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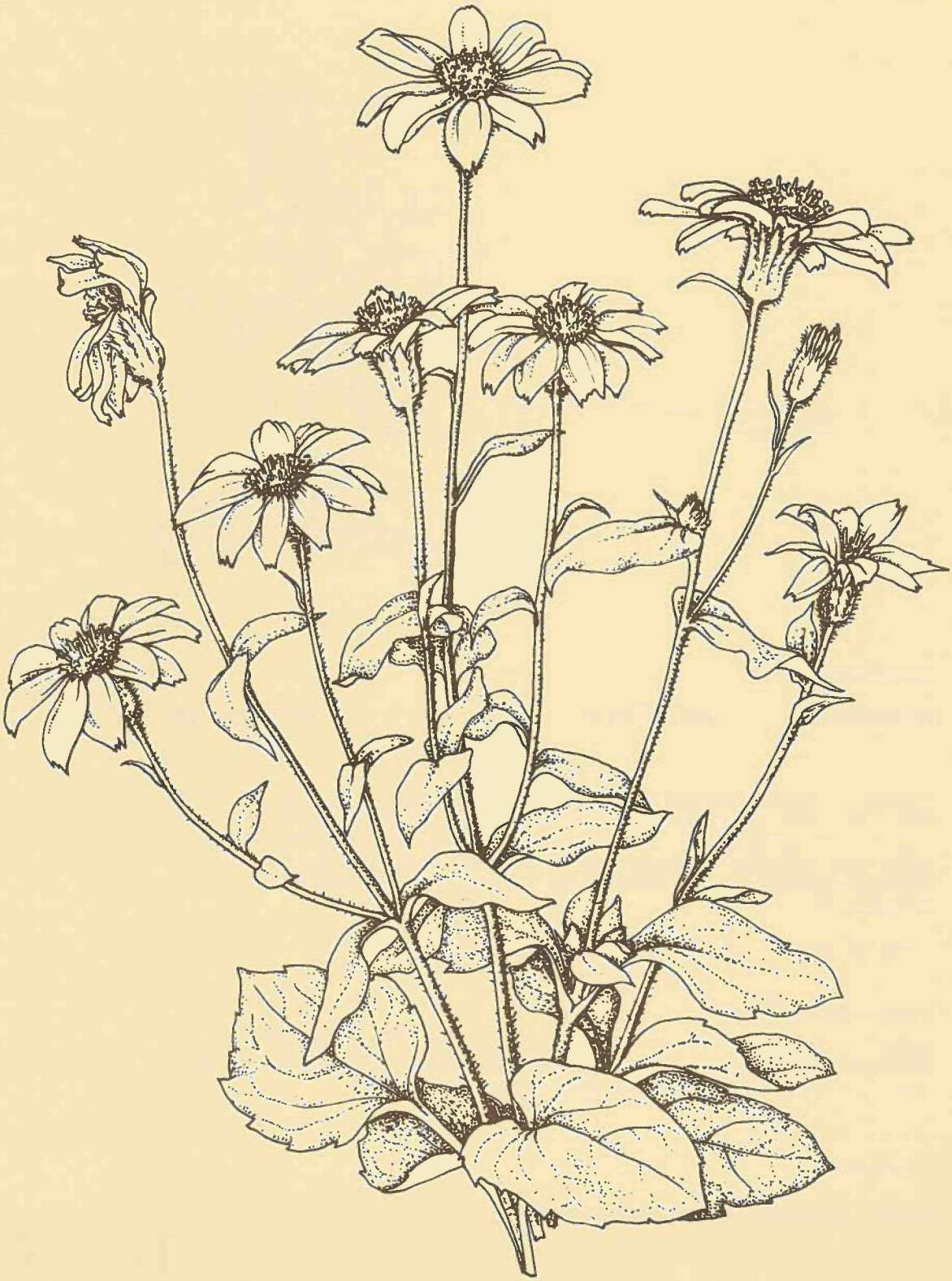
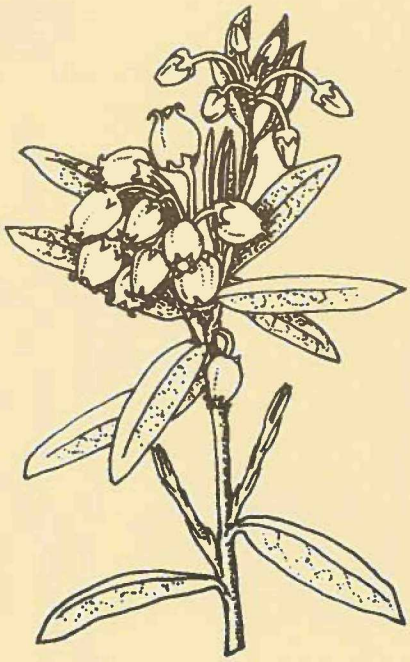


## Cover:

*Arnica cordifolia*, Heart-leaved Arnica, often covers acres of ground in the Interior of British Columbia.



*Andromeda polifolia* subsp. *polifolia*, Bog Rosemary.

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## *Acknowledgements*

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# *Arnica* in the Wild and in Cultivation in British Columbia

GERALD B. STRALEY*

Several species of *Arnica* are among the dominant wild flowers in open forests, alpine meadows, and along mountain streams in British Columbia. These yellow-flowered members of the Aster family (Asteraceae or Compositae) are especially common at higher elevations throughout the Province and western North America. Although Composites are easily recognized, many are considered, even by botanists, to be difficult to identify to genus or species. They are also often overlooked as garden subjects.

Arnicas are distinctive enough not to be confused with any other Composite in British Columbia. The plants are generally 30–60 cm tall, with a few taller and many shorter. The bright yellow heads, or tight clusters of many small flowers, are 2–6 cm wide. The most distinctive character of the genus is the leafy stem with opposite pairs of leaves. The plants most often confused with Arnicas are the Ragworts (*Senecio*), of which there are many species in British Columbia. Senecios have alternate leaves along the flowering stems and usually have smaller heads than Arnicas. The two genera often grow together. In drier habitats, a few species of taller, coarser Sunflowers (*Helianthus*), some with opposite leaves, might be mistaken for an *Arnica*. A *Balsamorhiza* was confused at least once with an *Arnica*. A recent issue of "Beautiful British Columbia" (issued by the provincial Ministry of Tourism) contains a photograph of *Balsamorhiza* with the caption describing it as an *Arnica*. Balsamorhizas have much larger heads, basal leaves with no leaves on the flowering stems, and they grow in drier habitats than Arnicas.



The difficulties in identification often begin once you have determined that you have an *Arnica*. Even the experts have difficulty assigning some populations to a definite species. There are about 30 species worldwide, 27 of them being found in western North America, with about 15 in British Columbia. A few of these species are very distinct, while others intergrade with one or more other species.

All species are herbaceous perennials growing from rhizomes just under the soil surface. The rhizomes may be very short, giving the plants a tightly clumped appearance, or longer, forming larger populations. Many species produce basal rosettes of 4–8 leaves the first year. These rosettes may send up a flowering stem in the second or later years. The stems and leaves of most species are covered with gland-tipped hairs, giving the plant a sticky feeling and pungent odor when bruised. The odors are difficult to describe, but are distinctive in many species. Of the British Columbian species, only *Arnica latifolia* lacks the glandular hairs and is odorless.

An *Arnica* "flower" or head is actually composed of many small flowers called florets (Figure 1a). The head is surrounded by a row of a dozen or so leaf-like structures known as involucral bracts (Figure 1b). Just inside these bracts is a row of petal-like ray florets (Figure 2a). These are female and lack anthers. Within the row of ray florets are a few to many small, tubular disc florets (Figure 2b). These are perfect with five fused anthers surrounding the style and stigma. A few species (but only *Arnica parryi* in British Columbia) have no ray florets— these rayless heads are known as discoid. Both the ray and disc florets have an inferior ovary, which will develop into an achene, a one-seeded fruit. Attached to the top of the ovary are a number of white or brown bristles (the pappus) that become dry and expand at maturity (Figure 3a), forming a round fuzzy ball resembling the seed-head of a dandelion (Figure 3b). Each achene is carried in the wind by the pappus.

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The following key can be used for identifying a majority of Arnicas found in British Columbia. It has been simplified from a more complex key (Straley, 1980), and there may be many specimens that will not quite fit this simplified form.

