DAVIDSONIA

VOLUME 3 *NUMBER 3* *Fall 1972*

Cover

Habit of fruiting plant of
Oregon Grape, *Mahonia nervosa.*

Western Bunchberry, fruiting
specimen of *Cornus unalaschensis.*

DAVIDSONIA

VOLUME 3 *NUMBER 3* *Fall 1972*

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Errata

p. 9	line 12	1949
p. 12	lower left	*Catalpa speciosa*
p. 20	lower right	*Berberis darwinii*
p. 35	upper	*Chamaecyparis obtusa* 'Nana'

Notes

p. 11 *Populus deltoides* is not a typical form but a tree of hybrid origin undoubtedly involving *Populus tremuloides*

Alpine Garden Initiated

ROY L. TAYLOR, *Director*

Two years ago Davidsonia featured the new Botanical Garden Program that had been approved by the Board of Governors. Today marks another turning point in the development of the Garden. The first contract for garden development on the Main Garden site was let in August. The Main Gardens consist of 20 acres and will include the new Botanical Garden Center. Closely associated with the Garden Center are a number of garden sections (Davidsonia 1(3):28). The architectural plans are soon to be completed for the Research-Administration and Conservatory Garden Center. In the meantime, work is now progressing on the servicing of the site and establishment of the subgrades for the Alpine (Rock and Scree) Garden. Completion of the latter garden is scheduled for early summer of 1973.

It seems appropriate to ask the question: Why an Alpine Garden at the University Botanical Garden? The answer is almost self-evident since so much of our botanical interest and expertise in British Columbia is associated with plants from alpine regions. British Columbia is a unique province in Canada for the variety and importance of the many mountain ranges that affect our daily lives. One need only fly over the Province to realize the extent to which the land mass consists of mountains. The development of an alpine garden at the University is an attempt to provide a wide range of suitable alpine material for research; and, in addition, to provide a garden element that features botanical specimens rather than mass displays consisting of a limited number of ornamental curiosities. This latter function is best carried out by commercial demonstration gardens or by specialized elements in park systems.

The alpine garden may also serve as an important educational tool for the large number of alpine plant enthusiasts in the Lower Mainland Region, of whom many are associated with The Alpine Garden Club of British Columbia. For the past two years, members of this society have been propagating plant material for eventual incorporation in the Alpine Garden at U.B.C.

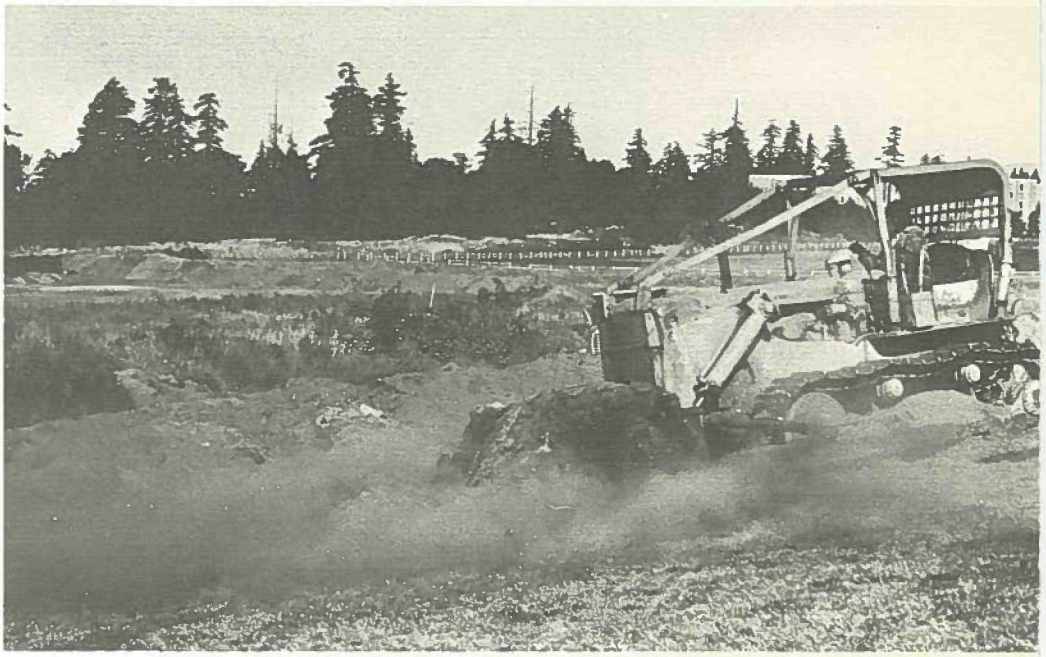
Alpine gardens can be organized in many different ways. I have already alluded to the concept that the plants in the garden will be botanical specimens, that is, species that occur naturally in their native environments. Horticulturally improved specimens will in general be found in the special garden component devoted to those plants improved or developed by man through selection and special breeding programs. The arrangement of the plants in the garden will be geographical, seven distinct areas representing six continental regions. The entire garden will be divided lengthwise into altitudinal and ecological life zones. Each of the continental areas will have various ecological environments such as talus slopes, rock outcrops and meadows. The principle rock used in the garden will be a local pyroxene andesite of volcanic origin. The main reason for the geographical and ecological arrangement within the garden is to provide a means for the serious student of alpine plants to compare like morphological forms from different parts of the world, and to gain a better understanding of the diversity of the taxa within any one family or order of plants.

