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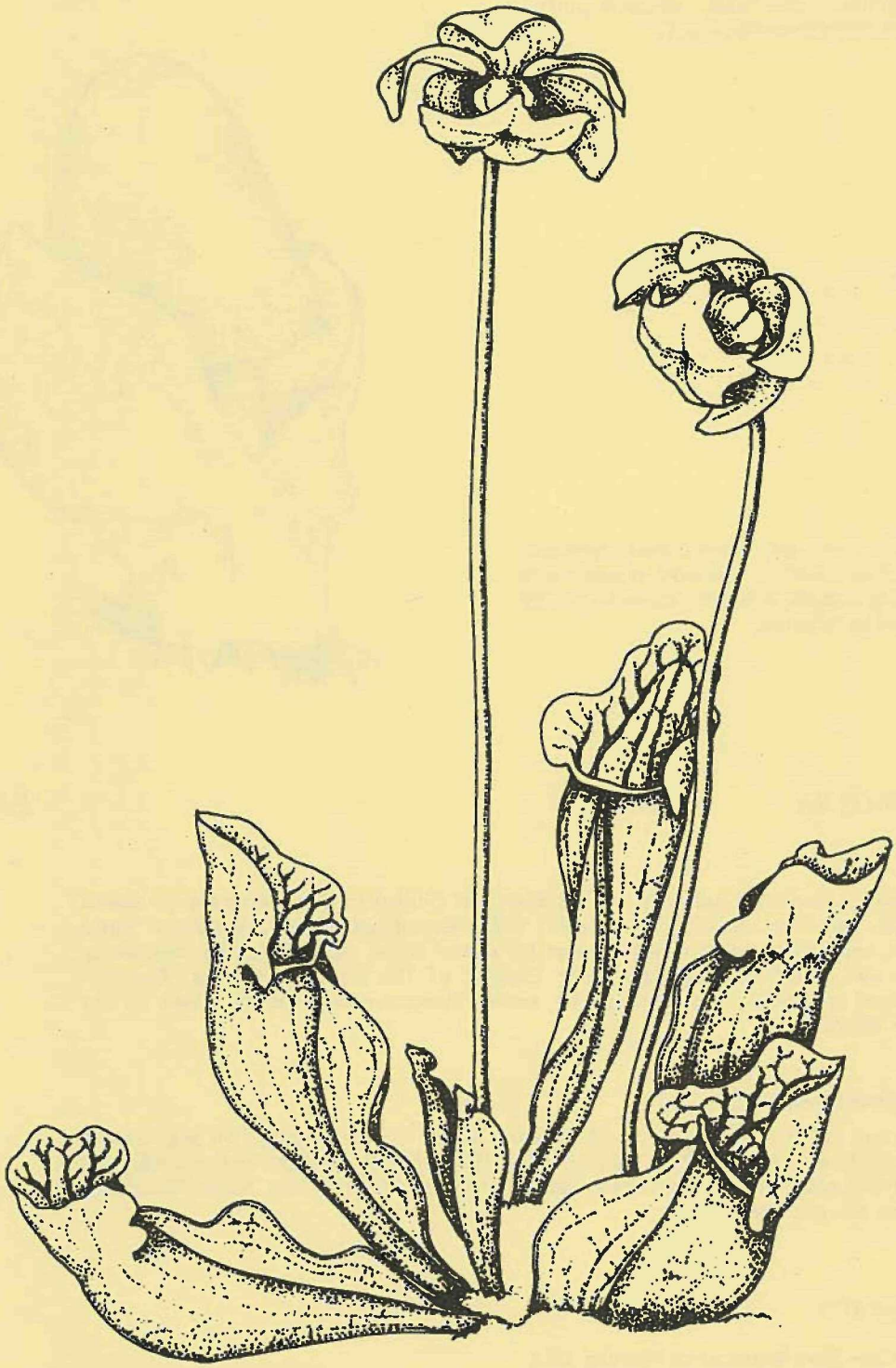
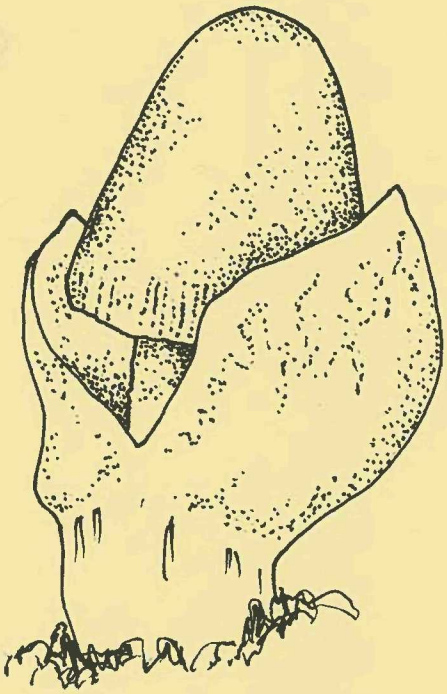


Cover:

Sarracenia purpurea subsp. *purpurea,* Northern Common Pitcher-plant, occurs in northeastern British Columbia, × 0.37.



Amanita porphyria, Grey-brown Amanita, × 0.66. This Amanita is present in summer to late fall in coniferous forests, especially along trails and in clearings.

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Insectivorous Plants in British Columbia

SYLVIA TAYLOR

For centuries people have been fascinated by the unusual adaptations and lifestyles of the insectivorous (insect-eating) plants, also often called carnivorous plants. Several species have been cultivated as curiosities for over 300 years. Sundews were important in medicine and in mythology in 15th and 16th century Europe. The American Indians and early explorers and settlers in North America thought that a plant as strange as the Pitcher-plant *(Sarracenia)* must be a possible source of medicine and drugs. Carnivorous plants have excited the imagination of many writers — the man-eating plants of many stories are probably based on a superficial knowledge of the small, harmless Venus'-flytrap *(Dionaea muscipula)* or other species with an active trapping mechanism, coupled with a very vivid imagination. Needless to say, there are no scientific facts to substantiate "man-eating plants". Certainly, there have been reports of one of the tropical Pitcher-plants *(Nepenthes chelsonii)* digesting giant rats — but even this is difficult to substantiate. The majority of insectivorous plants trap and digest small insects such as flies, ants and mosquitoes, and occasionally small frogs and lizards are caught by the larger pitcher plants.

There are at least 450 species (in 13 genera belonging to six families) of insectivorous plants distributed throughout the world. Their basic characteristic is their unique method of survival — they all lure and trap insects, and have an enzyme system to digest the prey. The plants then absorb nutrients from the digested insects. Like all green plants, insectivorous ones can manufacture their own food by photosynthesis utilizing the raw materials of sunlight, water and carbon dioxide. But they also live in nutrient-poor habitats and supplement mineral deficiencies by "feeding" on insects, absorbing necessary nitrogen-containing compounds.

There is some disagreement among scientists as to the importance of the insectivorous habit. The plants usually live in nitrogen-poor soils, and scientists had always assumed that the habit had been evolved to enable the plants to survive in such conditions, where most other plant species cannot grow. However, it is now known that some species can survive quite well without an insect diet, even in nutrient-deficient habitats. It appears that insects provide supplemental nutrients, such as nitrogen and phosphorus, and that these nutrients allow the plants to grow faster and produce more flowers and seed than when the supplementary diet is absent. Charles Darwin and his son Francis first showed convincingly that Sundews in cultivation were more vigorous when fed artificially by supplying insects to the leaves than ones that were not fed (Darwin, 1876). More recent experiments have shown that it is likely that most of the plant's energy and essential organic compounds result from photosynthesis, and that the majority of minerals used are obtained from the prey. Unfortunately, these suggestions have not yet been definitely proved, and more research is needed. Certainly, the ability to absorb certain essential nutrients from insects enables the plants to survive in nutrient-poor environments, where there is little competition because of the absence of other plants.

All the insectivorous plants trap insects on the outside surface of a modified leaf, and most then secrete enzymes onto or into the trap to digest the insect. Some of the simple end products of digestion are absorbed into the plant through the outer cell walls. A few species do not appear to secrete enzymes, digestion being accomplished by decomposition of the insect by bacteria present within the trap.

Insectivorous plants may be divided into three groups based on the method of catching the prey:—

a) Active trap — typified by the Venus'-flytrap *(Dionaea muscipula),* which has a fast-acting reflex movement making it the most animal-like trap. The most common active traps are found in the Bladderworts, which have small, elastic-walled bladders with fast-moving trap doors. The prey is swept into the bladder in a current of water produced when the walls of the bladder spring apart following the opening of the entrance.

b) Semi-active trap or Flypaper trap — utilizes movement as a supplement to an adhesive that captures the prey. This type is found in the Sundews and Butterworts. Glands on the leaf surface secrete adhesive droplets, which trap insects attracted by odor, color, or refraction of the drops. Tentacles on the leaf then gradually move over the prey, thus enclosing it.

c) Passive trap or Pitfall — relies entirely on highly specialized modifications of the leaves to trap the victim. The prey is enticed to enter the pitcher of Pitcher-plants such as *Sarracenia* and *Nepenthes* by color and odor, is then trapped, drowned, and digested in the fluid at the base of the pitcher.

Insectivorous plants usually grow in special and geographically restricted habitats, such as sphagnum bogs. Even one new ditch or one load of fill can change the drainage pattern sufficiently to dry up a small bog, thus making it unsuitable as a habitat for bog-loving plants. The addition of fertilizer and the control of fires also have adverse effects, the latter by allowing forest vegetation to gradually grow in the bogs. These factors are combining to make insectivorous plants scarce, and possibly even endangered in some areas. In addition, large quantities or whole populations are sometimes dug up by plant collectors or commercial dealers. Because of these concerns, several insectivorous plant habitats in the United States have been protected, and plants growing in the wild should all be treated as rare and threatened.

In British Columbia there are eleven species of insectivorous plants, representing four genera in three families.

Droseraceae (Sundew Family)

The family Droseraceae contains four genera, three of which contain only one species each and are of limited distribution — *Dionaea muscipula,* Venus'-flytrap; *Drosophyllum lusitanicum,* Portuguese Dewy Pine; and *Aldrovanda vesiculosa,* an aquatic plant. The fourth genus, *Drosera* or the Sundews, contains a large number of species (estimates range from about 85 to 144 species), of which six occur in North America, and two in British Columbia.

Sundews are found in every continent of the world, typically inhabiting damp heaths, bogs, swamps, and other wet habitats with acid soil (preferably with a pH of 3.5-4.0). It is a particularly hardy genus, and these plants are among the first ones to grow on fire-ravaged forest soils, or other newly disturbed habitats, such as roadside ditches and abandoned logging trails. In general, they are among the smallest of the insectivorous plants, many being only 2.5-5 cm in diameter and often completely hidden in the surrounding sphagnum moss except at flowering time. One exception is *Drosera regiae* of South Africa, which has leaves 61 cm long, and which is reputed to be capable of catching and digesting small animals.

The genus consists of low, stemless, herbaceous perennials with a slender rhizome that produces a small number of fine fibrous roots each year. The leaves are tiny, flat and solid or thick and clublike, and form a rosette on the surface of the ground. The leaves may be round, spoon-shaped, oblong, or filiform (narrow and threadlike). The shape of the leaf is the most important characteristic for distinguishing the North American species. There is an obvious petiole (leaf stalk), except when the leaf is filiform. The margins and upper surface of the leaf are covered with many stalked glands or "tentacles" (up to 400 have been counted in *Drosera rotundifolia,* and 200 may be the average number) that secrete a highly viscid, clear mucilage that glistens in the sunlight. The glands tend to be short and stubby near the centre of the upper surface, becoming longer towards the margin. In some species, or in some habitats, the glands are bright red, contrasting with the transparent globules. All the species flower in early summer, producing a slender, leafless, upright flower stalk that is 15-50(-76) cm tall and bears 1-20 erect flowers on the upper part. The flowers are bisexual, regular, 2.5 cm or less across, and open one at a time only in sunshine, and often for only one morning. There are 5 petals, which are white to pink or deep red, depending on the species. There are 5 to many stamens, arranged in whorls of 5. There are 3-5 styles, which are often divided. The fruit is a capsule, and the seeds are very tiny (almost dust-like). The seed is mature in 6-8 weeks. Many species are capable of self-fertilization if the flower has not been cross-fertilized by the time it closes.

Insects are attracted to the leaves because of the odor, color, or, perhaps, refractions of the droplets. The glands secrete both an adhesive substance and digestive enzymes. The viscid secretion droplets accumulate on each gland head and are held there until the gland is touched by the prey, when more secretion is released. When an insect lands on the leaf it becomes stuck in the mucilaginous droplets, and its struggles to escape stimulate the secretion of more sticky fluid until the insect may be completely covered. At the same time, the stalked glands begin to bend inward over the insect, soon followed by curling of the longer outer "tentacles". In a matter of time (maybe several hours) the insect is completely caught within a sticky web of "bars". Most insects die within about 15 minutes of capture of suffocation caused by the mucilage blocking the respiratory holes or trachea along the abdomen. The glands now secrete digestive enzymes, which decompose the insect. It has been shown that Sundews contain the enzymes peroxidase, estarase, acid-phosphatase, and protease in the digestive fluid. After about a week the "tentacles" unfurl, and the leaf is able to catch more prey. It has been shown that each "tentacle" can repeat the bending and unbending process about three times.

