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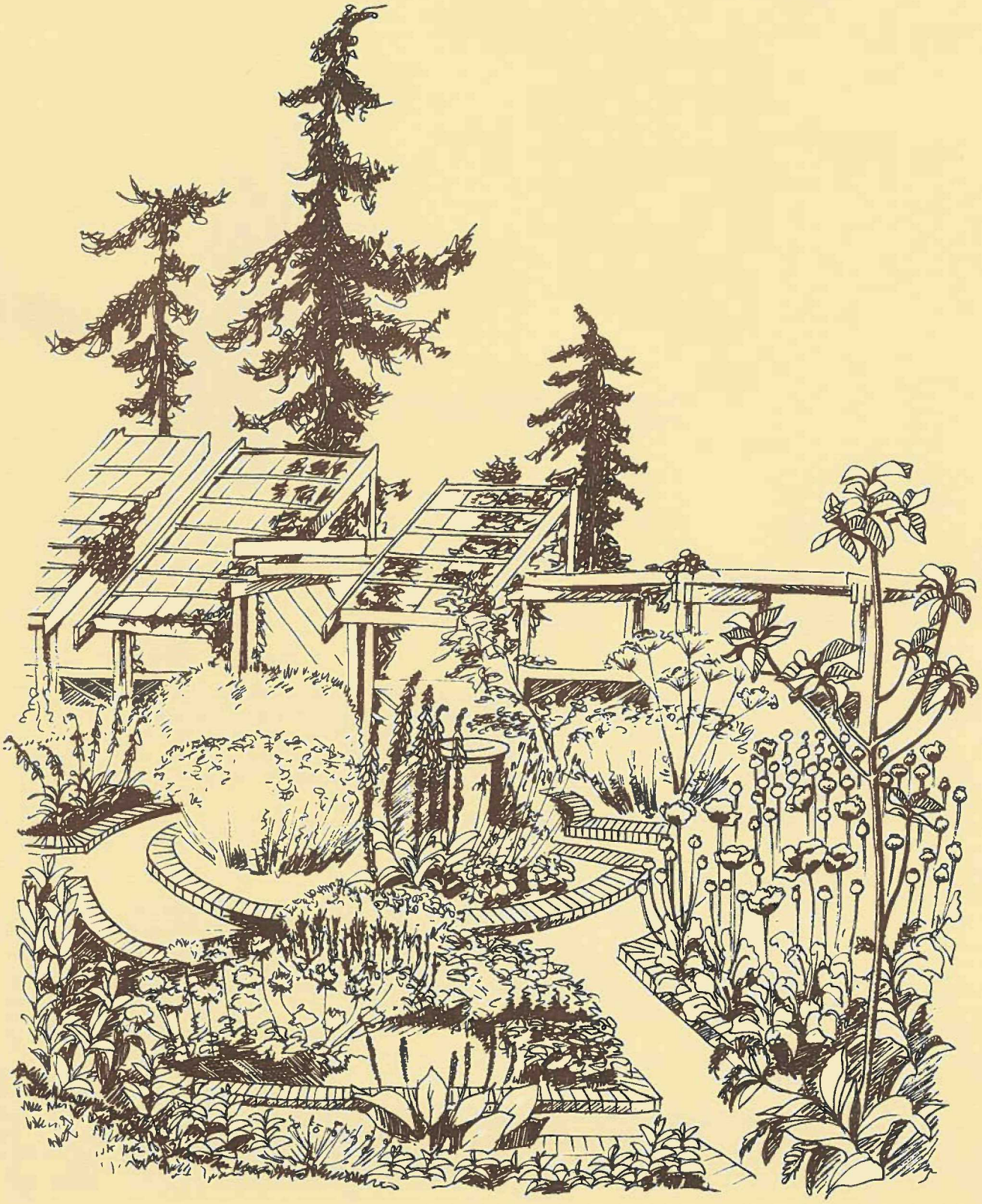
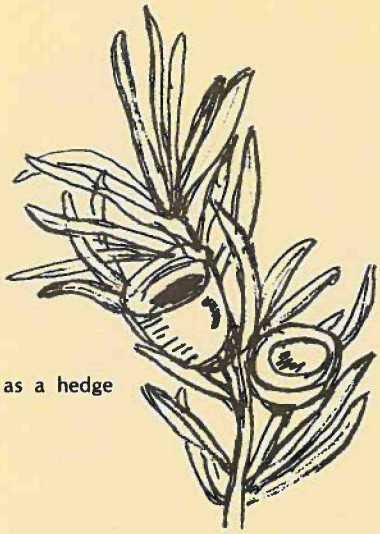


Cover:
The Physick Garden at UBC, with the Arbor Garden in the background.



Taxus baccata, English Yew, is used as a hedge around the Physick Garden, × 1.0.

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The Physick Garden at UBC

BABETTE GOURLAY and RACHEL MACKENZIE*

Down through the ages, man has discovered that certain plants or their parts could cure or alleviate the ills of his body. One can imagine Eve brewing a Hyssop tea to soothe Adam's aching back. Legend tells us that Paris first saw Helen of Troy when she was digging Elecampane roots in the palace garden. The biblical singer in the Song of Solomon lists fragrant healing plants — Spikenard, Camphor, and Aloes — as a simile for love.

At first men only gathered healing plants, later they began to cultivate them, and to keep written records of the knowledge as it accumulated. In Greece, 500 years before Christ, the *Treatises of Hippocrates* initiated the separation of medicine from religion. Hippocrates was followed by Theophrastus, who compiled *Researches about Plants, Principles of Vegetable Life*. In the first century A.D., Dioscorides, a Greek who served as a physician to the Roman armies and collected plant information from many countries, included much new knowledge in his *Materia Medica*. That same century, Pliny the Elder compiled his *Natural History*.

After the classical period, the civilized world entered into the Dark Ages, during which the church kept the lamp of learning alight. Ancient Greek and Latin manuscripts were stored in monastery libraries, where the monks copied them laboriously by hand, and used the knowledge so obtained to grow plants in their herbal gardens. When the Renaissance arrived, and with it the art of printing, it was these same early volumes that were the sources of the first herbals. These were handsome books, often illustrated with woodcuts, that named and described those plants that had, or were supposed to have, officinal or healing properties.

It must be remembered that medicine and folklore were still inextricably entwined. Although "physick"[1] gardens were founded under the auspices of the medical universities, standards varied. In the sixteenth century such gardens were put into cultivation for the benefit of medical students at Salerno, Venice, Padua, and Pisa. In 1597, a garden was established in Paris to supply bouquets to the French Court. No doubt these were antiseptic bouquets to ward off the Plague. It is interesting to note that this plot of land later evolved into the present-day Jardin des Plantes.

In England, it was not until 1621 that the medical faculty of Oxford University inaugurated a physick

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[1]Physick is the archaic form of physic

garden for teaching purposes. At that time, medicine was still in a state of flux. Less than twenty years earlier, a statute of James I listed the grocers and apothecaries together as a City Company. Surgeons were also barbers, and physicians were hardly distinguished from irregular practitioners, who were allowed not only to formulate and compound drugs but also to prescribe them.

Slowly, however, standards improved. The Apothecaries were separated from the Grocers in 1617, and were legally incorporated as The Worshipful Society of Apothecaries of London in 1632. In 1673, the Society founded a garden in the village of Chelsea, away from the pollution of London. Thus was born the world-famous Chelsea Physic Garden. The word *physic* at that time meant all things natural as distinct from metaphysical. Accordingly, the Chelsea Physic Garden was a botanic garden as we now know it, rather than primarily a garden of medicinal plants. The particular interest of the Apothecaries was with 'officinal' plants, those proved by the monks to have healing powers, but there was still a hope that every plant eventually would be found to be a cure for some bodily ill. This hope was due to a theory called the Doctrine of Signatures, which was propounded by Paracelsus (1493-1541), a German-Swiss physician and alchemist. He proposed that certain plants were endowed with "signatures" to assist man in his search for herbal remedies, while others were purposely left blank to encourage man to find their healing properties for himself. These signatures were stamped by God with the image of their properties: a herb with yellow sap would naturally cure jaundice, while one with heart-shaped leaves would relieve heart trouble. The early herbalists spent much time searching out these signatures.

By 1722 the Chelsea Physic Garden had become more scientific under the direction of Philip Miller, who also wrote and published the *Gardener's Dictionary* in 1731. Plants now were being studied botanically and horticulturally, not just as healing agents.

The above history is included in order to illustrate how the UBC Physick Garden has evolved from a long line of historical tradition.

Dr. Roy L. Taylor was appointed Director of the new UBC Botanical Garden in 1968, and embarked on a long-range project to develop eighty acres into various garden components. Included in the Main Garden component, with the Alpine, Native and Arbor Gardens, was the Physick Garden. This was designed in 1976 by the Vancouver-based landscape architectural firm of Justice and Webb*. A sixteenth century engraving of a monastery garden by the Dutch artist van der Heyde (Figure 1) was used as a basis for their design of a circular garden of twelve beds edged with brick, with a sundial in the centre as the garden's pivotal point.

The sundial has its own history. It was built and placed on a pedestal by Captain Basil Hartley of the Royal Navy and a Mathematics Professor at UBC in the late 1920s. He donated the sundial to UBC, and for some years it stood in the centre of an Iris Garden then located on West Mall on the site of the present Ponderosa Cafeteria. The pedestal was later moved to near the rockery situated between West Mall and the old Arboretum, the dial apparently disappearing about 1966. When the new Ponderosa Office Annex was built on this site, Botanical Garden staff removed the pedestal to the Nursery for storage until a suitable location in the new Garden development could be found. A new dial and gnomon (the pointer) were needed, and Justice and Webb were invited to design these. The sundial will be installed and dedicated at a future ceremony.

