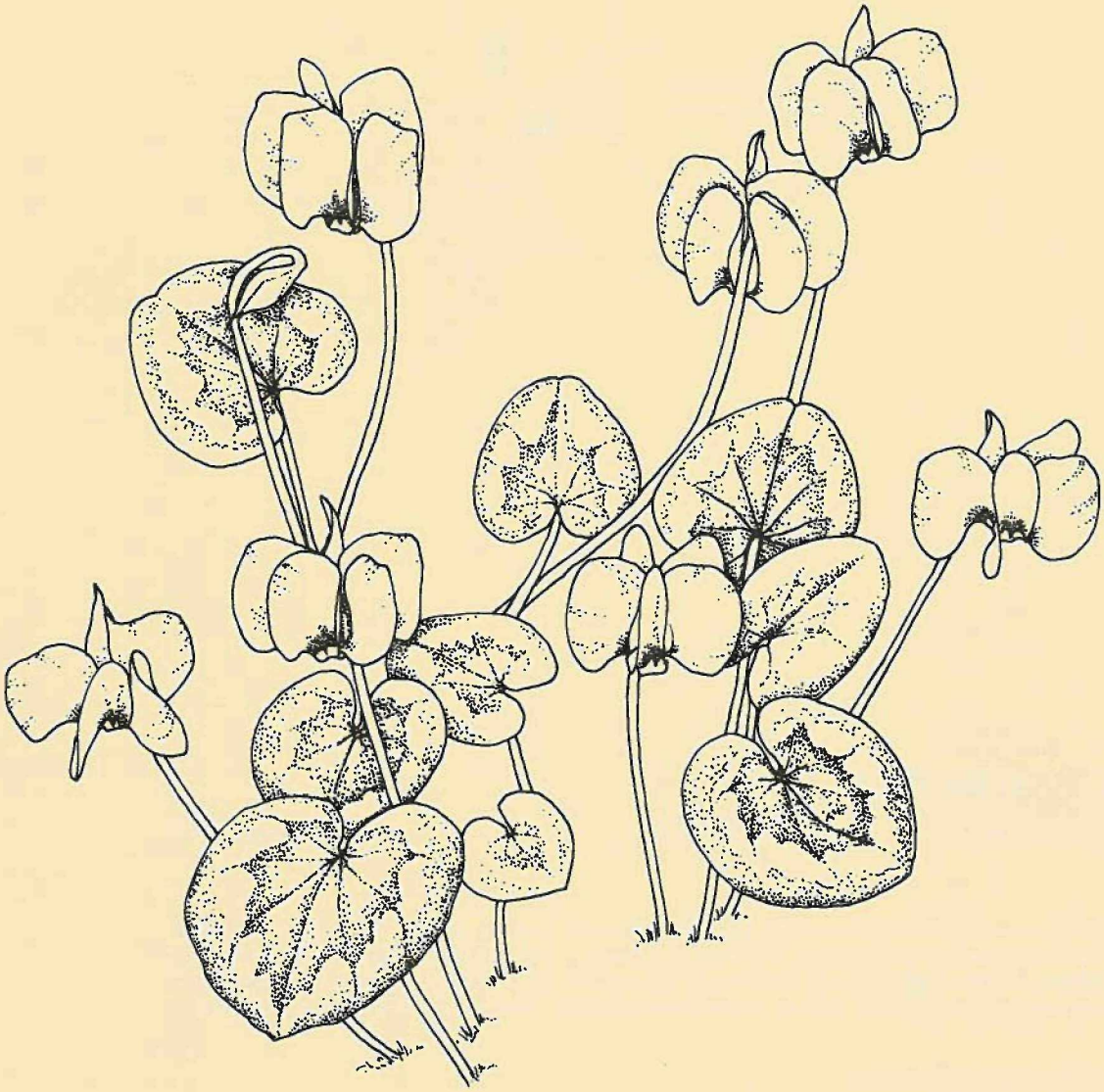
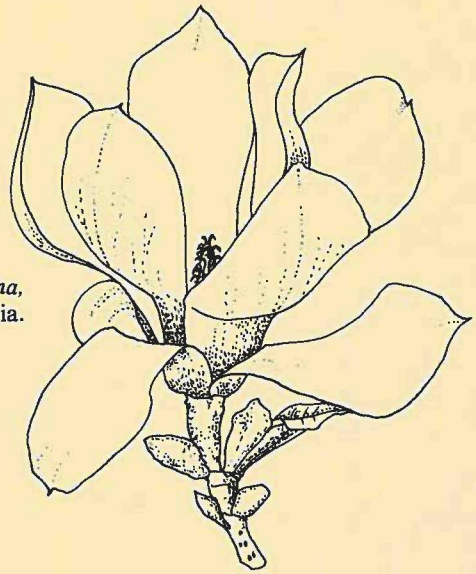
DAVIDSONIA

VOLUME 6 *NUMBER 1* *Spring 1975*



Cover

Cyclamen orbiculatum var. *coum,* a member of the Primrose Family (Primulaceae). This hardy and easily grown plant forms attractive clumps when naturalized in the garden.



Magnolia × *soulangeana,* the Saucer Magnolia.

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Cliff Erosion Control with Plants

CHRISTOPHER J. MARCHANT

For at least half a century, perhaps several centuries, the 300 foot high sea cliffs at Point Grey have been gradually eroding. Aerial photographs indicate this, and they also show that in recent years an increasing area has been affected. It appears that there has always been a somewhat cyclical variation in the vegetation cover, which has advanced and receded coincident with fluctuation in cliff stability. However, this natural geological phenomenon has now become a major cause for concern to the University of British Columbia, since parts of the university campus sit strategically on the summit of the cliffs, and some of the land and large buildings (among them the temporary headquarters of the Botanical Garden) may be threatened with eventual subsidence into the ocean.