There are minute stalkless glands scattered over the upper leaf surface and on the stalks of the larger glands. Their function is not known, but there are two theories — one is that they function in the absorption of the digestive products, and the other is that they are concerned with the movement of the larger glands.

There are two theories concerning the movement of the stalked glands. The first proports that bending is caused by uneven growth of the stalk (Shetler, 1974b) — an acceleration of growth begins near the base on the outside of the stalk and moves upward towards the gland at the top. This means that the outside of the stalk grows faster than the inside, so that it bends inwards. Unbending is caused by accelerated growth on the inside of the stalk. The second theory states that bending results from a loss of turgor (rigidity) in groups of cells along the side of the stalk closest to the stimulus, that is, on the inside of the stalk. In this theory, the stalkless glands are thought to be responsible for the withdrawal of fluid from the cells, which causes the loss of turgor. Unbending is caused by the cells regaining turgor (Heslop-Harrison, 1978).

The Sundews are restricted to catching only small or very weak prey — flies and even ants are capable of escaping from the sticky fluid or from between the "tentacles". Even so, they may catch large numbers of insects — an English naturalist once estimated that plants covering 1 to 2 hectares of land killed about 6,000,000 insects in one season (Savage and Savage, 1979).

Sorcerers and alchemists both held Sundews in high esteem, because of the "dew". Until relatively recently, many ordinary people in Europe believed that a single plant brought into the house would cause "pernicious fever", and that a person who searched for a Sundew on Midsummer's Eve and rubbed the leaves over his skin would become indefatigable. An accidental discovery, however, was of no use! Sundews were particularly effective when collected at midnight on Midsummer's Eve — but one had to walk backwards all the time to avoid being followed by the Devil! Extracts and teas are still prescribed in France and Germany as an anti-spasmodic for tuberculosis, asthma, catarrh and whooping cough. The active ingredient has been found to be plumbagin, which is present in the British Columbian species.

The genus name is derived from the Greek *droseros*, 'dewy' or 'moist with dew', because the drops of sticky mucilage glisten like dewdrops in the sun.

> *"To return to our native bog-plants; the Sundews, all very much alike, and all, therefore, to be treated of under* Drosera *rotundifolia, are pretty and interesting, though not brilliant. Evil little things they are, with their carnivorous habit. One wonders what crime the past lives of* Drosera *can have held, that now the race should be compelled to dree so ominous and unpleasant a weird of murder and fraud. When will the Sundews be free of the burden, through some self-sacrificing individual plant who shall starve to death rather than take life, and so redeem his race into the happier paths of peace and virtue?"*
>
> (Farrer, 1908, p. 245)

Drosera anglica Hudson — Great Sundew

The Great Sundew is circumboreal, being found in swamps and bogs in Europe, Japan and North America. In British Columbia it can be found in suitable bogs and swamps throughout the Province, sometimes occurring in dense colonies that cover many acres. This is the most common species at moderate to high elevations in British Columbia.

There is considerable variation in the shape of the leaf blade from narrowly ovate to spatulate-oblong or cuneate-obovate. The leaves are 10-30 mm long, (2-)3-5(-7) mm broad, gradually narrowing to the petiole, and often standing erect above the moss. The petiole is glabrous or sparingly glandular-hairy, and 1.5-8 cm long. The scape (flower stalk) appears in June to August and is 6-18 cm tall, bearing 2-7 whitish flowers in a racemose inflorescence at the top. The calyx is (4-)5-6 mm long, connate for about one-third of its length, and the lobes are ovate-oblong. The petals are oblong and slightly to considerably longer than the calyx. There are (4)5 stamens, and (3)4-5 styles, which are bifid for two-thirds of their length. The seeds are 1-1.4 mm long, and the testa is loose, longitudinally striated, and prolonged but not flattened at each end of the seed.

Drosera anglica is believed by some authorities to be a fertile hybrid derived from a cross between *D. rotundifolia* and another species (possibly *D. linearis* Goldie). Some of the forms with the broader spatulate to obovate leaves have been shown to be sterile hybrids between *D. anglica* and *D. rotundifolia*.

The specific name *anglica* is derived from Anglia, meaning England.

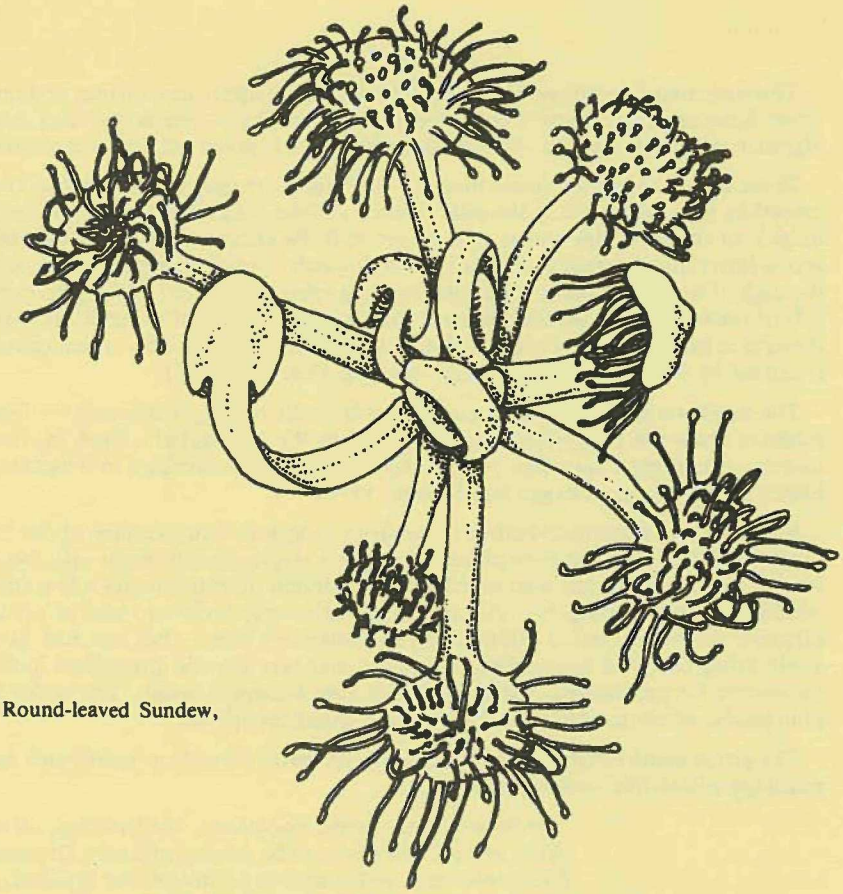


FIGURE 1. *Drosera rotundifolia,* Round-leaved Sundew, as seen from above, × 4.8.

Drosera rotundifolia Linnaeus (Figure 1) Round-leaved Sundew

The Round-leaved Sundew is also a circumboreal species, being found in sphagnum bogs and swamps throughout the Northern Hemisphere. It is present in suitable habitats throughout British Columbia, and may also be found growing on old floating logs in stagnant lakes, or among the mosses in marshy ground around pools. This is the predominant North American species, being found in most areas except the extreme south and most of the Rocky Mountain and Great Plains regions.

The leaves are spreading, often hidden in the moss, and may be bright red if the plant is growing in full sunlight. The rosette of leaves is 6-8 cm in diameter. The leaf blades are round to broadly obovate-cuneate, (5-)6-12 mm long, and usually at least as broad. The petiole is stout and 2-9 cm long. The scape appears in June to early September, and is up to 25 cm tall, bearing (1-)3-10(-20) whitish flowers. In some parts of the range the flowers may be pink or even yellow, mauve or purple. The flowers are very similar to those of the Great Sundew, except that there are usually only 3 styles and they are bifid nearly to the base. The seeds are about 1.5 mm long, and the testa is loose, longitudinally striated, and prolonged and distinctly flattened at each end of the seed.

In winter the rosette of leaves withers, and winter buds, which withstand freezing, are formed on the rhizome. Axillary buds, which also form on the rhizome, create secondary rosettes below the main one. As the rhizome decays, these separate and become new plants.

The specific name *rotundifolia* means 'with round leaves'. A potion made from the leaves of *D. rotundifolia* has been used to cure coughs, whooping cough, and respiratory diseases such as asthma. The fresh juice from the leaves has also been used in various parts of the world as a cure for corns, calluses and warts.

Both native species are easy to grow in live sphagnum moss, preferably the small-growing type that tends to form tufts. The moss should be kept constantly moist, but not sodden, and there should be high humidity. These plants should receive about 40-50% sunlight all day, and the temperature should be between 18-30°C during the growing season. All Sundews need a dormant period, with reduced light and a temperature of -4 to 4°C. Forcing the end of dormancy is not successful as the plants usually rot and die. Propagation is by seeds, or vegetatively from young and vigorous leaves or offshoots.

Lentibulariaceae (Butterwort Family)

The family is usually divided into five genera containing about 500 species between them. Four of the genera are small and fairly homogenous; the fifth, *Utricularia* or the Bladderworts, is very complex and variable, and includes an estimated 150 to over 300 species. Two of the genera in this family, *Pinguicula* (Butterwort) and *Utricularia* (Bladderwort), occur in British Columbia.

Pinguicula Butterwort

There are between 30 and 46 species of Butterwort, widely distributed throughout the Northern Hemisphere and in the South American Andes. They are usually found in wet places, often with mosses, such as on wet soil or among rocks along shores and streambanks; on hummocks in swamps; or in low, wet, sandy pinelands.

Most of the species are very similar in appearance. They are fibrous-rooted perennial herbs with a compact basal rosette of leaves that lies flat on the ground. The leaves are oval or tongue-shaped, pale yellowish-green, and the margins curl inwards to form a shallow bowl shape. The flowers are solitary at the ends of erect bractless scapes, and are somewhat reminiscent of the flowers of the genus *Viola*. The calyx is 5-lobed, and the lobes are partly connate to form an upper lip of 3 lobes and a lower lip of 2 lobes. The corolla is usually white or light to dark violet, or occasionally bright yellow, bilabiate with an upper lip of 2 lobes and a lower lip of 3 lobes, and is prolonged into a basal spur. The fruit is a 2-valved capsule.

The insectivorous adaptations are not as obvious in this genus as in other genera. The only unusual feature is the greasy appearance of the leaves. The upper surface of the leaf is covered with large stalked glands that secrete a film of colorless sticky mucilage over the leaf. There are also stalkless glands, raised slightly above the leaf surface and appearing rather wart-like, which secrete digestive enzymes. An insect landing on the leaf causes pressure, which results in the slow inrolling of the margin, thus pushing the insect towards the centre of the leaf, and also stimulating the secretion of mucilage. A small insect is soon fast in the sticky secretion, and struggling only causes it to sink deeper into the fluid. The stalkless glands secrete the digestive enzymes only if nitrogenous compounds are present, thus a grain of sand blown on to the leaf may cause the inrolling of the margin but there will be no secretion of enzymes. The digestive fluid is even more viscous than the mucilage, and contains the enzymes ribonuclease, esterase, acid-phosphatase, amylase, and protease. Digestion is usually complete in about 24 hours, and the leaf slowly uncurls to re-set the trap. The hard indigestible remains of the insect dry out and eventually may be blown away by the wind. The Butterworts usually capture small insects, such as mosquitoes and gnats, which are attracted by a fungus-like or decaying odor.

The generic name is the diminutive of the Latin *pinguis,* 'fat' or 'fatty', referring to the greasy appearance of the leaves, and *ula* 'little one'. The common name Butterwort also refers to the greasy appearance — wort is the old Middle English word for 'plant'. The leaves of Butterwort were used in Scandinavia as a medicine, and were rubbed on open sores of animals to make them heal faster. In fact, the digestive fluid does contain an antibiotic to stop the decaying of the insects. Butterwort was also commonly used as a milk coagulant in home dairy recipes.

Pinguicula villosa Linnaeus Hairy Butterwort

The Hairy Butterwort is found in many northern sphagnum bogs and swamps in North America and in Eurasia, but it is usually so inconspicuous that it is rarely collected. In British Columbia it has been collected on the Queen Charlotte Islands, at one station on Vancouver Island, and also apparently near Prince Rupert.

The leaves are 0.4-1.5 cm long, 0.2-0.7 cm broad, glabrous below and villous above. The scape is produced in June to August and is 2-6(-12) cm tall and villous with capitate hairs, with a single nodding lavender-blue flower. The sepals are (0.8-)1-2 mm long, and the corolla is 6-9 mm long, including the spur. The capsule is 3-5 mm long and erect.

The specific name means 'covered with soft hairs', referring to the hairs on the leaf surface and on the scape.

