U-shaped or almost linear; bundle traces 3. Stipule scars lacking.

Bark brown.

Roots deep, and fibrous.

Leaves deciduous, alternate, 5-10 cm long, odd-pinnately compound with 3-11 leaflets, and stipitate. Leaflets paired except at top, usually sessile, elliptic to obovate or circular, 1-3 (-5) cm long and 0.5-3(-4.5) cm broad. The apex is rounded to acute or acuminate and the base is usually somewhat rounded to cuneate. The upper surface is light to dark green, dull or shiny, and glabrous or nearly so to slightly glandular and hairy. The lower surface is paler and glabrous to puberulent or densely glandular-pubescent, especially on the veins. The margin is coarsely to finely and closely singly or doubly serrate, with the teeth often glandtipped in the latter case. The lower leaflets are occasionally smaller than the upper ones. The crushed foliage may develop to a greater or lesser extent a smell similar to bitter almonds after a few minutes because of the presence of benzaldehyde. The petiole is glabrous to finely downy, sometimes sparsely prickly, and slightly to very glandular. The rachis is usually puberulent to subglabrous, and eglandular to evidently stipitate-glandular.

The stipules are well-developed, usually green, leafy, often paired and adnate to the petiole. They are 1-2.5 cm long, and narrow to broad or dilated with a short pointed apex.

Flowers are usually large, showy, strongly perigynous, perfect, fragrant, and solitary or in small (rarely large) corymbs at the ends of short growths (either main and/or lateral shoots) of the current year's growth. Sepals 5, often pinnate and appearing as lobes of the calyx-like floral cup, greenish, lanceolate to ovate and usually constricted in the middle, (0.5-)1-3(-4) cm long and 2.5-5(-6) mm broad at the base. They are often foliaceous with flattened appendages, and are usually persistent in fruit. Petals 5, light pink to deep rose or red, less often white, (1-)1.5-4 cm long, spreading, broad and notched at the apex, and inserted on the disc at the edge of the floral cup alternating with the sepals. Stamens numerous, distinct, inserted on the disc at the edge of the floral cup, and commonly in 3 series. Styles numerous, slender, inserted with the floral cup but free and distinct and more or less exserted from the usually narrow mouth. Stigmas capitate, single, subterminal, slender, and commonly forming a cluster at the mouth of the floral cup. Floral cup or hypanthium is composed of a portion of the receptacle plus some corolla and calyx material, is globose to ellipsoid or pyriform, mostly 3-5(-10) mm diameter at anthesis, and naked or sometimes with hairy bractlets. Ovary partially superior, several, hairy-capitate, and 1-celled. Ovule single, pendulous. Pedicel slender to stout, erect to somewhat curved, 0.5-2.5(-4) cm long, and glabrous to coarsely stipitate-glandular. The age at first flowering is usually 2-4 years in most species.

Fruit an achene which is one-sided, bony, usually long-hairy on at least part of the surface, brown, and 3-6(-8) mm long. The seed is enclosed in a hard pericarp within the achene. The floral cup enlarges to form the hip which contains a few to many achenes. The hip is more or less fleshy, somewhat berry-like, globose to ellipsoid or pyriform, red or red-orange to purplish, 0.6-2(-2.5) cm long, 0.5-2(-2.5) cm diameter, usually glabrous to somewhat hispid-glandular, and persistent well into the winter in most species. Good seed crops are usually produced every year, although may be biennial in some species.

Key to the species in British Columbia

Stems erect or arching; prickles mostly stout, recurved or hooked, and flattened; sepals tending to be reflexed after anthesis, usually sooner or later deciduous, some with conspicuous lateral lobes. Introduced species.

Erect, much-branched shrub, 1-2.5(-3.5) m tall; infrastipular prickles not clearly differentiated; leaflets 5-7(-9), broadly elliptic to circular or seldom ovate, doubly serrate, fragrant; flowers single or in small cymes of 1-3, very fragrant; hip scarlet-red to orange-red, subglobose to ovoid or ellipsoid ..... *Rosa rubiginosa*

Somewhat erect, coarse shrub, 1-3 m tall; infrastipular prickles usually straight and often paired; leaflets 5-7(-11), elliptic to ovate or obovate, sharply singly or doubly serrate, not fragrant; flowers solitary or in small bracteate corymbs of 2-4(-5), fragrant; hip scarlet becoming blackish, globose to ellipsoid or ovoid ..... *Rosa canina*

Stems erect, not or scarcely arching; prickles stout or weak but seldom much recurved; sepals generally ascending or erect after anthesis, persistent except in one species (*R. gymnocarpa*), seldom with lateral lobes. Native species.

Sepals, top of floral cup and styles deciduous as fruit matures; sepals 0.5-1.2 cm long. Slender, erect to lax shrub, 0.3-1.5(-2.5) m tall; prickles slender, numerous, weak and straight; infrastipular prickles if present slender and seldom obviously differentiated; leaflets 5-8, elliptic to obovate or sometimes ovate, usually sharply doubly serrate; flowers usually solitary, rarely 2-4; hip red to orange-red, subglobose to pyriform or narrowly ellipsoid; achenes few to about 12 ..... *Rosa gymnocarpa*

Sepals and styles long-persistent; sepals often well over 1.2 cm long.

Stems more or less bristly with slender prickles; infrastipular prickles absent or if present not clearly differentiated.

Somewhat lax much-branched shrub, 0.2-1.5(-2.0) m tall; leaflets (3-)5-7(-9), elliptic to ovate or obovate, singly to commonly coarsely doubly serrate; flowers mostly solitary or sometimes in small clusters of 2 or 3; hip dark red to reddish-purple, globose to ellipsoid or pyriform with a distinct neck, sepals becoming erect or connivent; achenes commonly 15-25. Low shrub of forested regions ..... *Rosa acicularis* subsp. *sayi*

Semishrub with stems woody at base only and dying back partly or wholly each year, 0.2-1.5(-2.0) m tall, occasionally truly shrubby in sheltered places; leaflets (5-)9-11, elliptic to obovate, sharply simply serrate; flowers generally several in corymbiform cymes; hip purplish, globose to pyriform, sepals becoming more or less spreading; achenes commonly 15-30. Semishrub of dry plains and prairies ..... *Rosa arkansana*

Stems mostly with well-defined infrastipular prickles, sometimes nearly unarmed.