The geological structure of the cliffs consists of bedded and consolidated sands and gravels overlying about 40 feet of clay deposits at the base. A subsequent thin layer of glacial till has been deposited over the sands. Under natural and stable conditions the cliffs are clothed with a climax vegetation of Coast Douglas Fir; there are also successional areas with *Alnus rubra* (Red Alder), *Thuja plicata* (Western Red Cedar), and native shrubs.

Aerial photos indicate that erosion initiates mainly at the clay/sand interface, where natural and seepage groundwater flows to the cliff face and causes undercutting of the sands. Subsequently, on bare sites, wind and frost play their part. In addition the spring high tides wash against the base of the cliffs and remove the accumulated sand fallen from above. It seems probable that under natural conditions a given site would erode for a time, then heal over with new vegetation. This is supported by evidence from aerial photography. However, in recent years two major changes have come about. Firstly, buildings and paved areas have enormously increased and probably altered the surface and subsurface drainage patterns. Secondly, the beach has become a very popular recreation area and many people climb on the cliffs, opening up new erosion areas in stable vegetation and dislodging tons of sand in eroded sites. This new biotic factor is interrupting the natural vegetation regeneration cycle and hence erosion is now increasing unchecked.

The Botanical Garden at the University of British Columbia, with financing from a special grant by the University, has initiated an experimental Cliff Erosion Control Scheme. This project, co-ordinated by myself and supported by two hired students, is designed to test selected native and imported vegetation for suitability in recolonising the eroding areas and discouraging human access to the cliff face. The scheme is intended as an integral part of the joint U.B.C./Provincial Government schemes to mechanically stabilise the cliff toe and cliff face and prevent further loss of land area.

Planning and selection of the plant material for this project required recognition of the main cliff geoclimatic and biological features affecting plant growth, some of which were discussed above. These include:

(1) Mobile sand which is subject to extreme drying in rainless periods.
(2) Vertical upper faces, from which falling lenses of sand are deposited temporarily on lower slopes.
(3) Active frost erosion in winter when the cliff faces are wet.

FIGURE 1. Site 4 near the Museum of Anthropology. Erosion here is severe, and human activity too great for a planting scheme to succeed. Buttresses of clay indicate the level of the basal sedimentary clay layers.

(4) Active wind erosion in summer when the cliff faces are dry.
(5) Relatively dry upper slopes.
(6) Wet lower levels, especially the clay layers.
(7) Human disturbance of loose sand and vegetated areas.

Certain criteria were established with respect to the kinds of plant material selected, and also in relation to the site, which is basically a northwest slope subject to periodic strong northwesterly winds. Plant species suitable for revegetation should be fast-growing and easy to establish, salt-spray and wind tolerant, able to withstand extremes of temperature and soil dryness, and tolerant of mobile sand and periodic burying. They should also be able to bind the substrate by means of deep-penetrating roots, creeping underground stems or other structures, and should have characteristics which will discourage human interference, e.g., thorns, spines or a thicket-forming habit.

An important requirement of the project is to maintain as far as possible the appearance of the natural cliff vegetation. This does not necessarily confine experimentation to native material from British Columbia. Indeed, it is the local vegetation which has shown inability to resist the present erosive forces; for this reason, testing extends to non-native plant species from other temperate regions.

It would be desirable to experiment with plants on the largest and most severe erosion site, which lies between the cliff-top buildings of Cecil Green Park and the new Museum of Anthropology. However, we have begun by seeking smaller sites where the passage of people is less severe and can be partly controlled. The accompanying map of the Point Grey Cliff shows the eroding sites, and indicates how we have numbered them for ease of description.

The first site chosen (Site 1), near Searchlight Tower 1, was artificially filled with subsoil but after a few weeks was abandoned, owing to a severe washout during a period of heavy rain. The experience there indicates the high risk of artificially rebuilding eroded cliff faces without careful prior assessment and planning.

FIGURE 2. The natural vegetation of the cliff face in its undisturbed state. Note the abundant woody plants and ferns.