Pinguicula vulgaris Linnaeus Common Butterwort

The common Butterwort is the most widespread species in the genus, being found throughout the arctic and subarctic regions and up to 2300 m in the mountains of Eurasia, northernmost Africa, Iceland, Greenland and North America. However, it is seldom abundant in its preferred habitats of bogs, mossy seeps, and wet soil on beaches, meadows, or even on bare soil. In British Columbia it is found at relatively high elevations on Vancouver Island and in the Coastal Mountains, and in valleys in the northern part of the Province.

The leaves are succulent, elliptic or oblanceolate, entire, 2-5(-6) cm long, and 7-18 mm wide. The petioles are short and winged. The scape appears in (May) July to August, is 5-15 cm tall, and is obscurely glandular. The calyx of the flower is 3-5 mm long. The corolla is deep violet-purple to lavender-blue or, rarely, nearly white. It is

(12-)15-25 mm long including the slender spur (which is about 10 mm long), and has a flaring throat and broad, rounded lobes. The capsule is 4-6 mm long and is erect.

The species is represented by two subspecies in British Columbia. *Pinguicula vulgaris* subsp. *macroceras* (Link) Calder & Taylor (Figure 2) has flowers 24 mm long with large broad, rounded lobes that are suddenly narrowed to form a long filiform blunt spur up to 32 mm long. The lower corolla lobes are oblong-obovate. This subspecies is found in very different habitats ranging from sunny moist slopes to glacier moraines and dripping rocks at elevations between 50-2300 m in the north Pacific coastal area, including Japan, the Kamchatka Peninsula, the Aleutian Islands and Alaska. In British Columbia it is present across the southern part of the Province to the Rocky Mountains, but becomes almost purely coastal (except for a few stations along the Skeena River) in the northern parts. *Pinguicula vulgaris* subsp. *vulgaris* is distinguished by the lower corolla lobes, which are oblong rather than oblong-obovate.

The specific name *vulgaris* means 'common', 'general' or 'ordinary', while the subspecific *macroceras* is derived from two Greek words, *macro* and *ceras,* meaning 'large horn', referring to the large spur.

Both species of *Pinguicula* can be cultivated, preferring moderate or cool summer temperatures with a relative humidity of 60-100%. The Hairy Butterwort is probably best grown in small compact-tufted species of living sphagnum moss, but the Common Butterwort may be grown in a mixture of ⅓ black peat, ⅓ sand and ⅓ perlite. In cultivation, all Butterworts are subject to attack by snails, aphids and the fungus *Ustilago pinguicula.* This fungus causes a smut and produces dark brown or black masses of spores in the anthers. The disease is present in wild populations of the Common Butterwort in British Columbia. Propagation is by seed, or vegetatively from young and vigorous leaves. Butterworts do not like to have their root systems disturbed, so are difficult to transplant.

Utricularia Bladderwort

Most species of Bladderwort are aquatic (either anchored in open water or free-floating), some are terrestrial on wet or moist soil, and a few are epiphytic in moss. One or two species are known that are restricted to the pools of water found at the base of the leaves of large bromeliads in South America. Representatives of the genus are found on all continents of the world, with about 12 species occurring in North America and five in British Columbia.

All species lack true roots and show little distinction between the stem and leaves. In the aquatic species, the leaves are submerged and very finely divided. All our native species have alternate leaves, but in other species the leaves may be partly or wholly whorled. There are bearded, hollow bladders among the leaves or growing from specialized stalks. The scape is tall and slender, and bears a loose raceme of yellow flowers, each of which is subtended by a bract. The flowers are strongly bilabiate, the lower lip is either entire or 3-lobed, and the upper lip is either entire or shallowly

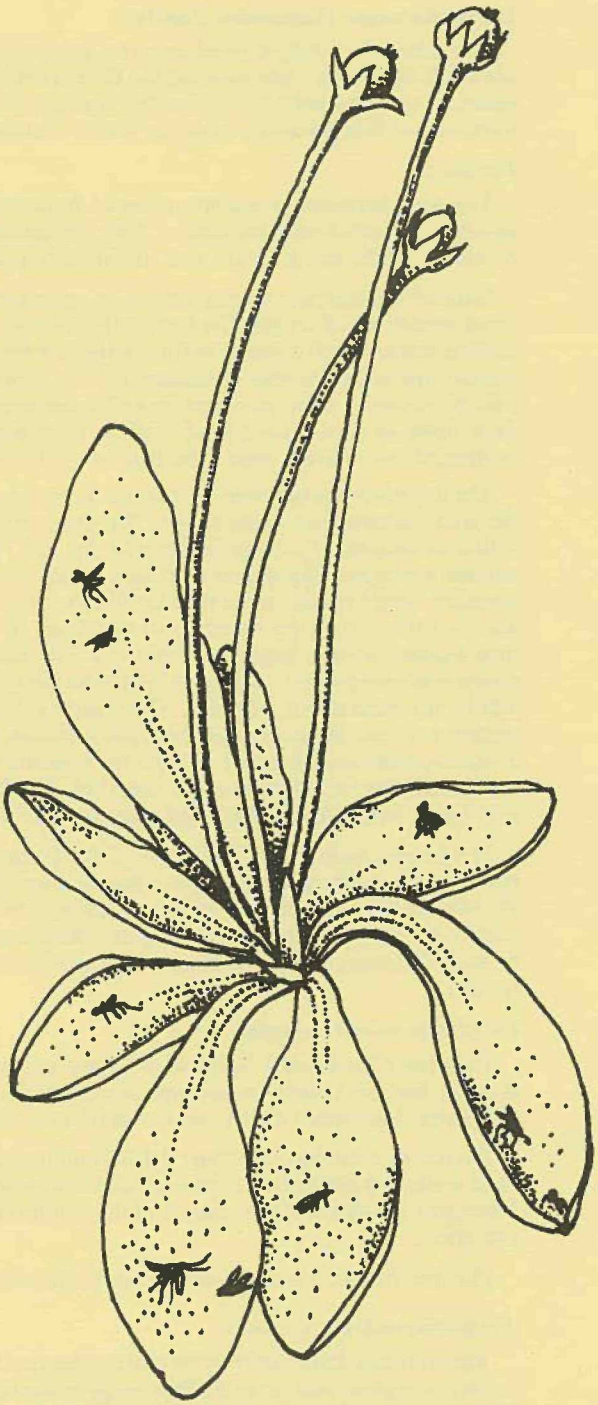


FIGURE 2. *Pinguicula vulgaris* subsp. *macroceras,* Common Butterwort, in fruit, × 1.

2-lobed. In most species the lower lip is raised at the base to form a prominent palate, which partially or completely closes the opening to the corolla tube. The base of the corolla tube is extended backward and downward to form a spur or sac. The fruit is a capsule. Most species form winter buds at the ends of the stems in the fall, but some do not. These buds fall off and lie dormant at the bottom of the pond during the winter, ready to produce new plants in the spring.

The bladders are modified leaves and there are many variations in form, with the smallest known being 0.3 mm and the largest about 6 mm in diameter. The best known one is that of the Greater Bladderwort (*Utricularia vulgaris*). This is slightly less than 6 mm across, flattened, pear-shaped, and is attached to the plant by a short stalk at one side. There is an opening at the narrow (free) end protected by a "door", which is attached at the top and hangs downward over the opening, swinging free at the bottom where it rests against a semi-circular collar or threshold. At the edge of the opening are a pair of branched antennae plus a number of long slender bristles along the side. These form a funnel to guide the prey into the opening of the bladder. There are (1)4 stiff bristles near the lower free edge that constitute the tripping or trigger mechanism. Scattered over the outside of the bladder walls and on the threshold of the door are numerous stalkless glands, which secrete a mucilaginous substance. On the outer surface of the door are many stalked glands, which also secrete mucilage plus a sugary substance that is believed to attract the prey. The inside walls of the bladder are covered with many 2- to 4-headed glandular hairs.

When the trap is set, the door is closed, the trigger hairs are in position, the bladder is almost empty of water, and the walls are straight or slightly concave. If a passing insect touches the trigger hairs, their movement alone distorts the bottom edge of the door causing it to move away from the threshold. The vacuum inside the bladder causes a suction so that water rushes into the bladder, carrying with it any insect or animal small enough to pass through the opening. The bladder is now full of water and the walls bulge outwards. Specialized cells in the walls of the bladder are concerned in the active transport of ions from inside the bladder to the water outside. This sets up an osmotic gradient that results in water being moved out of the bladder, thus re-setting the trap. The re-setting takes only about 30 minutes, although the prey may remain alive inside the trap for several days before eventually dying. The mechanism of digestion is uncertain, but the insect quickly disintegrates after death, therefore, there seems to be some kind of digestive fluid secreted into the bladder. In addition, there are reports that the cells of the bladder become a red-brown color, suggesting some sort of metabolic activity. It has also been found that the small pool of water that remains at the bottom of the bladder does contain the enzymes esterase, acid-phosphatase, and protease. The indigestible, hard remains of the insect stay in the bladder.

The movement and trigger mechanism of *Utricularia* was the subject of an early movie film produced by Dr. F. E. Lloyd of McGill University in the 1930's. Dr. Lloyd, who was interested in the physiological aspects of the plants, also wrote one of the first comprehensive books on carnivorous plants (Lloyd, 1942).

Bladderworts can capture a wide range of organisms, including insects and insect larvae, diatoms, desmids, protozoans, and small crustaceans such as *Daphnea* and *Cyclops*. They can also catch the occasional tadpole or newly hatched fish, provided these are very tiny. Occasionally, bladders are found that have half a tadpole sticking out through the door — obviously the victim was too large!

The generic name is derived from the Latin *utriculus,* 'little bag' or 'little bottle', referring to the bladders.

Utricularia gibba Linnaeus — Humped Bladderwort

The Humped Bladderwort is found mainly in Central and South America and Africa, but is also present in the eastern and western parts of North America. In British Columbia it is found on Vancouver Island, being common in several lakes near Victoria and in Ash, Patterson and Turtle Lakes near Port Alberni, and on the mainland in Beaver Lake in Vancouver.

The stolons (stems) are 10-25 cm long and are often a characteristic zig-zag shape when floating. The leaves are 3-10 mm long, filiform, and dichotomously branched from the base. One branch is usually straight and without bladders, while the other is usually further branched and has 1-3 bladders. The bladders are 0.5-1.5 mm long, 0.5-1.0 mm wide, and have long branched hairs at the membrane opening. There are no winter buds. The scape is 3-7 cm tall and there is either 1 or 0 scale. The inflorescence contains 1-2 bright yellow flowers, each subtended by a semi-amplexicaulous bract. The pedicel is 5-10 mm long and is straight after anthesis. The calyx lobes are equal, 1.5-2.5 mm long, and orbiculate. The upper lip of the corolla is 2-6 mm long, flat, and is at right angles to the lower lip, which is 3.5-6 mm long. The palate is conspicuous and 3-4.5 mm long, and the spur is cylindrical, 3-5 mm long, straight and parallel to the lower lip. The capsule is about 5 mm in diameter.

The species is represented in British Columbia by the subspecies *gibba,* the typical form.

The specific name *gibba* means 'swollen on one side'.

Utricularia intermedia Hayne in Schrader — Flat-leaved Bladderwort

Flat-leaved Bladderwort is a circumpolar boreal species, but is absent from Iceland, and is usually free-floating in shallow standing or slowly moving water. In North America it is present as far south as California, Indiana and Delaware. It is of scattered distribution in British Columbia, where it is often associated with *Carex lasiocarpa*. Sometimes it grows in the sub-littoral zone of pools, anchored in the mud and forming large mats.

The stolons are very slender and are of two kinds:— leafy stolons 10-50 cm long, which lack bladders; and leafless ones with bladders. The leaves are 5-30 mm long, and are divided at the base into 3 branches, which then dichotomously branch into 6-20 slender segments. The segments are flat, have a central nerve, a blunt obtuse tip with an abruptly starting bristle, and are all about the same width. The bladders are 1.5-4.5 mm long and 2-4 mm wide. The winter buds are (2-)5-7(-15) mm long, 3-10 mm wide, and ovoid or ellipsoid. The scape appears in July to August, and is 5-20 cm tall with one or two bract-like scales. The inflorescence has 2-4(-5) bright yellow flowers, each subtended by a bract that is 1.5-4 mm long. The pedicel is 3-15 mm long. The calyx lobes are subequal, 2.5-3.5 mm long and 2-3 mm wide. The upper corolla lip is 4-9 mm long, and the lower lip is 8-12(-18) mm long and 7-20 mm wide. The palate is well developed and about 7 mm long, and the spur is cylindrical, straight, 8-12 mm long, and is at an acute angle to the lower lip. The capsule is about 3 mm in diameter.

The specific name means 'intermediate', usually referring to the color, form or habit of the plant. This particular species is intermediate in size between *U. minor* and *U. vulgaris*.

Utricularia minor Linnaeus — Lesser Bladderwort

Lesser Bladderwort is a circumpolar species with small discontinuities in the distribution in Asia and America, and is usually found in shallow standing or slowly moving water. In North America it extends as far south as California, Colorado, Indiana and New Jersey. It is considered to be less common than the Flat-leaved Bladderwort *(U. intermedia)*, but its small size may mean that it is frequently overlooked and, therefore, it may be more common than the records indicate. In British Columbia it can be found in and around peaty bogs and swamps, commonly occurring in small-channelled drainage areas, along and under the margins of these channels.