During the planning stages of the Alpine Garden much consideration has been given to the development of a pathway system that will permit the visitor to move systematically through the garden without becoming lost or frustrated. A series of diagonal pathways move through the various life zones in each continental area. Numerous small meandering paths for the move adventuresome lead off these main pathways. The elderly or handicapped visitor will then be able to progress through this exciting garden by using the main pathways. Nodules associated with the major path system will permit groups to gather to listen to tour leaders or will simply provide areas for contemplation of the garden itself.

In the early phases of the development of the plans for the Botanical Garden, there was general agreement that each garden element should be architecturally unique. We were influenced in this planning decision by the success of the Nitobe Memorial Garden, an important element of the Botanical Garden which in itself represents a special example of landscape design. The plants in Nitobe Garden form an

Looking east across the Main Garden site to the 2.2 acre Alpine Garden situated immediately west of and below Thunderbird Stadium.

important part of our accessioned plant material and this is the only area on campus where certain plant species can be found. The combination of a unique landscape architectural design and a well-maintained and accessioned plant collection creates the most successful program in any botanical garden. The design of the new Alpine Garden at the University of British Columbia attempts to reflect this philosophy.



Main Garden site viewed from the center of the Alpine Garden. Bulldozer removing the topsoil prior to preparation of the foundation and installation of the water and drainage systems.

The Genus Mahonia Nutt. in British Columbia

Member of the Family Berberidaceae

MAHONIA NERVOSA (Pursh) Nutt.
Oregon Grape *or* Cascades Mahonia

MAHONIA AQUIFOLIUM (Pursh) Nutt.
Holly-leaved Mahonia, Tall Mahonia, Mountain Grape

MAHONIA REPENS (Lindl.) G. Don
Creeping Mahonia

Key to Species

Leaves petiolate, that is with bare portion of the rachis below the basal pair of leaflets (2-)5.5-15 cm long occupying from one-third to one-half the length of the rachis ..... *M. nervosa*

Leaves subsessile, that is with the lowest pair of leaflets 1.5-2.5(-4) cm above the base of the rachis, the short petiole being only one-twentieth or less the length of the rachis

Ovules (5-)6 - 9; leaves with 5 to 11 leaflets, leaflets prominently spinulose with 12 - 29 prominent spine-tipped teeth; lower surface shining or dull, but not glaucous or papillose ..... *M. aquifolium*

Ovules 3 - 5; leaves with 3 to 7 leaflets, leaflets spinulose with 15 - 45 short spine-tipped teeth; lower surface of leaflet dull and often glaucous, covered with minute papillae ..... *M. repens*

Natural Distribution

Mahonia nervosa occurs west of the Cascades from southern British Columbia southwards to central California and Idaho. In British Columbia it is found on Vancouver Island to 50°30'N, and in local areas on the Skagit River, in Manning Park and the Monashee Mountains. *Mahonia repens* occurs in eastern British Columbia south along the eastern slopes of the Cascades to northeastern California and east to the Rockies. *Mahonia aquifolium* occurs in southern British Columbia and northern Washington to northeast Idaho and south from the eastern base of the Cascades to the Coast.