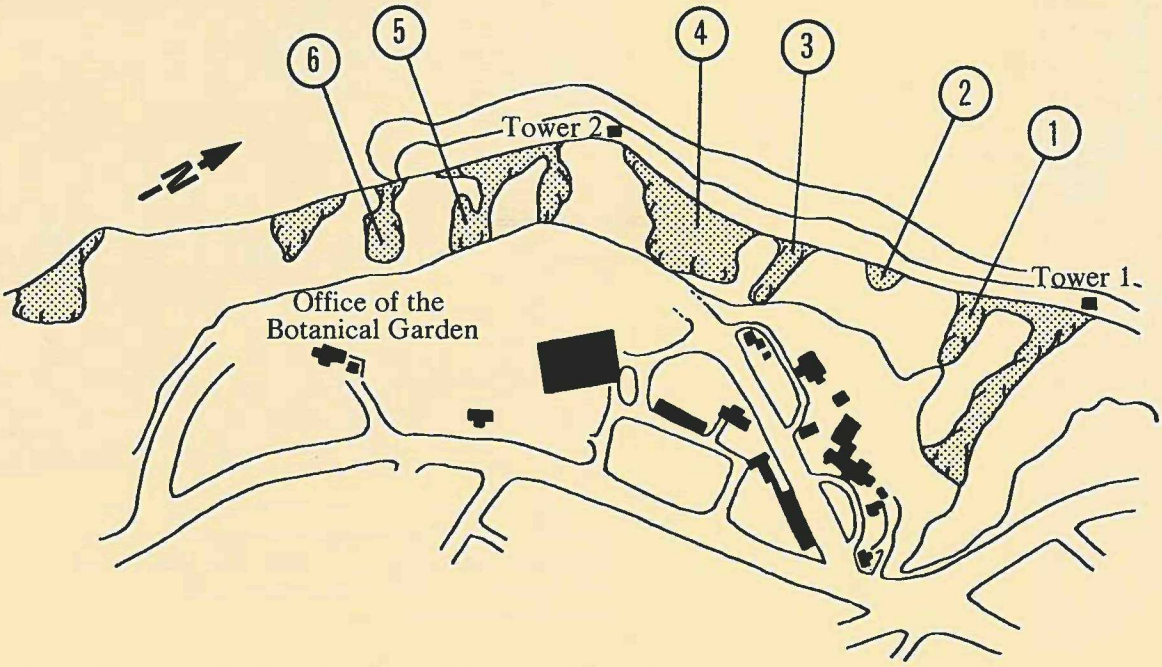

FIGURE 3. A map of the Point Grey cliffs showing the experimental revegetation sites. Eroded areas are indicated by shading.

The second site (Site 6) is an isolated but fairly typical section of eroded cliff, west of Searchlight Tower 2. Aerial photos show that it has been eroded at least since 1956, and during the first season of our work several collapses of the upper cliff were seen to occur. At the top of Site 6 a 30-foot vertical cliff exposes the bedded sand strata of the region. Below is a 150-foot wide steep slope of mobile sand with harder ledges of stratified sand, pebbles and clay protruding intermittently. The slope is still supporting a belt of trees at the base above the beach, so it is less subject to toe erosion by tidal action than some other sites. The site faces west-northwest and the east side receives much more sunshine than the west; by dividing the site roughly in half vertically, testing can be carried out under both semi-shade and full sun conditions.

Site 6 is too steep and loose for planting work to be undertaken without safety ropes and harness, and there is the additional risk of slabs of cliff falling without warning on workers below. Also, access to the site with tools and plant materials was initially only by a tortuous trail down a nearby gulley. Since inaccessibility to the general public is of paramount importance for successful plant establishment, no permanent access was created, but a forty-foot timber-rung rope ladder was constructed and slung from a support platform above the site. This provides a rapid, cheap and removable (though strenuous) means of approaching the work area. Plant material is transmitted to the site by a pulley system constructed alongside the rope ladder. These innovations are shown in Figures 4 and 5.

So far, it has not been financially possible to get irrigation water onto the site, so all plantings must rely on natural cliff moisture and rain for establishment. Experience has proved that techniques can be developed to plant relatively efficiently under the difficult conditions of the site. There are other difficulties that must also be overcome. To supply the hundreds of plants required to cover the area of Site 6 alone has required many hours of manpower in terms of propagation, seed-gathering and stratification, not to mention nursery space requirements and the time interval needed to develop nursery stock to planting size.

The range of possible plant materials, from woody trees and shrubs to herbaceous perennials and even biennials, is considerable and the list in the accompanying table includes only the more

FIGURE 4. Site 6, showing the rope ladder down the vertical upper cliff and the pulley system running beside it.

FIGURE 5. Workers on the Cliff Project use safety harnesses to facilitate planting on steep slopes. Here Malcolm Clark is planting *Lupinus*. The slope on the right is planted with *Mentha arvensis* and *Mimulus moschatus*.

important ones that have been either used or proposed. Availability is the ultimate controlling factor for some species but such problems will gradually be overcome. Clearly many desirable erosion-controlling species may not be available in commercial nurseries, so project personnel must gather seed or cuttings and raise under cultivation the hundreds of individuals required. The numbers in parentheses in the table show the total individuals raised for planting out so far.

Elymus mollis (Dune Wild Rye Grass) and *Lupinus arboreus* (Bush Lupine) have been the two most extensively planted species. They also appear to be the most successful in terms of survival on the site. Two native trees which propagate easily are Red Alder (*Alnus rubra*) and Bigleaf Maple (*Acer macrophyllum*), both of which have been planted as second-year seedlings. Other woody species that have been tried are *Salix hookeriana* (Hooker's Willow), *Aesculus hippocastanum* (Common Horse-chestnut), *Sorbus aucuparia* (European Mountain-ash), *Ulex europaeus* (Common Gorse), *Rubus discolor* (Himalayan Blackberry), *Rosa nutkana* (Nootka Rose), and *Viburnum* and *Cotoneaster* species. However, further material of these is necessary for adequate testing.

Mentha arvensis (Field Mint) and *Mimulus moschatus* (Musk Monkeyflower) show promise as rapid spreaders in semi-shade, and *Verbascum thapsus* (Great Mullein), a biennial plant of Interior scree slopes, has survived planting in hot summer weather. *Equisetum arvense* (Common Horsetail), a natural coloniser of the lower cliff slopes, has unfortunately proved difficult to transplant successfully. However, commercially available *Coronilla varia* (Crown Vetch) raised in pots has successfully transplanted to the harder sand ledges. The Marram Grass of Europe *(Ammophila arenaria)* was collected near Victoria, B.C., where it has become naturalised. It is a proven dune stabiliser under tough conditions in Europe, but it may not be as well adapted to a cliff environment. Some herbaceous plants have been chosen for their ability to rapidly colonise unstable areas by seed, even though they may not have outstanding stabilising properties. Examples are *Lupinus arboreus, Cytisus scoparius* (Scotch Broom), *Digitalis purpurea* (Common Foxglove), *Verbascum thapsus,* and *Epilobium angustifolium* (Fireweed). Simple mixtures of agricultural cereal and legume crops will also be tested in the future.