The stolons are 15-75 cm long and are differentiated into leafy ones with few bladders, and ones with fewer leaves and more bladders. The leaves are numerous, 3-10 mm long, and dichotomously branched into 2-17 ultimate segments. These segments are slender, flat, without a central nerve, and the ultimate ones are strongly acuminate. The bladders are borne on the leaves, usually 2-6 per leaf. They are 1.5-2 mm long and 0.7-1.5 mm in diameter. The scape appears in June to September and is 4-15 cm tall with 1-4 bract-like purple scales. The inflorescence contains 2-10 pale yellow flowers, each subtended by a purple auriculate bract that is 1-2 mm long. The pedicel is 2-10 mm long, and is recurved after anthesis and in fruit. The calyx lobes are equal, 0.5-2.5 mm long, 0.5-2.5 mm wide, and the lower lobes are emarginate. The upper lip of the corolla is 2-4 mm long, and the lower lip is 4-8 mm long and 4-4.5 mm wide. The palate is about 3.5 mm long, and poorly developed. The spur is small, 1-2 mm long, saccate, and poorly developed. The capsule is globose and about 2-2.5 mm in diameter.

A more robust form, which has the stolons 50-120 cm long, has been collected from several places in British Columbia. The leaves of this form are 9-20 mm long, orbiculate, and divided into 20-40 segments.

The specific name *minor* means 'smaller', 'inferior', or 'less', referring to the habit of the plant. It is rarely seen in flower in British Columbia.

Utricularia ochroleuca R. W. Hartman

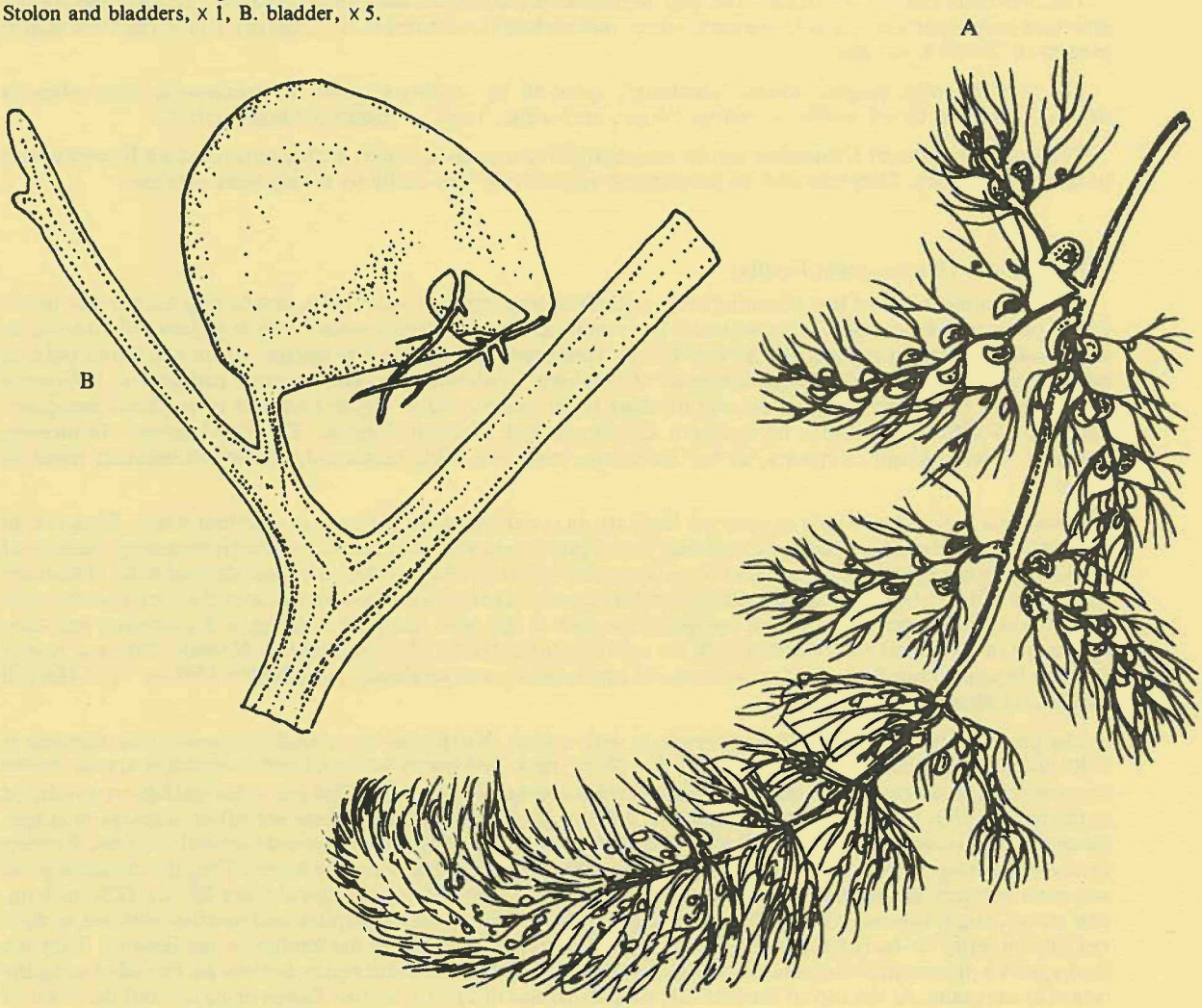
This species is found in northern, central and western Europe, but is considered rare there, and in North America from the Northwest Territories and Alaska east to Nova Scotia, and south to Washington, Oregon, Colorado and Illinois. Its distribution in British Columbia is poorly known.

The stolons are 5-30 cm long and are differentiated into leafy and leafless ones. The leaves are 3-15 mm long, and are divided into 3 parts at the base, these then further divide to form 5-19 segments. The segments have a central nerve, and are gradually narrowed into a bristle at the apex. The leaves occasionally bear one bladder. The bladders usually form on the leafless stolons, and are about 1.5-2.5 mm long, and 1-2 mm wide. The winter buds are subglobose, 1.5-5 mm long, and 1.2-2.5 mm wide. The scape appears in July to August, is 5-25 cm tall, and has 1-5 bract-like scales. The inflorescence contains 2-10 lemon yellow or pale yellow flowers, each of which is subtended by an auriculate bract about 0.5-4 mm long. The pedicel is 2-15 mm long, and is straight in anthesis but becomes slightly recurved afterwards. The calyx lobes are subequal, about 2.5-3.5 mm long, 1.5-2 mm wide, and the lower lobe is emarginate. The upper lip of the corolla is 3-9 mm long, and the lower lip is 5-12 mm long and a little narrower than the upper lip. The palate is about 5 mm long, and the spur is 3-5.5 mm long, pyramidal with a broad base, and at right angles to the lower lip.

Non-flowering specimens are difficult to distinguish from non-flowering plants of the Flat-leaved Bladderwort *(U. intermedia),* and it may be that many collections have been misidentified. Flowering specimens are easily referrable to this species because of the pyramidal spur at right angles to the lower lip, a characteristic that is found in no other species in the area.

The specific name is derived from two Greek words — *ochros,* 'pale' or 'pale yellow', and *leucon,* 'white' — meaning 'yellowish-white', referring to the color of the flowers.

FIGURE 3. *Utricularia vulgaris,* Greater Bladderwort.
A. Stolon and bladders, x 1, B. bladder, x 5.



Utricularia vulgaris Linnaeus (Figure 3) Greater Bladderwort

Greater Bladderwort is a circumpolar boreal species, with a break in the distribution in Iceland and Greenland. It is present in ponds, lakes, marshes, and slow-moving streams. In North America it is widely distributed in a variety of suitable habitats as far south as California, Arizona and Texas.

The stolons are 20-180 cm long, and rather coarser than in the other native species. The leaves are numerous, 1-5(-9) cm long, pinnatifid, and divided into 20-150 filiform segments. The segments are terete and progressively more slender after each division so that the ultimate ones are filiform and strongly acuminate. The bladders are 1-4 mm long, 1-3 mm wide and are attached near the base of the points of branching in the leaves by stalks 0.1-1.0 mm long. The bladders on the primary branches are larger than on other branches. There may be as many as 10-50 bladders per leaf. The winter buds are ovoid or ellipsoid, 7-20(-30) mm long, and 6-15 mm wide. The scape appears in May to August, and is stout, 6-30(-40) cm tall, and has 1-5 bract-like scales. The inflorescence contains (3-)6-20 bright yellow flowers subtended by bracts 2.5-8 mm long. The pedicel is 6-30 mm long, and is recurved after anthesis and in fruit. The calyx lobes are subequal, 3-6 mm long, 2-4 mm wide, and the lower lobe is emarginate. The upper lip of the corolla is 3-17 mm long, and the lower lip is 5-20 mm long and slightly lobed. The palate is gibbous, as large as the upper lip, and sometimes has reddish-brown veins on it. The spur is 10 mm long, well-developed, falcate and directed forward. The capsule is globose, and about 6 mm in diameter.

The American plants tend to have the spur somewhat more slender and pointed than in the Eurasian forms, and have been separated out as *U. vulgaris* subsp. *macrorhiza* (Le Conte) R. T. Clausen. This is the form that is present in British Columbia.

The specific name *vulgaris* means 'common', 'general' or 'ordinary', and the subspecific *macrorhiza* is derived from two Greek words — *macro,* 'large', and *rhiza,* 'root' — meaning 'large-rooted'.

The aquatic species of *Utricularia* can be propagated from seeds in water, with plants reaching flowering size in one to two years. They can also be propagated vegetatively very easily by taking stem cuttings.

Sarraceniaceae (Pitcher-plant Family)

This is a small family of low perennial herbs inhabiting bogs and wet savannahs, and having pitcher-like leaves for trapping insects and other tiny animals. It contains about seventeen species in three genera, all endemic to three widely separated regions of the New World. *Heliamphora* contains 4-6 species, which are found only on isolated mountains of the Guiana Highlands of northern South America. *Darlingtonia californica,* California Pitcher-plant or Cobra-plant, is the sole member of its genus, and is highly localized in montane meadows, between 90-1830 m elevation, of northern California and adjacent Oregon. The third genus, *Sarracenia,* contains between 8 and 12 species, all but *Sarracenia purpurea* being found only in the southeastern states of America.

Sarracenia species grow only in very wet habitats, in waterlogged soil or even in standing water. Bogs are an especially typical habitat. They are commonly found growing in acid soil, but this seems to be mainly because of the lack of competition — specimens of *S. purpurea* have been found growing in humus derived from sphagnum moss with a pH of 4.0, but also in an alkaline marl bog with a pH of 8.0. They were one of the first insectivorous plants to be discovered, although not recognized as such at the time. The first drawing of *S. purpurea* was done in Europe in 1601, and was reproduced in the second edition (1636) of John Gerard's *Herball.* This was one of the first botanical books in English (instead of Latin) when it was originally published in 1597 as "The Herball or General Historie of Plantes".

The genus consists of herbaceous perennials with round, horizontal to vertical rhizomes. The rhizome is 8-30 cm long when mature, and may survive for 20-30 years. The leaves are in a basal rosette and appear in two or sometimes three forms each year. The most obvious are the pitchers, modified entire leaves that are produced in the spring, with a second crop sometimes appearing in the fall, although these are often different in shape. Secondly, half or all of the leaves in the fall (depending on the species) may be sword-like and tubeless, forming the overwintering leaves or phyllodia. Finally, all species produce small scale-like leaves. The pitchers show great variation between species, but in general either lie flat on the ground or arch upward, are 30-60 (-122) cm long, and are strikingly colored, varying from yellowish-green to dark green to purplish and mottled with red to dark red (the intensity of the red depending partly on the amount of sunlight in the habitat or the season). They are fleshy, and a prominent wing runs along the outer surface of the leaf from top to bottom on the side facing the centre of the plant. At the top of the leaf this wing broadens to form a narrow flange or lip around the front of

the mouth of the pitcher and a hood on the back side. The hood is sometimes quite long and may arch over the opening, thus forming a protection against rainwater entering the pitcher. The flowers appear in the spring to early summer, and are large and showy with a more or less agreeable scent. There is a solitary leafless scape, 30-60(-122) cm tall (usually about as long as the leaves), which bears a single, nodding flower at its apex. There are usually 5 (occasionally 4) sepals that are green or sometimes colored and petal-like, broad and spreading, and persistent. The five petals are free, large, yellow to greenish-yellow or dark red, oblong to obovate, or they may be very short and almost absent. They hang straight down and are incurved. There are twelve to many free stamens. The base of the style is slender, but it is expanded at the top to form a very broad umbrella-like body with 5 angles and 5 rays. There is a small hooked stigma at the end of each ray. The ovary is subglobose and there are numerous ovules. The fruit is a 5-valved capsule with a granular surface. The seeds are numerous, small, plump, and tan to dusty lavender in color.