Habitat

The habitats of *Mahonia nervosa* and *M. aquifolium* are characterized as the Humid Transition Zone; within this zone *M. nervosa* is usually found on shaded slopes in coniferous forests below 6000′, whereas *M. aquifolium* is found on wooded slopes below 7000′. *Mahonia repens* is found in the Arid Transition Zone in open pine forests. In British Columbia *M. nervosa* is generally confined to lower elevations in the Coastal and Interior Wet Belt forests. On Vancouver Island it occurs up to 4600′ elevation, lower than this on the mainland. *Mahonia aquifolium* is found in exposed situations with poor rocky soil up to 4000′ in the Interior and is the species most often noticed. *Mahonia repens* is widely scattered throughout B.C. in dry places to 6000′.

Description of Mahonia nervosa

Evergreen erect unarmed shrub, aerial stems 1 - 3 (-6) dm long, ascending to erect, scaly and caudex-like. The leaves are borne in a terminal cluster.

The root system is strongly rhizomatous.

The stems are generally scaly and green at first, though sometimes slightly purplish, ripening to a brownish grey.

The twigs are roundish and relatively stout. The pith is comparatively large, pale and continuous.

Buds are alternate, rather small except the terminal bud which is ovoid with 6 persistent brownish, glumaceous scales which become almost spiny when dry.

Leaf scars are narrow and half encircle the stem.

Leaves are alternate, 25 - 45(-60) cm long, coriaceous, pinnately compound and in a terminal tuft. They are holly-like in appearance. Leaflets number (7-)9 - 19(-21) and are (2-)3 - 6(-10) cm long,