Spiny shrubs and trees are most important as barriers to human access in our project. Several of these do well on sea cliffs and dunes. The Himalayan Blackberry *(Rubus discolor)* has the advantage of rapid growth once it is established, and forms repellent thickets, but it is slow from

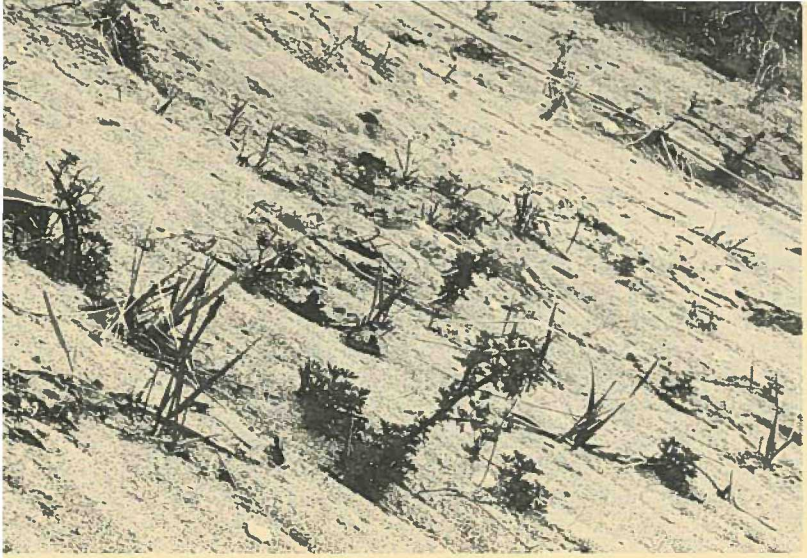

FIGURE 6. A sand talus slope at Site 6, planted with a mixture of *Elymus mollis* and *Lupinus arboreus*.

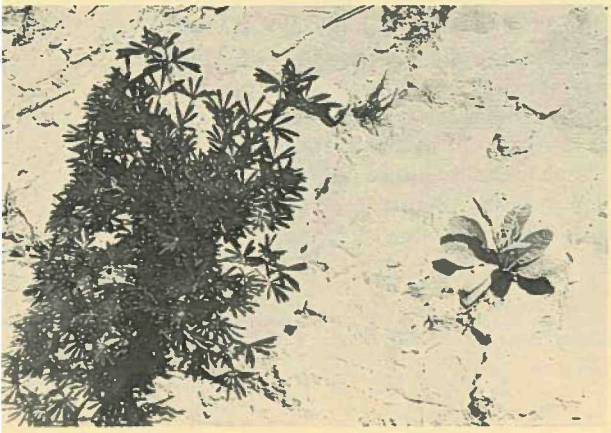

FIGURE 7. *Lupinus arboreus* and *Verbascum thapsus* on a sand slope.

FIGURE 8. *Elymus mollis* and *Salix hookeriana* on an upper talus slope at the foot of a vertical cliff. The *Elymus* in particular does well on these sites.

FIGURE 10. Trampling and uprooting of the plants by passersby has caused some difficulties.

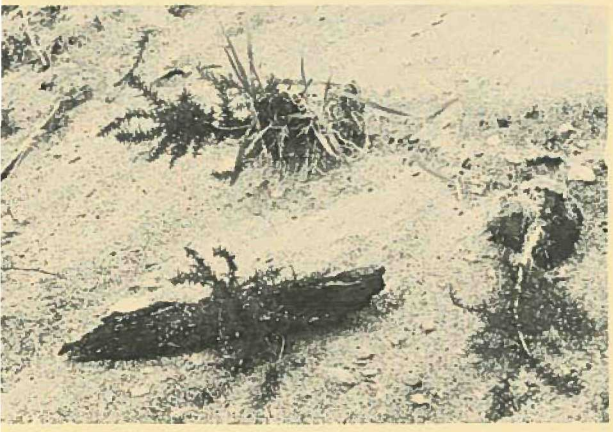

FIGURE 9. Malcolm Clark pegs out Broplene Mesh on the talus surface at Site 6. Active erosion is evident at the top of the photograph.

seed and needs to root from stem tips in the fall. A rapid system for propagating this desirable plant would be of great value. The Sea Buckthorn, *(Hippophae rhamnoides)* forms tangled spiny thickets on European dunes and is very tolerant of salt spray. It propagates best from root cuttings. It is, unfortunately, hard to obtain in B.C. The Black Locust *(Robinia pseudoacacia)* is a fast-growing, hardy, spiny leguminous tree which develops very deep-penetrating roots and tolerates coastal dune conditions. It would propagate best by seed. Finally, Common Gorse *(Ulex europaeus),* another nitrogen-fixing legume, is most aggressive in some sandy coastal areas. It is viciously spiny and freely seeding. To date, we have relied on young plants and cuttings dug from bush and shore areas of the U.B.C. campus, together with a few suitable potted species already available in the Botanical Garden Nursery. A program of seed collection and stratification is being initiated, which will intensify later in the season. Seeds will be stored and germinated to provide a stockpile of material for planting next season.

An additional method of erosion control which has met with success in some situations is the erosion mesh. This is basically a net, fixed to the soil surface, which helps retain the substrate and slow the erosive action of wind, rain or flood water. Seed of suitable plants sown under the mesh are able to germinate and grow through to form a close-knit mat of mesh and vegetation. Wire Rope Industries of Vancouver have supplied us with a 25-foot square sample of Broplene Mesh which is presently being tested on the Point Grey Cliffs.