The petals are persistent for several weeks and then drop, but the remainder of the flower persists until the seeds are mature in July to September. The umbrella-shaped style is believed to catch pollen released by the anthers, holding it where insects can easily find it. Only a minority of plants in a population seem to flower in any one year. The species hybridize freely where their natural ranges overlap or in cultivation, and there are a large number of natural hybrids, the most common probably being *Sarracenia* x *catesbaei* Elliott *(S. purpurea* subsp. *venosa* x *S. flava).*

The prey are attracted to the pitcher by the flower-like appearance and odors. There are nectar-secreting glands extending from the lip downwards on the outside. Insects land on the surface and gradually move into the mouth of the pitcher as they feed on this nectar. The lip of the pitcher has stiff hairs that point downward into the trap, and the insect cannot return once it has passed through this area. Just below the lip, in the steepest portion of the throat, is a highly polished, slippery area without hairs, thus forcing the insect down into another region of downward pointing hairs and then into a pool of liquid at the bottom of the pitcher. This liquid is a mixture of digestive enzymes, rainwater (in some species), and bacteria, which are believed to help in digestion. It is also believed that the liquid may contain a wetting agent to reduce the surface tension so that the trapped insect is unable to crawl across the surface. It has been shown that the enzymes invertase and protease are present. The chemical coniine has recently been shown to be present in very low concentration, sufficient to kill any insect before digestion (Dr. G. H. N. Towers, personal communication). This is the same chemical that is present in Poison-hemlock and that was used to kill Socrates. The trapped insects accumulate in the fluid, and the digestive products are continuously withdrawn as the plant needs them.

The usual insects caught are ants, beetles and flies, although small toads, frogs and centipedes may also be trapped. The quantity of prey captured is sometimes quite large — the pitchers usually live for several months and may be almost completely filled with decaying remains. The odors of decay are often evident. Some animals have learned to use the pitchers for food, shelter, or in part of their life-cycle. Small tree frogs often shelter during the day in the mouths of large pitchers, using the suction pads on their feet to cling to the inside walls. The fly *Sarcophaga sarraceniae* lays its eggs among the insect remains at the bottom of the pitcher, the larvae feed on these and then bore their way out through the wall to pupate in the soil. It has been discovered that the larvae produce an anti-enzyme as a protection against digestion. Some small mosquitoes also breed within the pitchers in the wild.

Pitcher-plants have been cultivated as curiosities for many years, and have been used medicinally to a limited extent. The Indians of Newfoundland used the roots of the northern form of the Common Pitcher-plant as a medicine for smallpox, and the treatment was also used in England for a short period about 1865. Steam distillation of the roots of *S. flava* produces sarasin, which was used to relieve tic douloureux, a painful facial nerve irritation.

The generic name honors Dr. Michel Sarrasin (or Sarrazin) de l'Etang (1659-1734), a botanist and physician at the Court of Quebec, who sent a specimen of *Sarracenia purpurea* subsp. *purpurea* to the French botanist Joseph Pitton de Tournefort (1656-1708) about 1700.

Sarracenia purpurea Linnaeus — Common Pitcher-plant

This is the most widespread species, being found in sphagnum bogs from the subarctic to the sub-tropics of North America. It is now known to occur in all ten provinces of Canada, being found about eleven years ago in northeastern British Columbia (Krajina, 1968).

The rhizome is stocky and more or less vertical. The pitchers are more or less suffused with purple or red, (5-)10-20 cm long, 1-5 cm wide, obovoid, and curved-ascending from the base. They tend to be smaller and more reddish when growing in an exposed situation. The wing is broad, and the hood is erect, open, reniform, and

covered with reflexed bristles. The scape appears in late May to August, is erect, and 30-50 cm tall. The flower is subglobose, 5-7 cm wide, and commonly dark purple-red or, rarely, yellowish. The style is greenish-yellow to red.

There are two subspecies of the Common Pitcher-plant, which integrade in New Jersey. *Sarracenia purpurea* subsp. *purpurea* or Northern Common Pitcher-plant occupies the northern part of the range, and is the form found in British Columbia. It is characterized by long narrow pitchers that are usually more than three times as long as broad, and by having smaller hood wings, which extend only slightly beyond the margin of the pitcher. The petals and summit of the style are red. *Sarracenia purpurea* subsp. *venosa* is the southern form, which has shorter, broader pitchers that are usually less than three times as long as broad.

The specific and subspecific epithet *purpurea* is from the Latin *purpureus,* 'purple', referring to the color of the flowers and/or leaves. *Sarracenia purpurea* subsp. *purpurea* was designated as the Provincial flower of Newfoundland in 1954, but was first used as an emblem on the Newfoundland penny about 1876 by order of Queen Victoria. A potion of the roots and leaves was used as a cure-all for stomach, diuretic and menstrual complaints and as a laxative, as well as for smallpox.

The Common Pitcher-plant is somewhat difficult to cultivate, and is probably best grown on live sphagnum moss with semi-shade and cool root temperatures during the hot summer months, after it has reached maximum development. Full sun is needed before this for best flower and pitcher formation. High humidity is essential. However, we are presently growing the northern form successfully in The E. H. Lohbrunner Alpine Garden at UBC in a peat bed using a mix of one-third peat moss, one-third coarse sand and one-third loam. The plants are in full sun, but are never allowed to dry out in the summer. It has been stated that water from a water softener or deionizer should not be used as the added sodium is detrimental to the plant. Propagation is by seeds, which reach flowering size in 3-5 years, or by division of the rhizome.

Insectivorous Fungi and Seeds

In addition to the insectivorous plants, it has been found that some fungi are carnivorous. *Arthrobotrys obligiospora* and *Dactylaria brochopaga* both trap eelworms in loops of their hyphae, and then ingest needed nutrients from the body.

There are also indications that the seeds of some non-insectivorous plants may be carnivorous, or capable of carnivory. John T. Barber of New Orleans has found that seeds of the Common Shepherd's-purse *(Capsella bursa-pastoris)* are apparently capable of trapping prey. The seeds are mucilaginous, that is, they release a gummy covering or pellicle when they take up water. The mucilage appears to contain a substance that will attract motile soil bacteria, nematodes and protozoans. Barber showed that nematodes accumulated in statistically significant numbers around Shepherd's-purse seeds, and that a significant number of them would be dead (75% versus 7% in the absence of seeds after 8 days). Therefore, he suggested, and later proved, that the seeds released a toxin. He also showed that Shepherd's-purse seeds released proteases on imbibition (uptake of water), and that the proteolytic activity was confined to the mucilage. Experiments using labelled amino-acids proved that the germinating seeds were able to take up products of digestion, and that they were incorporated into the seedling. The seeds are small and contain minimum food reserves, and the plants grow in semi-arid soils of low fertility. Thus, although the plants do not appear to *need* prey to germinate, or for the seedlings or plants to be healthy, the potential for carnivory seems to be present — the seeds can attract, trap, kill, digest, and absorb the resultant nutrients.

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All-America Selection Display Garden

The UBC Botanical Garden had an All-America Selection Display Garden for the first time this summer. In this garden were displayed All-America flower winners from the immediate past and present years. The garden was located in the entrance area to the Main Garden, and was open to the public at all times. Displayed in the Garden were plants grown from seed supplied by three seed houses as well as the All-America Selection Committee. The garden will be maintained in future years, with a changing display of flowers each year.

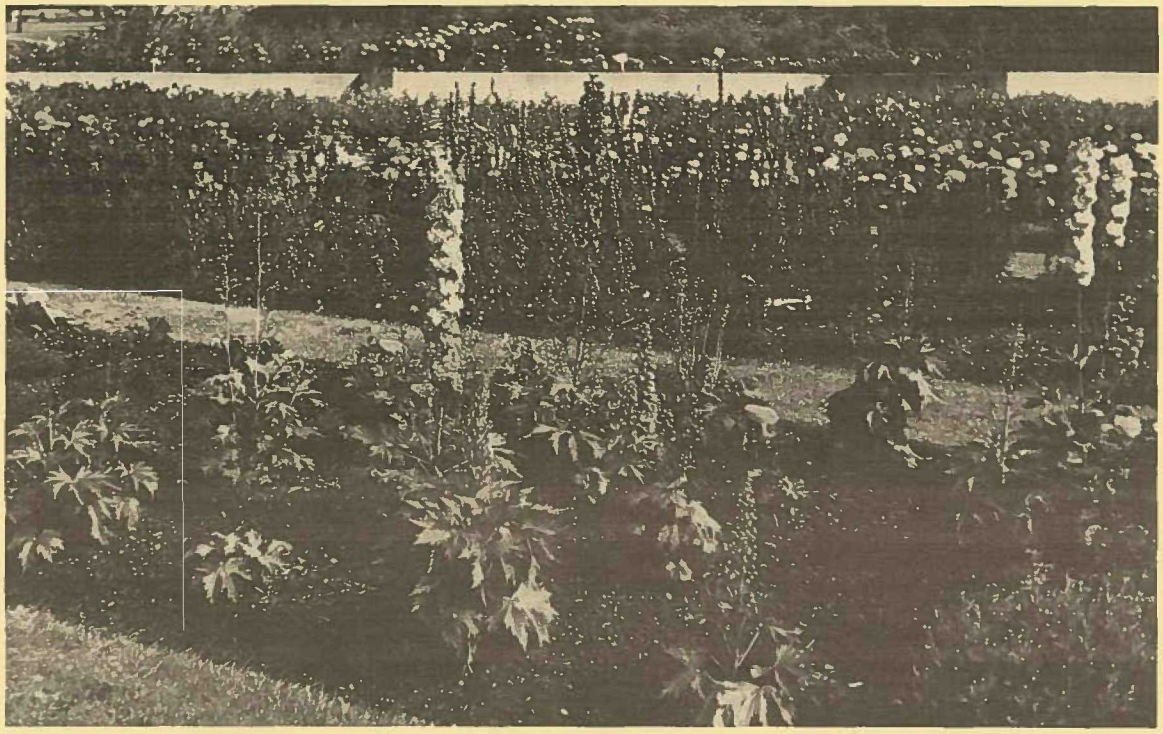

FIGURE 4. A view of the All-America Selection Display Garden in late September.

The Genus *Lonicera* in British Columbia

Member of the Family Caprifoliaceae

LONICERA CAERULEA Linnaeus
Bluefly Honeysuckle

LONICERA CILIOSA (Pursh) A. P. de Candolle
Western Trumpet Honeysuckle

LONICERA DIOICA Linnaeus
Glaucous-leaved Honeysuckle

LONICERA ETRUSCA Santi
Etruscan Honeysuckle

LONICERA HISPIDULA (Lindley) D. Douglas ex Torrey & Gray
Hairy Honeysuckle

LONICERA INVOLUCRATA (J. Richardson) Banks ex K. P. J. Sprengel
Twinberry Honeysuckle

LONICERA x NOTHA Zabel
Tartary Hybrid Honeysuckle

LONICERA UTAHENSIS S. Watson
Utah Honeysuckle

Description of the Genus Lonicera

Lonicera is a genus of vigorous erect shrubs or woody vines. The shrub forms may be bushy or climbing, deciduous to evergreen, and 1.2-3 m tall. The woody vines are sometimes more or less evergreen. All forms have thin stems and hollow branchlets.

The twigs are rounded and mostly slender. The pith is moderate, pale or brown, and is excavated at the nodes in some species. The leaf scars are opposite, crescent -shaped, small, and on the narrowed extremities of raised bases that are more or less connected by transverse lines. Bundle traces 3. Stipule scars lacking.

The winter buds are often superposed, with the lowermost being the largest or developing into an inflorescence in the first season. They are sessile, variously shaped, and have 2 to rather numerous 4-ranked scales.

The leaves are opposite, simple, mostly entire, short-petiolate or sessile, and exstipulate or rarely stipulate, when the stipules are usually small and adnate to the petiole. Few show fall color.

The flowers are either in axillary pairs on a slender petiole subtended by 2 bracts and 4 bractlets, or in sessile whorls at the ends of the branches. They are perfect, white or yellow to pink, scarlet or purple, usually small but showy, and often have a fragrance that is most marked towards the evening thus attracting night-flying hawk-moths and hummingbirds. The flowers are subtended by bracts and bractlets, the bractlets being distinct, connate or sometimes wanting. The calyx is small, with the 5 sepals united to form an ovoid to nearly globulose tube, with a shallowly 5-lobed limb, the lobes sometimes being obsolete. The corolla is regularly or nearly regularly 5-lobed or often evidently bilabiate with a 4-lobed upper lip and a single strap-shaped lower lip. It is tubular to funnelform or campanulate, and is often gibbous (swollen) or spurred near the base. Nectar is secreted at the base of the corolla tube. There are 5 stamens, which are inserted on the corolla tube and alternate with the corolla lobes. The anthers are linear or oblong. The style is slender and elongate, and the stigma is capitate. The ovary is inferior and usually 2-3(-5)-celled. The ovules are pendulous, and there are 3-8 per cell. The flowers generally appear in the spring, but in late summer in some species.