Once the Physick Garden took form, the next steps were to research suitable plants, locate sources for them, and then to supervise their arrangement in the garden beds. This interesting and exciting task was undertaken by a Committee of The Botanical Garden's 'Friends of the Garden'. The Committee members investigated early herbals in the Woodward Library on Campus, conferred with Messrs. Justice and Webb, and also met with Dr. Allan Goodeve of the Pharmaceutical Science Department at the University. It was learned from Dr. Goodeve that a small physic garden had formerly flourished in a plot of ground near the Pharmaceutical Science Building. He suggested the names of many of the plants now in the Physick Garden, as well as donating an Index Seminum from the School of Pharmacy Physick Garden at Seattle.

The examination of early herbals at the library proved fascinating, their illustrative woodcuts ranging into the realm of true art. It was learned that the *Leech Book of Bald* is the oldest Saxon book dealing with the virtue of herbs, dating from about A.D. 900-950. The oldest illustrated herbal from Saxon times is a translation of the *Herbarium of Apuleius Platonicus*. The first English printed herbal is that of Richard Banckes (1525), which went into many editions and was, in many ways, superior to those that followed. It was followed by *The Grete Herball* printed by Treveris in 1526; by the *New Herball* of Turner in 1551; and by John Gerard's *The Herball* in

*The firm is now known as Justice, Webb and Vincent Landscape Architects Ltd. We wish to thank Mr. Clive L. Justice and Mr. Harry J. Webb for their help and kindness in providing information on the garden design and development, and for providing copies of their original artwork.

FIGURE 1. Springtime, from an engraving by P. van der Heyde, 1570. This engraving was used as the basis for the design of the Physick Garden at UBC.

1597, justly the most famous due to its excellent illustrations. However, only sixteen of Gerard's woodcuts are original, the rest are copies from the book *Eicones Plantarum*, printed at Frankfurt in 1590. The most comprehensive herbal in the English language was written by John Parkinson in 1640, and included descriptions of 3800 plants, compared with just over 2000 in Gerard. The best known of the seventeenth century herbalists is Nicholas Culpeper, whose personality appears to have been as peppery as his name. He was as much astrologer as herb doctor, believing in the connection between plants and the stars and planets.

With this help, and their own research, the Committee members compiled a card index of plants suitable for the garden, including their botanical and common names, history, and uses. During this period, one of the Committee, Barbara Dean, visited the Chelsea Physic Garden where she conferred with the Director, Mr. Allen Paterson. He generously offered to send seeds to UBC, and eventually a total of thirty-seven varieties arrived. They were planted out in the garden in 1978, thus making UBC's Physick Garden truly an "offshoot" of the Chelsea Physic Garden. Unfortunately, the one plant of this series that did not survive was the Mandrake, *Mandragora officinarum*, the most ancient love-hate plant with its colorful history and poisonous properties.

In addition to the seeds received from Chelsea, initial bedding plants were obtained from Marguerite Hardin who operates a Herb Garden in West Vancouver, and from Mr. Derek Schouten, the head gardener at the Park and Tilford Gardens in North Vancouver.

The UBC Physick Garden has its own magical quality, and is uniquely set apart behind its dark green yew hedge. It contains age-old plants, ancient strains handed down to us through the centuries, unchanged by hybridization and growing today just as they did when Hippocrates searched for his simples on the slopes of

Cos. The English Yew, *Taxus baccata*, surrounding the garden follows the old tradition that all such gardens be enclosed, no doubt to protect the ignorant from the many poisonous plants. Pliny was the first to mention that Yew leaves themselves are poisonous, now known to be due to the presence of the alkaloid taxine. An infusion was used as a medicine in early times, but is no longer employed. An interesting fact is that the wood of the English Yew was used by English yeomen to make their longbows, and our Western Yew, *T. brevifolia*, was similarly employed by many Indians of the Pacific Coast.

Various methods of arranging the plant material in the garden beds were considered, such as grouping by plant family, by plant use, or by signature. However, it was decided that the esthetic approach was preferable, plants being placed in groups most pleasing to the eye, with trees and taller plants around the circumference and smaller plants arranged in the centre beds.

Appropriately planted in the heart of the garden is Heartsease, *Viola tricolor* (Figure 2), one of the oldest medicinal herbals known to man. It was used as a cure for a variety of complaints, including coughs and skin ailments, and has been given many names, usually a designation concerning love, such as 'Love-in-idleness', 'Kiss-her-in-the-buttery', and even 'Tittle-my-fancy'. It is sometimes still prescribed today for chest conditions.

There are four plants in the garden whose properties are in use today in the treatment of cardiovascular disease.

The fragrant Lily-of-the-valley, *Convallaria majalis* (Figure 3), yields convallarin, a drug useful as a heart stimulant, and in aiding stroke patients to regain their speech.

The most useful of these four plants is the Common Foxglove, *Digitalis purpurea*, the leaves of which contain many glycosides, including digitalin, digitalein, digitonin, and digitoxin. It was used by country folk as a remedy for gout and dropsy, and was first cultivated in early Yorkshire gardens. It was later researched and then adopted by the medical profession since it was found to be the most effective drug for stimulating the

FIGURE 2. *Viola tricolor*, Heartsease, × 0.70.

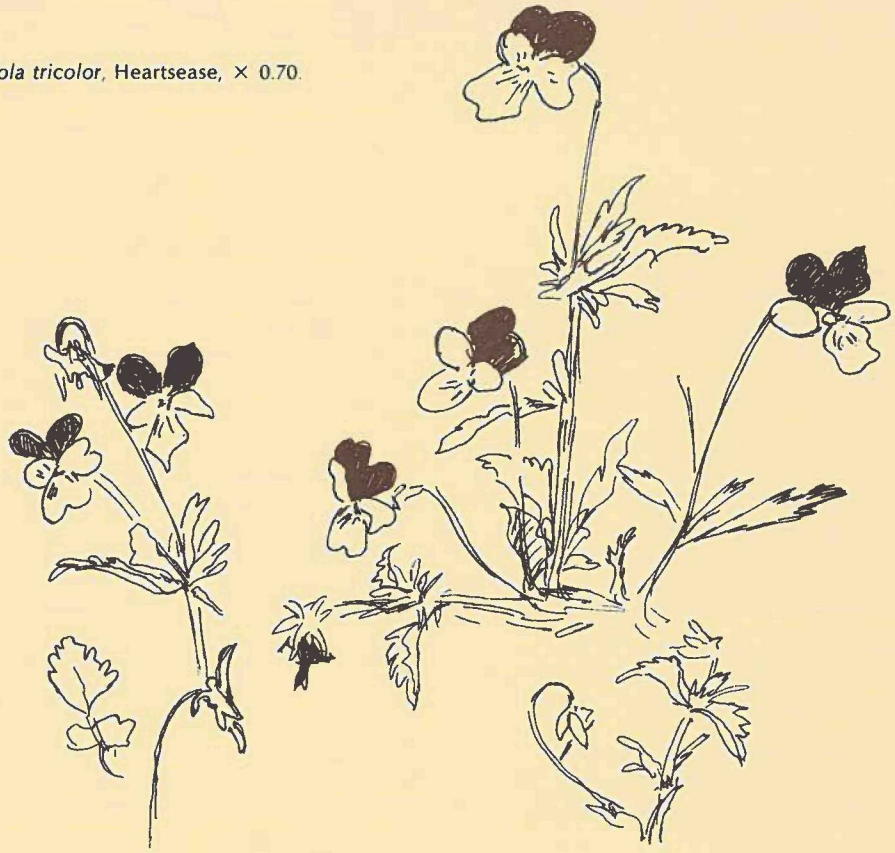

FIGURE 3. *Convallaria majalis*, Lily-of-the-valley, × 0.75.

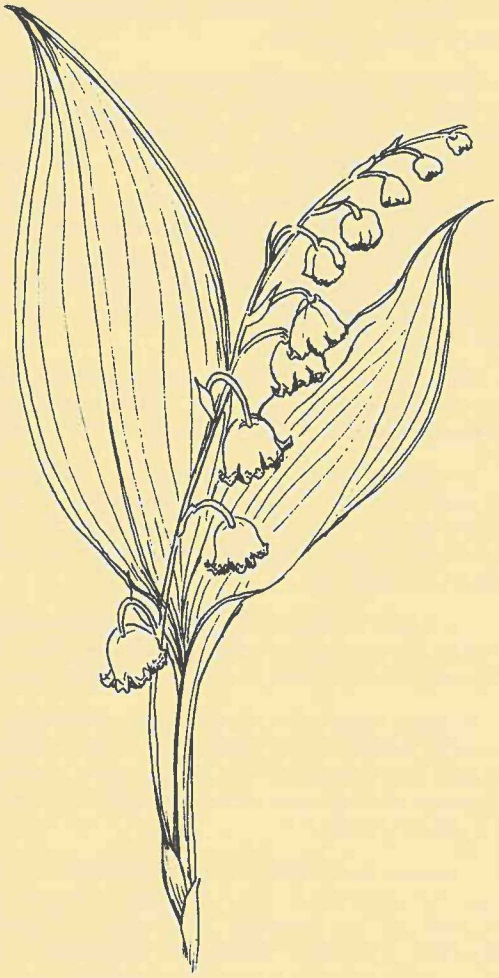

FIGURE 4. *Digitalis lutea*, Straw Foxglove, × 0.375.

heart. Its other common name, Dead Man's Bells, attests to its extreme toxicity if used in the wrong quantity. The Physick Garden has four species of this stately flower — *Digitalis purpurea, D. laevigata, D. grandiflora,* and *D. lutea* (Figure 4).