At the present time it is not possible to predict the results of this pilot project. At least two years will be necessary to access the effectiveness of plantings. However, our initial experiments are promising. Public vandalism is a problem, and public awareness of the purpose of the project must be encouraged by signs and perhaps by personal contacts on site. There is no doubt that plants alone may not solve all the problems, but they can be effectively integrated with a sound mechanical stabilisation program. By their natural tendency to self-perpetuate and multiply they could result in great dollar savings on maintenance costs. Plants are also a much more publicly acceptable method than unsightly engineering schemes. They could very simply restore the beach and cliffs at Point Grey to a stable, natural recreational and land resource, to the satisfaction of all parties involved.

PLANT MATERIAL USED IN THE CLIFF RESEARCH PROGRAM

Species:	Number of Plants:
Alnus rubra (Red Alder)	39
Salix hookeriana (Hooker's Willow)	10
Sorbus aucuparia (European Mountain-ash)	4
Acer macrophyllum (Bigleaf Maple)	27
Aesculus hippocastanum (Common Horse-chestnut)	33
Pseudotsuga menziesii (Douglas Fir)	343
Viburnum spp.	15
Cotoneaster microphyllus (Small-leaved Cotoneaster)	15
Pernettya mucronata (Chilean Pernettya)	1
Ulex europaeus (Common Gorse)	101
Rubus discolor (Himalayan Blackberry)	6
Ribes divaricatum (Coastal Black Gooseberry)	4
Rosa nutkana (Nootka Rose)	2
Lupinus arboreus (Bush Lupine)	405
Coronilla varia (Crown Vetch)	201
Reynoutria japonica (Japanese Knotweed)	15
Mimulus moschatus (Musk Monkeyflower)	70
Verbascum thapsus (Great Mullein)	88
Mentha arvensis (Field Mint)	51
Campanula rapunculoides (Creeping Bellflower)	1
Rumex acetosella (Sheep Sorrel)	4
Bidens frondosa (Common Beggarticks)	1
Equisetum arvense (Common Horsetail)	70
Miscellaneous grasses	30
Ammophila arenaria (European Beach Grass)	23
Elymus mollis (Dune Wild Rye Grass)	818
Spartina pectinata (Prairie Cord Grass)	4
Poa douglasii ssp. *macrantha* (Seashore Blue Grass)	58
Arundinaria spp. (Bamboo)	6

The Genus Dodecatheon Linnaeus in British Columbia

Member of the Family Primulaceae

DODECATHEON CONJUGENS Greene
Slim-pod Shootingstar

DODECATHEON DENTATUM W. J. Hooker
White Shootingstar

DODECATHEON FRIGIDUM Chamisso & Schlechtendal
Northern Shootingstar

DODECATHEON HENDERSONII A. Gray
Henderson's Shootingstar

DODECATHEON JEFFREYI van Houtte
Jeffrey's Shootingstar

DODECATHEON PULCHELLUM (Rafinesque) Merrill
Few-flowered Shootingstar

Natural Distribution and Habitat

The genus *Dodecatheon* consists of more than twelve species in North America, of which six may be found in British Columbia in areas ranging from valleys to alpine heights. *Dodecatheon pulchellum* is found in coastal prairies, Interior grasslands, saline swamps, and mountain meadows and streams. It occurs from near sea level to above timberline, and from Alaska to Mexico and east to Pennsylvania. *Dodecatheon hendersonii* is found in woods and prairies from Vancouver Island south on the west side of the Cascades to southern Oregon, and in the Sierra Nevada of Southern California. *Dodecatheon jeffreyi* occurs on wet ground, usually in meadowland or along streams, from Alaska to northern British Columbia. *Dodecatheon dentatum* occurs near waterfalls and stream banks and on shaded moist slopes on the east side of the Cascades, from southern British Columbia to northern Oregon and central Idaho. *Dodecatheon conjugens* is found in seepages in sagebrush or on montane meadows on the eastern slopes of the Cascades, from British Columbia to northern California and east to Alberta and Wyoming.

Description of the Genus

Shootingstars are herbaceous perennials with erect scapes (in our species (2-)10-40(-60) cm tall) and basal leaves. The plants range from glabrous to conspicuously glandular-puberulent; pubescence may be distributed throughout or in the inflorescence only. Only *D. dentatum* and *D. conjugens* are entirely glabrous, the other species displaying varying degrees of pubescence.

The roots are white or brownish, fleshy-fibrous, and usually produced from a short rootstock which may be erect as in *D. pulchellum* or horizontal as in *D. frigidum.* In *D. jeffreyi* they are connected by slender rhizomes and may form quite large clumps. The rootstock is absent in *D. hendersonii* and *D. conjugens.* Small rice-like bulblets may develop among the roots at flowering time in *D. hendersonii,* and sometimes in *D. jeffreyi.* The roots become much reduced and difficult to see in late autumn and winter, but uptake of water leads to increased size in spring.

The leaves of *Dodecatheon* form a basal rosette, present at flowering time but withering by summer. Leaves are petioled, entire to dentate, 1-6 cm wide (narrower in *D. conjugens*) and 2-20 cm

long (up to 50 cm in *D. jeffreyi* and *D. dentatum*). Size, shape and pubescence vary considerably from one species to another, and often within species.

The flowers are perfect, regular and symmetrical, five-parted (occasionally four-parted in *D. hendersonii* and commonly so in *D. jeffreyi*), and grouped in terminal involucrate umbels of 2 to 15(-25) flowers, or sometimes occuring singly. Pedicels are slender, recurved and 1-7 (-9) cm long. The calyx is persistent, short-tubular, and deeply cleft into five lanceolate lobes which are reflexed at flowering time but later erect. The corolla is showy, five-parted, short-tubular, with a dilated thickened throat, and in our species 10-30 mm long. The lobes are long and strongly reflexed, magenta to lavender or purple, or sometimes cream to white. The stamens are opposite the corolla lobes, exserted, and connivent around the style. The anthers are long and slender (lanceolate or linear-lanceolate) and often narrowing towards the apex, basally attached, dehiscent on the inner surface, and with prominent highly coloured connectives; the filaments are short and broad, free or united. The style is filiform, exserted and slightly longer than the stamens, the stigma capitate and sometimes rather conspicuously enlarged. The ovary is one-celled and superior, with many ovules on a free central placenta. Shootingstars flower from February or March to August depending on the species and range. *Dodecatheon dentatum* is the only white-flowered species found in British Columbia, the other species occasionally producing white forms but these not common.