Flowers mostly 4-6(-8) cm diameter and commonly solitary; sepals mostly 1.5-4 cm long, 3-6 mm wide at base; petals mostly 2.5-4 cm long; floral cup 5-10 mm diameter at anthesis becoming 12-20 mm diameter in fruit. Robust, erect

shrub, 1-3(-4) m tall, often forming dense thickets; prickles stout, whitish, paired, flattened, straight to curved; infrastipular prickles straight, often much enlarged and conspicuously flattened towards base; leaflets 5-7(-9), elliptic to broadly elliptic, singly to doubly serrate; flowers rarely corymbose; hip purple to red, subglobose to globose; achenes several to many ..... *Rosa nutkana*

Flowers usually less than 5 cm across and commonly clustered; sepals mostly 1-2 cm long, 2-3.5 mm wide at base; petals 1.2-2.5 cm long; floral cup 3-5 mm thick at anthesis becoming 10-15(-20) mm diameter in fruit.

Upright, dense but slender shrub, 1-2(-3) m tall; prickles weak, straight, slender, few; infrastipular prickles weak, straight, sometimes absent; leaflets 5-7(-9), elliptic to ovate, finely and closely serrate; flowers 3-6 in a corymbiform bracteate cyme; hip reddish-purple, pyriform to ellipsoid or globose; achenes commonly more than 20. West of Cascade mountains ..... *Rosa pisocarpa*

Upright rather lax to somewhat stiff, sometimes much-branched shrub, 0.5-2 (-3) m tall; prickles straight to curved, slender, terete, brittle; infrastipular prickles usually well-developed, paired, straight to somewhat recurved and terete; leaflets 5-7(-11), obovate to elliptic, coarsely singly to doubly serrate; flowers solitary or in small corymbs of 1-5; hip red, globose to ellipsoid or pyriform; achenes mostly 15-30. East of the Cascades ..... *Rosa woodsii*

Description of the species

Rosa acicularis subsp. *sayi* — Leaves 5-9 cm long. Leaflets 1.5-6(-8) cm long, 0.5-3(-4.5) cm wide, with lower ones usually smaller than upper. Stipules broad with a pointed apex. Flowers 2-5(-6) cm diameter, pink to red, fragrant, in June to August in British Columbia or as early as May in other parts of the range. Hip 1-2(-2.5) cm long, 0.6-1.5(-2.0) cm diameter, glabrous, and persistent through the winter becoming shrunken, wrinkled and curved downward. Achenes about 5 mm long.

Rosa arkansana — Leaflets (1-)2.5-4(-5) cm long, 0.5-2.5 cm wide and often appearing rather crowded. Stipules dilated. Flowers 2.5-4 cm diameter, pink to red (sometimes white), in June to August in British Columbia and June to July in other parts of the range. Hips 0.8-1.5 cm diameter. Achenes about 4 mm long.

Rosa gymnocarpa — Leaflets 1-4 cm long, 0.5-3 cm wide. Stipules narrow to broad. Flowers 1.5-2.5 cm diameter, light pink to deep rose or red, in May to August throughout the range. Hip about 1 cm long, 0.4-0.6 cm diameter, and glabrous. Achenes 3-5 mm long.

Rosa nutkana — Leaves 6-10 cm long. Leaflets 1.5-5 cm long, 0.6-4.0(-4.5) cm wide. Upper stipules dilated and short-pointed. Flowers 4-6(-8) cm diameter, pink to red, in May to July throughout the range. Hip 1-2 cm long, 1.2-2.2 cm diameter, glabrous to densely bristly or prickly, and persistent through the winter becoming wrinkled and upright. Achenes 4-6(-8) mm long.

Rosa pisocarpa — Leaves 5-7.5 cm long. Leaflets 1-4(-8) cm long, 0.7-2 cm wide. Stipules narrow, although upper ones may be somewhat broader than the lower. Flowers 2.5-3 cm diameter, rose-pink to red, in May to July in British Columbia and June to August in the remainder of the range. Hip 0.6-1.2(-1.5) cm long, 0.6-0.9 cm diameter. Achenes about 3 mm long.

Rosa woodsii — Leaves 5-10 cm long and crowded. Leaflets (1-)2-5 cm long, 1-2.5 cm wide. Stipules narrow or dilated with a pointed apex. Flowers 2.5-5(-6.5) cm diameter, bright pink to red, in May to July in British Columbia and June to August in the remainder of the range. Hip 0.6-1.2(-2) cm long, 0.6-1.2(-1.5) cm diameter, glabrous, and persistent into the winter remaining more or less upright. Achenes 3-4 mm long.