Monk's-hood, *Aconitum napellus*, yields from its leaves and roots an alkaloid so poisonous that the Roman Emperor Trajan (from A.D. 98 to 117) forbade its culture on pain of death. Anglo-Saxon archers believed that they had merely to tip their arrows with it to immediately kill man or beast. However, this "most hastie poyson" aconite is very effective as a heart sedative.

Common Motherwort, *Leonurus cardiaca*, is a bitter-tasting herb whose specific name is derived from the Greek word for heart, *kardia*. The common name, Motherwort, stems from its reputation for helping women "in sore travail". So excellent was its reputation as a cure for disease that it was brought out to the New World by early settlers, and it soon established itself in the wild. It is interesting to note here that all plants with the suffix 'wort' were used by the Anglo-Saxon 'leeches', 'wort' meaning medicinal herb and 'leech' meaning doctor.

Most of the other herbs in the garden have been known for centuries for their soothing and healing properties, and some have also been used for other purposes. The descriptions that follow are of some of the more interesting species, either because of their uses or their histories.

Common Comfrey, *Symphytum officinalis*, was used by the Greeks and Romans to help sprains and bruises. A visitor to the Physick Garden last fall told how a European-born neighbor had advised him to use a comfrey compress for a crushed heel received in an industrial accident. The subsequent quick healing amazed the Workers' Compensation Board, but not his neighbor who knew other common names of this herb to be 'Knitbone' or 'Boneset'.

The seeds of Roman Chamomile, *Chamaemelum nobile*, are said to have been taken to Britain by the invading Roman legions. Their physician Dioscorides used it "for healing wounds in sinuses". Another use in less sanitary times was as a strewing herb because of the fragrance given off when it was crushed underfoot.

All-heal, *Valeriana officinalis*, acquired its generic name from the Latin verb *valere*, 'to be healthy'. It was used as a sedative for the nervous system, because of its gentle and not prolonged action. In Catholic countries it was dedicated to the Virgin Mary and was often called 'Blessed Herb', while Chaucer referred to it as 'Setwall' or 'Setewale'. Another plant called Red or Garden Valerian, *Centranthus ruber*, is also used to treat nervous disorders.

Common or White Horehound, *Marrubium vulgare*, is employed as a soothing medicine in bronchial and digestive complaints. The Egyptians called it 'Seed of Horus'. The botanical name may be derived from the Hebrew *marrob*, meaning 'bitter juice', it is one of the five bitter herbs eaten at the feast of the Jewish Passover. Horehound belongs to the family Lamiaceae, which also includes the various mints. The volatile oils of all varieties of menthas have long been used to flavor medicines. In the Physick Garden are grown *Mentha × gentilis, M. requienii, M. spicata* (Spearmint), and *M. pulegium*. *Mentha pulegium*, Pennyroyal, was of "great force against the swimming in the head, the paines and giddinesse thereof" when worn was a garland about the head, according to Gerard.

Another very popular herb was Plantain, *Plantago rubrifolia*. Alexander the Great took it to soothe his raging headaches, and Culpeper recommended it for assuaging fevers, healing wounds, and curing bites from "madde dogges". In North America, its juice mixed with salt was one of the better cures for rattlesnake bites. The natives of America and New Zealand called Plantain 'Englishman's Foot', because it seemed to spring up along the roadside wherever the settlers walked.

Vinca major (Figure 6) and *V. minor*, Periwinkle, were sometimes called 'Sorcerer's Violet', possibly because witches used them for making love philtres. Culpeper said that Periwinkle's medicinal value was that "it stays bleeding at the mouth and nose, if it be chewed". The Madagascar Periwinkle, *Catharanthus roseus* (Figure 7), is an important source of at least sixty alkaloids, some of which have been found to have value in inhibiting the division of certain kinds of cancer-forming cells.

Thornapple, Henbane and Deadly Nightshade, all members of the Solanaceae family, are three therapeutic, but also very poisonous, plants. They are distinctive in appearance, have fascinating histories, and rank among the most interesting plants in the garden. They yield the drugs scopolamine, hyoscyamine, and atropine, all of which produce narcotic and hallucinogenic effects.

The Thornapple, *Datura stramonium*, bears an elegant white flower so innocently pure that we only believe in the plant's poisonous qualities by the look of the spiny egg-shaped seed pod. From time immemorial con-

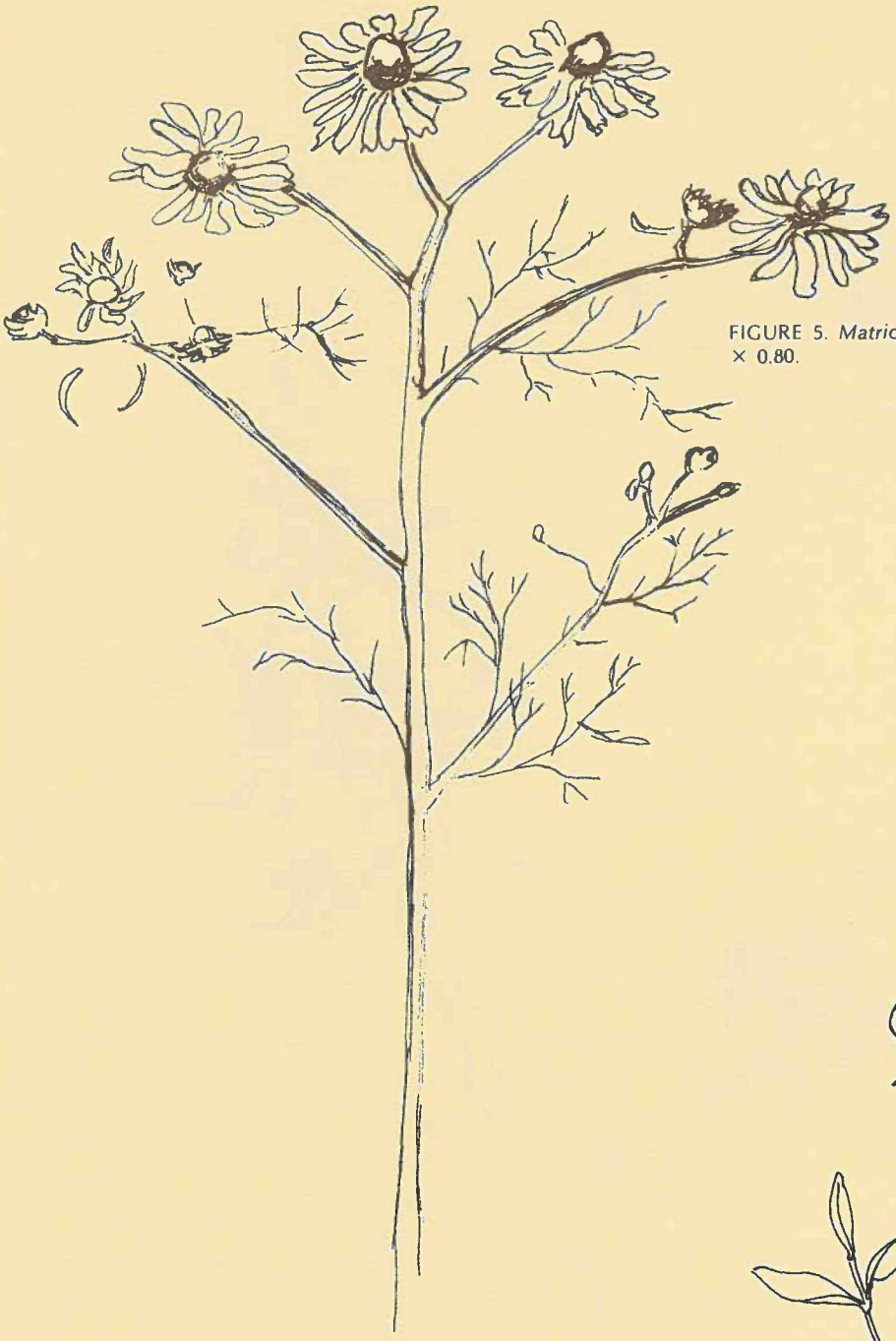

FIGURE 5. *Matricaria chamomilla*, German Chamomile, × 0.80.

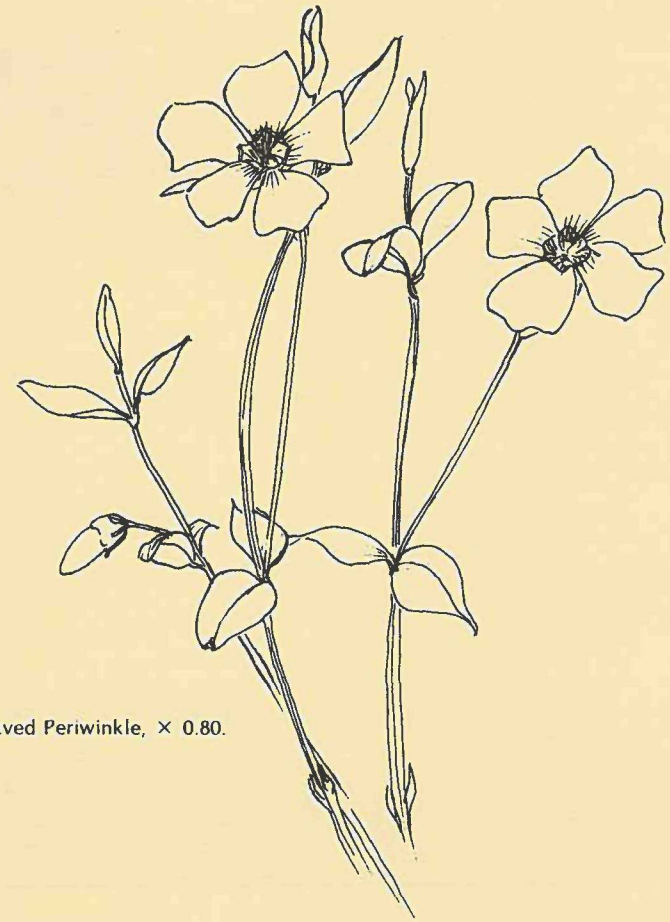

FIGURE 6. *Vinca major*, Big-leaved Periwinkle, × 0.80.