*Key to the species of Arnica in British Columbia*

Pappus brown or tawny

Heads discoid (lacking ray florets) ..... *A. parryi*

Heads radiate (with ray florets)

Anthers purple; heads nodding, dwarf plants of northern British Columbia ..... *A. lessingii*

Anthers yellow, heads erect; mostly taller plants of wide distribution in British Columbia

Stem leaves mostly 5–12 pairs

Involucral bracts with tuft of hairs at tip ..... *A. chamissonis*

Involucral bract tips not hairier than rest of bract ..... *A. amplexicaulis*

Stem leaves mostly 2–5 pairs

Heads mostly narrowly turbinate; stem leaves broad, ovate, with abruptly restricted leaf bases; largest leaves near middle of stem ..... *A. diversifolia*

Heads mostly broadly hemispheric; stem leaves narrow; leaf bases gradually narrowing to petiole; largest leaves near base of stem ..... *A. mollis*



Pappus white

Leaf blades relatively narrow, mostly 3–10 times as long as wide

Heads nodding ..... *A. louiseana*

Heads erect

Heads hemispheric; plants of open plains and dry sagebrush

Rhizomes with dense tufts of brown hair ..... *A. fulgens*

Rhizomes lacking dense tufts of brown hair (sometimes with a few white hairs) ..... *A. sororia*

Heads mostly narrower (campanulate to turbinate); plants mostly of alpine or arctic habitats

Leaves, stems, and especially involucral bracts densely white pilose ..... *A. angustifolia*

Leaves, stems, and involucral bracts sparsely pubescent

Stem leaves toothed; rays bright yellow ..... *A. lonchophylla*

Stem leaves mostly entire; rays orange-yellow ..... *A. rydbergii*

Leaf blades relatively broad, mostly 1–2.5 times as long as broad

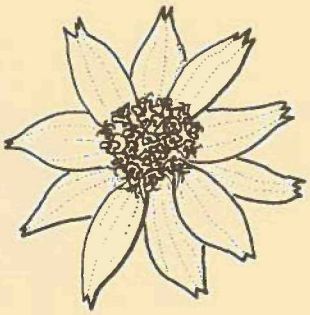
Leaves mostly glabrous, lacking odor; plants mostly of moist forests and alpine meadows ..... *A. latifolia*

Leaves with abundant glandular hairs, with strong odor; plants of drier habitats

Plants strongly rhizomatous; leaf bases cordate; heads broad; plants mostly of Ponderosa Pine and Douglas Fir forests ..... *A. cordifolia*

Plants tufted (with very short rhizomes); leaf bases attenuated or rounded; heads narrow; plants of stabilized rocky slopes and alpine scree slopes ..... *A. gracilis*

A.



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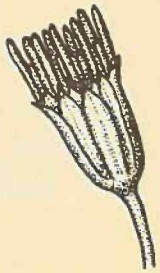
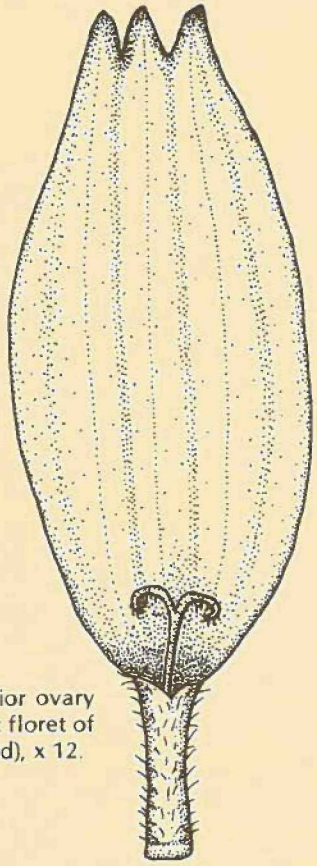


FIGURE 1. A. Typical *Arnica* head, x 1. B. Unopened *Arnica* head with involucral bracts, x 1.

A.



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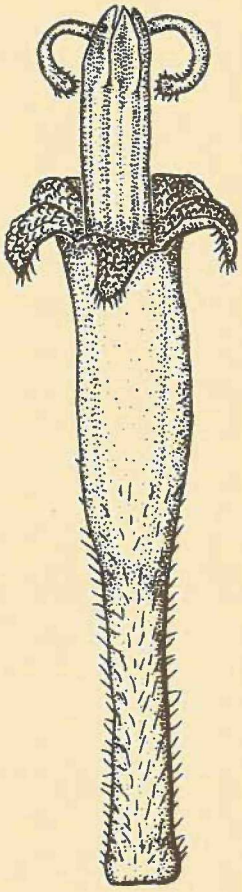
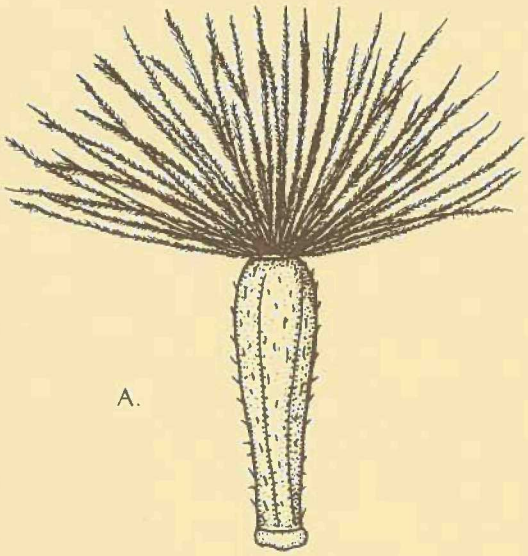


FIGURE 2. A. Ray floret of *Arnica* (inferior ovary and pappus removed), x 8. B. Tubular disc floret of *Arnica* (inferior ovary and pappus removed), x 12.



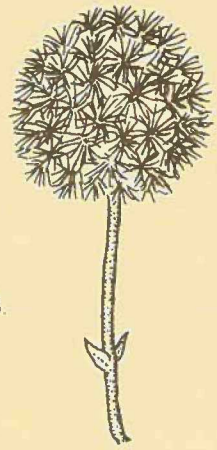




FIGURE 3. A. *Arnica* achene with attached pappus bristles, x 4. B. *Arnica* seed head, x 1.

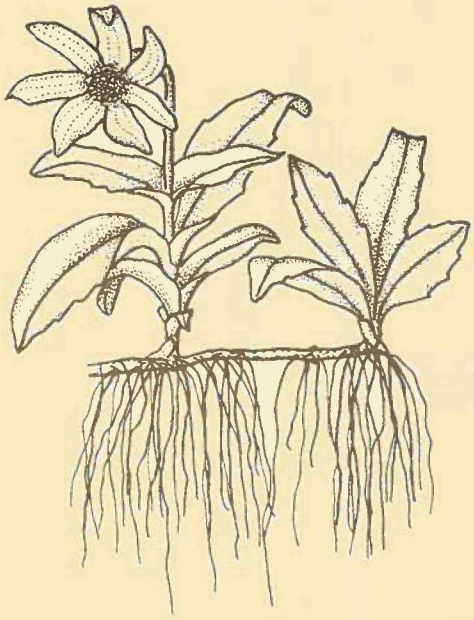


During the past four years I have collected most of the North American species, and have successfully grown many of them in cultivation. In addition to more scientific studies, I have also considered the value of both species and selected populations as garden subjects. Several have potential in the perennial garden, naturalized areas, or alpine rockeries. I have had little difficulty in transplanting most of the species. The root systems are usually relatively small, although it is difficult to get the soil to remain attached to the roots and rhizomes. I usually wrap the bare roots in moist sphagnum in plastic bags until the plants can be replanted. The tops of the plants invariably die back to the ground if transplanting is done while they are growing, but new shoots usually begin to grow soon after. In nature, most species begin to flower shortly after the snow has melted and they continue to flower for a few weeks. In cultivation, I have been able to keep many of them flowering throughout most of the summer by removing the heads (or even whole stems) before they go to seed.

Several of the alpine and arctic species have great potential as rock garden subjects, and deserve to be grown much more frequently than they are. As is typical of many alpines, they have very large heads compared to the size of the plant. *Arnica lessingii* and *A. louiseana* (Figure 4) from northern British Columbia both have long, lemon-yellow florets, and the usually solitary heads arch gracefully. These two are nearly stemless with a tight cluster of basal leaves, and the heads are held just above the leaves. They are very similar, except that *Arnica lessingii* has dark purple anthers while *A. louiseana* has yellow anthers. They both have short rhizomes, and they form neat compact little plants.

A somewhat more slender species with large, more erect heads is the circumpolar *Arnica angustifolia* (listed as *A. alpina* in many books). This species usually has narrow, densely hairy leaves. It is relatively easy to transplant, and forms nice clumps in the alpine garden. There are some very lovely examples in the UBC Native Garden and in the Devonian Botanical Garden of the University of Alberta. *Arnica lonchophylla* is a questionable species that is often considered to be a variety of *A. angustifolia*, but it has definite toothed leaves and is usually more robust. Whether a species or a variety, *Arnica lonchophylla* is rare in British Columbia, being more common in Alberta.