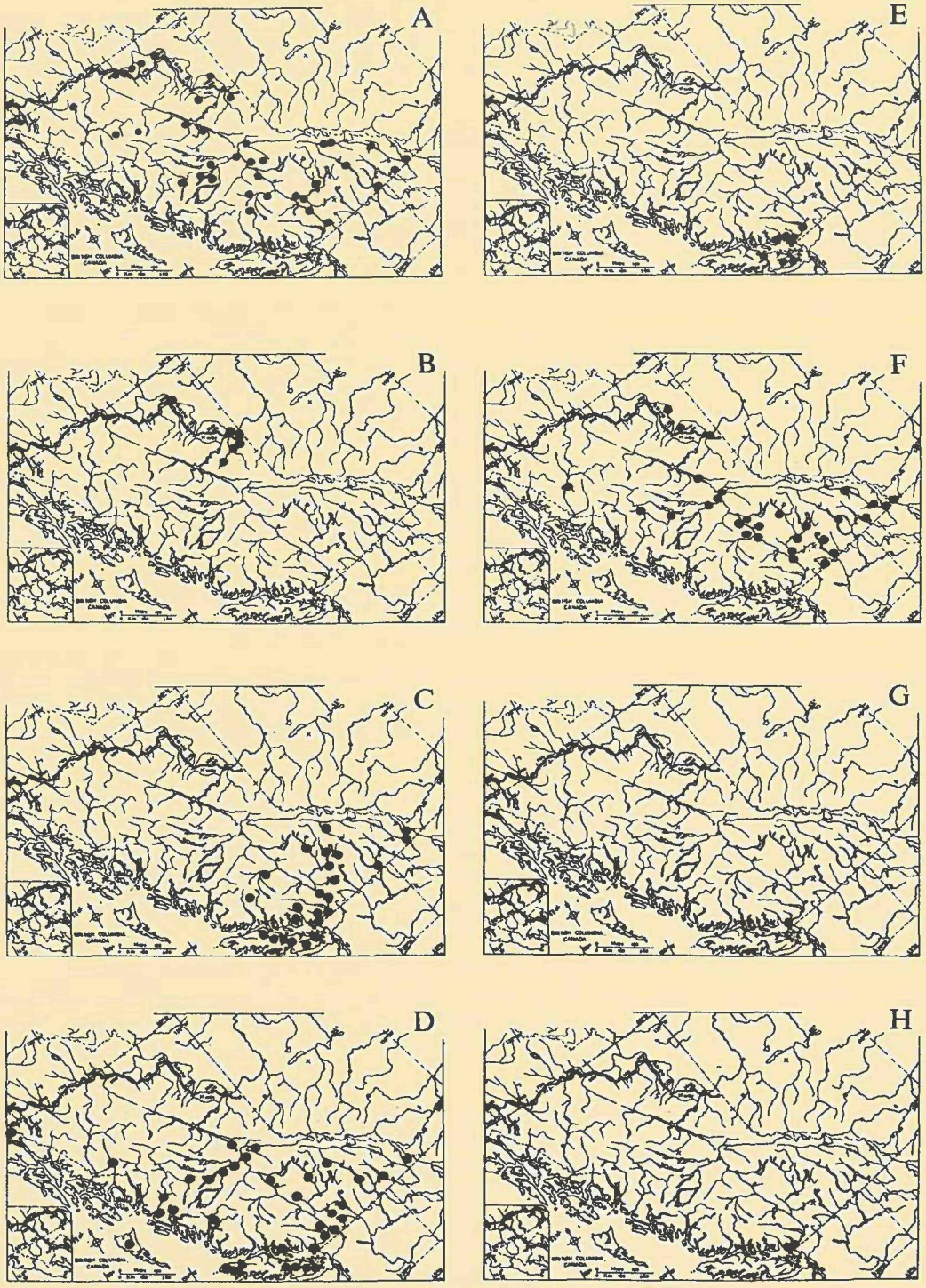

FIGURE 16. Distribution of *Rosa* species in British Columbia. A. *Rosa acicularis* subsp. *sayi*, B. *R. arkansana*, C. *R. gymnocarpa*, D. *R. nutkana*, E. *R. pisocarpa*, F. *R. woodsii*, G. *R. canina*, H. *R. rubiginosa*.

Rosa canina — Leaflets (1-)1.5-4 cm long, 1-2.5 cm wide. Upper stipules broad and dilated. Flowers 4-5 cm diameter, pink to red (occasionally white), fragrant, in May to June throughout the range in North America. Hip (1-)1.5-2 cm long, usually glabrous, and becoming blackish and withered in the winter. A very variable species.

Rosa rubiginosa (sometimes known as *R. eglanteria*) — Leaflets 1-2.5(-3) cm long, 0.8-1.5 cm wide, and very glandular with sweet-scented viscous brownish glands below. Flowers 2.5-5 cm diameter, bright pink to red (occasionally white), very fragrant, in May to July throughout the range in North America. Hip 1-1.5(-2.5) cm long, 1-1.5 cm diameter, generally glabrous to somewhat glandular-hispid at least at the base. This species differs from most other *Rosa* species in having nectar secreted at the edge of the receptacle.

Varieties and Hybrids

The genus *Rosa* is a taxonomically difficult genus, due partly to infraspecific variation in some conspicuous characters, partly to frequent interspecific hybridization, and partly to other factors such as polyploidy and, sometimes, apomixis. Each of the species will hybridize with the others where the ranges come into contact or in gardens. This great variation has led to the naming of countless varieties and species, most of which have now been reduced to synonymy.

Rosa acicularis is a variable species with two subspecies presently accepted, subsp. *sayi* (also known as var. *bourgeauiana* Crepin) and subsp. *acicularis* which is primarily Eurasian but also extends into Alaska. The species hybridizes with *Rosa nutkana* where the ranges overlap. *Rosa collaris* Rydberg may be a hybrid of *R. acicularis* and *R. gymnocarpa.*

Rosa arkansana is a much less variable species, although there is apparently one double-flowered mutant which has not been named but which has ornamental possibilities.

Rosa gymnocarpa is another variable species in which 10 segregates were named in 1912 based on minor vegetative variations. It hybridizes occasionally with *R. acicularis* and perhaps also with *R. nutkana* where the ranges overlap. The forma *floribus albis* was found in Okanogan County, Washington, but is not in commerce.

There are two varieties of *Rosa nutkana*, both of which are present in British Columbia. The variety *nutkana,* Nootka Rose, has the infrastipular prickles much enlarged and conspicuously flattened at the base, and is the common phase west of the Cascade summits. The variety *hispida* Fernald, Bristly Nootka Rose, is the more bristly or prickly of the two and the infrastipular prickles are seldom enlarged and flattened towards the base. This is the common phase east of the Cascade summits. The species hybridizes with *R. woodsii* to a limited extent.

Rosa pisocarpa is the least variable of our native species, although occasional specimens are difficult to distinguish from some forms of *R. woodsii* subsp. *ultramontana.* There are several forms in the northern Sierra Nevada and the Siskiyou Mountains of California which seem to show hybridization or intergradation between *Rosa californica, R. pisocarpa* and *R. woodsii* subsp. *ultramontana.*

Rosa woodsii is another very variable species with two subspecies occurring in British Columbia. The subsp. *ultramontana* (S. Watson) Taylor & MacBryde, Pearhips Woods Rose, is 1-2(-3) m tall and a rather lax shrub. There are usually 7 leaflets which are 2-5 cm long, elliptic, and have a coarsely serrate few-toothed margin. The flowers are corymbose with up to 5 flowers per cyme, 2.5-4.5 cm diameter, and red. There is a large foliaceous bract-like stipule at the base of the inflorescence. This is the common form of the species in British Columbia. The subsp. *woodsii,* Woods Rose, is a somewhat stiff, much-branched shrub which is 0.5-1.5(-2) m tall. The leaves appear crowded and there are usually 5-7(-11) leaflets which are 1-3(-4) cm long and obovate to elliptic with often doubly serrate and usually glandtipped margin. The flowers are solitary or in few-flowered cymes, bright pink to red, and 5-6.3 cm diameter. There is no foliaceous bract-like stipule at the base of the inflorescence. This form is generally rare in British Columbia, but occurs in the same areas as the

subsp. *ultramontana*. The species hybridizes with *Rosa blanda* over a large part of their overlapping ranges outside British Columbia, resulting in a complete series of intergrading forms in Manitoba, North Dakota, Iowa, Minnesota and Wisconsin. One of these hybrids has been named *Rosa x dulcissima* (Lunell) W. H. Lewis.