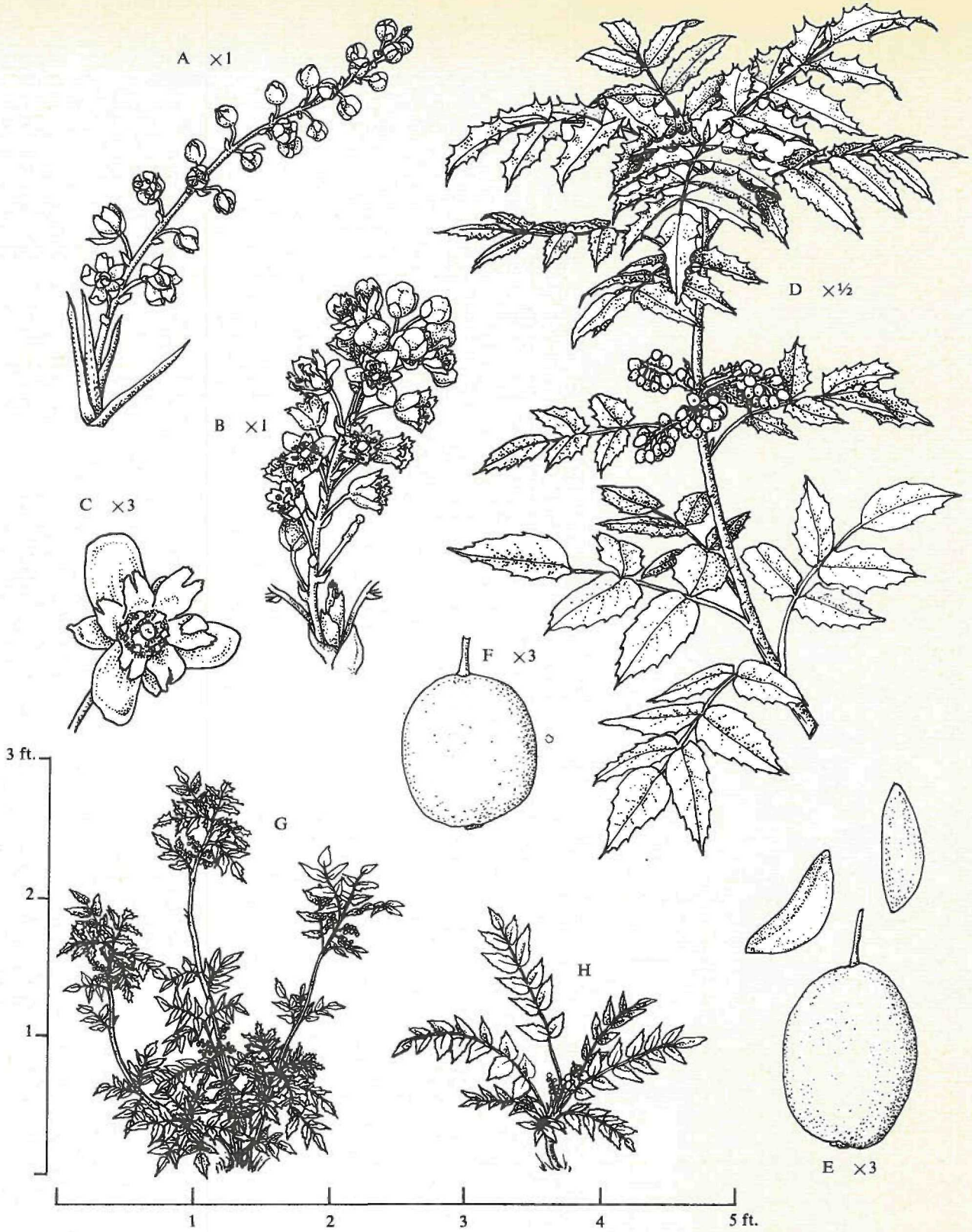


FIGURE 1. *Mahonia* species. A floral raceme of *M. nervosa*, B. floral raceme of *M. aquifolium*, C. individual flower showing 4 of the 5 whorls of perianth segments, D. fruiting branch of *M. aquifolium*, E. individual berry and seeds of *M. aquifolium*, F. berry of *M. repens*, G. habit of *M. aquifolium*, H. habit of *M. nervosa*.

ovate to ovate-lanceolate, acute, palmately 3 to 8 nerved, coarsely serrate-spinulose and both surfaces are somewhat glossy green. The petiole is 5 - 12 cm long and is stipulate and dilated at the base.

Flowers March to June depending on the location. The inflorescence is an erect raceme, (7-)10 - 20 cm long, usually fascicled, bracteate, loose, solitary or a few (2-4) from the axils. Pedicels (4-)6 - 12(-15) mm long. The perianth of the flower is in 5 alternating whorls of 3. The outer and smallest whorl is of 3 bractlets, oblong to lanceolate, 2 - 3 mm long, membranaceous and somewhat greenish. Inner sepals 6 in 2 whorls of 3, 6 - 8 mm long, bright yellow. Petals 6 in 2 whorls of 3, slightly smaller than the sepals, oblong, concave, bilobed, yellow, with 2 glands at the base. Stamens 6, opposite to and shorter than the petals, adnate to the petals at the base only, filaments not bilobed at the apex (compared with *M. aquifolium* and *M. repens* in which the filaments have a pair of recurved teeth just below the anther), irritable (they close around the style when touched). Stigma sessile, peltate. Ovary superior, 1-celled.

Fruit is a berry, globose ellipsoid, 8 - 10(-11) mm long, deep blue or blue-black, glaucous. Seeds solitary or few, black.

Mahonia aquifolium and *M. repens* differ from *M. nervosa* mainly in the habit of the shrub, size and form of leaves, number of leaflets and their appearance, in the appearance of the raceme and in the filaments of the stamens.

Mahonia repens is 1 - 2 dm tall with the stems creeping and stoloniferous, the leaves are 7 - 25 cm long, the leaflets number (3-)5 - 7(-9), are 3 - 9 cm long, oblong to ovate or ovate-lanceolate and pinnately veined with 15 - 45 spinulose teeth. The upper surface is glossy or dull, the lower always dull and more or less glaucous and covered with microscopical papillae. The bud scales are deciduous. Racemes densely many-flowered, 3 - 8 cm long, from small terminal or lateral buds.