The fruit is a cylindric to ovoid, single-chambered capsule, in our species (5-)7-12(-20) mm long. When ripe it splits from the tip into five acutely pointed valves, or the tip (together with the style) forms an operculum with the walls splitting into valves below, leaving the tips of the valves truncate. The seeds are many, small, brown, ovoid or angled, and punctate. The calyx is persistent and erect at the base of the capsule.

Key to the Species in British Columbia

8 Capsule opening by an operculum or lid at the tip, and below this by valves (teeth); connectives (filament tissue connecting the two pollen-sacs of each anther) with cross wise wrinkles.

Anther filaments 2-4 mm long, united into a tube, purple-black; leaves ovate to obovate, with blades only slightly longer than wide and narrowing abruptly to the petioles . . . *D. hendersonii*

Anther filaments less than 1.5 mm long, free or united, yellowish or dark purple to black; leaves narrowly ovate or obovate, with blades commonly at least three times as long as wide and narrowing gradually to the winged petioles.

Stigmas capitate (knoblike), about twice as wide as the styles at midlength; anther filaments purple to black; petals, sepals and stamens either 4 or 5 (commonly both on the same plant) . . . . . *D. jeffreyi.*

Stigmas only slightly larger than the styles; anther filaments yellowish to purple; petals, sepals and stamens 5. . . . . *D. conjugens.*

Capsule opening by valves from the tip; connectives smooth, sometimes becoming longitudinally wrinkled when dry.

Anther filaments 1.5-3.5 mm long (occasionally shorter in small flowers), yellowish to orange; leaves narrowly ovate or spathulate, narrowing gradually to winged petioles often as long as the blade. . . . . *D. pulchellum.*

Anther filaments less than 1 mm long, both filaments and anthers deep red-purple to black; leaves ovate to narrowly ovate or elliptic narrowing abruptly to the petioles.

Flowers magenta to lavender; anther filaments free or united into a shallow tube; leaves irregularly crenate to almost entire, 0.8-3.5 cm wide and less than 15 cm long; a northern species (Alaska, Yukon and northern B.C.). . . . . *D. frigidum.*