Rosa canina is perhaps the most variable of all *Rosa* species, and at least 60 varieties and subspecies have been named in Europe. In addition, several other species are believed to have been derived originally from hybridizations between *R. canina* and other species. *Rosa alba,* which was cultivated in England before 1597, may be a hybrid between *Rosa canina* and either *Rosa gallica* or *R. damascena*. *Rosa centifolia,* the Cabbage Rose, is a complex hybrid derived from crossings between *Rosa rubra, R. phoenicia, R. moschata* and *R. canina* which was developed by Dutch breeders between 1580 and about 1710. Similarly, *Rosa* x *hibernica* is a hybrid between *R. canina* and *R. spinosissima,* and *R.* x *macrantha* derives from a cross between *R. canina* and *R. gallica.*

Rosa rubiginosa forms one of the parents of innumerable hybrids which used to be very common in gardens but which are now mostly lost to commerce. The old form 'Clementine' was a natural hybrid between *Rosa rubiginosa* and *R. damascena* which was found in a hedgerow in Cheshire, England. It was reintroduced as 'Janet's Pride' in 1892.

Ornamental Cultivars

Various Prairie rose breeders have used *Rosa acicularis* in making crosses aimed at producing hardier hybrid tea-type roses for Canada. Among these cultivars are cv. Lac La Nonne (*R. acicularis* x *R. rugosa* 'Plena') with very deep pink to almost red flowers which was introduced in 1950 and is hardy to at least -55°C; cv. Wasagaming ([*R. rugosa* x *R. acicularis*] x 'Gruss an Teplitz') with clear rose red double flowers; cv. Altalaris (*R. altaica* x *R. acicularis*) with flowers white flushed pink; and cv. Larry Burnett (*R. acicularis* x *R. spinosissima*) which is also very hardy. Breeders in New York State have used *Rosa acicularis* in crosses to produce hardier miniature roses.

Crosses between *Rosa nutkana* and *R. rugosa* were tried in Sitka in the early part of this century but were not hardy enough to survive the winters. Cultivars of *Rosa nutkana* are cv. Halliana with large pink flowers, and cv. Cantab (*R. nutkana* x 'Red Letter Day') with red flowers turning purplish as they fade.

Rosa woodsii subsp. *woodsii* (as *R. macounii*) has been used in crosses resulting in a number of cultivars, including cv. Alice; cv. Bertha (of *R. rugosa* x *R. macounii* parentage); cv. Mary L. Evans (*R. macounii* x 'Hansa'); cv. Moose Range ('Hansa' x 'Mary L. Evans'); and cv. Ruth ('Mary L. Evans' x 'Alika') which is very hardy.

Among the cultivars of *Rosa canina* are cv. Abbotswood with double pink flowers; cv. Andersonii with large single pink flowers; and cv. Kiese with semi-double bright red flowers.

Rosa rubiginosa has given rise to several hundred forms, most of which are no longer in cultivation. This species is perhaps most famous as one of the parents of the Penzance Sweet Briers developed by Lord Penzance in the 1890's. He released 16 of these cultivars on to the market and several of them are still available. They include cv. Amy Robsart; cv. Flora McIvor; cv. Lady Penzance (*R.* x *penzanceana* Rehder, *R. rubiginosa* x *R. foetida* 'Bicolor'); cv. Lord Penzance (*R. rubiginosa* x 'Harison's Yellow'); and cv. Anne of Geierstein. Other cultivars of this species include cv. Hebe's Lip; cv. Janet's Pride; cv. Magnifica with semidouble fragrant carmine flowers; cv. Fritz Nobis ('Joanna Hill x 'Magnifica'); cv. Gold Bush ('Golden Glow' x 'Magnifica') with double yellow flowers; and cv. Rudolph Timm (['Johannes Bottner' x 'Magnifica'] x ['Baby Chateau' x 'Else Poulson']). Several crosses were made at the Central Experimental Farm in Ottawa in the 1930's and 1940's using *Rosa rubiginosa*, and these cultivars include cv. Caribou with profuse white flowers; cv. Nascapee; cv. Erie; and cv. Ojibway, all of similar parentage and all hardy. There are also several double forms such as cv. La Belle Distinguée and cv. Mannings Blush.

Propagation

The germination of *Rosa* seeds is notoriously difficult, and there is great diversity of form among the seedlings because of the high degree of hybridization which occurs. The depth of dormancy, and therefore the length of time required for germination, varies with the species, and some have been known to be dormant for 7 years although the average appears to be about 12-15 months. Seeds from which the seedcoats have been removed will germinate very quickly, therefore various pretreatments have been tried. Soaking the seeds in concentrated sulphuric acid for varying periods, followed by a warm and then a cold stratification period has been relatively successful in some species. Scarification of the seed coat has shortened the germination time in some forms, and is usually done by passing the achenes and pulp through a mincing machine. The simplest effective method so far known is stratification, although the germination rate may still be low. Densmore and Zasada (1977) showed that *Rosa acicularis* did not usually germinate in nature until the second year after seed maturity. They obtained the best germination by warm stratification at 25°C for 118 days, followed by cold stratification at 5°C. Germination began after 92 days, with a germination rate of 60% after 107 days at 5°C. *Rosa nutkana* may be stratified for 140 days at 1-5°C followed by 36 days at 21°C when 63% germination may be expected. *Rosa gymnocarpa* should be stratified for 90 days at 1-5°C with 43% germination occurring after a further 90 days. *Rosa canina* should be stratified for 60 days at room temperature, followed by 60 days at 1-5°C with 47% germination occurring after at least another 60 days. *Rosa rubiginosa* should be stratified for 570 days at 5°C when as little as 24% germination may be expected.

In general, four methods of germinating the seed may be tried:- a) sow the seed immediately it is ripe; b) warm stratify at room temperature for 2-3 months and sow late in the fall; c) cold stratify at 1-5°C over the fall and winter, and sow in the spring; and d) store dry in a sealed container at 1-3°C for 2-4 years and then sow. After treatment the seed should be sown 0.5-2 cm deep (depending on the size of the seed) in an equal mixture of sand, soil and peat moss.

The best method of separating the achenes from the hips is to macerate the hips in slow running water, allowing the pulp and empty achenes to float away. If the pressure is too high viable seeds may also float away. The achenes may then be dried at room temperature for 48 hours before sowing, stratifying, or storing at 1-3°C.