Mahonia aquifolium is 15 - 20(-45) dm tall with erect stiffly branched stems, the leaves are 10 - 25 cm long, leaflets number (3-)5 - 9(-11), are (2.5-)3 - 8 cm long, oblong to ovate or ovate-lanceolate and pinnately veined with 12 to 29 usually prominent spinose or spinulose-serrate teeth. Upper surface is bright glossy green, lower is usually somewhat glossy to pale, not papillate. Bud scales deciduous. Raceme many-flowered, clustered, fascicled, 3 - 8 cm long from small terminal or lateral buds.

Propagation

Easily propagated by seeds sown soon after maturity or stratified for 3 months at 40°F and sown in spring; by suckers which are freely produced; by cuttings of half-ripened wood under glass and by layering. Most plants can be easily divided with a sharp spade.

Transplantation

Easily transplanted, but slow to establish afterwards.

Conditions for Cultivation

The shrubs are fairly slow to establish in the garden and are then relatively slow growing, taking 5 to 6 years to bush out. The recommended hardiness zone in Canada for *M. nervosa* is 7, for *M. aquifolium* zone 5 and for *M. repens* zone 3 (Sherk & Buckley, 1968). The shrub will grow well with a minimum amount of attention planted about 18" apart in good, humid but well-drained garden soil, in partial shade in a position sheltered from strong winds and hot sun, particularly in winter. Pruning should be done only to induce compactness in the young stages or to maintain the plants in scale with their surroundings. Any further pruning tends to impair the fruit display since the flowers are usually produced on wood of the previous season. An occasional light thinning out in the dormant season, or the cutting out of stems which are old, weak or rubbing together, is probably all that is needed.

Landscape Value

All the *Mahonia* species of British Columbia are considered choice ornamentals because of their habit, evergreen leaves and attractive flowers and, particularly, the fruits (Davidsonia 2(2):24; 3(2):15). They make excellent ground covers in partial shade, on banks, under trees as foundation plantings or wherever a small to medium-sized evergreen shrub is needed. *Mahonia repens* makes an attractive rock garden evergreen.

Availability

Only *M. aquifolium* is readily available from nurseries in southwestern British Columbia. *Mahonia nervosa* can be obtained from some nurseries, but *M. repens* and the various cultivars are apparently unavailable from local nurseries.

Varieties and Ornamental Cultivars

One variety of *M. aquifolium* has been named from Marysville Buttes in California—*M. aquifolium* var. *dictyota* Jepson which has prominently reticulate leaves which are shining and yellow above. It is 6-12 inches in height and sparsely leafy. There are also several cultivars of *M. aquifolium*: 'Atropurpureum', a selected form with leaves which turn reddish-purple during winter and early spring; 'Compactum', a compact form with very glossy leaves and bronze winter color; 'Mayhan', a dwarf selection which is slightly taller than the preceding form, but with no plant reported over 30" high; 'Heterophylla', a small shrub of loose open habit with leaves composed of 5 - 9 long, narrow, glossy green wavy-edged leaflets which often turn reddish-purple during the winter. The origin of this latter cultivar is uncertain, it has variously been regarded as a hybrid (*M.* × *heterophylla*) or species (*M. toluacensis*), but it is probably an unusual form of *M. aquifolium* (Hillier, 1971). *Mahonia* 'Moseri', which we have just received in the Botanical Garden, is an interesting small shrub with attractive bronze-red young leaves turning to apple green and finally dark green. It is a hybrid derived from *M. aquifolium*. One cultivar of *M. repens* has been listed: 'Rotundifolia' is a small shrub of distinctive appearance with leaves ovate or rounded, spineless, sea-green, large plumes of rich yellow flowers borne in May, followed by glaucous black berries. It is probably a hybrid between *M. aquifolium* and *M. repens*. One hybrid between *Berberis vulgaris* and *M. aquifolium* has been known for many years—×*Berberis neuberti* or ×*Mahonia neuberti* or ×*Mahoberberis*. This is a rather low and sparingly branched shrub, subevergreen. The buds are alternate, moderate in size, solitary and sessile with 6 or more loose grey scales which usually develop into short spurs covered by the long, persistent, basally dilated petiole. The leaves are papery, pungently serrate, mostly with one leaflet.