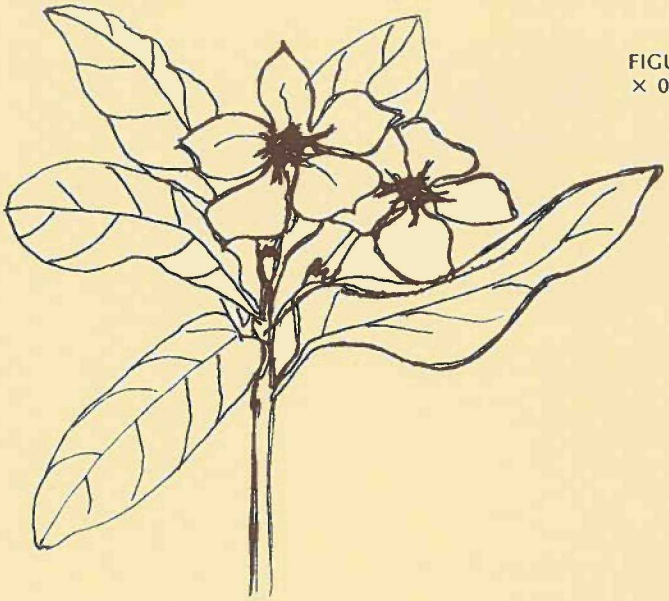

FIGURE 7. *Catharanthus roseus*, Madagascar Periwinkle, × 0.90.

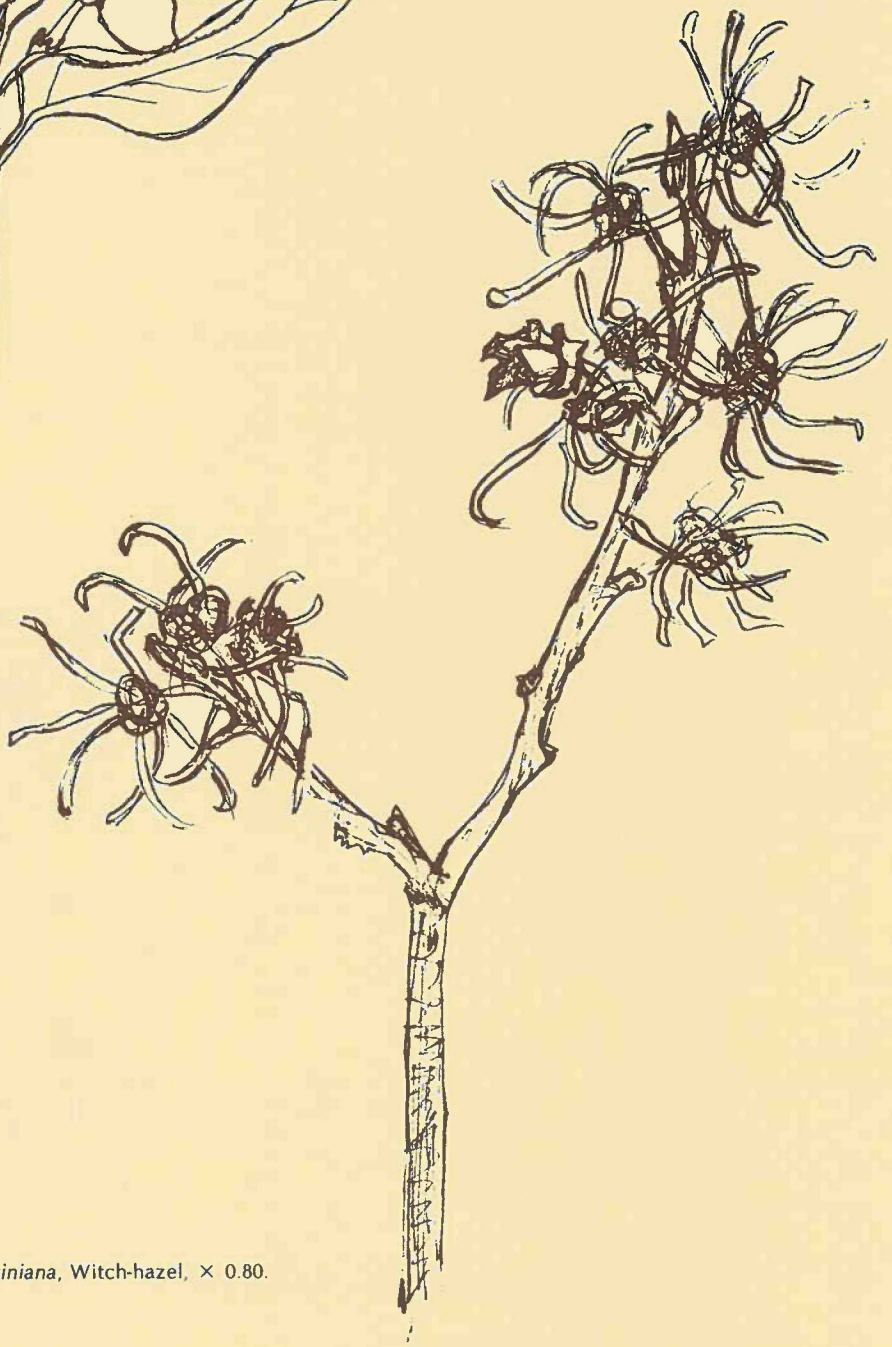

FIGURE 8. *Hamamelis virginiana*, Witch-hazel, × 0.80.

coctions made from the black seeds of *Datura* species have been used nefariously. Referred to in early Sanskrit writings, *D. metel* was utilized in India by an ancient religious sect for wholesale murder in the name of Kali, goddess of destruction. It is believed that the priests of Apollo at Delphi, in ancient Greece, used the leaves of *Datura* to bring on paroxysms attributed to the gods when making their prophecies. However, parallel with the evil uses run records of its medicinal virtues. *Datura* relieves a wide range of complaints from epilepsy to hysteria, also asthma and bronchial complaints. Seeds sent home from Peru were renowned in Spain for their curative powers. In sixteenth century England, *Datura* is reputed to have healed a Mistress Lobel of Colchester after she had been struck by lightning!

Black Henbane, *Hyoscyamus niger*, earned its common name because it was thought to be lethal to poultry. The drug hyoscyamine obtained from the leaves has been employed as a sedative since Babylonian times. In the Middle Ages, it was one of the main ingredients of the "soporific sponge", the forerunner of a present-day anesthetic. In the twentieth century, it was included in the "twilight sleep" drugs that helped women through the pain of childbirth. It was also the drug with which Dr. Crippen murdered his wife. Black Henbane is an attractive-looking annual or biennial, bearing many pale yellow, purple veined flowers.

Atropine from the Deadly Nightshade, *Atropa belladonna*, is still used in ophthalmology because of its mydriatic effect. It was this attribute of dilating the pupils of the eye that gave the plant its name of 'Belladonna' or 'beautiful lady', as the Italian women of the Renaissance used it to make their eyes seem larger and more lustrous. The hallucinogenic effect of the scopolamine extracted from the roots is thought to have been the cause of delusions of flight by witches who anointed themselves with the juice before taking to the air! The Deadly Nightshade is a vigorous, branching herb, bearing purple or greenish-brown flowers; the beautiful, glossy black fruits are often as large as cherries.

Blue Morning-glory, *Ipomoea purpurea*, and the Opium Poppy, *Papaver somniferum*, are also hallucinogenic in their properties. The Blue Morning-glory is known as 'Badoh Negro' in Mexico because of its narcotic black seeds. The dried juice from the seed pod of *Papaver somniferum* produces opium, which is manufactured into opiates for medicinal use, including morphine, codeine, and laudanum. The generic name *Papaver* is believed to be derived from the Celtic *papa*, 'pap' or 'porridge', referring to the Celtic custom of mixing poppy juice in gruel to send crying babies to sleep. Records of the use of the Opium Poppy as a sleep inducer go back as far as 3500 B.C.

Around the perimeter of the garden, inside the hedge, are several trees with medicinal properties. One with a long history and many virtues is the European Elder, *Sambucus nigra*. Every part of this tree is useful. The leaves make a soothing emollient when mixed with linseed oil, while the flowers are used both as an astringent in eye lotions and as a drug for bronchial disorders. The berries are said to encourage longevity, certainly they make good jam. The bark provides a diuretic decoction. Despite its excellent properties, the Elder also has a history of magic and sorcery. All witches grew Elder in their gardens, and some even used the tree as a dwelling place. Because of this, country folk would not cut down an Elder tree, fearing that the witch would be cut in error and the branches would therefore drip blood. There were, of course, disastrous consequences for the woodsman. Since Elder wood was used in many spells, it was never wise to burn it or to use it for making cradles.