The easiest method of propagating roses is by semi-ripe or hardwood cuttings. Semi-ripe cuttings are taken in August and rooted in a standard propagating medium on a mist bench with bottom heat, or may be planted out in the border or in a frame. Hardwood cuttings, 12-18 cm long, should be taken in the fall or winter and buried to about 1.25 cm of the top in sawdust or sand in a shady location outside, in the greenhouse, or in a cold frame. They should be kept moist during this period of holding over, and may be planted out in the following spring either in the garden or in a frame.

Flexible arching canes will layer easily by bending them over until they touch the soil and then burying them. Suckers are formed in many types of roses and may be separated from the parents, although they are usually more prickly.

Budding and grafting during the summer or at mid-winter are techniques which are often used for propagating special forms in commerce.

Densmore and Zasada (1977) found that *Rosa acicularis* spread vegetatively over wide areas by rhizomes, which could resprout after fire or other disturbance had destroyed the aerial parts.

Transplantation

Roses may be transplanted easily, usually bare-rooted, in early spring, although care should be taken not to damage the deep root system.

Conditions for Cultivation

Rosa species are usually extremely hardy, vigorous, and easy to maintain, much more so than the hybrid forms commonly grown. They prefer a good heavy loam which is unlikely to dry out in the

summer, although they will thrive in most soils except ones which are wet and/or acid. The soil should have a pH of 5.6-6.5(-7.0), and should be well drained. Roses are generally tolerant of shade, and prefer at least 5-6 hours of full sun daily. Exposure to morning sun is preferable to afternoon sun as this allows night-time moisture to dry out quickly, thus reducing the incidence of moisture-induced leaf diseases. The shrubs should be planted 45-60 cm apart in a hole large enough to spread out the roots, and should be watered conservatively but deeply because of the deep root system.

An annual dressing of manure or compost with a little balanced fertilizer will help to maintain the shrub in a healthy condition.

These species are all hardy to at least Zone 4 or 5 (American), although *Rosa acicularis* is hardy to Zone 2 (American) or Zone 1 (Canadian) and is ideal for the cold climate of the northern United States and Canada.

The species require very little attention other than occasional renewal pruning to remove dead or old wood and branches which are crossing in the centre of the bush or rubbing against other canes. Always cut back to about 0.6 cm above an outwardly pointing bud. Pruning may be done immediately after flowering, unless the fall display of hips is desired when the shrub should be pruned in February. Shortening of the growth in the first year after planting will help to encourage strong basal growth.

Landscape Value

Roses are one of the most important garden plants, and wild rose bushes make attractive ornamentals which are not very often seen in gardens, although they were first cultivated in China about 5,000 years ago. The species are usually vigorous and easy to maintain because they are less susceptible to insects and diseases. The species and horticultural varieties are not appreciated in North America as much as they are in Europe, although many of them are of value for certain distinctive uses in the garden despite the fact that they rarely bloom more than once a year. The species are suitable for use as specimen shrubs, to provide massed color in hedges or between other plantings, or in shrubberies. They are attractive in flower, and many of them also retain the decorative hips well into the winter. Many are valuable garden ornaments simply because of their hardiness.

Rosa acicularis is hardy in Zone 1 or 2, and can be used as a climber in the far north of Canada. *Rosa arkansana* makes an excellent hardy native rock garden plant, as does *R. gymnocarpa,* although the latter is not showy. *Rosa nutkana* is useful for informal hedges, and the variety *hispida* is considered as the most choice of the native species. *Rosa rubiginosa* and the Sweet Brier hybrids make good hedges which may be kept low by annual pruning, screens, and will also grow over fences and trellises. They are also much planted for the sweet-scented foliage and flowers, a fragrance which is particularly strong on humid days or after rain.

Availability

The native species are not generally available from nurseries, although some are available from nurserymen in eastern Canada and in England.

Other Uses

Apart from their use as cut flowers, roses in general have figured prominently in food, medicine, heraldry, art, literature, and as religious and romantic symbols since before the days of the Romans. The Brier Rose was said to have sprung from Christ's blood as he wore the Crown of Thorns, and therefore the rose was important in theology — the Rose Window in a Church, and rosaries (originally strings of beads made from tightly pressed rose petals which gave out a pleasing fragrance). Dried roses have even been found in Egyptian tombs. They have been important in many ancient home remedies, and even in black magic. The Crusaders covered battle wounds with a salve made of red roses. One 18th century ointment for aches and strains in humans and animals required 4 lbs. of roses. In 12th century England, a concoction of powdered rose petals and mustard seed was mixed with the fat of a green woodpecker and then applied to a neighbour's fruit trees to stop them bearing fruit forever.

The Romans hung a rose above the participants in a confidential conversation, hence *sub rosa*, 'under the rose', meaning sworn to secrecy. This is linked with Cupid's gift of a Rose (the emblem of Love) to Harpocrates, the God of Silence, as a bribe not to reveal the amours of Venus, his mother. They also strewed rose petals at banquets, Nero is reputed to have spent the equivalent of $50,000 for roses at one banquet.

The hips are edible and an excellent source of Vitamin C, containing about 20 times as much as orange juice. They are used in making jams, jellies, marmalades, and even catchup. The hips are gathered in the fall, the juices extracted by boiling and then mixed with other fruit juices to drink or for use in jelllies and syrups. The pulp is removed from the seeds and skins to make jams, marmalades and catchups. The flavor is often improved by combining with a tart fruit or juice such as Cranberry (*Vaccinium* spp.) or High Bush Cranberry (*Viburnum edule*). Queen Victoria is reputed to have enjoyed a sauce made of Sweet Briar hips and lemon juice with mutton. Rose buds can be pickled with white vinegar and sugar and eaten with cold meats.

Among the other uses of Roses are the manufacture of Attar (or Otto) of Roses — one of the world's most valuable and expensive oils which is the base of most perfumes; Rose Water for the complexion; Rose Wine which has a delicate flavor; and Ointment of Roses, Rose Cold Cream, Rose Pomatum (for baldness), and Rose-scented soaps and snuff. Potpourri was much used in 19th century homes and is a fermented concoction of flowers including roses, herbs and spices. Rose petals have been used as scented smoke filters for cigarettes, but proved too expensive.