Other Uses

The Indians of British Columbia used the berries of *M. nervosa* and *M. aquifolium* for food; they make an excellent jelly when fully ripe or touched with frost, and can be eaten raw. They also used the berries of *M. nervosa* for the treatment of liver and urinary troubles, jaundice and gall stones, while the Upper Skagit Indians of Washington State used to boil the roots and drink the juice as a treatment for venereal disease. The Indians also used to make a yellowish dye from the wood or outer cortex of the roots which was then used for dying baskets and rags for braided rugs. *Mahonia aquifolium* was used to treat psoriasis and "scald head" by the B.C. Indians. The Indians of Washington made a tea from the roots which was then used as a gargle for sore throats and to purify the blood in the spring.

Diseases and Problems of Cultivation

If exposed to wind and sun during winter in the cooler parts of the growing area the leaves turn brown and present an unsightly appearance. These leaves can be pruned out in early spring when they are soon replaced by vigorous glossy new growth, but it is much better to provide a windbreak or other shelter in these regions.

Fungus Diseases

a) *Puccinia graminis*—'rust'. The Mahonias and Barberries are alternate hosts of the wheat rust fungus and for this reason the planting of susceptible kinds is prohibited in wheat growing areas. *Mahonia aquifolium* is one of the most resistant forms.

b) *Cumminsiella mirabilissima* (Pk.)Nannf., *C. texana, C. wootoniana, Puccinia koeleriae* Arth. and *P. oxalidis* are other rust fungi which can also occur on *Mahonia*, although they are rarely serious enough to require control methods.

c) *Phyllosticta berberidis, P. japonica ,P. mahoniaecola, P. mahoniana, Coccomyces coronatus* (Schum. ex Fr.)de N. and *Mycosphaerella* sp.—'leaf spots'. Pick off and destroy spotted leaves.

Insects

a) *Aleyrodes inconspicua*—'inconspicuous whitefly' is present on *Mahonia* on the west coast of North America. The pupa case is pale or dark yellow with only a narrow fringe, the wings of the adult are dark brown. Spraying is recommended.

b) *Aspidiotus camelliae*—'greedy scale' can attack *Mahonia* throughout North America. The small scales are very convex, light grey, thin, pointed, with yellow or dark brown exuviae near one edge. They are omnivorous feeders on bark, and sometimes on the leaves and fruit. Spraying is recommended.

The generic name *Mahonia* was given in honor of Mr. Bernard McMahon or M'Mahon, 1775 - 1816, a prominent American horticulturalist.

The type localities of both *M. nervosa* and *M. aquifolium* are in the Cascades of the Columbia River, while the type locality of *M. repens* is probably in Montana.

Systematics

Most botanists maintain *Mahonia* as a distinct genus from *Berberis* because of the evergreen, always pinnate leaves, unarmed stems and an inflorescence type not found in *Berberis*. *Berberis* always has simple leaves (Ahrendt, 1961). Others contend that there are no genetic barriers between the two species and therefore *Mahonia* is best treated as a section (*Mahonia*) of the genus *Berberis* (Hitchcock et al, 1964). However, the only hybrids which have occurred between the species (×*Mahoberberis*) all appear to be artificially produced in nurseries.

Oregon grape is the State Flower of Oregon.

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Botanical Garden News and Notes

Gifts and Donations—During the summer period some notable gifts were given to the Botanical Garden. The Mitsubishi Company of Japan donated 25 new carp for the main pool of the Nitobe Memorial Garden; Dr. Janet R. Stein provided a donation for water lily plants for the Faculty Club Pool; and Dr. Katherine I. Beamish donated a number of epiphytic Australian orchids for the tropical house.

Stanley Smith Horticultural Trust—A grant of $15,000 payable over a three-year period was made to the Botanical Garden by the Stanley Smith Horticultural Trust of Great Britain to assist in the purchase and installation of a special collection of alpine and rock garden plants for the Main Garden.