In the garden are two species of Willow, the Weeping Willow or *Salix babylonica* and the French Willow or *S. triandra*. The bark of many willows yields the glucoside salicin. Even before the advent of modern medicine, North American Indians knew of its efficacy as a pain killer. They boiled the bark of *Salix* and used the elixir as a cure for sore throat, as an antiseptic, and as a tonic. Acetylsalicylic acid or 'aspirin' is now prepared synthetically, but is still the most effective drug to relieve pain in arthritis and all types of rheumatism.

The bark of the Buckthorn or Cascara, *Rhamnus purshianus*, is valued for its purgative qualities. The bark is collected and then stored for one year until other properties disappear and the drug frangulin remains when extracted. It is still used as a cure for chronic constipation in modern medicines. Its laxative qualities were well known to the Indians of the West Coast. At one time charcoal from the burned bark of a European species, *R. frangula*, was in great demand for the manufacture of gunpowder.

The Witch-hazel, *Hamamelis virginiana* (Figure 8), is a small tree or shrub native to North America, which has the unique habit of bearing its clusters of spangled golden-yellow flowers on bare branches in late fall. The common name is derived from its use in "water-witching", a branch of the tree being used as a divining rod to find the source of water. The leaves, bark and twigs of the Witch-hazel contain tannins, which are distilled with alcohol and used to stop bleeding and to prevent inflammation.

No list of Physick Garden plants would be complete without including two very protective herbs, the Grace

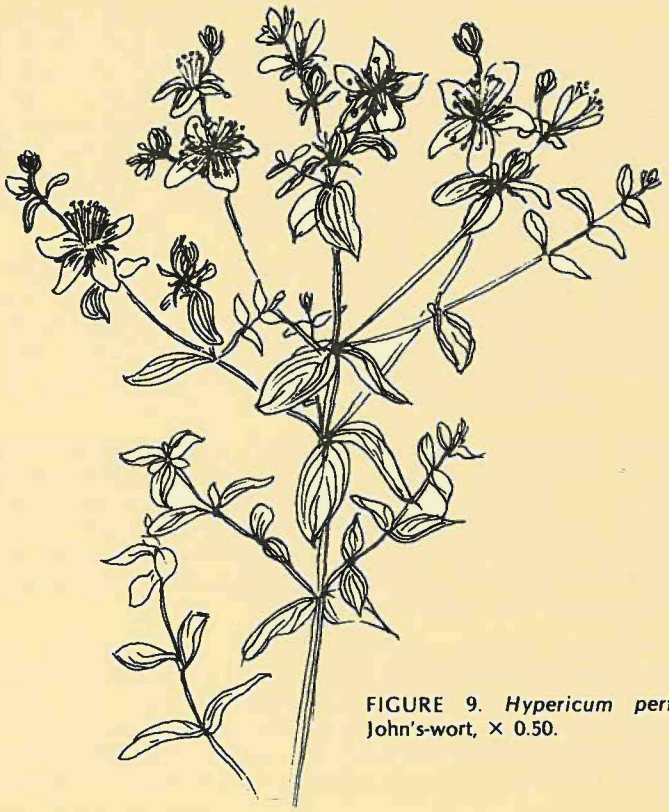

FIGURE 9. *Hypericum perforatum*, Common St. John's-wort, × 0.50.

of God and the Herb-of-Grace. Common St. John's Wort, *Hypericum perforatum* (Figure 9), was thought to be so beneficial that it earned the name of 'Grace of God'. Records show that Dioscorides used it to treat wounds, and that the early crusaders used it as a styptic. It has a long Anglo-Saxon history of being employed to protect church and house. Large branches hung over doorways prevented the entry of any evil. On the 23rd of June, the eve of St. John's Day, the plant was burned on hilltops to protect both land and cattle from evil spirits. Medicinally it was purported to lessen pain, help the after-effects of shock, and cheer the melancholy.

Common Rue, *Ruta graveolens*, has long been known as the 'Herb-of-Grace'. It is an attractive plant with blue-green, compoundly-pinnate leaves, and small greenish-yellow flowers. The ancient Greeks used it against the plague; Pliny prescribed it for no less than eighty-four maladies. His advice for a thriving plant was to steal it, and then plant it underneath a fig tree! Rue was taken to England by the Romans and was subsequently described in the herbals almost as a medicinal cure-all. Nosegays made of Rue and other herbs were carried by the rich to protect them from vermin and "evill aires". Judges also carried it as a protection against infection and the unpleasant odors of prisoners. Rue, with its pungent odor and bitter-tasting leaves, came to be associated in Elizabethan times with repentance. Branches of Rue were used at one time to sprinkle holy water before mass and during exorcisms. Shakespeare speaks of it often in his plays. The gardener in Richard II says, "I'll set a bank of rue, sour herb of grace", and Ophelia's lines are famous, "there's rue for you, and some for me; we may call it herb of grace o' Sundays".

Neither space nor time permits further description of the more than ninety plants presently growing in the Physick Garden, but a list of them is included in the Appendix. In the late sixteenth century, William Coles said that the history of such herbs is "a subject as ancient as the Creation, yea, more ancient than the sun or moon or stars, they being created on the fourth day, whereas plants were the third". Dealing with so old a subject, it is difficult to find a path through the maze of legend, to sift fact from fiction, to establish the origin of a name, or to prove a cure. The search is never dull, and it is hoped that this article may 'tittle-the-reader's-fancy' so that he may, in the future, investigate and appreciate these not always beautiful, but very fascinating, plants.

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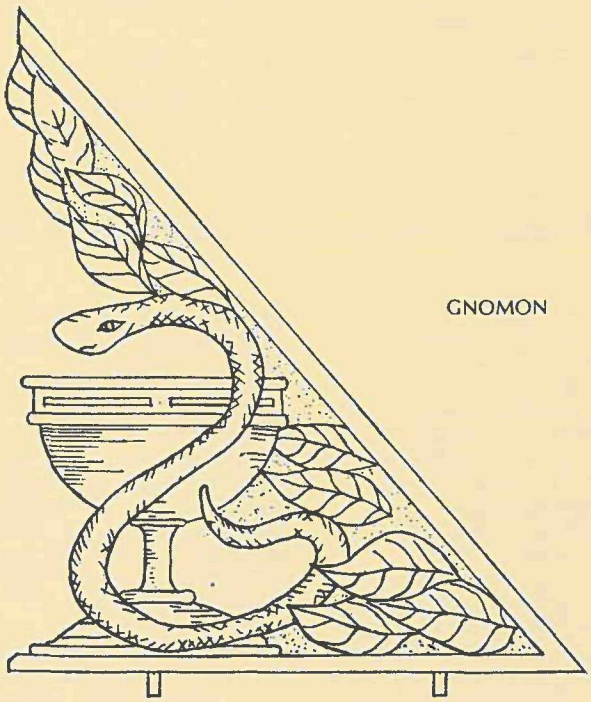
APPENDIX. Plants Grown in The Physick Garden

Achillea millefolium (Common Yarrow) Asteraceae
Aconitum napellus (Monk's-hood) Ranunculaceae
Althaea officinalis (Marsh Mallow) Malvaceae
Amni visnaga (Bisnaga) Apiaceae
Aquilegia vulgaris (European Columbine) Ranunculaceae
Arctostaphylos uva-ursi (Kinnikinnick) Ericaceae
Argemone mexicana (Mexican Prickly Poppy) Papaveraceae
Artemisia absinthium (Common Wormwood) Asteraceae
Artemisia dracunculus (Tarragon) Asteraceae
Atropa belladonna (Deadly Nightshade) Solanaceae
Balsamita major (Costmary) Asteraceae
Betula pendula (European Weeping Birch) Betulaceae
Centella asiatica (Water Pennywort) Hydrocotylaceae
Centranthus ruber (Red Valerian) Valerianaceae
Chamaemelum nobile (Roman Chamomile) Asteraceae
Chenopodium ambrosioides (Wormseed) Chenopodiaceae
Chenopodium bonus-henricus (Allgood) Chenopodiaceae
Colutea arborescens (Bladder-senna) Fabaceae
Conioselinum pacificum (Pacific Hemlock Parsley) Apiaceae
Convallaria majalis (Lily-of-the-valley) Liliaceae
Coriandrum sativum (Coriander) Apiaceae
Cynoglossum officinalis (Common Hound's-tongue) Boraginaceae
Datura stramonium (Thornapple or Jimsonweed) Solanaceae
Digitalis grandiflora (Yellow Foxglove) Scrophulariaceae
Digitalis laevigata (Foxglove) Scrophulariaceae
Digitalis lutea (Straw Foxglove) Scrophulariaceae
Digitalis purpurea (Common Foxglove) Scrophulariaceae
Dipsacus fullonium (Fuller's Teasel) Dipsacaceae
Eryngium maritimum (Sea Holly) Apiaceae
Galega officinalis (Goat's Rue) Fabaceae
Gaultheria procumbens (Wintergreen) Ericaceae
Hamamelis virginiana (Witch-hazel) Hamamelidaceae
Hosta sieboldiana var. *hypophylla* (Plantain Lily) Liliaceae
Hosta sieboldiana var. *sieboldiana* (Plantain Lily) Liliaceae
Hyoscyamus albus (White Henbane) Solanaceae
Hyoscyamus niger (Black Henbane) Solanaceae
Hypericum perforatum (Common St. John's-wort) Hypericaceae
Inula helenium (Elecampane) Asteraceae
Ipomoea purpurea (Blue Morning-glory) Convolvulaceae
Juniperus communis (Common Juniper) Cupressaceae
Laburnum × *watereri* (Golden-chain Tree) Fabaceae
Leonurus cardiaca (Common Motherwort) Lamiaceae
Levisticum officinale (Lovage) Apiaceae
Lobelia siphilitica (Great Lobelia) Lobeliaceae
Lobelia tupa (Devil's Tobacco) Lobeliaceae
Lycium chinense (Chinese Matrimony Vine) Solanaceae
Marrubium cylleneum (Horehound) Lamiaceae
Marrubium vulgare (Common Horehound) Lamiaceae