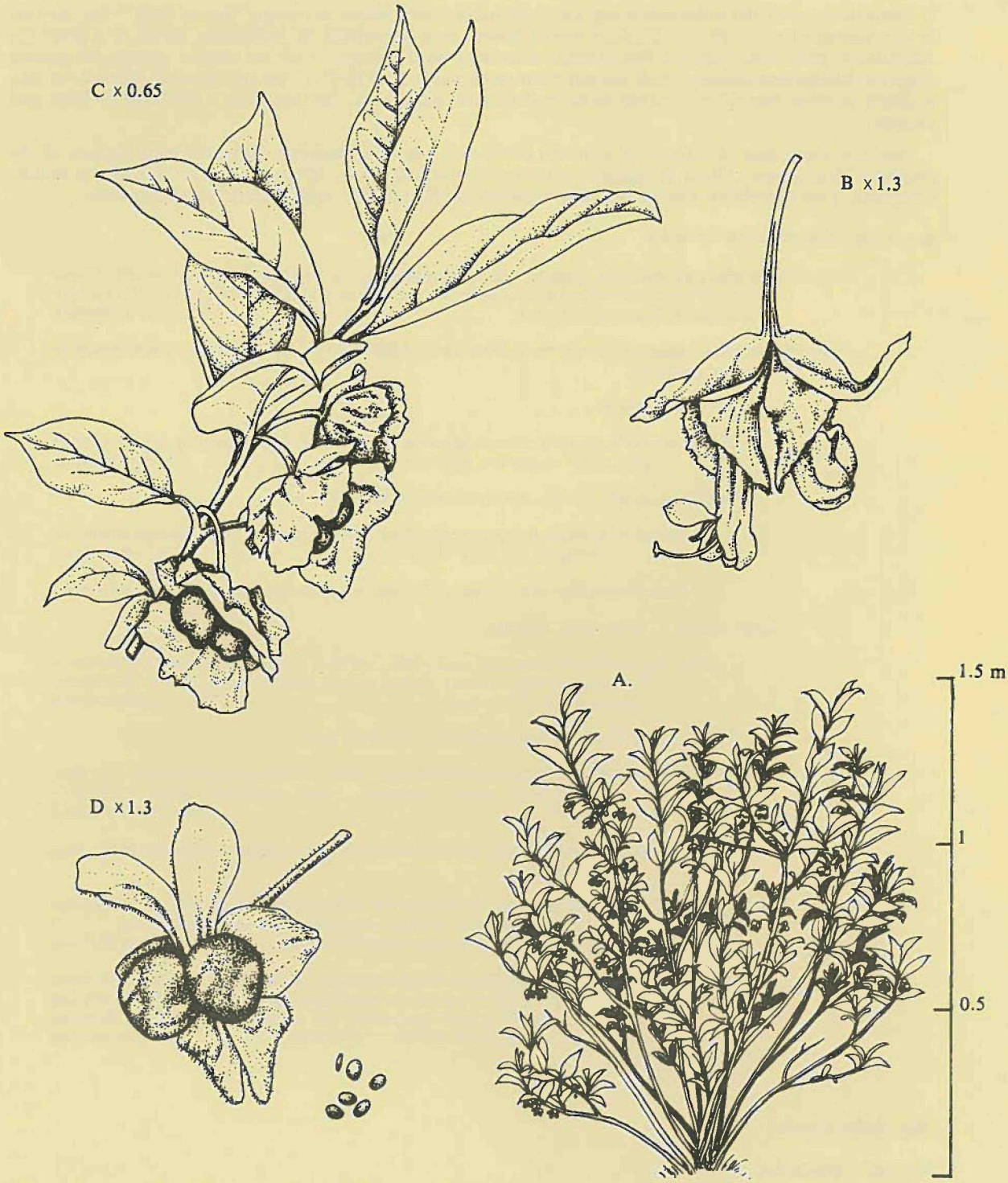

FIGURE 5. *Lonicera involucrata* var. *involucrata*. A. Habit, B. flowers, C. fruiting branch, D. fruit and seeds.

The fruit is a small fleshy berry and may be bright red to bright yellow or orange, blue or black. They are ripe in the summer or early fall, and those of paired flowers may be partially or completely united. The fruits are attractive to birds. The seeds are few to many depending on the species. They are oval or oblong but appear elliptic in longitudinal section, small, and the outer epidermis is often thick, pitted and lignified. There is no data available to show how old plants must be to produce good seed crops. Seed dispersal is primarily by birds and animals.

There are more than 150 species of *Lonicera* distributed over the temperate and subtropical regions of the Northern Hemisphere. About 20 species are native to North America, of which 6 occur naturally in British Columbia. Two introduced species may also be found growing wild in certain parts of the Province.

Key to the species in British Columbia

Lower leaves with well developed, connate, stipule-like appendages at the base of the short petiole; flowers in terminal or terminal and axillary inflorescences with several compact whorls; corolla strongly bilabiate. Vine or climbing shrub ..... *Lonicera hispidula*

Lower leaves without stipule-like appendage; flowers in terminal whorls or axillary pairs; corolla weakly or strongly bilabiate.

Corolla strongly bilabiate.

Evergreen or half-evergreen vine (occasionally deciduous), 2-4(-9) m long; flowers in terminal dense spikes. Adventive species..... *Lonicera etrusca*

Deciduous shrubs; flowers in terminal clusters or axillary pairs.

Flowers in terminal almost stalkless clusters; bushy shrub, 1.5-6 m tall with twining or trailing stems about 60 cm long..... *Lonicera dioica*

Flowers in axillary pairs; shrubs, 2-3 m tall. Adventive species ..... *Lonicera* x *notha*

Corolla regular or only weakly bilabiate.

Twining vine with widely branched stems often 5-6(-9) m long; upper 1-3 pairs of leaves on flowering branches connate (united around stem) at base; flowers in terminal compact spikes of 1-3 whorls ..... *Lonicera ciliosa*

Shrubs; upper leaves not connate; flowers in axillary pairs.

Leaves (3-)5-12(-15) cm long; flower pairs closely subtended by two pairs of large leaf-like green or purple conspicuous bracts; erect bushy shrub, 0.5-3(-4) m tall..... *Lonicera involucrata*

Leaves less than 9 cm long; flowers not subtended by obvious bracts; shrubs less than 2 m tall.

Fruit red and often of unequal size with one member of pair not developing; leaves 2-5(-8) cm long; ovaries united at base when mature; erect or somewhat straggly shrub, 0.6-2 m tall ..... *Lonicera utahensis*

Fruit blue or blue-black (occasionally red), both usually of equal size; leaves 1.2-7.5(-9) cm long; ovaries apparently united but actually separate within a narrow-mouthed cup formed by the united bractlets; sturdy shrub, (0.2-)0.5-1.5(-2) m tall ..... *Lonicera caerulea*

The Native Species

Natural Distribution and Habitat

Lonicera caerulea is a widespread species with several varieties, and is present throughout many areas of northern and central Europe, Asia and North America. In North America it is present south of approximately latitude 60°N, extending south to California, Nevada, Wyoming, Minnesota and Pennsylvania. It is usually

present on streambanks and in other moist to sometimes rather dry places, at moderate elevations in the mountains. In British Columbia it is common at moderate to rather high elevations in the mountains of the Interior Hemlock Zone of the southern part of the Province, extending east to Alberta. The northern limit in British Columbia may be about latitude 52°N.

Lonicera ciliosa is present from British Columbia south to northern California, especially west of the Cascade summits, and east to Montana, Utah and Arizona. It is widespread in open woods and thickets, hillsides and ridges, from sea level to moderate elevations in the mountains. In British Columbia the species is common in the southern half of the Province in open woods and brush below 460 m west of the Cascades and in the Wet Interior Zone, and there is sporadic occurrence to the Kootenay River Valley. It is often found clambering through small conifers in the woods.

Lonicera dioica occurs from Quebec south to North Carolina and Iowa, and west to the Mackenzie District, eastern British Columbia, South Dakota and Oklahoma. It is usually found in woods, often in wet places. In British Columbia it is present in the northeastern and southeastern regions of the Province, in semi-open dry forests above 610 m in the Rocky Mountain region. Collections have been made at Fairmont, Windermere, Field, Peace River, Hudson Hope and on the Liard River near Smith River.

Lonicera hispidula occurs from southwestern British Columbia south to southern Oregon and southern California, and on Santa Cruz and Santa Catalina Islands. It is found in open woods and thickets west of the Cascade summits. In British Columbia it occurs west of the Cascades on rocky dry open hillsides, woods and thickets, often sprawling over broken rock or low shrubs. It is present in the southern Coastal region, the Gulf Islands, and on south Vancouver Island.

Lonicera involucrata occurs from southern Alaska south along the coast to Santa Barbara County in California and Chihuahua in Mexico, and east to Quebec, Lake Superior, New Brunswick, Colorado and Arizona. It is present on fairly moist to wet soil in woodlands and thickets from sea level to rather high elevations in the mountains. In British Columbia it is rather sporadic but often locally abundant on moist sites with rich soil to at least 1525 m throughout the Province. It is especially abundant in the Coastal and Interior Wet Belt Zones. It forms a conspicuous element of the lowland coastal vegetation throughout the Queen Charlotte Islands. On the coast it is associated with Thimbleberry, Red-osier Dogwood and Pacific Crabapple. In the interior it is usually found in more open situations with Salmonberry, Red-osier Dogwood, Water Birch and Cow Parsnip.

Lonicera utahensis is present from southern British Columbia and the Olympic Mountains of Washington south to Crater Lake and the Blue Mountains of Oregon, and east to Alberta, Montana, Wyoming and Utah. There are varied reports of its occurrence in northern California, although Munz and Keck (1973) state that it probably does not occur in that state. It is widespread on moist wooded or open slopes, by stream banks and at the edges of bogs, at moderate to rather high elevations in the mountains. In British Columbia it is widely distributed across the southern parts of the Province in moist places from valley bottoms to the timberline east of the Cascades to the Rockies, and also at subalpine elevations at the Coast. It also extends north in the mountains to latitude 52°N at Anahim Lake and in the Rockies.

Description

Lonicera caerulea — a highly variable species. Branchlets stiff and glabrous, or hairy only when young, although some forms have branches that are much more hairy or downy. The bark is often shredded and light brown. Winter buds are often superposed, short, spreading, and with valvate lower scales. The leaves are bright-green, elliptic to oblong-obovate or oblong, have a rounded or obtuse apex, and are 0.6-3(-4) cm broad. They are glabrous or sometimes pubescent above, but are more or less hairy beneath, especially on the midrib and veins. The margin is sometimes villous-ciliate. The petiole is 2-5 mm long and hairy. The flowers are in axillary pairs, pale-yellow to yellowish-white, sometimes tinged with red, and appearing in (April-)June to July throughout the range. The corolla is funnelform, (0.9)1.0-1.3(-1.9) cm long, and 5-lobed to scarcely bilabiate. There is a short thick or gibbous spur at the base of the tube. The corolla tube is hairy within and without. The bracts are paired, green, oblong-linear, and narrow, 3-6(-10) mm long, and the longer ones are somewhat foliaceous in texture but still inconspicuous. The bractlets are wholly connate to form a narrow-mouthed cup completely enclosing the ovaries. The peduncle is axillary on twigs of the season. The fruit is oval to ellipsoid, and 0.5-1.0 cm diameter. $2n = 18, 36$.

Lonicera cilosa — a twining vine, often growing through and around the branches of other shrubs or small conifers. The twigs are hollow, and glaucous when young, becoming glabrous with age. They are sometimes more or less evergreen. The leaves are mostly elliptic to occasionally ovate or obovate, with a rounded to acute apex and wedge-shaped base, 4-10 cm long and 2.5-5 cm broad. They are green and glabrous above, and

glaucous blue-green and slightly downy beneath. The margins are ciliate. The petiole is 3-5(-12) mm long. The flowers are yellowish to reddish-orange, sometimes tinged purple on the outside, and appear in May to July (to August) throughout the range. The flowers are fragrant. The corolla is tubular-funnelform to narrowly funnelform, (2-)2.5-4 cm long, and shallowly or not very strongly bilabiate. The corolla tube is downy outside and pubescent on the inside adjacent to the stamens, and there is a gibbosity on one side at the base on the outside. The stamen filaments and style are slightly exserted and hairy. The flowers are sessile. The fruit is orange-red to coral-red with orange pulp inside, 5-6(-10) mm diameter, and in groups of 3 to 4 that develop at the expense of the remainder. The seeds are large and yellow. The fruit is ripe in September.