FIGURE 4. *Arnica louiseana*, x 1.





*Arnica gracilis* (Figure 5) is a smaller flowered species, forming very dense clumps from short rhizomes and with much-branched stems with many heads. This, too, has long been considered by some botanists to be a variety of another species, in this case *Arnica latifolia*. However, I find it easily separable in the field from *Arnica latifolia* and consider it to be a distinct species. It has very short glandular hairs on the leaves and stems, giving it a strong odor when bruised. *Arnica latifolia* lacks these glandular hairs and the odor. *Arnica gracilis* is a plant of scree slopes and rocky areas in the Rocky Mountains and, rarely, in the Cascade Range and other mountains in British Columbia. Populations that I have moved to the UBC Botanical Garden Nursery have continued to grow, and have produced great quantities of flowers for several years. It is a species preferring a well-drained, gravelly soil.

Similar to *Arnica gracilis*, but with darker orange flowers and forming larger clumps in alpine meadows and scree slopes is *Arnica rydbergii* (Figure 6). This species has not done as well in cultivation, but a few plants have continued to multiply and flower each spring. Some of the larger-headed forms of *A. rydbergii* should be selected and tried in alpine gardens. One of the distinctive features of this species is the presence of a strong mid-vein and two strong lateral veins on the lower stem leaves.

*Arnica cordifolia*, Heart-leaved Arnica, is the most widespread of the larger species in western North America. *Arnica cordifolia* and *A. latifolia* are the two species most often encountered in British Columbia. Stretches of bright yellow flowers along the roadside as one crosses Allison Pass on the Hope-Princeton Highway in May (or almost anywhere else in moderately dry forest east of the Cascades) are probably *Arnica cordifolia*. It often covers acres in open Ponderosa Pine and Douglas Fir forests, and is one of the first plants to colonize recently burned-over or cut-over areas. The heart-shaped leaf bases are the reason for its common name, and distinguish it from all other Arnicas in British Columbia. The leaves feel soft and sticky to the touch, because of the presence of both soft non-glandular hairs and sticky glandular hairs on the foliage. The "citrus-like" or "sagebrush-like" odor of the foliage is distinctive. The large yellow heads are either borne

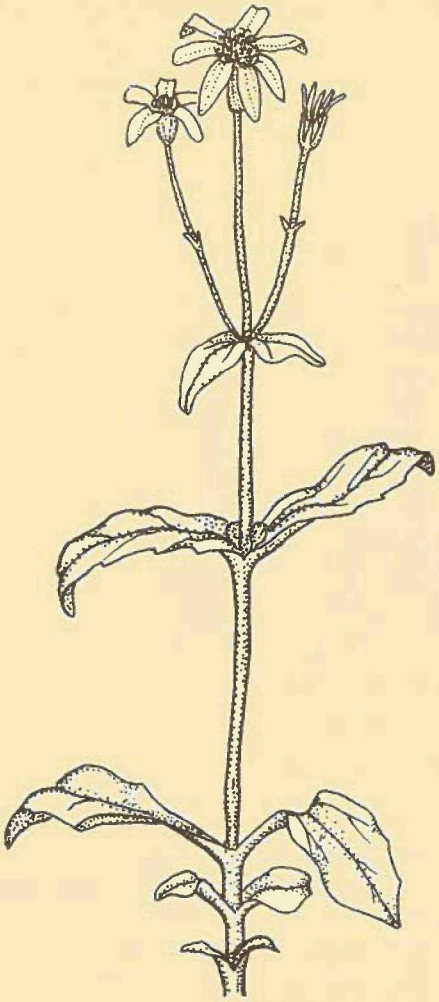


FIGURE 5. (left). *Arnica gracilis*, x 1.

FIGURE 6. (right). *Arnica rydbergii*, x 1.

singly or 3 or more on the flowering stems. *Arnica cordifolia* is readily transplanted if enough of the roots and rhizomes are lifted carefully, and if it is then moved to a sunny well-drained location. It usually produces long rhizomes so that a small clump planted in a garden can spread and could possibly become a little weedy. However, a yearly removal of some unwanted basal rosettes and rhizomes should keep the plant in bounds. Some of the dwarf forms of this species produce short rhizomes and may be better subjects for cultivation, since they have less tendency to spread.

Occasionally *Arnica cordifolia* grows in wetter habitats with *Arnica latifolia*, and the two species may then be confused. *Arnica latifolia* is usually leafier than *A. cordifolia*, and it lacks the cordate leaf bases and glandular hairs. The ray florets of *A. latifolia* are usually paler and their tips are more "squared-off" than those of *A. cordifolia*. *Arnica latifolia* is the most widespread and the most variable species of *Arnica* in British Columbia. It grows from the Coast to the Rockies, and ranges from very dwarf plants with only one head per stem in alpine meadows to robust broad-leaved forms with several heads per stem in moist shaded locations. This species has never done very well in cultivation. The plants grow well, but flower very poorly. However, there are some probable hybrid populations between *A. cordifolia* and *A. latifolia* that combine some of the best characteristics of both (Figure 7). They usually have a strong odor, very large heads with many heads per stem, short rhizomes, and they grow well in cultivation. They have continued to flower all season if the old heads are removed after flowering. The most notable examples of these suspected hybrids have been collected in western Montana and southwestern Oregon.

*Arnica chamissonis* is not only the most robust of our British Columbian Arnicas but also the most strongly rhizomatous. It is usually found growing in open wet areas. In my opinion, it is the only one of our native species that may be too weedy for cultivation in the perennial garden. However, it could be grown in containers, which would keep the rhizome growth in check. A similar, but usually less-rhizomatous, species is *A. amplexicaulis*. This species can usually be found in wet rock

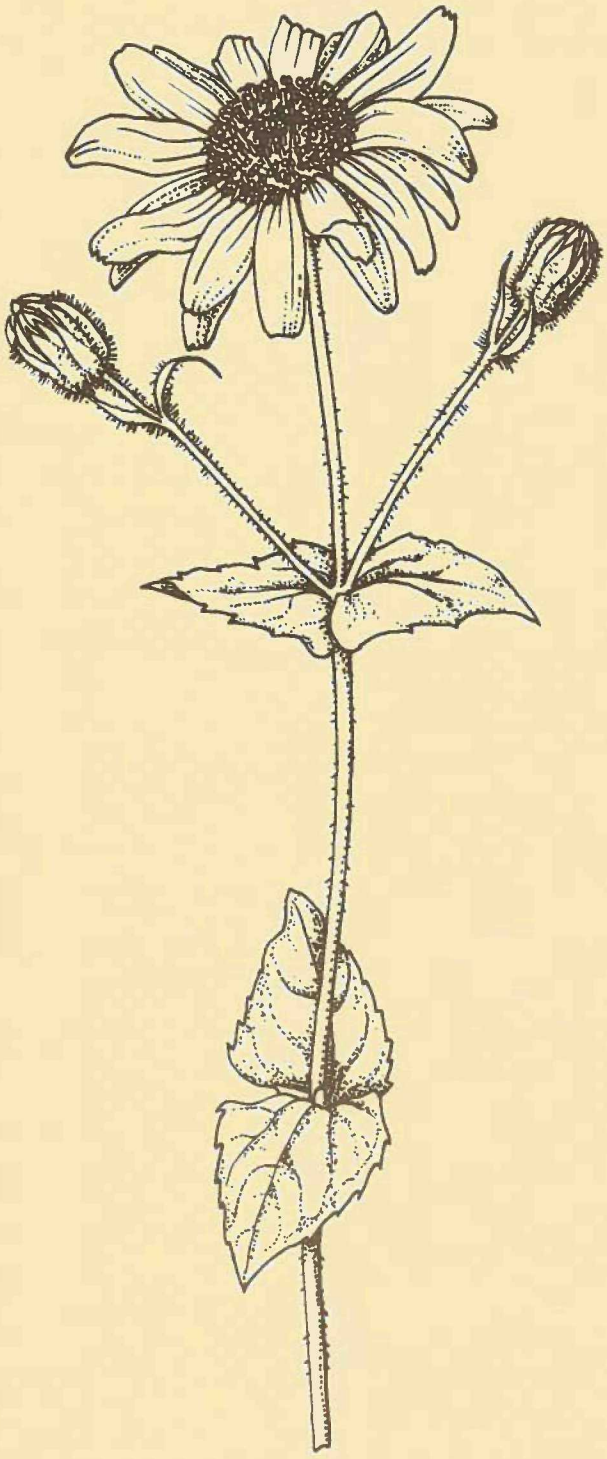


FIGURE 7. Probable hybrid between *Arnica cordifolia* and *A. latifolia*, x 0.9.