Matricaria chamomilla (German Chamomile) Asteraceae
Medicago orbicularis (Medic) Fabaceae
Melissa officinalis (Lemon Balm) Lamiaceae
Mentha × gentilis (Red Mint) Lamiaceae
Mentha pulegium (Pennyroyal) Lamiaceae
Mentha requienii (Creme-de-Menthe Plant) Lamiaceae
Mentha spicata (Spearmint) Lamiaceae
Mirabilis jalapa (Four-o-clock) Nyctaginaceae
Monarda menthifolia (Bee Balm or Mint-leaved Bergamot) Lamiaceae
Myrtus communis 'Nana' (Myrtle) Myrtaceae
Nepeta cataria (Common Catnip) Lamiaceae
Papaver somniferum (Opium Poppy) Papaveraceae
Pentaglottis sempervirens (Alkanet) Boraginaceae
Physalis ixocarpa (Tomatillo) Solanaceae
Plantago rubrifolia (Plantain) Plantaginaceae
Prunella vulgaris (Common Self-heal) Lamiaceae
Pulmonaria officinalis (Blue Lungwort) Boraginaceae
Rhamnus purshianus (Cascara) Rhamnaceae
Ruta graveolens (Common Rue) Rutaceae
Ruta graveolens 'Variegata' (Rue) Rutaceae
Salix babylonica (Weeping Willow) Salicaceae
Salix triandra (French Willow) Salicaceae
Salvia elegans (Pineapple-scented Sage) Lamiaceae
Salvia sclarea (Clary Sage) Lamiaceae
Sambucus nigra (European Elder) Caprifoliaceae
Sanguisorba minor (Salad Burnet) Rosaceae
Santolina chamaecyparissus (Lavender Cotton) Asteraceae
Saponaria officinalis (Soapwort or Bouncingbet) Caryophyllaceae
Symphytum asperum (Rough Comfrey) Boraginaceae
Symphytum officinale (Common Comfrey) Boraginaceae
Tanacetum cinerariifolium (Pyrethrum) Asteraceae
Tanacetum parthenium (Feverfew) Asteraceae
Tanacetum vulgare (Common Tansy) Asteraceae
Taxus baccata (English Yew) Taxaceae
Tragopogon porrifolius (Common Salsify) Asteraceae
Vaccinium myrtillus (Low Bilberry) Ericaceae
Valeriana officinalis (All-heal or Common Valerian) Valerianaceae
Verbascum densiflorum (Mullein) Scrophulariaceae
Verbena officinalis (Vervain or Holy Wort) Verbenaceae
Vinca major (Big-leaved Periwinkle) Apocynaceae
Vinca minor (Common Periwinkle) Apocynaceae
Viola tricolor (Heartsease) Violaceae



GNOMON

Calypso bulbosa (Linnaeus) Oakes in Z. Thompson

Member of the Family Orchidaceae

RON LONG*

Calypso bulbosa is the best loved and most widespread of our wild orchids. This lovely forest plant is named for the goddess Kalypso (or Calypso), the daughter of Atlas who, in Greek legend, became enamored of Ulysses when he was shipwrecked on her lonely island of Ogygia. He stayed with her for seven years and she bore him two children, Nausinoüs and Nausithoüs. She promised him immortality if he remained with her, but Ulysses persisted in his resolve to return home to his wife and son.

The goddess' name, derived from the Greek *kaluptein* meaning 'concealment', is eminently suitable for her floral namesake. The habitat preferred by *Calypso* is the deep, cool shade of evergreen forests, where a sharp eye is needed to discover the diminutive plant hidden amongst the moss and fallen twigs.

The Latin name, *Calypso bulbosa*, is now generally accepted by botanists throughout the Northern Hemisphere, but there is a long history of revisions, as with so many botanical names. It took almost one hundred years for the name to stabilize.

Carolus Linnaeus (1707-1778), a professor at the University of Uppsala in Sweden, ended the centuries-old confusion in botany with the publication of his *Species Plantarum* in 1753. This work established a single, world-wide, binomial designation for most of the plants known at that time. Linnaeus' system has been expanded and refined ever since. This revolutionary 1753 publication contained the first scientific description of *Calypso*, but Linnaeus made a mistake that is still repeated by amateur naturalists. Because *Calypso* has a pouch-like lip similar to the Lady's Slipper Orchids, he included it with that group in the genus *Cypripedium*, calling it *Cypripedium bulbosum*. He took the specific name from the bulb-like underground stem called a corm.

It eventually became clear that the pouch that had misled Linnaeus had, in fact, evolved quite differently from that in *Cypripedium*. Also, the column had only one anther bearing two pairs of pollinia, setting *Calypso* well apart from other members of the Orchidaceae.

In 1807 a British botanist, Richard Anthony Salisbury (1761-1829), established a new genus containing only one species, which he called *Calypso*. But Salisbury also made an unnecessary change in the specific name, changing it to *borealis* from *bulbosum*. The name stood as *Calypso borealis* for 35 years, but eventually the rules of nomenclature laid down by Linnaeus were applied to correct the error. The Rule of Precedence maintains that the oldest suitable name shall be retained. Since there was no reason for Salisbury to have changed the specific name, *borealis* was dropped in deference to Linnaeus' original *bulbosum*. This change was published in 1842 by William Oakes (1799-1849), an American botanist from Vermont. So, 89 years after Linnaeus first published the description, the name had finally evolved into its modern form, *Calypso bulbosa*. Oakes' use of the suffix 'a' rather than 'um' did not change the meaning of the word.

Although the genus *Calypso* contains only one circumpolar species, the characteristics of the species vary slightly but consistently in different parts of the range. Several of these differing groups have been designated as subspecies and varieties. The plants from Eurasia, which Linnaeus described, belong to *Calypso bulbosa* subsp. *bulbosa*. Plants in Japan are called *Calypso bulbosa* var. *speciosa* (Schlechter) Makino. In North America there are two varieties — one characterized by a splash of brilliant yellow hairs about the opening of the pouch, the other having white hairs.

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

The variety with white hairs is now known as *Calypso bulbosa* subsp. *occidentalis* (Holzinger) Calder & Taylor. This subspecies occupies a very limited range extending from the southern tip of the Alaska Panhandle along the coast to northern California and eastward to northern Idaho. *Calypso bulbosa* subsp. *occidentalis* was first distinguished as forma *occidentalis* by John Michael Holzinger (1853-1929) in Idaho in 1895. (The designation forma or form is applied to varieties that exhibit only very minor differences from the type.) Calder and Taylor (1965) decided that the forma *occidentalis* was distinct enough to warrant a higher designation, so they elevated it to subspecific status.

The yellow-haired variety has a much wider range, stretching right across Canada from Newfoundland to Alaska, and extending in a narrow spur down the spine of the Rocky Mountains almost to Mexico. In 1813 Robert Brown (1773-1858) proposed this variety as a separate species, *Calypso americana*. Other botanists did not agree with Brown's determination that the variety was sufficiently different to justify specific status. Carlyle Luer (1975) used the name Brown had coined to designate it as a variety, *C. bulbosa* var. *americana*. Calder and Taylor (1968, pp. 287, 288) assessed the entity and decided that the available specimens from Eurasia were too old and in too poor a condition to allow a definite distinction to be made between the variety *americana* and the variety *bulbosa*. So, pending more recent collections from Eurasia, they decided to consider the North American plants as not distinct from *C. bulbosa* subsp. *bulbosa*.

Such differences between authors are a normal part of the classification process. It merely remains for one or the other, or a third party, to publish convincing data on a given designation that is acceptable to, and followed by, other authors. Sooner or later, though it may take another fifty years, agreement will be reached.

Before we leave the subject of names, some mention should be made of common names. *Calypso* is one of an unfortunately small number of plants whose Latin name also widely serves as its common name. However, the following common names have been published: Fairy Slipper, Venus Slipper, Lady's Slipper, False Lady's Slipper, Angel's Slipper, Pink Slipper-orchid, Pink Fairy Slipper, Cytherea, Deer's-head Orchid, and Hider-of-the-north. These are names recorded only from western North America. Consider the confusion if we included all the names from the rest of North America, then added an equal number of common names from the several European countries where *Calypso* occurs, as well as those from Japan.

It can be seen that common names do have their disadvantages compared to the Latin or scientific names. It is true that Latin names can seem rather formidable. Anyone who is slightly intimidated when faced with *Calypso bulbosa* (Linnaeus) Oakes in Z. Thompson subsp. *occidentalis* (Holzinger) Calder and Taylor has my complete sympathy! However, once the Latin names are understood, it is not so bad. If the text of this paper is studied, the meaning of the various elements of Calypso's scientific designation should, I hope, be clear. Latin names can be very interesting and informative. When a few Latin roots and words are learned, such as *bulbosa* = 'bulb-like'; *speciosa* = 'showy'; and *occidentalis* = 'western', then the name alone will provide some basic information about the plant. Thus, the enjoyment of plants is enhanced.