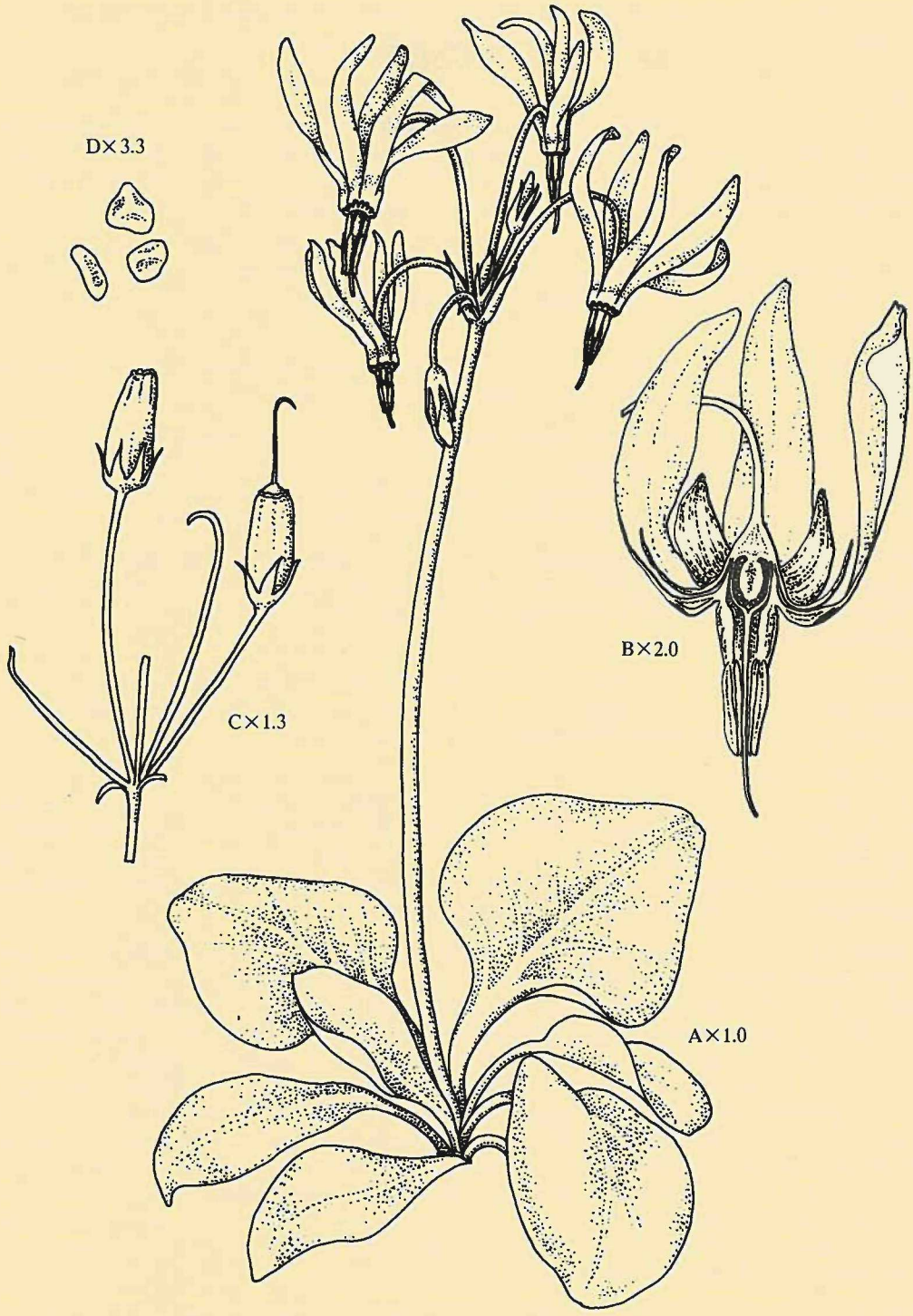

FIGURE 11. *Dodecatheon hendersonii* ssp. *hendersonii.* A. Habit of plant at flowering time, B. a single flower split lengthwise to show stamens, style and ovary, C. mature capsules, D. seeds.

Flowers white; anther filaments free; leaves dentate, 2-6 cm wide and up to 50 cm long; range more southerly (southern B.C. to northern Oregon). . . . . .*D. dentatum.*

Species Descriptions

Dodecatheon conjugens — an inland species with stout scapes and a finely purple-flecked calyx. The flowers are usually rose-pink or magenta, sometimes white; the corolla tube is yellowish with a red or purple wavy line at the base, the anthers and connectives yellow to purple or black. The leaves are entire and glabrous to densely granular-puberulent. This species flowers from April to June.

Dodecatheon dentatum — a plant of stream banks and wet places. There are one or two purple dots at the base of each corolla lobe; the tube is yellow with a red or purple wavy line at the base. The corolla and stamens are persistent around the developing capsule. The leaves are glabrous. Flowering is from May to July.

Dodecatheon frigidum — the corolla tube is yellow with a maroon band below. This northern alpine species occurs at elevations up to 1700 meters. It flowers June and July.

Dodecatheon hendersonii — the scapes are often reddish, the calyx purple-flecked. The corolla lobes are magenta to lavender (sometimes white) with a band of yellow at the base edged above with white and below with a purple-black band. This species, with its fleshy roots and its thick leaves forming a flattened rosette, is well adapted to summer drying. It flowers from March to June.

Dodecatheon jeffreyi — a large-leaved species common in wet places. The flowers are magenta to lavender, sometimes pink or white. The corolla tube is cream or yellow with a reddish-purple band below. The capsule opens usually by an irregularly shaped operculum, but occasionally by valves. Flowering is from June to August.

Dodecatheon pulchellum — the calyx is purple-flecked, the corolla tubes magenta to lavender (occasionally white), the corolla tubes yellow with a red or purple wavy line at the base. This species is widespread and variable. Flowering from April to August.

Varieties and Ornamental Cultivars

All six species are somewhat variable, but in most cases only one variant occurs in British Columbia. All material of *D. conjugens* in our area may be referred to the pubescent phase, var. *beamishiae* Boivin. *Dodecatheon dentatum, D. hendersonii* and *D. jeffreyi* are all represented in B.C. by their typical subspecies (ssp. *dentatum,* ssp. *hendersonii* and ssp. *jeffreyi* respectively), though other forms of these species occur to the south.

Dodecatheon pulchellum is an extremely variable species. It has been divided at one time or another into many different taxa, most of which are related elements in a continuous series (Hitchcock *et al.*, 1959). Three subspecies are recognized in British Columbia: (a) ssp. *cusickii* (Greene) Calder & Taylor, a pubescent early-flowering form common on open grassy areas of the Interior; (b) ssp. *macrocarpum* (A. Gray) Taylor & MacBryde, a coastal polyploid race, more or less glabrous and commonly with large leaves; and (c) ssp. *pulchellum,* which resembles ssp. *cusickii* but is glabrous and prefers moister, cooler habitats. Other variants of this species exist which may or may not be worthy of taxonomic recognition. The tiny one- to two-flowered plants found at high elevations in the Rockies have been designated as var. *watsonii* (Tidestrom) C. L. Hitchcock, but they are included here in *D. pulchellum* ssp. *pulchellum.* The Sooke form of *D. pulchellum* ssp. *marcrocarpum* (referred to incorrectly as *D. 'littorale'*) is a small plant with an unusually short flowering stem. This is a desirable form for the garden, where it produces abundant flowers and leaves but retains the short scape.

Though all of these species are excellent garden subjects, only *D. pulchellum* has named cultivars. *Dodecatheon pulchellum* 'Album' is a white-flowered form, and *D. pulchellum* 'Red Wings' has brilliant rosy flowers. All of the lavender-flowered species, however, are known to produce white forms.

Propagation

The genus can be proagated either vegetatively or by seeds. Seed should be planted as soon as ripe in a rich, well-drained, moist soil in the shade; the plants will take from two to four years to reach flowering size. Division of the plants is probably best done in early spring when the roots are swollen with moisture; small pieces should root readily. New plants are continually formed vegetatively from the thick fleshy roots or from the rice-grain bulblets found in some species.

Transplantation

The plants transplant easily, but it is preferable that large plants not be taken from areas where they are rare. Small offsets transplant much more readily and still leave the mature plant for others to enjoy.

Conditions for Cultivation

Dodecatheon will grow in any reasonably well-drained, moist fertile soil. The plants require moisture during the growing season, but drier conditions when dormant, and resent crowding. They are easy and rewarding plants to grow in the Lower Mainland area of British Columbia.