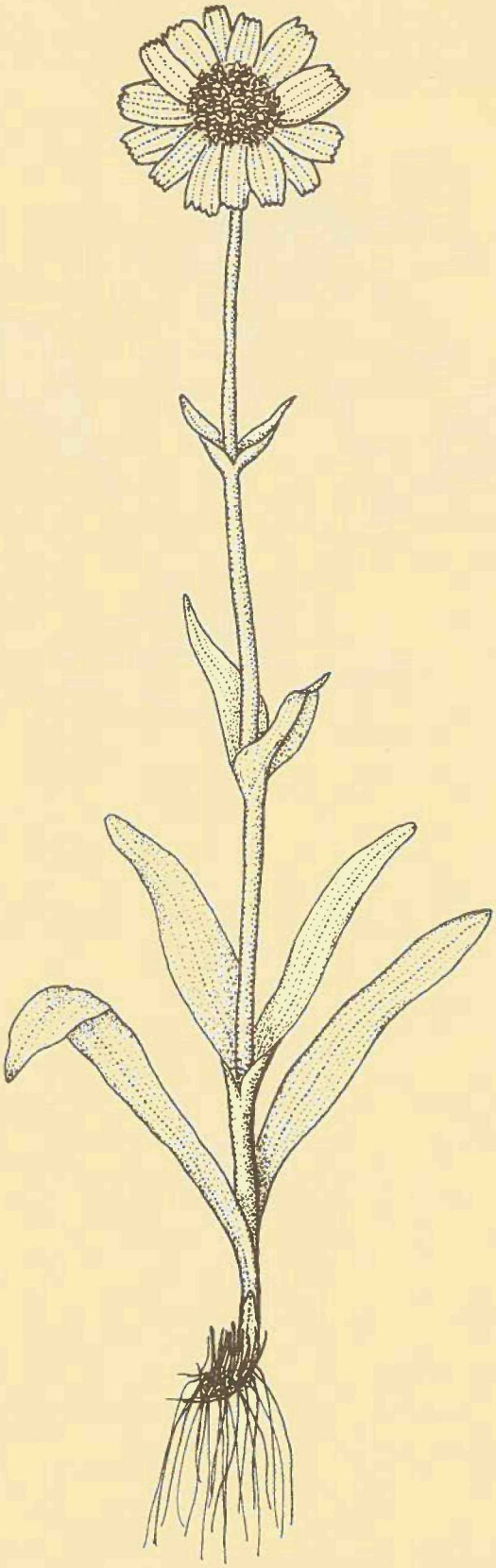


FIGURE 8. *Arnica fulgens*, x 0.75.

crevices, often where it receives sprays of water from a waterfall. It can be seen among the rocks of Little Qualicum Falls on Vancouver Island. *Arnica amplexicaulis* forms a pretty plant in cultivation with its much-branched stems, many heads, and long, toothed leaves.

*Arnica fulgens* (Figure 8) and *A. sororia* are similar species usually found in dry habitats. They are most abundant in the prairies or in sagebrush country in British Columbia. Both species are very slender, with narrow lance-shaped leaves, and one or more large, dark orange-yellow heads per stem. The two have been considered varieties of the same species by some authorities. *Arnica sororia* is usually the slenderer of the two. *Arnica fulgens* is characterized by dense tufts of brown wool on the rhizomes among the old leaf bases and roots. A few specimens of *A. fulgens* have been grown in the UBC Native Garden and the Botanical Garden Nursery. They have produced only one flush of flowers each spring, but these have been quite large and showy. They seem to grow well here on the Coast, provided that they have well-drained soil in a warm, sunny location.

My experience with *Arnica diversifolia* and *A. mollis* is that they grow less well in cultivation than the other species discussed above, although a few populations of *A. diversifolia* have grown moderately well in containers. A third species, *A. parryi*, has little use in the garden since its ray-less heads are the least showy of any of our British Columbian species.

FIGURE 9. Flowering and seed heads of *Arnica discoidea*, x 0.5. This species occurs from southern Washington to southern California. Discoid species of *Arnica* are less attractive than the radial forms and are of little merit in cultivation.



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# *Lysichiton americanum* Hulten and St. John

American Skunk-cabbage

RON LONG*

This impressive member of the Araceae (Arum family) deserves better than its common name. It draws admiration because of the brilliant yellow spathe and the enormous glossy leaves — or at least it would if it were not for the faint but distressingly exact odor of skunk about the stem and leaves. Some authors maintain that there is no similarity in the smell of the plant and that of its four-legged namesake. This opinion can only be attributed to the relative scarcity of skunks within the range of *Lysichiton americanum*. Anyone who has lived in eastern North America, where skunks are plentiful, will immediately recognize the smell. Other authors hopefully point out that the flowers are sweet-scented. If this is so, the sweetness is effectively masked by the other scent, which is increased if the stem or leaves are crushed or broken. But what winter-weary spirit does not receive a much-needed lift when, early in spring, the dank woods are illuminated by these softly glowing lanterns?



First to appear are the spadix and its golden hood, the spathe. The spadix is a thick spike bearing hundreds of minute flowers. The spathe is actually no part of the flower, but a bract or modified leaf, which, along with the foul odor, serves to attract pollinating flies. The spadix is at first enclosed by the spathe but later extends beyond it. The leaves appear shortly after and continue to grow long after the spadix and spathe have disappeared. When fully grown, Skunk-cabbage leaves are often larger than those of any other plant in our area.

The genus name is derived from the Greek *lysis*, a 'loosening', and *chiton* 'a cloak', a reference to the loose-fitting spathe, which is cast off. The specific epithet *americanum* means 'of or from America'. *Lysichiton* is so small a genus as to be almost non-existent, yet botanists cannot agree on whether one or two species should be recognized. There is not even agreement on the spelling of the names and so two spellings are current, *Lysichiton* and *Lysichitum*. Heinrich Wilhelm Schott (1794–1865) began the controversy by naming *Lysichitum kamtschatcensis*, a plant found along the east coast of Russia. Disagreement flared when, in 1931, Oskar Eric Hulten and Harold St. John published the description and name of the American species. The two plants are similar but the spathe colors are distinct. The North American species has a bright yellow spathe whereas the Asian species is white. Hybrids are found in gardens where both are cultivated together. Modern taxonomic techniques, such as a comparison of chromosome numbers, may eventually settle the issue.

The Skunk-cabbage, like other members of the Arum family, contains crystals of calcium oxalate, which cause a severe stinging sensation if any part of the plant is eaten raw. Yet Skunk-cabbage was an important springtime source of food to natives of both western American and eastern Russia. The closely related Taro was a staple in the diet of the Polynesians. It is interesting to note that such apparently widely separated peoples independently discovered that heating or drying removes the stinging properties of this family. Indians of the Pacific coast of America often found early spring a time of want and, of necessity, utilized every possible resource. Skunk-

* Ron Long, BioSciences Photographer, Simon Fraser, University, Burnaby, B.C. V5A 1S6

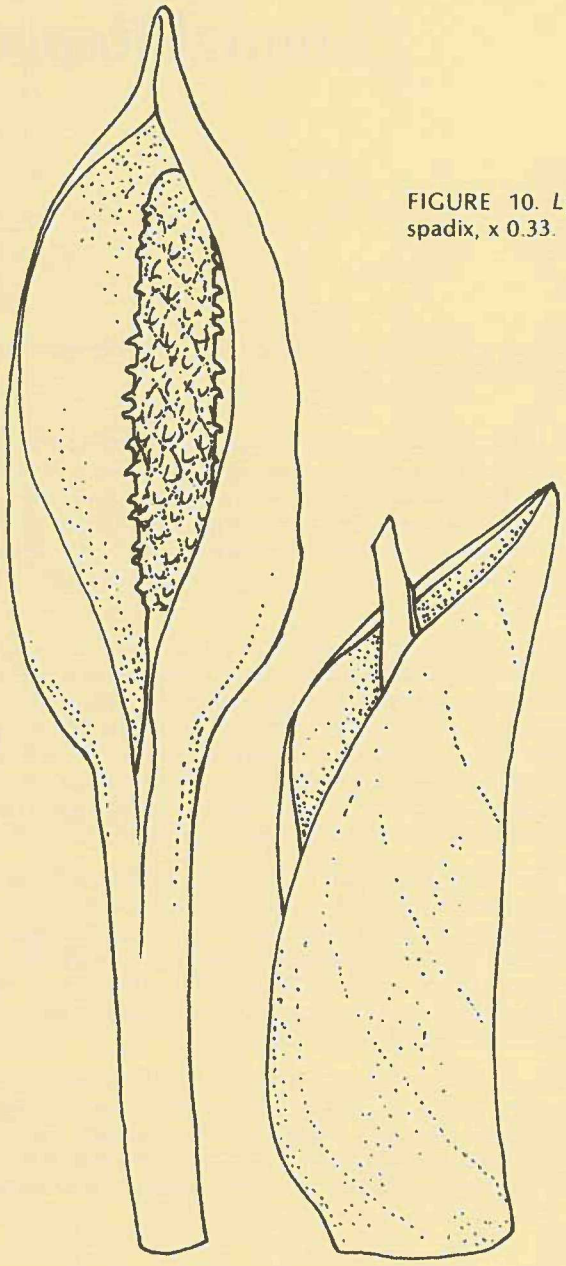


FIGURE 10. *Lysichiton americanum* spathe and spadix, x 0.33.



cabbage roots, dried and pounded, provided flour and the young cabbage-like leaves could be rendered edible by boiling in several changes of water.