Visitors—The following visited the Botanical Garden during the late summer: Mr. Angus P. Heeps of the Henry Foundation for Botanical Research, Gladwyn, Pennsylvania; Mrs. Dorothy Hansell, Editor of the Bulletin of The American Association of Botanical Gardens and Arboreta; and Mr. Harold G. Hillier, Senior Partner of Hillier & Sons of Winchester, England. Mr. Hillier presented a public address on "The History and Development of the Jermyns Garden" and showed a new film of The Royal Horticultural Society's Gardens at Wisley.

New Appointments—Mr. A. J. MacPhail has joined the Botanical Garden as a Senior Technician specializing in alpine plants. Mr. MacPhail will be responsible for the coordination of the development of the Alpine Garden to be developed in the spring of 1973 and will also be responsible for the index seminum. Mr. William S. White, a recent graduate of the B.C. Institute of Technology Horticultural Training Pro-

gram, has joined the staff as an Assistant Gardener. Miss Susan Smithline has recently replaced Mrs. Morag L. Brown as the Secretary to the Office. Mrs. Brown has been a member of our staff for over three years and we wish her well in her new endeavors.

Staff Activities—Mr. James O'Friel attended the Western Region, International Plant Propagators meeting at Corvallis, Oregon. Mr. David Tarrant was elected President of the Vancouver Orchid Society and Dr. C. J. Marchant was elected a Director of The Canadian Botanical Association. Mr. Ken Wilson visited Great Britain and collected material of *Rhododendron* species for the Botanical Garden collection. Dr. John W. Neill was elected President of the B.C. Society of Landscape Architects. Dr. Roy L. Taylor served as Moderator for the Symposium "The Urban Arboretum in Time of Crisis" sponsored by The Arboretum Foundation at Seattle, and participated in the Annual Meeting of the A.A.B.G.A. at Seattle in September. In addition, Dr. Taylor was elected Vice-President of The Biological Council of Canada.

Expedition Seed Collections—Material has been received from the University College, Bangor, Nepal Expedition and from the Expedition of Wye College Graduates to Afghanistan.

Ilgachuz Survey—During the month of August a two-week joint Botanical Garden and Botany Department expedition made a vegetation survey of the Ilgachuz Mountains in west central British Columbia. These unusual volcanic mountains possess unique northern tundra and some unusual dry land elements. The expedition was part of a continuing program in the establishment of ecological reserves in Canada.

Flora North America Program—A National Research Council of Canada special award of $90,000 has been made to the Botanical Garden to provide for the establishment of an editorial unit for the international 'Flora North America Program'. This program will commence on October 1, 1972. Dr. Bruce MacBryde has been appointed as Associate Editor of the Botanical Garden Program and Miss Deborah Smyth as Secretary.

Botanical Garden Extension Programs—In cooperation with the Center for Continuing Education, the Botanical Garden is offering four programs in the Fall of 1972—Gardening Through the Seasons Series I, Gardening Through the Season Series II (2 sections) and Gardening for Apartment Dwellers. These courses have been oversubscribed and the public has shown continuing interest in programs devised to assist in the development of practical gardening techniques.

CLIMATOLOGICAL SUMMARY*

Data *1972*	*July*	*August*	*September*
Mean temperature	62.55°F	63.35°F	54.55°F
Highest temperature	82°F	79°F	81°F
Lowest temperature	48°F	51°F	35°F
Grass minimum temperature	39°F	42°F	24°F
Total rainfall/No. days with rainfall	3.83"/6	1.10"/6	3.66"/16
Total snowfall/No. days with snowfall	nil	nil	nil
Total hours bright sunshine/possible	326.2/482.51	304.6/439.03	176.7/372.22
Max. wind speed for 1 hour/direction	19/NW	11/NE	12/SE
Mean mileage of wind at 3'	141.4	71.6	73.7
Mean mileage of wind at 40'	94.1	101.5	105.8

**Site: The University of British Columbia, Vancouver, B.C., Canada*
Position: lat. 49°15'29"N; long. 123°14'48"W. Elevation: 342.6'

The common marsh
Cattail, *Typha latifolia.*

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