Rosa rubiginosa is grown in some parts of the world for use in the flavoring of food, and the leaves are used as a tea substitute. *Rosa canina* is in great demand as rootstocks for grafting modern hybrids because it is deep-rooted, robust, and hardy. *Rosa nutkana* also provides sturdy and compatible rootstocks for budding, and it has been suggested that this species should be used instead of *R. canina* in North America because it is more hardy.

The wood requires no staining and is easily worked, and heavy old roses often grow large enough for use by the hobbyist. Various species of briers have been used for the manufacture of pipe bowls, and as inlays in very intricate and beautiful woodwork. The stumps of old roses can be used for such things as lamp bases, vases and ornaments.

Most *Rosa* species provide food and cover for wildlife. At least 24 species of birds and mammals in North America eat the hips, they are seldom preferred foods but they are available through the winter, and about 13 species of mammals browse on the stems, twigs and foliage. Rose thickets provide excellent nesting or escape cover for many kinds of birds and small mammals. The roses are also important in soil conservation, watershed and environmental forestry uses, and the thicket-forming species may help to control erosion in such areas.

Ethnobotany

The Indians used the rose in several ways for food, medicine, and in mythology. Many tribes ate the hips, although the Southern Kwakiutl believed that they would get an "itchy bottom" and so refrained. The sprouts and roots of *Rosa nutkana* were boiled and the decoction used to make an eyewash, or drunk (sometimes as much as 10 cupfuls a day) as a purgative for a pain in the stomach. In western Washington, a tea made from the bark of this species was given to Chehalis women in childbirth to ease labor pains, while the Cowlitz Indians bathed a new baby in the water in which leaves had been boiled to make him strong. Haida women ate the young shoots in spring as a tonic and beauty aid, along with Fireweed (*Epilobium angustifolium*). The Sikani Indians crushed the roots, steeped them in water, and then used the decoction as an eyewash. Several tribes boiled the leaves or peeled twigs of *Rosa nutkana* and *R. gymnocarpa* and used it as a tea. The Quinault Indians of Washington burned twigs of *Rosa nutkana,* mixed the ashes with skunk oil, and applied the ointment to syphilis sores.

Rosa gymnocarpa was used in several ways by the Thompson Indians of British Columbia. The stems were boiled and the decoction drunk for general indisposition and as a tonic. The hips were

occasionally eaten but were usually strung and used as beads by the children. The leaves and bark were dried, toasted, and powdered and then used as a drink or, occasionally, smoked as a tobacco substitute. The wood was used for making arrows, the hoops of baby carriers, and also for handles.

Rosa pisocarpa was used in similar ways to the above by the Indians of western Washington, although they also used a liquid made by steeping the bark as a soothing drink after childbirth.

The Lillooet Indians of British Columbia placed prickly branches of *Rosa acicularis* at the bottom of the bed as a protection against bad spirits. The Thompson Indians considered the twigs and branches of *Rosa gymnocarpa* to have magical purifying properties. The twigs were placed in the beds of widows and widowers during the period of widowhood, and the larger branches were used to sweep evil influences out of graves before burial.

Diseases and Problems of Cultivation

The species are somewhat less susceptible to insect and disease problems and are much hardier than the hybrids which are generally grown. A large part of the control of the diseases which do occur is the maintaining of the plants in a healthy condition.

Winter damage in very cold areas may occur if warm periods are followed by sudden drops in temperature.

The principal insect pests are aphids, spider mites, and thrips, and may be controlled by spraying as soon as they appear.

Toms (1964) reports that three types of Rust and one Canker occur naturally on the species in British Columbia. *Phragmidium rosae-californicae* (on *Rosa gymnocarpa, R. nutkana* and *R. pisocarpa*), *P. fusiforme* (on *R. nutkana*), and *P. montivagum* (on *R. pisocarpa*) have been found to cause Rust on the Coast and in the Interior of the Province. *Coryneopsis microsticta*, Canker, has been found on *Rosa nutkana* on southern Vancouver Island.

Mildew, caused by the widespread fungus *Sphaerotheca pannosa* var. *rosae,* is a perpetual problem on the Coast, with defoliation and loss of flowering occurring as well as weakening of the plants. At the Botanical Gardens we now apply a 10 minute misting to all our species roses every morning. This has been proven to almost eliminate Mildew as the spores cannot live in free water. However, the plants must dry quickly for this technique to be effective. The second serious disease in this area is Blackspot, caused by the fungus *Diplocarpon rosae*, which is spread by heavy overhead watering and rains.

Origin of the Name

The generic name *Rosa* is the ancient Latin name for the rose, from *roseus*, 'rosy' or 'pink'. It also may possibly be derived from the Celtic *rhod*, 'red', or the Greek *rhodon*, 'a rose tree'. The specific name *acicularis* means 'needlelike', referring to the needle-like prickles while the subspecific *sayi* commemorates Thomas Say (1787-1834), an entomologist who first collected the plant. The specific name *arkansana* means 'Arkansas' for the Arkansas River, Colorado where it was first collected; *gymnocarpa* means 'bearing naked fruit' because the hips are bare at maturity. The specific name *nutkana* means 'from Nootka Sound' where it was first discovered, while the varietal name *hispida* means 'bristly'. The specific name *pisocarpa* means 'with pea-like fruit'; *woodsii* commemorates Joseph Woods (1776-1864), an English botanist and specialist on roses; and the subspecific *ultramontana* means 'beyond the mountains', possibly beyond the Rocky Mountains. The specific name *canina* is from the Latin meaning 'pertaining to dogs', and is applied metaphorically to inferior kinds as 'of little value', such as a scentless versus a scented species. The specific epithet *rubiginosa* means 'rusty'.