On the 24th of May 1806 Meriwether Lewis noted in his journal — "the Polecat Colwort is in blume". He was referring to Skunk-cabbage, but the source of the name he used is obscure. It does not appear in any other reference and possibly Lewis coined it on the spot. Lewis, an easterner, would have recognized the smell. The derivation seems simple — polecat is another name for skunk; *cole* in Greek means 'a sheath' (the spathe?); and *wort* is Old English meaning 'a herb' or 'a plant'.

# Annual Report 1979

The following represents a summary of the Annual Report for 1979, a limited number of copies of which are available from the Office of The Botanical Garden.

*Introduction*

Nineteen seventy-nine was a year of upgrading and developing many of the partially completed areas within the Botanical Garden, made possible by the Capital Development money received in 1978. Special emphasis was placed on the upgrading and modification of some landscape elements around the Department of Anthropology building; new parking areas related to Cecil Green Park and Graham House; and the completion of a landscape linkage between the main campus and the Anthropology and Sociology Building. These new landscape features will help coordinate the upper campus Main Mall area with the extension of the academic facilities across Northwest Marine Drive.

The Asian Garden has continued to develop under the careful direction of Mr. Peter Wharton and Dr. John Neill. There has been excellent growth of rhododendron species in this area, which is to be formally opened in 1981. The area has been readied for the introduction of the new pedestrian underpass connecting the Asian Garden with the Main Garden, necessitated by the extension of a 4-lane boulevarded highway between the two areas. We will work closely with landscape architects on contract with the B.C. Ministry of Transport and Highways to ensure complementary landscaping of the roadside verges with the garden components, both along this road and along the 16th Avenue Extension between the Native Garden and the Natural Stand Forest area. The Asian Garden will eventually be completely closed and accessible only from the Main Garden area.



The final drawings were completed for the development of PHASE III of the main building, which will serve as a Public Information Interpretative Centre for the Main Garden area. It is anticipated that the construction of this centre will be completed by late summer 1980. A clean-up of the service yard area, the main entrance to the garden, and the completion of the Evolutionary, Systematic, and Economic garden areas will mean that the principal landscaping for the Main Garden will be completed by the end of 1980. These various developments will ensure that the Garden should be fully functional from a public point-of-view by 1981, and the long-awaited influx of visitors should take place at that time.

The Botanical Garden has continued to reach out to the public and to the academic community through the development of a number of programs. The continued success and development of the Garden would not be possible without a dedicated staff. We are fortunate, indeed, to have staff who care about the areas they curate and who work on development of their specialty collections in concert with the total development of the garden. As Director, I am pleased to acknowledge the excellent support I have had from the Botanical Garden staff during 1979.

*Research Activities*

The major research program on the control of erosion of the Point Grey cliffs continued under the direction of Dr. C.J. Marchant. On-site surveys were carried out during 1979 to record survival rates, degree of vigor, annual growth increment, and re-seeding and sand-binding capabilities of plant materials. Work continued in maintaining and updating the important photographic record of the planting sites and of various overseas cliff erosion projects that may provide an appropriate model for a major engineering and vegetational control scheme at Point Grey. There was severe damage to the vertical upper cliffs in January 1979, caused by a period of unusually prolonged and heavy frost, which resulted in slabbing of massive blocks of frozen sand that then crashed down onto the talus slopes beneath and even to beach level. This caused damage to two of the planting sites, resulting in replanting of extensive areas later in the year. Results from 1979 show that approximately 50% of the downward sand movement on the planted talus slope has been arrested, and there is about 80% cover of all planted sites.

The living tropical and temperate fern collections are increasing in variety and vigor as accessions continue and cultivation techniques improve through innovative experimentation. Success has been achieved with

many notoriously difficult species. A fern courtyard of temperate Pteridophytes was planted in the Bio-Sciences Building Courtyard as a permanent teaching aid.

The Botanical Garden continued to provide leadership in the research on rare plants of British Columbia. Additional meetings were held by the B.C. Rare and Endangered Species Committee, and the accumulation of data is nearing completion.

Trials were conducted on summer propagation of various woody plants in a specially constructed, sealed plastic tunnel.

*Collections*

Much time was spent during 1979 in arriving at a satisfactory plant collection policy for the garden components and the garden as a whole, so that a systematic and logical sequence of inclusion of new material could be developed.

The plant collections continued to be expanded to meet present and future needs for academic teaching and research progress. There are now a total of 10,967 records in the master file. Approximately 1600 plants were added to the E.H. Lohbrunner Alpine Garden; 3880 plants, including 450 rhododendrons and 160 trees and shrubs, were added to the Asian Garden, which will eventually house one of the world's largest collections of rhododendrons and azaleas; approximately 800 plants were added to the B.C. Native Garden; and approximately 600 plants in 74 species were added to the Physick Garden. In the main Rose Garden, 217 cultivars of 83 varieties were planted, including 75 of the newest varieties from the British Isles and Germany, and 24 cultivars of 24 varieties were added to the rose display in Cecil Green Park. Approximately 500 trees and shrubs were planted in the relandscaping at the Museum of Anthropology and adjacent areas, including 40 large hemlocks at the Museum entrance. Additional perennial beds were planted at the Office and Educational Centre, and the heather border was extended by the addition of 85 more varieties. An experimental vegetable garden made up entirely of raised planters was constructed next to the greenhouses at the Office. This project was highly successful, the design proving to be particularly useful for handicapped persons and for those people having only a small gardening area.

The Nursery continues to represent the focal point for the propagation and development of new plant material for the Garden programs. Approximately 13,000 plants were dispatched to various Garden components, and plant material was also sent to several outside institutions, including 4000 heather plants in 31 taxa to the Pacific Vocational Institute near Vancouver for teaching and display purposes. The new propagation facility and work area was completed during 1979. Two new greenhouses provide propagation and growing-on sections, and a winter storage area has been erected for hardening-off propagated material. The academic service role of the Garden is emphasized by a cooperative agreement signed with the Department of Botany, which made available research space in the propagation facility in return for the provision for some funds for the construction. The Nursery is now maintaining four separate research projects for the Botany Department, a collection of forest tree seedlings for the Faculty of Forestry, and growing on a collection of *Araucaria araucana* seedlings from several sites in South America.



The third field day for the B.C. Nursery Trades Association, the B.C. Society of Landscape Architects and representatives of various Lower Mainland parks departments was held in July. A total of 811 plants in 10 taxa were propagated specifically for introduction to the commercial nursery trade.

One significant aspect of the Botanical Garden's importance as a source of new plant material for commercial interests in the province was the development of the All-America Selection Display Garden in the Main Garden area. This garden contained 1430 annuals in 106 taxa, and presented new, award-winning varieties to the public and the industry.

*Major Publications*

The Botanical Garden continued to publish its quarterly journal *Davidsonia*. Of particular interest in this year's issues were an article on insectivorous plants of British Columbia, and the winning entries in two categories of "Graphica Botanica", an art contest sponsored by the Graduate Students' Association of the UBC Department of Botany.

Three technical bulletins were produced: *Gardening as Therapy (Summer Season)* by Margaret Coxon and David Tarrant; *Phenology of Cultivated Rhododendrons in the Lower Mainland of British Columbia* by Dr. L. Keith Wade, Research Associate of the Botanical Garden, with the generous assistance of members of the Vancouver Chapter of the American Rhododendron Society in the collection of data and in the provision of a grant toward the cost of publication; and *Plantae Occidentalis: 200 Years of Botanical Art in British Columbia*, published to coincide with the opening of the art exhibition of the same name.