Landscape Value

All species are desirable plants for the garden. They are occasionally grown in perennial borders but are particularly fine plants for rock gardens. *Dodecatheon dentatum* and *D. jeffreyi* adapt readily to wet areas and stream banks and will readily seed themselves in such areas.

Availability

Dodecatheon is reasonably easily obtainable from nurseries specializing in rare and/or native plants in this area, and also from some of the larger bulb specialists in the east.

Other Uses

The flowers of *D. jeffreyi* were believed by women of the Thompson Indians of British Columbia to be useful in controlling the affections of men. They were also used as a charm to obtain wealth and to make people give presents to the charmer. The leaves and roasted roots of *D. hendersonii* were apparently eaten by some Indian tribes.

Diseases and Problems of Cultivation

The genus is relatively free of diseases and pests. *Puccinia ortonia* (rust) and *Phyllosticta dodecathei* (leaf spot) are the most frequently reported diseases.

Origin of the Name

The generic name *Dodecatheon* is derived from the Greek *dodeka,* 'twelve', and *theos* or *theoi,* 'god'. This has been related to a name given by Pliny to a spring flower (believed to be the primrose) which was under the care of the twelve principal gods of the Greeks. Alternatively, the cluster of crowned flowers may resemble an assembly of the Olympian gods. However, Sir W. J. Hooker stated that *Dodecatheon* receives its name from the number of flowers, frequently twelve, present in each umbel. The species name *pulchellum* means pretty or beautiful; *hendersonii* commemorates Louis Foeniquet Henderson, an Oregon Professor of Botany; *jeffreyi* commemorates John Jeffrey, a botanical collector in western North America; *frigidum* means growing in cold regions; *dentatum*, toothed or furnished with teeth; and *conjugens*, joined in pairs.

The species *Dodecatheon meadia* was first cultivated about 1709 in England but then disappeared and was reintroduced about 30 years later. The genus was originally called *Meadia* by Mark Catesby in 1752, in honour of Dr. Richard Mead, an English physician and patron of science. Linnaeus altered the name to *Dodecatheon* in 1753, although *meadia* was retained for the first species to be described.

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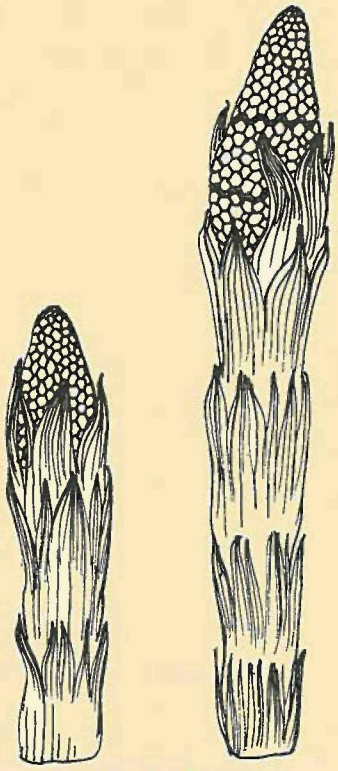
Standardization of Names of British Columbia Plants

Beginning with this issue, all scientific and common names of plants native to British Columbia will conform to those used in the Flora British Columbia Program, a research program carried out for the past three years at the Botanical Garden. The results of this research will be published in book form during 1976 by the University of British Columbia Press. The publication will appear as part of the Technical Bulletin Series of the Botanical Garden, under the title "Vascular Plants of British Columiba — A Descriptive Resource Inventory". The Flora British Columbia Program will be the subject of a forthcoming article in Volume 7 Number 1 (the Spring 1976 issue) of Davidsonia.

Climatological Summary*

Data	*January*	*February*	*March*
Mean temperature	2.8°C	2.4°C	4.9°C
Highest temperature	10.6°C	8.3°C	10.0°C
Lowest temperature	−5.6°C	−6.1°C	−1.7°C
Grass minimum temperature	−10.6°C	−12.8°C	−8.9°C
Total rainfall/No. days with rainfall	139mm/18	119mm/20	104mm/18
Total snowfall/No. days with snowfall	208mm/9	343mm/12	0/0
Total hours bright sunshine/possible	57.1/265.4	64.4/278.4	165.0/361.2
Max. wind speed in km for 1 hour/direction	26/NW	24/NW	26/SE
Mean kilometers of wind at 1 m	125.8	114.9	142.4
Mean kilometers of wind at 13 m	184.1	164.0	202.6

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



Fertile shoots of the Giant Horsetail, *Equisetum telmateia* var. *braunii.*

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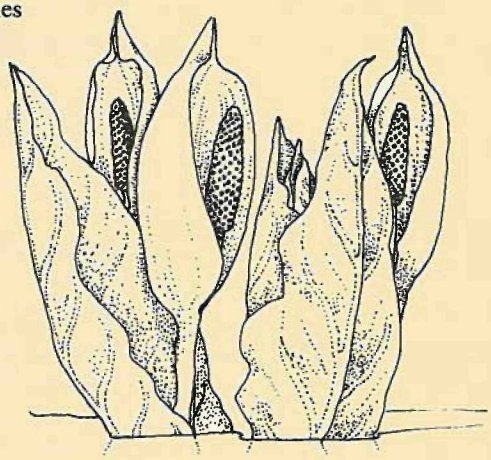
The yellow spathes of *Lysichiton americanum* (American Skunk-Cabbage or Swamp Lantern) appear in the early spring and form patches of vivid color in wet places.



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Volume 6 Number 1 *Spring 1975*

Contents

Cliff Erosion Control with Plants 1

The Genus *Dodecatheon* in British Columbia 7

Standardization of Names of British Columbia Plants 12

Climatology 12

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