Type Localities

Rosa acicularis subsp. *sayi* was collected at the "mouth of the St. Peter [Minnesota] River, Minnesota" while the species was first described from "cultivated specimens from material originally collected in Siberia". The species was first introduced into cultivation in Great Britain in 1805, and

the subspecies in 1891. It is the Floral Emblem of Alberta. *Rosa arkansana* was collected on the "banks of the Arkansas River near Cañon City, Colorado" by T. S. Brandegee. It was first introduced into cultivation in 1917. *Rosa gymnocarpa* was collected in "Oregon, in shady woods" by Thomas Nuttall, and was introduced into cultivation in 1893. *Rosa nutkana* was collected at "Nootka Sound, British Columbia" by Thaddeus Haenke (1761-1817) in 1791 during the Malaspina expedition, and was introduced into cultivation about 1876. *Rosa pisocarpa* was collected in "Multnomah County, Oregon" by Elihu Hall, and was introduced into cultivation about 1882. *Rosa woodsii* was described from cultivated specimens thought to have come from near the Missouri River, and is known to have been in cultivation about 1880, although the subsp. *woodsii* was introduced before 1826 as *R. macounii*. The subsp. *ultramontana* was collected (as *R. californica* var. *ultramontana*) in "Utah and Nevada" by Sereno Watson (although the type locality may also be cited as "on the eastern side of the Sierra Nevada, California"). The type locality of *Rosa canina* is "Europe" and it is one of the earliest known roses, being known since the latter part of the sixteenth century. The type locality of *Rosa rubiginosa* is "Habitat in Europa australi". The common name 'Sweet Briar' is derived from the sweet fragrance of the plant coupled with its thorny habit of growth. This is the 'Eglantine' of Chaucer and Shakespeare. The species (as *R. eglanteria*) was cultivated prior to 1551, and is credited with unusual longevity as specimens are still found growing in the long deserted gardens of ruined castles.

The name of the Island of Rhodes (or Rhodos) is believed to be because of the large number of roses growing there.

Fossil roses found in rock formations in Colorado and Oregon prove that wild roses date back at least 40 million years in North America. They are believed to have originated in central Asia about 60 million years ago, and then to have spread from there over the whole Northern Hemisphere.

The oldest known living rose tree, a form of *Rosa canina*, is at Hildesheim Cathedral in Germany, and is said to be over 1,000 years old.

Since 1461 and the Wars of the Roses, the Rose has been the National Emblem of England. The conventional heraldic rose is an exact reproduction of *Rosa canina*. In the latter part of the 15th century the rose was the mark distinctive of the seventh son of the family.

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Botanical Garden News and Notes

New Programs for the Fall — A number of programs and workshops are being offered by The Botanical Garden in cooperation with the Centre for Continuing Education: *Fruit Tree Pruning, The Home Greenhouse* and *Advanced Home Greenhouse* by Ken Wilson; *How to Turn on Your Bulbs: Planting for Christmas and Spring, Workshop on the Care of Houseplants, Planning a Patio or Balcony Garden* and *Christmas Decorations* by David Tarrant; and *Color Your Fall with Trees and Shrubs* by Peter Wharton. In addition several educational travel programs are planned for late 1978 and 1979: *Botany in Borneo, Malaysia, Singapore and Thailand; Horticultural Tour to the Hawaiian Islands; Horticultural Tour: England and Corfu; Gulf and San Juan Islands: A Field Study Cruise;* and *Queen Charlotte Islands: A Field Study Cruise.* Additional information about any of these programs can be obtained from The Botanical Garden or the Centre for Continuing Education at UBC.

FIGURE 17. Dr. William T. Stearn dedicates the B.C. Native Garden to the memory of Professor John Davidson during the Dedication Ceremonies on April 24th. The other participants are (left to right): Mr. Donovan F. Miller, Chancellor of the University of British Columbia; Dr. Douglas T. Kenny, President of the University; and Dr. Michael Shaw, Vice-President for Academic Development.

Other special programs in the field of hortitherapy will be provided for various handicapped groups during the fall and spring.

New Technical Bulletin — The proceedings of the 'Horticulture as Therapy' symposium and workshop held in March are now available for the price of $3.00 plus postage from The Botanical Garden. A complete list of publications by the Garden is available on request.

Student Plant Sale — The dates of September 13, 14 and 15 have been set for the Student Plant Sale by the Friends of the Garden. The sale will feature indoor plants suitable for student residences and apartments. Advice on the care and maintenance of the plants will be given by David Tarrant, Margaret Coxon and Gerald Straley. Any profits that accrue from the sale will be used to provide additions to the reference library for the FOG program and to help defray the costs of publications of FOG projects, such as the guide to Nitobe Garden.

New Program Development — The Botanical Garden was allocated one million dollars from the Labour Intensive Special Projects Fund for use in garden development. Projected programs are: completion of a new nursery propagation unit and winter storage facility; completion of sub-grade and garden component construction in the Main Garden, including the Economic Garden, Evolutionary Garden, Hybrid Garden, and Landscape Garden of Canadian Native Plants; development of the 30-acre Asian Garden will be continued and expanded; and a new public service facility, known as Phase III of the Main Garden building, will be initiated in the fall. The underpass between the Asian Garden and the Main Garden will be completed in conjunction with the proposed extension of Southwest Marine Drive. Some renovations to the existing Horticulture Workshop at the Office will be completed, and extensive upgrading and completion of landscape elements at the Museum of Anthropology and at the Anthropology and Sociology Building will be undertaken. Particular emphasis will be directed toward the establishment of ethnobotanical collections around the outdoor Museum exhibition areas.

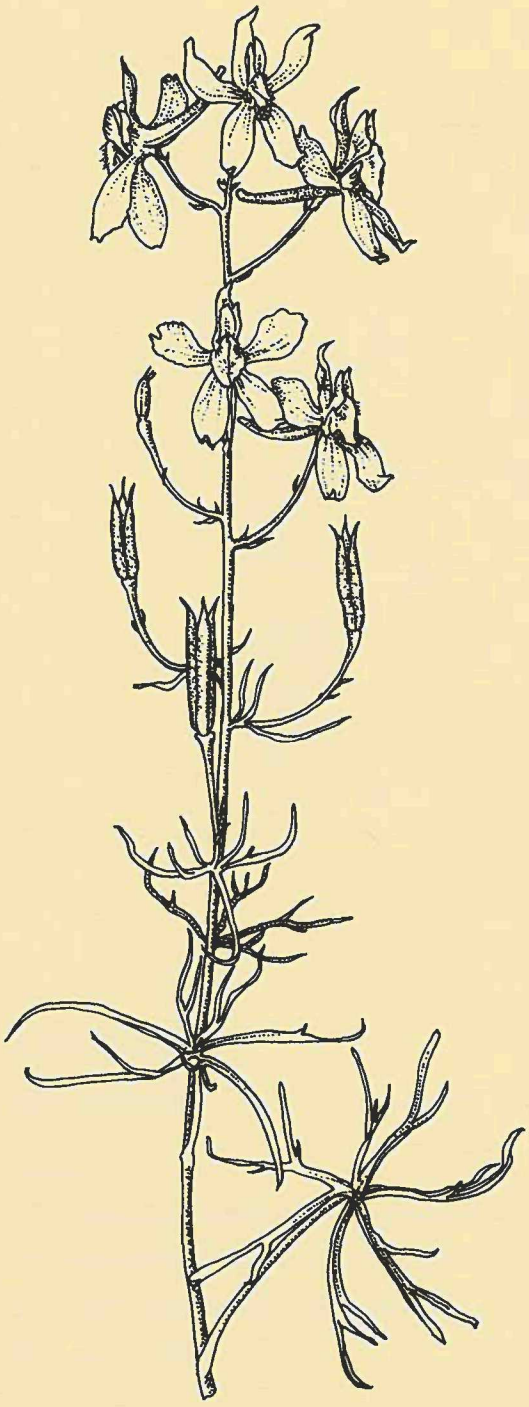
Pacific Naitonal Exhibition — The Botanical Garden will again participate as part of The University of British Columbia's exhibit program at the area's major agricultural exhibition in late August and September. Various members of staff will give demonstrations and provide an answering service to enquiries from visitors to the fair.