*Library*

The library continued to add to its holdings, with 21 new journals being added to bring the total number of publications received to 211. A total of 94 books were accessioned into the library, 41 of which were donations. This total does not include a large donation of 161 books and publications received from Dr. T.M.C. Taylor, a former head of the UBC Department of Botany, because discussions are still taking place with other libraries on campus regarding their accepting some of the botanical books and all of the zoological and general publications included in the donation. The reprint collection was increased by the addition of 90 reprints, 37 of which were of direct horticultural interest. A total of 440 35 mm slides were accessioned into the Botanical Garden collection.

*Education Programs and Public Service*

The Botanical Garden continued to expand the number of educational programs offered in horticulturally related classes and workshops. Eighty-seven classes, comprising 823 students and 242 contact hours, were provided for both amateur and professional groups.

Continued progress was made during the year in the general development of the horticulture as therapy program. In the summer, a follow-up symposium was held to determine the impact of the original Horticulture as Therapy Symposium held in March 1978. Indications are that many of the professional groups that attended the first symposium have now initiated and developed new programs of their own in the hortitherapy field. The Botanical Garden is gradually becoming a resource centre for hortitherapy rather than being responsible directly for individual programs. Horticultural workshops were held in the Garden for patients from an Extended Care Unit at UBC, using the hortitherapy greenhouse facilities. The Garden also participated in the academic training of occupational therapists in conjunction with the UBC School of Rehabilitation Medicine.



Botanical Garden staff gave 36 talks and lectures to various clubs, garden societies and professional organizations, in addition to approximately 30 lectures during a ten-day period at the Vancouver Home and Garden Show.

The Garden's guided tour program continued to serve both professionals and the general public. Fifty-five tours, involving 1518 participants, were conducted through the various garden components. The Nitobe Memorial Garden was visited by approximately 70,000 people during the year, a ten percent increase over 1978 attendance.

Two staff members participated in numerous radio and television programs during the year, as well contributing a weekly gardening column in a local newspaper. The Canadian Broadcasting Corporation (CBC) filmed a 12-part series, tentatively called "Gardening in British Columbia", for showing in 1980. The series will feature aspects of the Botanical Garden in each show, and Mr. David Tarrant, the Education Coordinator, worked closely with the host and producer of the show in its development and filming stages.

During the year, 4978 public enquiries were received and responded to either by telephone, letter, or in person.

The Garden and the UBC Centre for Continuing Education combined resources to provide a four-week field study tour of gardens and nature reserves in southeast Asia in June and July, and a two-week tour of botanical gardens in Hawaii in the winter.

*Friends of the Garden*

The volunteer 'Friends of the Garden' continued to play an important role in many aspects of the Garden's activities. There are presently 34 members in the program. They conducted 24 tours of the Nitobe, Alpine and B.C. Native components of the Garden, comprising 934 people and 28 contact hours. In addition, the volunteers continued to provide much-needed assistance in established Garden programs, such as the Seed Exchange Program and the setting-up and staffing of the Garden's display at the Vancouver Home and Garden Show. In September, the Friends organized the third Botanical Garden Plant Sale for UBC students and staff. Approximately 7200 plants were sold during the four-day period, nearly 1600 more than in 1978.

One of the major events undertaken by the Garden during 1979 was the art exhibition "Plantae Occidentalis: 200 Years of Botanical Art in British Columbia". This comprehensive historical exhibit was the culmination of three years of research and development by the Art Committee of the Friends of the Garden, and could not have been accomplished without their generous enthusiasm, hard work and dedication.

*Special Employment Programs*

A Young Canada Works Program allowed the employment of three students from May to September 1979. The work included: research into the propagation of proposed new plant introductions from the Garden collections to determine the most economic and feasible method of production; researching and writing the history of the original Arboretum at UBC, and mapping the plants currently in the remaining parts; and mapping and labelling new tree and shrub plantings in the Asian and Main Garden areas. A Youth Employment Program of the Provincial Government allowed the employment of one student to work on the Rare and Endangered Species of British Columbia Program.

*Professional Associations*

The Garden continued to provide leadership in several areas through the participation of staff members in executive or committee positions in various professional, university and community organizations. The Director was the leader of the official Canadian Delegation to the XIVth Pacific Science Congress in Khabarovsk, USSR, and was appointed to the Overseer's Committee of the Arnold Arboretum of Harvard University.

*Summary*

The Botanical Garden has continued to achieve excellence of its plant collections and garden developments during 1979. This has been possible through the concerted efforts of a dedicated staff, and through support by the President's Office for the Garden program on campus.

I cannot overlook the need for a major infusion of operating funds to meet the capital development of the past several years. Much of our development has been made possible by the infusion of capital grant funds, but these programs can only be successfully operated if staff positions and corresponding operating expenses are made available in the operating budget. It is my hope that a special allocation will be made to the operating budget to effect the successful maintenance of the capital developments that have now been completed.

We anticipate that, as the plant collections mature and programs are completed, we will provide even greater service to both the University community and the community at large in the area of horticulture. We are pleased to be able to meet these new challenges and look forward to continued success in the development of the Botanical Garden programs.

Roy L. Taylor
Director

# The Dorothy Hansell Award

The Botanical Garden was very pleased to receive the Dorothy Hansell Award in April at the Annual Meeting of the American Association of Botanical Gardens and Arboreta held in Atlanta, Georgia. The award was presented for the publication *Plantae Occidentalis: 200 Years of Botanical Art in British Columbia*, which was described in the citation as being "visually beautiful and in keeping with the standard of excellence for which Dorothy Hansell stood". Dorothy Hansell was the editor of the New York Botanical Garden's Garden Journal, the Newsletter and Bulletin of the Holly Society of America, the American Bonsai Society Journal, and the AABGA Bulletin.

FIGURE 11. Ms. Susan Johnston (left), editorial assistant for *Plantae Occidentalis*, holds the Dorothy Hansell Award that is held by the Botanical Garden for one year. Miss Susan Munro (right), author of the ethnobotanical section in the book, holds the plaque that is to be kept permanently in the Garden.

# Book Reviews

Trees and Shrubs for Western Gardens. Gordon Courtwright. 1979. Timber Press, P.O. Box 92, Forest Grove, OR 97116. 239 pp. $42.50 (U.S.)

The statement on the Contents page, *"This book is intended to be a visual plant dictionary"*, is particularly appropriate. Each plant is illustrated in color and is briefly described. It should be most valuable to the homeowner selecting the right plant for a given situation, and to the nurseryman catering to self-service customers.

Gardeners in the Pacific Northwest and southwestern British Columbia should pay particular attention to the hardiness ratings as plants useful in northern California but not hardy further north are included. Canadian readers who have become accustomed to the Sherk and Buckley ratings, where a rating of 8 is normal for Vancouver and Victoria, will find that many plants listed as 8 (Wyman version) would not be satisfactory.

Descriptions are minimal, but the plants are illustrated according to size and listed according to characteristics or suggested use. A unique feature is the planting guide. Each plant is listed as suitable for one of five situations dealing principally with exposure and moisture requirements. One good feature is that most illustrations are of the whole plant — too many references show only close-up pictures of leaves, flowers or fruit. Some of the illustrations are disappointing, but it is valuable to have them shown in real situations.



The Botanical Index is sufficiently complete and accurate for the nursery trades and homeowner.

This publication does not qualify as a textbook, but it is a useful addition to the list of references.

Dr. John W. Neill
Director, Landscape Architecture
Department of Plant Science, UBC

Plants in Danger. Edward R. Ricciuti. 1979. Illustrations by Ann Zwinger. Harper & Row, Publishers, 10 East 53rd Street, New York, N.Y. 86 pp. $8.95 (U.S.)

This book is written for children age 12 and up, providing a discussion of the ways in which plants are threatened by natural and unnatural events, and how this destruction can be halted.

The first chapter explains the problem — 20,000 plants are endangered world-wide, more than 300 species have already disappeared in the United States and just under 2000 species have been classified as in immediate danger or likely to become endangered in the same country. This is followed by a chapter detailing the importance of plants to man, with a discussion of photosynthesis, oxygen production and carbon dioxide usage, the colonization of land by plants, and the importance of fruits and plants as food. The third chapter is concerned with the war against plants — burning, air pollution, changes in drainage, and the loss of soil after the removal of the vegetation.

Examples of endangered plants are given in three chapters entitled "The Last Forest Giants and Other Threatened Trees", "The Strange and The Beautiful", and "The Disappearing Desert Dwellers". In each case, the reason for the threat is detailed, whether it be disease (often imported into the country), collection by dealers and botanists, or the importing of "foreign" plants into previously isolated areas, such as Hawaii. The final chapter explains how the endangered plants may be saved, and the steps that are needed. The author includes a brief discussion of the way in which botanical gardens, universities, and research institutions can play an important role by propagating and growing rare species so that specimens will survive even if they disappear in the wild.