Lonicera dioica — a bushy shrub, with essentially glabrous stems. The bark is gray or straw-colored. The winter buds are solitary, ovoid, and have ovate to narrowly triangular scales. The leaves are usually elliptic to obovate but are variable, tapered at the apex and base, 3.5-10 cm long and 2.5-5 cm broad. They are green and glabrous above, glaucous and more or less pubescent below. The margin is finely hairy. The upper one or two pairs of leaves are united around the stem at the base forming a concave disc. The remainder of the leaves are almost sessile. The flowers are yellowish, but often tinged purplish or reddish, and appear in June and July throughout the range. Two or more pairs of leaves beneath the inflorescence are united. The corolla is strongly bilabiate, with the lobes varying from about half the length of the tube to approximately equal to the tube in length. The tube is slightly swollen at the base, and is glabrous outside and glabrous to densely hairy within. The filaments of the stamens are attached nearly at the opening of the tube, and have downy bases. The style is usually glabrous to somewhat pubescent, and is distinctly longer than the tube. The fruit is coral-red, nearly 10 mm in diameter, and fleshy. The seeds are light brown, elliptic, and 3.4 mm long by 2.6 mm wide. A slight groove or ridge may be apparent. The fruit is mature in July to August or September, and is dispersed during August to September or October.

Lonicera hispidula — vine or climbing shrub with slender, freely-branching stems 1-3(-4) m long. The branches are villous-hirsute with glandular hairs, varying to glabrous. The young stems are often hairy, varying to glaucous or glabrous. The leaves are ovate to ovate-oblong or somewhat elliptic, often cordate or subcordate at the base, 2-7 cm long and 1.5-5 cm broad. They are green and glabrous or hairy above, glaucous and more or less pubescent to glabrate beneath. The upper 1-3 pairs of leaves are connate around the stem. The petioles are short. The central axis of the inflorescence varies from glabrous to hirsute or glandular. The flowers are reddish to purplish, often being yellowish inside in the latter state, or sometimes pink or yellow tinged with purple. They appear in June to August over the range. The corolla is 1-2.5 cm long, and is strongly bilabiate with the lobes about as long as, or longer than, the tube. The tube is slightly gibbous near the base, and is densely hairy inside and glandular-pubescent outside. The stamens and style are long exserted, and the filaments are hairy below. The fruit is red, almost 10 mm in diameter, and is rather juicy. Only a few fruits will mature in most years. 2n = 18.

Lonicera involucrata — an erect to spreading or rounded shrub. The twigs are stout, 4-angled, and glabrous or sometimes long-hairy, especially when young. The bark is light-brown or purplish, becoming gray with age, and freely exfoliating. The winter buds are often superposed, glabrate, and the bud-scales are parted. The leaves are narrowly ovate to oblong, oblong-ovate or obovate, with an acuminate and acute to rounded apex, and a cordate to cuneate base. The leaves are 2-7.5(-8) cm broad, and are prominently veined. They are dull dark green and usually glabrous above, occasionally being sparsely pubescent on the veins, and bright green and glabrous to slightly downy beneath, especially along the main veins. The margin is often ciliate. The petiole is 5-6(-12) mm long. The flowers are yellow, sometimes tinged with red, and appear in March or April to August, partly depending on the elevation. The corolla is narrowly funnelform to subcylindrical, 1-1.5(-2) cm long, and nearly regular with the lobes almost equal. The tube has a gibbosity or short thick spur on one side at the base, and is glandular-hairy outside. The stamens are shorter than the tube, and are glabrous, or nearly so, and glandular. The anthers are often slightly exserted. The style is slender, longer than the stamens, and is glabrous. The bracts are (0.8-)1-1.5(-2) cm long, ovate or oblong, glabrous or often glandular-pubescent, and dark-red. The bractlets are axillary, slender, and 0.5-5 cm long. The fruit is shining purple-black or black, globose to ovoid, 8-10 mm in diameter, paired and wholly distinct above the bracts. The seeds are slightly shiny, black, elliptic, 2.7 mm long and 1.8 mm wide. The fruits are mature in July to August, and are said to be poisonous by the Indians, although they are so bitter and nauseous to taste that there is little danger of a sufficient number being eaten to cause concern. 2n = 18.

Lonicera utahensis — a shrub, with a number of irregular straggling branches from a long thin stem. The branches are slender, spreading and glabrous. The bark is gray, and often rather dead looking. The leaves are elliptic to somewhat ovate or oblong, with a broadly rounded to obtuse apex and an obtuse to blunt or sometimes subcordate base. They are 1-4 cm broad, pale green and glabrous above, and glabrous to more or less

pubescent to hirsute below. The margin is coarsely ciliate near the base of the leaf. The petioles are 2-5 mm long. The flowers are in axillary pairs, although one member of the pair is often dwarfed, and are white to pale yellow, often fading to salmon-yellow. They appear in May to July. The corolla is tubular, 1-2 cm long, and nearly regular with the lobes more or less equal in size and shape but arranged to seem obscurely bilabiate. The base of the tube is gibbous at one side, or the gibbosity is sometimes enlarged to form a short thick spur, and it is occasionally pinkish in color in that area. The stamens and style are glabrous. The ovaries are divergent and weakly or scarcely united at their bases when young, becoming firmly united when mature. There is 1 pair of bracts, which are narrow and (1-)1.5(-3) mm long. The bractlets are about 1 mm long or less, or obsolete. The peduncle is common to two flowers, and is slender and 1-1.5(-2) cm long. The fruit is globose, pulpy and soft, and 6-10 mm in diameter. There are 2-4 seeds. The peduncles elongate in fruit to 35 mm long.

Varieties and Ornamental Cultivars

The members of the genus *Lonicera* hybridize readily, and there are therefore a number of ornamental cultivars in some species.

Lonicera caerulea is a variable shrub with several varieties throughout its range. The form found in British Columbia is *L. caerulea* var. *cauriana* (Fernald) Boivin, which is the cordilleran form of the species. This variety differs from the type in that it is 0.2-1 m tall, the branches are pruinose or puberulent and sparsely hirsute, and the leaf margins are always villous-ciliate. The fruit is often red instead of blue or blue-black, and the seeds are whitish-brown, orbicular and 1-1.7 mm long.

Lonicera ciliosa has one named variety, var. *occidentalis,* in other parts of the range, which has more brightly colored fruit than the type.

Several varieties of *Lonicera dioica* are recognized. It is represented in British Columbia by *L. dioica* var. *glaucescens* (Rydberg) Butters in Clements, Rosendahl & Butters. This form occupies the more western part of the range of the species, and differs from the type in that the leaves are obovate to narrowly elliptic and are 5-8 cm long. The flowers are more purplish, and become reddish with age. The corolla tube is often downy outside as well as inside.

There are several forms of *Lonicera involucrata.* The form occurring in British Columbia is the typical var. *involucrata,* which has the corolla rarely tinged with red, and the plant is less than 1 m tall.

Propagation

The genus is easily propagated by either seeds or vegetative means, but the species hybridize readily so that forms may not come true from seed. However, the seed is an excellent means of raising new forms and is used for plant breeding purposes. The seeds of many species show double dormancy, so that germination may take a long time.

The fruit should be collected when it is ripe, and the seeds extracted by macerating the fruit in running water, allowing the empty seeds and pulp to float away. The seeds should be dried, and then either stratified or stored in a sealed container at 1-3°C for up to one year. In the absence of other information, the seed should be stratified for 3 months at 5°C and then sown. If germination does not occur within 4 months, the seeds can be stratified for a further 3 months at 5°C.

Most of the North American species, except *L. dioica,* will germinate best if they are warm stratified at room temperature for 3 months, followed by 3 months cold stratification at 5°C before sowing. The germination period should have alternating temperatures of 30°C day and 20°C night. This regime should give satisfactory results. *Lonicera dioca* may be sown in the spring without treatment with up to 95% germination after 80-100 days.

The seeds should be covered with 3-6 mm of soil when sown. Mulching with 5-7.5 cm of straw helps to prevent excessive drying during the germination period.

Softwood and hardwood cuttings are both easy to root, although it is probably best to use moderately firm young shoots taken in July or August. The cuttings should be planted either in straight sand or in peat moss, and kept moist and shaded. The use of a rooting hormone has been found to be advantageous. It is also possible to take cuttings and plant them in very sandy soil under a cloche outside. Each node can be split in half lengthwise and will root to produce two plants.

In addition, *Lonicera* species may be propagated by layering and by the division of large individual plants using a sharp spade.

Transplanting

Shrubs can be transplanted successfully, particularly after growth has been completed for the season. Pruning of weak wood and removal of some new growth will enhance success of the transplant.

Conditions for Cultivation

Lonicera species all like a well drained good loamy soil with a pH about 6.0. All forms prefer positions where the aerial parts are in the sun but the roots are shaded and cool (much like *Clematis*). All are easily grown within their hardiness limits (some are hardy to Zone 2 Canadian, or even possible to Zone 1), and will usually produce a wealth of foliage, flowers and fruit with very little care. The vine forms require a trellis, arbor or other support.

Lonicera ciliosa is hardy to USDA Zone 6. *Lonicera dioica* is hardy to USDA Zone 2, and will succeed very well in good garden soil, forming a low spreading rather elegant bush if given the support of a stout central stake. *Lonicera doica* var. *glaucescens* is hardy to Canadian Zone 2 or USDA Zone 4. *Lonicera involucrata* is hardy to Canadian Zone 1 or USDA Zone 4, and is a robust adaptable species growing equally well in seaside gardens and in industrial areas. *Lonicera utahensis* is hardy to USDA Zone 6.

Lonicera species require little regular pruning. The shrubby forms benefit from an occasional shortening of long growths that are spoiling the shape of the plant, and old weak growths of the climbing forms may be pruned out. They should all be pruned immediately after flowering.

Landscape Value

The genus contains a number of extremely beautiful species, and every climbing species that is hardy is worth growing. Several species are among the best flowering shrubs for the colder areas of Canada. Some forms, however, may be too large for the home garden, although they are excellent for shrubbery or in a wild garden. Several species have outstanding fragrance, and many have a good display of flowers, colorful fruit, and an attractive habit of growth. The fruits are very attractive to birds.

The climbing species are best scrambling over other bushes or tree stumps, trellises or pergolas, although some may be trained to grow as small standards. Some of the less rambling forms may be trained up stout posts 1.25-1.80 m tall, and then allowed to form loose spreading shrubs with no further support.

Lonicera caerulea has little or no merit for gardens, although it is botanically interesting. The native form, variety *cauriana,* is of value for its habit of growth, flowers, and fruit.

Lonicera ciliosa is rare in gardens, but is the showiest native honeysuckle, and should be more widely cultivated. The orange flowers are particularly attractive to hummingbirds.

Lonicera dioica will form a low spreading, rather elegant, bush if given the support of a stout central stake. It has no great beauty of flower, but is striking because of the very glaucous undersurfaces of the leaves. *Lonicera dioca* var. *glaucescens* has more attractive flowers than the species, and can be used as a perennial vine.

Lonicera hispidula should be grown in a native garden for its attractive habit of growth.

Lonicera involucrata is a loose straggly bush that has no real ornamental value, except that it is hardy to Canadian Zone 1, and would therefore be useful in such very cold areas. It is also useful in a native garden, and as ground cover bush plantings in revegetation programs.

Lonicera utahensis has an attractive habit of growth as well as attractive flowers, and is a particularly charming small shrub for shady gardens.

Availability

The native species are apparently not available from local nurseries, although *Lonicera caerulea* var. *dependens* may be found.

Other uses

Hummingbirds and long-tongued insects are attracted to the flowers because of the nectar, and birds eat the berries. Bears also apparently consider the berries of *Lonicera involucrata* as a favorite food — in fact this species was called Bearberry or Grizzly Berries by the native Indians.

Lonicera dioca var. *glaucescens* and *L. involucrata* are both used as habitat or food by wildlife, and *L. involucrata* may also be used as watershed plantings or in forest management.

The Indian tribes of British Columbia and western Washington had various uses for several of the native *Lonicera* species.

In British Columbia, the children of the Lower Lillooet tribe at Pemberton used to suck the nectar from the flowers of *L. ciliosa*. The Thompson Indians used to peel the thicker stems of this species, boil them and then drink the decoction as a tonic. They also used a fibre obtained from the stems as a thread or twine. The Sechelt Indians used to crush the tender green shoots and steep them in water, which was then used as a hair tonic. The Saanich tribe believed that the berries were poisonous. The Squamish Indians believed that the vine was used as a swing by ghosts — their common name for the plant means "swing of the ghosts".

The western Washington tribes made more use of *Lonicera ciliosa* than did the British Columbian Indians. The Swinomish boiled the bark as a tea for colds and sore throats, or swallowed the juice from chewed leaves for a cold. Leaves were bruised and soaked in hot water, and a woman then held her breasts over the steaming water to stimulate the flow of milk after childbirth. The Chehalis tribe crushed leaves in water, which was then used to bathe little girls so that their hair would grow long and shiny. The Chehalis and Squaxin tribes dipped leaves in water that the women then drank as a contraceptive, but the Squaxin also drank this water as a treatment for "womb troubles". The Klallam chewed the leaves and then put them on bruises. The Snohomish believed that crows used the plant as a swing.