Summer Activities — These will include participation in Senior Citizens gardening programs, and the development of a series of four-week training programs for extended care patients at the newly opened Harry V. Purdy Hospital on Campus. The latter program utilizes the new octagonal Hortitherapy Greenhouse at the Botanical Garden Office.

Climatological Summary*

Data 1978	APRIL	MAY	JUNE
Average maximum temperature	11.9°C	14.9°C	19.7°C
Average minimum temperature	5.7°C	7.7°C	12.3°C
Highest maximum temperature	16.1°C	22.6°C	25.5°C
Lowest minimum temperature	3.1°C	3.0°C	9.3°C
Lowest grass minimum temperature	-2.4°C	-3.2°C	4.2°C
Rainfall/no. days with rain	101.7 mm/19	100.8 mm/13	26.6 mm/9
Total rainfall since January 1, 1978	376.5 mm	477.3 mm	503.9 mm
Snowfall/no. days with snowfall	—	—	—
Total snowfall since October 1, 1977	41.1 cm	41.1 cm	41.1 cm
Hours bright sunshine/possible	127.9/404.0	287.8/468.0	261.2/482.2
Ave. daily sunshine/no. days total overcast	4.3/4	9.3/2	8.7/1

**Site: The University of British Columbia, Vancouver, B.C., Canada V6T 1W5*
Position: lat. 49° 15' 29" N; long. 123° 14' 58" W. Elevation: 104.4 m



Delphinium nuttallianum, the Upland Delphinium, a member of the Family Ranunculaceae which is common in the interior of British Columbia.

Botanical Garden Staff

Director

Dr. Roy L. Taylor

Supervisor of Operations

Mr. Kenneth Wilson

Research Scientist (Cytogenetics)

Dr. Christopher J. Marchant

Research Scientist (Horticulture)

Dr. John W. Neill

Research Technicians

Mrs. Annie Y. M. Cheng
Mrs. Sylvia Taylor

Secretaries to the Office

Mrs. Lorna Anderson
Mrs. Pam Robin

Plant Accession System

Mrs. Marie Shaflik

Education

Miss Margaret E. Coxon
Mr. David A. Tarrant
(Educational Coordinator)

Horticulturists

Mr. A. James MacPhail (Alpine Garden)
Mr. Gordon J. Ramsdale (Nursery)
Mr. Peter A. Wharton (Marine Drive Garden)

Gardeners

Mr. Pierre Rykuiter, Head Gardener
(Area Manager, South Campus)
Mr. Helmut Koblischke
(Area Manager, Upper Campus)
Mr. Harold Duffill
Mr. Leonard Gibbs
Mr. Robert E. Kantymir
Mr. Murray J. Kereluk
Mr. Paul Kupec
Mrs. Bodil Leamy
Mrs. Elaine V. Le Marquand
Mr. Sam M. Oyama
Mr. Ronald S. Rollo
Mr. Allan A. Rose
Mr. Colin Varner
Mr. Isao Watanabe
Mr. Thomas R. Wheeler

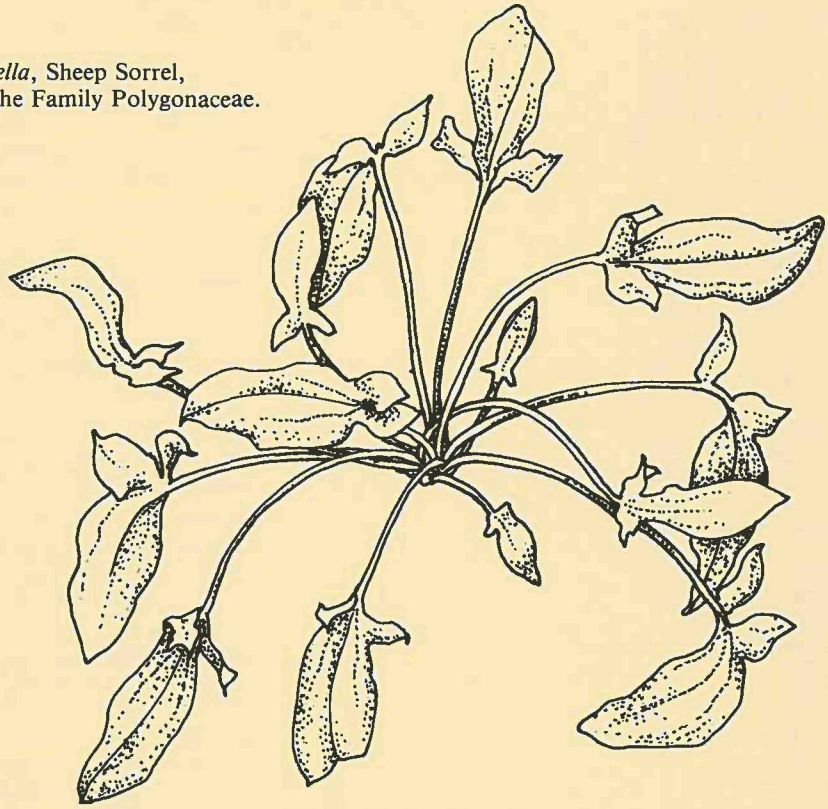
Research Associate

Dr. L. Keith Wade

Special Summer Student Program

Miss Veronica Anthony
Miss Sarah Curtis
Mr. Alex M. Downie
Mr. Pat Mooney
Miss Susan Munro
Mr. David Sze

Rumex acetosella, Sheep Sorrel,
a member of the Family Polygonaceae.



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