The book is well illustrated with black and white line drawings on the margins of many of the pages. There is also a reading list for those who may wish to read more deeply into the subject.

The author, formerly Curator of Publications for the New York Zoological Society, has written an excellent book on an often-neglected area for the young reader. Hopefully, this book will make many teenagers aware of the danger to plants.

Botanical Dermatology. Plants and Plant Products Injurious to The Skin. John Mitchell and Arthur Rook. 1979. Greenglass Ltd., 691 W. 28th Avenue, Vancouver, British Columbia. xiv + 787 pp.

This is an exceptionally well-documented and well-researched book on skin injuries caused by plants. It includes historical reviews of contact dermatitis and epicutaneous testing, as well as a table of reports of adverse reactions from the 28th century B.C. to 1900. The main text contains reports on reactions caused by 1405 genera and thousands of species in 248 families.



The book is directed towards dermatologists, but also has applications for those who receive queries from the public about injurious, or possibly injurious, plants.

However, I have reservations as to its ease of access for a non-botanist. The main part of the book (pp. 49–728) consists of 'An Alphabetical Listing of Plant Families and Genera', in which the genera are listed alphabetically within their family — the authors make it quite clear in the Contents listing that one has to know the botanical (Latin) name of the plant. The index appears to include every genus (but not species) mentioned in the book. The problem seems to be that patients and/or doctors are more likely to know the common name of a plant, so that the dermatologist has to have the ability to determine the Latin name of that plant before this book can be used.

The design of the book can be disconcerting — small type and two columns per page with the columns separated by the minimum of space (often only one or two letter widths), plus the fact that the lines are not right justified so that they are all of differing lengths. The book has the appearance of photographic reproduction and reduction from a typed manuscript, but insufficient attention has been paid to layout and proof-reading. Many items are misplaced, both in the text and in the references, and many errors in spelling exist, for instance, Altismataceae instead of Alismataceae, *Magifera* for *Mangifera*, and *Lacnanthes* for *Lachnanthes*. In addition, many lists of references are not alphabetical, although they are supposed to be. Finally, the spine and title page indicate that the publisher is "Greengrass", but the copyright page has "Greenglass Ltd".

This is apparently the first book to attempt to draw together all published reports on plants and plant products injurious to the skin. There is no doubt that it has been a gigantic undertaking, in which every report, no matter how insignificant, has been included. In spite of some reservations regarding style and layout, the comprehensive information contained in this book makes it a highly desirable reference for all libraries, as well as for many personal collections.

Sylvia Taylor
UBC Botanical Garden

# Botanical Garden News and Notes

*Assistant Director Appointed* — Mr. A. Bruce Macdonald, Senior Lecturer in Nursery Practice at Hadlow College of Agriculture and Horticulture at Hadlow, Tonbridge, Kent in England, has been appointed Assistant Director of the Garden as of August 1st 1980. Mr. Macdonald is a graduate of the University of London and has had practical experience at such well known nurseries as Sunningdale Nurseries, Ward's Nurseries and Highland Water Gardens in Great Britain. He has had work experiences also in southern France and at the Central Experimental Farm in Ottawa and, for a period of time, worked as Assistant Liaison Officer and Experimental Officer in Nursery Stock production at the Glasshouse Crops Research Institute, Littlehampton, Sussex. He also acted as horticultural consultant with Lugg and Gould Ltd., Agricultural Management Consultants in Warwick. For the past ten years Mr. Macdonald has participated in the Horticultural Training Programs at Hadlow College. He has published widely on propagation techniques and has recently served as Honorary Secretary of the Great Britain and Ireland region of the International Plant Propagators Society. We are particularly pleased to welcome Bruce on our staff here at the University of British Columbia and look forward to an active program with the Nursery Trades Association and in horticultural training through Bruce's activities. We also look forward to having Bruce, his wife Liz and their two children as a part of the Botanical Garden family.

*New Nursery Manager* — Mr Charles Tubesing assumed his position as Nursery Manager earlier this year. Mr. Tubesing is a graduate of Purdue University, West Lafayette in Indiana, majoring in Horticulture. After graduation he was appointed as propagator at Missouri Botanical Garden, and also taught extension courses in plant propagation. He is a member of the International Plant Propagators Society. Charles is particularly interested in the propagation, evaluation and introduction of hardy landscape plants. We welcome Charles and his family to Vancouver and the Botanical Garden.



*Summer Employment Program* — The Botanical Garden was awarded grants for three Summer Youth Employment students to work on the development of display labels for the various established components of the Botanical Garden. The students have been checking the accession records and the plants in the garden and are performing a valuable public service program for the Botanical Garden. In addition, the students participated in the recent Botany 80, a joint Canadian/American Botanical Societies conference, and the International Conference on Systematic and Evolutionary Biology, which were held at the University during July. A fourth student, Michael Hauner, is completing a survey of potential genera for inclusion in our Evolutionary and Systematic Garden, and preparing the base landscape plans for this program. The Evolutionary and Systematic Garden contouring and landscape layout has been completed under contract this past spring and currently the area is being readied for foundation plantings by having cover crops grown and ploughed under on the site to improve the soil quality.

*The Friends of the Garden Program* — New members will be starting a special training program in September. We look forward to having these new members participate in the Friends' Garden program. Mr. David Tarrant, Educational Coordinator, has been appointed Director of the revised program for the Friends of the Garden.

*New Walking Self-Guided Tree Tour of Campus Completed* — A walking tour of trees in the main campus area was compiled as part of the University program for the Botany 80 Conference held at UBC during July. Students from the Botanical Garden worked on this program and the maps are now available through the Botanical Garden. One hundred and seventy different trees and shrubs have been labelled and indicated on the map of the campus. Many of these trees and shrubs represent original plantings initiated by Professor John Davidson during the course of the development of the Arboretum near Vanier Park residences. Both the botanical and common names are given on the labels, which were produced by the Botanical Garden and installed on the trees prior to the initial walks launched during the Botany 80 Conference.

*Botanical Garden Courses Offered Through The Centre for Continuing Education For Fall 1980* — The following courses are being offered at the Botanical Garden:-

WE 3587-480. October 4 1980. Trough Gardens. James MacPhail.

WE 3594-480. October 4 1980. Herb Gardening for Gourmets. Section 1. Marguerite Hardin.

WE 3596-480. October 7 and 12 1980. Edible Mushrooms of the Pacific. David Zittin.

WE 3593-480. October 8-29 1980. Herbs: A Four-week Comprehensive Course. Marguerite Hardin.

WE 3595-480. October 18 1980. Herb Gardening for Gourmets. Section 2. Marguerite Hardin.

WE 3592-480. October 18 1980. How to Turn On Your Bulbs: Planting for Christmas and Spring. David Tarrant.

WE 3586-480. October 25 1980. Choosing Trees and Shrubs for Fall Colour. Peter Wharton.

WE 3502-480. October 25 1980. Propagation of Evergreen Shrubs for the Home Gardener. Bruce Macdonald.

WE 3503-480. October 28 1980. Enjoying Birds. Al and Jude Grass.

WE 3597-480. November 1 1980. Flower Arranging Using Winter Foliage. David Tarrant.

WE 3598-480. November 1 1980. Ferns for House and Garden. Christopher Marchant.

WE 3591-480. November 8 1980. Workshop on the Care of Houseplants. David Tarrant.

WE 3599-480. November 15 1980. Winter Flowering Shrubs. Gerald Straley.

WE 3589-480. November 22 1980. Fruit Tree Pruning. Section 1. Kenneth Wilson.



WE 3590-480. November 29 1980. Fruit Tree Pruning. Section 2. Kenneth Wilson.

WE 3588-480. December 13 1980. Christmas Decorations. David Tarrant.