The distribution of the two North American subspecies of *Calypso* is such that it is only in British Columbia that their ranges overlap. This close proximity has led to some interesting speculation on the ecological factors involved in the evolution of such distinct physical characteristics — the brilliant yellow hairs of the one compared to the almost invisible white hairs of the other. The most obvious assumption is that they are for attracting different pollinators. The whole field of plant/pollinator relationships as a scientific study is still in its infancy, so few definite statements can be made. However, the evidence indicates some fascinating possibilities.

It is thought that the non-nectar producing *Calypso* has evolved the bright yellow hairs in imitation of the many flowers that do produce nectar, offering bright yellow stamens as a signal to insect pollinators. It has been shown that the yellow hairs of *Calypso* absorb ultraviolet light in a way similar to the yellow stamens of other flowers. Bees, which see by ultraviolet light, are attracted by what would appear as a dark pattern at the centre of the flower. Since they seem to pay little attention to other characteristics of the flower, they are as likely to be attracted to *Calypso* as to a more rewarding flower. Though they collect no nectar for their trouble, they do pick up the sticky pollinia from one *Calypso* flower and carry them to another. Thus they provide a cross-pollination service, vastly important to *Calypso* but harmless to the insect. Presumably the pollinators that so obligingly allow themselves to be duped by *C. bulbosa* subsp. *bulbosa* are absent from the range of *C. bulbosa* subsp. *occidentalis*. No study has been made of the pollinators of *C. bulbosa* subsp. *occidentalis*, so we simply do not know how cross-pollination is achieved.

Calypso holds its own in a family renown for great beauty, but on a miniature scale. A close examination is rewarded not only by the hidden elegance that is revealed, but also by a delicately lovely fragrance. In other ways *Calypso* is unique, even among orchids.

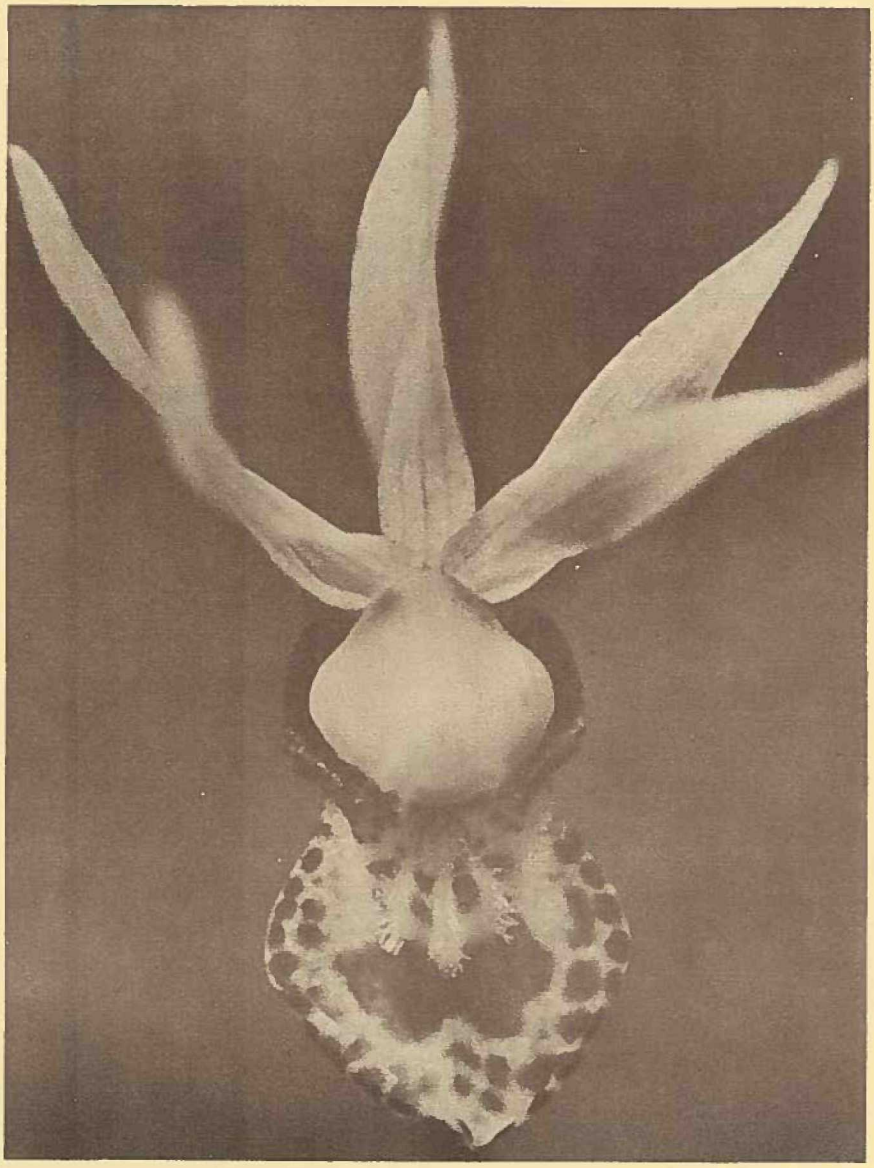


FIGURE 10. *Calypso bulbosa* subsp. *occidentalis*, Fairyslipper.

Throughout the range, *Calypso* is among the first plants to bloom in early spring — thrusting the frost-resistant flower into the light as soon as the warming soil permits. This early bloom is made possible by an unusual growth habit. The solitary leaf appears in late summer and persists through the winter. Thus *Calypso bulbosa* is able to utilize whatever sunshine is available through the fall to manufacture food, which is stored in the bulbous corm. It is this store that gives the plant its head start in the spring.

British Columbia is fortunate in still possessing an abundance of the habitat in which *Calypso* thrives. But there is little security for the plant. Every year logging removes more of the tall conifers that it is utterly dependent on for shade. Its very beauty is its worst enemy, for few can resist picking so lovely and fragrant a flower. The bulb is anchored by only a few tiny roots that are broken by even the most careful picker, resulting in the complete destruction of the plant. Similarly, attempts to transplant *Calypso bulbosa* have little chance of success. Like most terrestrial orchids, *Calypso* lives in a delicate association with soil fungi. The seeds cannot germinate unless the fungi are present, and the few small roots alone are inadequate to support a plant of even its diminutive size. *Calypso* must depend on the fungi for its nourishment. Little more is known of this fungal association, but it seems that a successful transplant is dependent on the purely accidental presence of the right fungi in the garden.

"To really see Calypso *you must visit her secret bower of green and meet her enthroned as she loves to be on some mossy dais in the shadow of the evergreens."*

Morris and Eames, 1929

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Rhamnus purshianus in British Columbia*

Cascara

Member of the Family Rhamnaceae

Natural Distribution and Habitat

Rhamnus purshianus A.P. de Candolle occurs from sea level to 1524 m from southern British Columbia south to southern California, and east to northern Idaho and northwestern Montana, with occasional occurrences in Arizona, particularly on the southern slopes of Grand Canyon. The species commonly occurs in rich rocky or humous soils of low river bottoms, flat valleys and the borders of slow-moving streams in the northern part of the range, and on dry gravelly or sandy soils on high foothill slopes in the southern part. It is common as scattered individuals or small groups on burned-over areas, along rural fence rows and country lanes, and as a scattered understory tree in mixed deciduous and coniferous forests. In British Columbia, the species is present at low elevations on Vancouver Island, the Gulf Islands, and the adjacent Mainland north to Bella Coola (52°N). It is also present in scattered localities in the Interior of the Province at Crawford Bay, Revelstoke, near Nakusp, Creston, near Salmo, about 5 km west of Yahk, Shuswap Lake, Adams Lake, and Slocan. *Rhamnus purshianus* is usually found as part of the understory in second growth deciduous and coniferous woods and thickets in British Columbia, being associated with Alder, Bigleaf and Vine Maple, Birch, Western Red Cedar, Douglas Fir, and Hemlock.

Description

Rhamnus purshianus is a deciduous, large shrub to medium-sized tree, which varies in size and form through the range, mainly because of soil and climatic effects. It is usually (0.9-1.8-)3-12(-15) m tall, with a trunk diameter of 15-50(-90) cm. The (usually) slender trunk divides into several or numerous large, upright to nearly horizontal branches either close to the ground or 3-5 m above the ground. Forest-grown trees in the northern part of the range tend to have straight trunks bare of branches for 4.5-6 m and a narrow open crown containing only a few horizontal branches, while open-grown trees of the same area have a very short trunk with very large upright limbs and a thick bushy crown. Open-grown trees in the drier southern regions are slender-stemmed shrubs forming dense clumps, and are sometimes bent to the ground. The species is often twisted and irregularly branched.

The root system is spreading and fibrous, with no tap root.

The bark ranges in color from ashy-gray to dark brown, often tinged with red, and is smooth or often scaly, especially near the base of old trees. It is (1.5-)3-6 mm thick, and is often furrowed longitudinally with transversely linear marks of the lenticels. The freshly cut inner surface is bright yellow due to the presence of frangulin, but darkens rapidly when exposed to light and air. The bark has a leather-like odor, a bitter taste, and colors the saliva yellow if chewed. It has medicinal value as a laxative.