Lonicera involucrata was used by the Indians much more than any other Honeysuckle. The Thompson and Lillooet tribes of British Columbia believed the berries to be highly poisonous — but the Flathead Salish of Montana ate them as a powerful laxative. Most tribes considered the berries to be at least inedible if not actually poisonous, except for birds and bears. The Bella Coola Indians chewed the leaves and applied the cud to an "itch", or applied it to an opened boil to draw out the poison. The leaves were crushed and applied to burns and to the sores of gonorrhoea. Gonorrhoea was also treated by applying toasted, pulverized bark. The bark was boiled and the decoction drunk for a cough. The Southern Carrier boiled the bark for five hours, and then used the decoction daily as an eyewash. The Gitksan used the fresh juice of berries for sore eyes, or the inner bark (when berries were unavailable) was soaked in water to make a milky solution used as an eyewash. The Thompson Indians boiled the leaves and then applied them to any part of the body that was swollen. Sometimes the leaves were bruised before boiling as this was believed to greatly increase their strength. They also used a decoction of leaves and twigs as a liniment. The Squamish chewed the bark and blew it onto the cheek for a toothache, or blew the fresh saliva onto a boil — this was said to be particularly effective if done in the morning immediately after waking, but before speaking. The Haida rubbed the berries into the scalp to prevent gray hair. *Lonicera involucrata* was an important medicinal plant for the Kwakiutl tribe on Vancouver Island. They boiled the leaves (or roots in winter), strained them and applied them as a hot compress to swollen shoulders and feet. The bark was boiled and placed on the breasts of a woman who had just given birth to make her milk flow, or the leaves were mixed with the basal leaves of Yarrow *(Achillea millefolium)* for the same purpose. The bark, berries or leaves were mixed with Sea Wrack *(Fucus gardneri)* or Sea Lettuce *(Ulva lactuca)*, dried Tobacco *(Nicotiana* sp.), and Red Alder bark *(Alnus rubra)* to make a poultice for swellings and sores. They never ate the berries, believing that they would lose their voices and become stupid if they did so, but they did make a purple dye from the berries mashed with Salal berries *(Gaultheria shallon)*.

The Quileute Indians of western Washington used the juice from *L. involucrata* berries to paint dolls' faces. They chewed the leaves as an emetic when poisoned. The women of the Quinault and Makah tribes chewed the leaves during childbirth. All the western Washington tribes associated the plant with the crow.

Indian hunters in the Okanagan sometimes ate the very juicy berries of *L. utahensis*, believing them to be a good emergency supply of water.

Diseases and Problems of Cultivation

The climbing members of the genus are very subject to aphid attacks in summer, especially during hot dry spells. However, these attacks are often overcome naturally if the plants have been given good loamy soil and cool moist root conditions. Some vines are very susceptible to infestations of spider mites.

In general, the genus is not susceptible to severe disease problems, although Leaf Curl makes the leaves thicken, curl and become deformed, and Powdery Mildew may be a problem in some areas, including the Lower Mainland of British Columbia.

The following diseases have been identified on the native species in the wild in British Columbia:—

Lonicera ciliosa — *Cercospora antipus*, Leaf Spot; *C. periclymeni; Poria ferrea*, Stem Rot; and *Stereum* sp.

Lonicera hispidula — *Microsphaera penicillata*, Powdery Mildew; and *M. alni*.

Lonicera involucrata — *Kabatia lonicerae* var. *involucratae,* Leaf Spot; *Microsphaera penicillata,* Powdery Mildew; *M. alni; Leptosphaeria dumetorum;* and *Ophiobolus minor.*

Lonicera involucrata — *Kabatia lonicerae* var. *involucratae,* Leaf Spot; and *Leptothyrium periclymeni* var. *periclymeni.*

The Adventive Species

Two other species of *Lonicera* have been reported either as adventive, that is, they have escaped from cultivation and have persisted in the wild for short periods of time, or as naturalized, that is, a thoroughly established alien reproducing without cultivation.

Lonicera etrusca Santi, Etruscan Honeysuckle, is a native of the Mediterranean region that has now become naturalized and established in thickets along the coast of Oregon (in Lane and Curry Counties), in Del Norte and Humboldt Counties of California, and in southwestern British Columbia. In British Columbia, it is established and common on southern Vancouver Island, particularly near Saanich and Sidney, as well as on the Lower Mainland and north to the Queen Charlotte Islands. It is a vigorous vine, with glabrous to sometimes pubescent twigs. The young shoots are reddish-purple, especially in cultivated forms. The leaves are oval to obovate with an obtuse apex and a rounded or broadly tapered base, 4-9 cm long and 2.5-5 cm broad. They are glaucous and usually somewhat downy beneath. The upper pairs of leaves are sessile and united at the base around the stem, although sometimes all the leaves are free. The inflorescence is a terminal group of dense spikes, each containing many flowers, and there are also sometimes two or three axillary heads. The flowers are yellowish-white or creamy-white tinged with purplish-red, becoming a deeper yellow with age, 3-5 cm long, and fragrant. The corolla is conspicuously bilabiate with the tube and lobes nearly equal in size. The fruit is red, and the berries are never united. There are several varieties and cultivars of *L. etrusca,* the variety *pubescens* being the form usually found in cultivation. The cv. Superba is a very vigorous form, with panicles larger than the species and reddish-purple shoots. The species is hardy to USDA Zone 7, and revels in full sun. It is not often seen in gardens in North America, but probably should be grown more widely as a garden and trellis plant. It is perhaps the most striking of all Honeysuckles when growing well, with long shoots that branch and form immense bouquets of flowers. It is probably best grown in the drier areas of the region. 2n = 18.

Lonicera x *notha* Zabel, Tartary Hybrid Honeysuckle, is actually a group of hybrids raised from seed of a garden cross between *L. ruprechtiana* and *L. tatarica,* and closely resembling *L. ruprechtiana.* It has become naturalized in some areas, and has been reported as an adventive from the Boreal Spruce Zone of British Columbia. It is a deciduous shrub, with ovate to oblong leaves. The leaves are pointed at the apex and tapered at the base, 3.5-10 cm long, and more or less downy on both sides. The paired flowers are in shades of pink, turning yellowish with age, 1.9 cm long, and not fragrant. The fruit is bright red and rather transparent. There are a number of cultivars of this species: cv. Grandiflora with large rose-tinted flowers; cv. Carneorosea (or Carneo-Rosea), which has the deepest rose-colored flowers of all forms; cv. Alba; cv. Ochroleuca; and cv. Carnea. The two cultivars cv. Grandiflora and cv. Carneorosea are among the best of the numerous hybrid bush honeysuckles, with attractive fruits as well as flowers and habit.

Origin of the Name

The Family name Caprifoliaceae is derived from *Caprea,* a she-goat, which has twisted horns in certain breeds. These horns are suggested by the twisting stems of the climbing Honeysuckles. The generic name *Lonicera* commemorates Adam Lonitzer (1528-1586), a German physician and naturalist who wrote a herbal (Kreuterbuch) that was reprinted many times between 1557 and 1783. The specific name *caerulea* means 'dark blue' or 'blue', referring especially to the shade of deep blue seen at midday in the Mediterranean sky. The origin of the subspecific *cauriana* seems obscure, although it may be derived from the Latin *caurus,* 'northwest' or 'northwest wind' and the suffix *-iana,* 'belonging to', referring to the geographical distribution of the plant. The specific name *ciliosa* means 'fringed' or 'ciliate', referring to the ciliate hairs of the leaf margin. The specific epithet *dioica,* 'dioecious' or 'coming from two', means that the male and female flowers are on separate plants. This meaning, however, is obscure in *L. dioica,* which is not dioecious. The subspecific *glaucescens* means 'having some bloom', referring to the glaucous underside of the leaves. The specific epithet *hispidula* refers to the stiff and rigid hairs on the plant. The specific name *utahensis* commemorates the fact that the plant was first described from a specimen collected in Utah.

The type locality of *Lonicera caerulea* var. *cauriana* is "Alpine meadows, Mt. Paddo [Adams]" in Washington, where it was collected by Wilhelm Nikolaus Suksdorf (1850-1932). The type locality of *L. ciliosa* is "On the banks of the Kooskoosky" where it was collected by Meriwether Lewis. It was first introduced to cultivation in Great Britain in 1824, and was awarded an Award of Merit by The Royal Horticultural Society in 1919. The type

locality of *L. dioica* var. *glaucescens* is obscure, as several specimens are cited. It was first cultivated in Great Britain in 1890, while *L. dioica* itself was first cultivated in 1636. The type locality of *L. hispidula* is "woods of North West America". It is believed to have been described from garden plants grown from seed collected in northwestern America by David Douglas. The type locality of *L. involucrata* is "wooded country between 54 and 64 degrees latitude" [Canada], where it was collected by Sir John Richardson (1787-1865). It was first cultivated in Great Britain about 1824. The type locality of *L. utahensis* is "Wahsatch Mountains, Utah, in Cottonwood Canyon; 9,000 feet altitude" where it was collected by Sereno Watson (1826-1892).

The specific name *etrusca* means 'from Tuscany', an area in northern Italy known as Etruria in classical times. The type locality is "region of Tuscany, Italy", and it was first cultivated about 1750. The specific name *notha* derives from the Greek *nothos,* 'false', 'baseborn', or 'bastard', referring to its hybrid origin. The plants were raised from seed in Munich Botanic Garden in about 1878, the seed having been obtained from St. Petersburg (Leningrad) Botanic Garden in Russia where the cross had occurred.

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Announcement — Change in Subscription Rates

The subscription price of the journal will increase to ten dollars per annum, effective Spring 1980 (Volume 11, Number 1). The cost of single numbers will increase to two dollars and fifty cents, except for special issues.

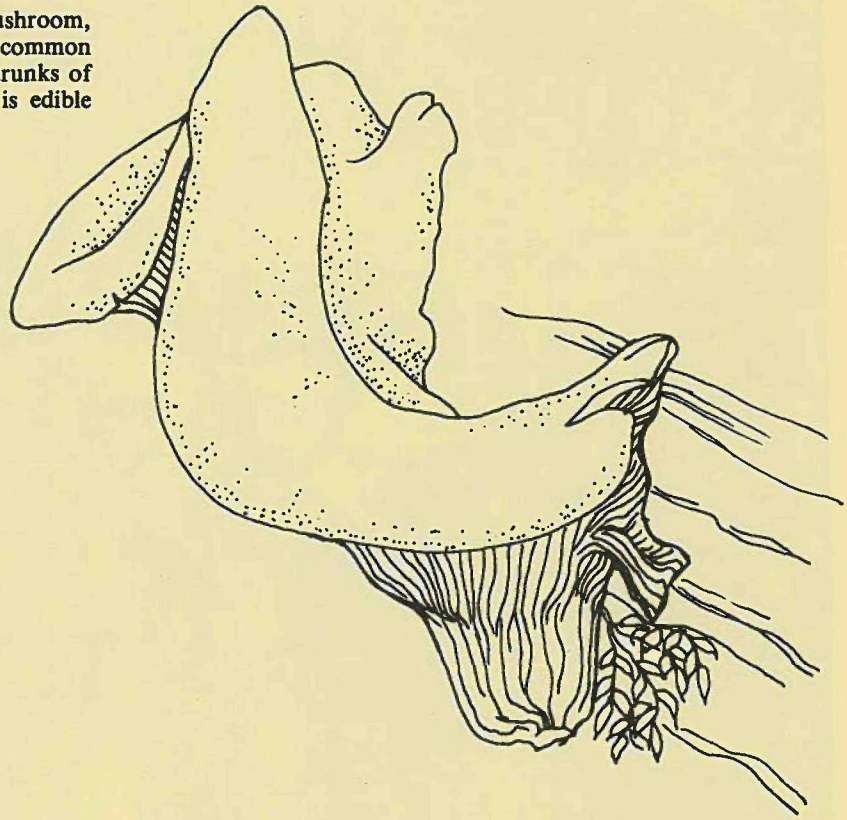
Climatological Summary*

Data 1979	JULY	AUGUST	SEPTEMBER
Average maximum temperature	21.2°C	20.6°C	18.8°C
Average minimum temperature	13.2°C	13.6°C	12.4°C
Highest maximum temperature	28.5°C	23.5°C	27.3°C
Lowest minimum temperature	7.5°C	11.1°C	9.3°C
Lowest grass minimum temperature	5.0°C	3.2°C	5.1°C
Rainfall/no. days with rain	25.8 mm/7	20.0 mm/8	115.5 mm/14
Total rainfall since January 1, 1979	375.4 mm	395.4 mm	510.9 mm
Snowfall/no. days with snowfall	0	0	0
Total snowfall since October 1, 1978	9.6 cm	9.6 cm	9.6 cm
Hours bright sunshine/possible	290.6/482.5	252.9/439.0	167.7/372.2
Ave. daily sunshine/no. days total overcast	9.4 hr/1	8.2 hr/2	5.6 hr/4

**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

A successful and happy buyer at the third Friends of the UBC Botanical Garden Plant Sale for Students, which was held in September during the first week of classes. More than seven thousand house plants were sold during the three-day event.

Pleurotus ostreatus, Oyster Mushroom, x 0.66. The Oyster Mushroom is common from spring to late fall on the trunks of dead trees, especially Alder. It is edible when young.



DAVIDSONIA

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