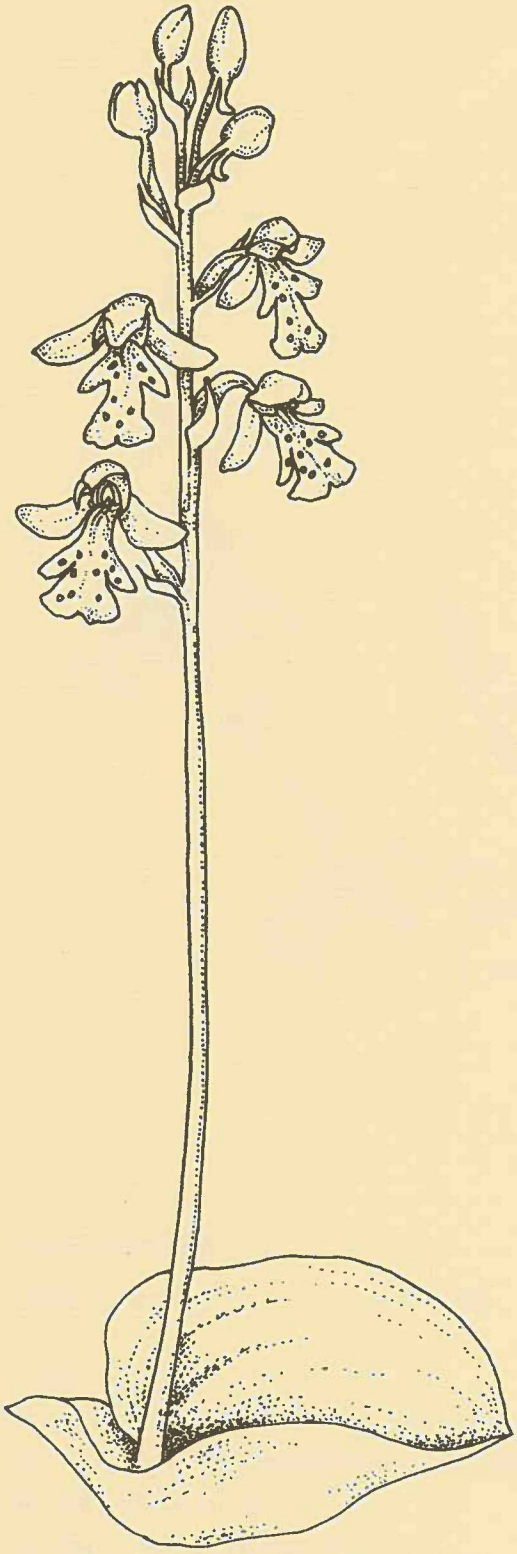
In addition to the above courses, David Tarrant will be leading a garden tour to the West Indies from January 28th to February 11th, 1981.

For further information on any of the above courses, please contact the Centre for Continuing Education at UBC (telephone: 604-228-2181, local 219).

# Climatological Summary*

| *Data* 1980 | APRIL | MAY | JUNE |
|---|---|---|---|
| Average maximum temperature | 13.9°C | 15.0°C | 16.7°C |
| Average minimum temperature | 6.6°C | 4.1°C | 10.9°C |
| Highest maximum temperature | 21.5°C | 21.2°C | 12.7°C |
| Lowest minimum temperature | 2.4°C | 4.1°C | 9.0°C |
| Lowest grass minimum temperature | -2.2°C | 0.0°C | 5.6°C |
| Rainfall/no. days with rain | 75.2 mm/15 | 70.7 mm/17 | 68.2 mm/16 |
| Total rainfall since January 1, 1980 | 451.9 mm | 522.6 mm | 590.8 mm |
| Snowfall/no. days with snowfall | 0 | 0 | 0 |
| Total snowfall since October 1, 1979 | 10.6 cm | 10.6 cm | 10.6 cm |
| Hours bright sunshine/possible | 193.5/404.0 | 182.1/468.0 | 187.7/482.2 |
| Ave. daily sunshine/no. days total overcast | 6.2 hr/2 | 5.9 hr/4 | 6.3 hr/3 |

**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*



*Amerorchis rotundifolia*, Round-leaved Orchis, a summer-flowering Ground Orchid found in the Interior of the province. This monotypic genus is known only from North America.

# Botanical Garden Staff

*Director*
Dr. Roy L. Taylor

*Assistant Director**
Mr. A. Bruce Macdonald (effective August 1 1980)

*Research Scientist (Cytogenetics)*
Dr. Christopher J. Marchant

*Research Scientist (Horticulture)*
Dr. John W. Neill

*Research Technicians*
Mrs. Annie Y.M. Cheng
Mrs. Sylvia Taylor

*Secretaries to the Office*
Mrs. Pam Morgan Robin, Secretary
Mrs. Gwynneth M. Quirk, Receptionist

*Plant Accession System*
Mrs. Marie T. Shaflik

*Education*
Miss Margaret E. Coxon
Mr. David A. Tarrant
(Education Co-ordinator)

*Horticulturists*
Mr. A. James MacPhail (Alpine Garden)
Mr. Allan A. Rose (B.C. Native Garden)
Mr. Charles E. Tubesing (Nursery)
Mr. A. Peter Wharton (Marine Drive Garden)

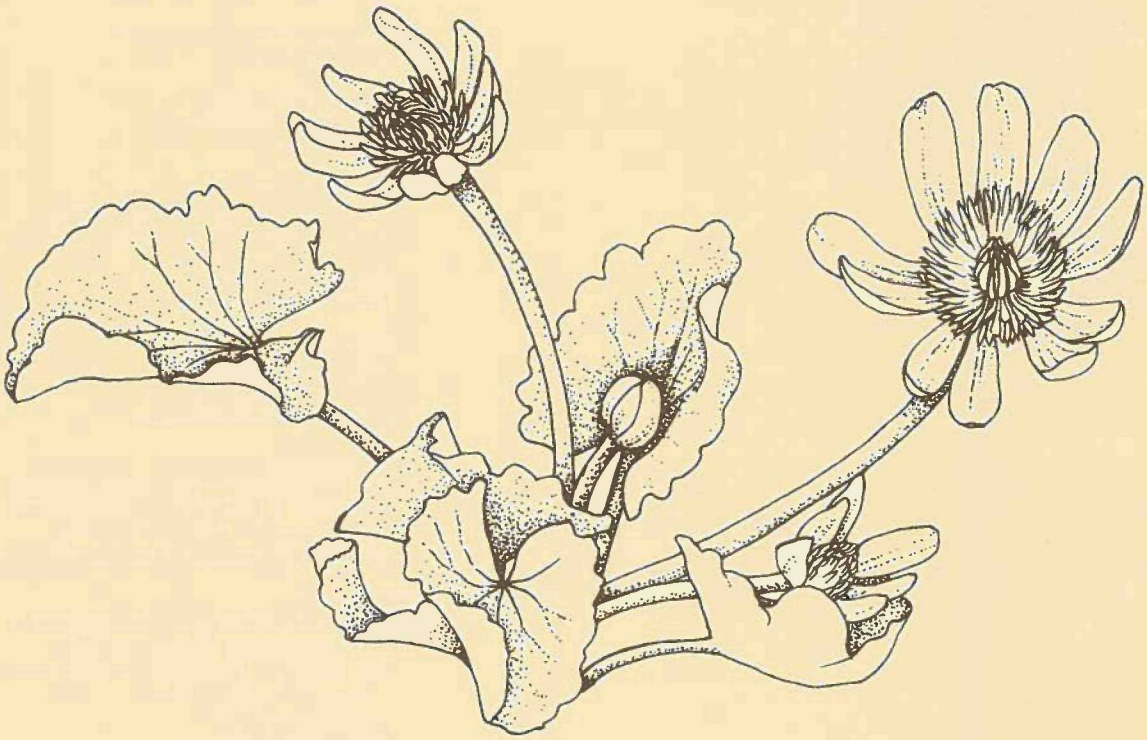
*Gardeners*
Mr. P. Joseph Rykuiter, Head Gardener
(Area Manager, South Campus)
Mr. Ronald S. Rollo, Sub-Head Gardener
(Area Manager, Nursery)
Mr. Harold Duffill
Mr. Leonard Gibbs
Mr. Kenneth W. Hadley
Mr. Murrary J. Kereluk
Mr. Paul Kupec
Mrs. Bodil Leamy
Mrs. Elaine V.M. Le Marquand
Mr. Douglas B. McEwan
Mr. Sam M. Oyama
Mr. Collin R. Varner
Mr. Isao Watanabe
Mr. Thomas R. Wheeler

*Research Associate*
Dr. L. Keith Wade

*Special Summer Student Programs*
Mr. Ian R. Arbuckle
Mr. Timothy D. Bacon
Mr. John C. de Wolf
Mr. Luca Michele Hauner
Miss Wendy E. Oberlander
Miss Debra J. Pack
Miss Jennifer J. Sherlock

* Previous incumbent, Mr. Kenneth Wilson, retired as Supervisor of Operations on February 29, 1980.

*Caltha leptosepala* var. *biflora*, Two-flowered White Marsh-marigold, a common plant of wet subalpine meadows. The flowers are usually borne two per stem, and the petals are white tinged with blue at the base and on the back.



DAVIDSONIA

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