The twigs are slender, rounded, and bitter-tasting. The young twigs are pubescent to tomentose and pale yellow-green to reddish-brown, becoming glabrous to slightly and minutely downy and dull reddish-brown with age. The pith is moderate, rounded, continuous, and white. The leaf scars are raised, crescent-shaped to half-ellipitical, horizontal, and alternate to occasionally obliquely opposite. There are usually 3 bundle traces visible on the leaf scar. The stipule scars are minute.

The heartwood is usually light brown tinged with red, and the sapwood is pale yellowish-white. The wood is rather coarse-grained, rather soft, moderately weak, and shrinks little on drying, but is of no economic value. There is no characteristic odor or taste.

*By Roy L. Taylor and Sylvia Taylor

The winter buds are naked (the only known deciduous tree on the West Coast to have naked buds), with protection provided by matted woolly rusty-brown hairs on the under surfaces of the new leaves. There is usually no true terminal bud, the last bud is a lateral one at the base of the last petiole, but it is very close to the end of the twig. The buds are 8-10 mm long, usually sessile, solitary, and arranged in 4 rows.

The mature leaves are alternate or occasionally obliquely opposite, or sometimes tufted or clustered at the ends of the branches. They are (2.5-)5-18(-20) cm long, 2.5-5(-7.5) cm broad, elliptic to ovate or obovate, with an acute to obtuse or rounded apex, and an obtuse to cordate or subcordate base. The leaves are dark green and usually glabrous or nearly so above, paler green and more or less pubescent below, at least on the veins. The margin is often undulate and finely serrulate. There are 10-15 pairs of prominent parallel veins, which bend upwards at the ends to form part of the margin. The leaves turn pale yellow in the fall (some trees turn bright reddish- or rusty-brown), and are usually deciduous, but young trees frequently retain their leaves through the winter, especially when growing in sheltered locations. In the drier southern parts of the range, the leaves tend to be smaller, thicker, somewhat more leathery and more hairy than in the northern regions. The leaves are sometimes confused with those of *Alnus rubra*, Red Alder. The petioles are stout, (1.25-)5-23 mm long, and are often pubescent. The stipules are minute, membranaceous, acuminate, and deciduous.

The inflorescence appears in April to June or July throughout the range, and is a pedunculate umbel of 8-40(-50) flowers occurring along twigs of the current season's growth. The peduncle is 5-40 mm long, slender, and pubescent. The flowers are polygamous (bisexual and unisexual flowers on the same plant, or variously segregated on different plants) but usually bisexual, inconspicuous, 3-5 mm long, and 3-4 mm across. The calyx is campanulate, with 5 lobes that are triangular-ovate, spreading, and acuminate. There is a short basal tube lined with a thin disk. The calyx lobes are deciduous but the tube is persistent and collar-like at the base of the fruit. The corolla is 1 mm long or less (shorter than the calyx), greenish or greenish-yellow, and campanulate with 5 lobes. The lobes are ovate, usually short-clawed, somewhat hooded or notched at the apex, and folded inwards around the stamens. There are 5 short stamens alternating with the calyx lobes. The filaments are very short and slender, and the anther lobes are sagittate. They are rudimentary and sterile in female flowers. There are 2-4 styles united below a 2-3-lobed obtuse stigma. The ovary is 2-4-celled, superior or partially buried in the disk, and contains a solitary erect ovule in each cell. The ovary is rudimentary in male flowers. The individual pedicels are 6-25 mm long, slender, and pubescent.

The fruit is a simple fleshy, berry-like drupe, and occurs in clusters. They are smooth, red when young maturing to black or purplish-black, 6-12 mm in diameter, and globose to subglobose. The pulp is juicy, rather thin, and sweetish in taste. The fruit bears the remnants of the style at the apex, and of the calyx tube at the base. The 2-3(-4) nutlets are very hard, 6-8 mm long, and gray to olive-green in color. The base of the nutlet is notched and the top is rounded to obtuse. When two nutlets are present, they are flattened on one side (rather like a coffee-seed), when three, they are triangular. Each nutlet contains one seed that is yellow-brown on the outside of the seed coat and bright orange on the inside. *Rhamnus purshianus* begins to produce fruit at about 5-7 years of age, bearing good seed crops almost annually, with light crops in some years. The fruit is mature in one season, usually in August or September. The succulent fruits are much relished by birds and mammals, and most seed dispersal is by this means. It should be noted that not all specimens will bear fruit, as some trees are completely dioecious.

Varieties and Ornamental Cultivars

There are apparently no varieties and ornamental cultivars of this species, although a recent publication from the University of Washington (Mulligan, 1977) lists a particularly shrubby form growing in the Lathhouse at the Arboretum. This form was collected in 1968 in central Washington.

Propagation

Rhamnus purshianus is considered to be very easy to grow from seed provided that the seeds are not separated from the pulp of the berries. If seeds are allowed to dry, many die and others may take up to one year to germinate. Davidson (1942) states that almost 100% germination can be obtained by stratifying the berries in layers with almost dry fine sand in a tin box (or plastic bag) over the winter at about 3-5°C. At sowing time, the berries and sand are rubbed between the hands to separate the seeds, and the mixture of seeds, sand and berry pulp is broadcast over the prepared seed bed. The seeds may be sown outside in April or May, or in flats in a cool place in February. The seedlings are transplanted after one year into rows about 45 cm apart, and then transplanted again to their permanent position after 2-3 years. In contrast, seed separated from the pulp and stratified at 1-5°C for 84-90 days before sowing will give only 24-28% germination after 185 days at 21°C night temperatures.

Alternatively, the berries may be collected just before they are ripe, rubbed lightly to break down the pulp,

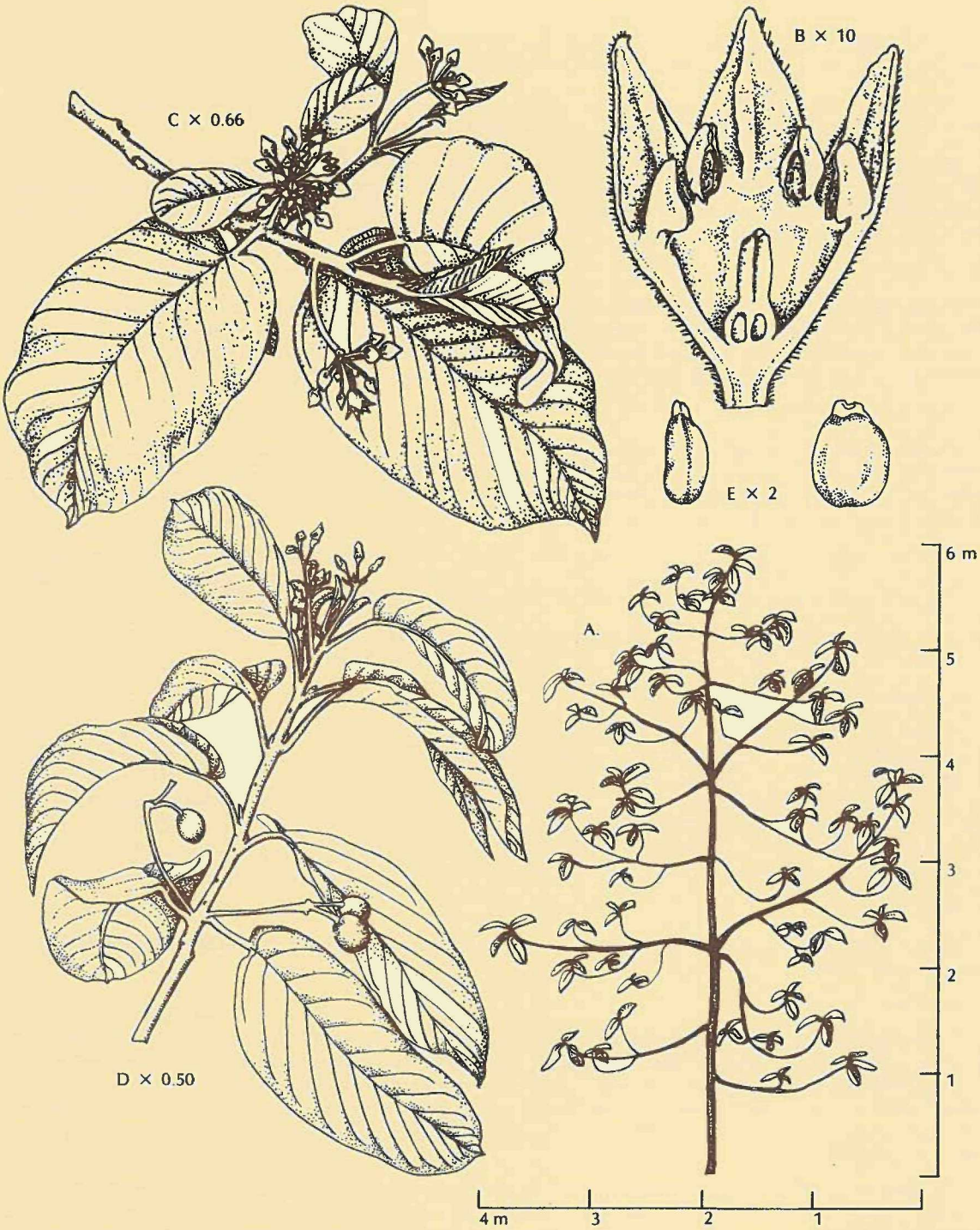

FIGURE 11. *Rhamnus purshianus*. A. Habit, B. longitudinal section through flower showing the arrangement of parts, C. flowering branch, D. fruiting branch, E. nutlets.

and planted outside immediately. This method exposes the seeds to the natural cold temperatures of the winter, and often results in earlier germination than sowing in the spring.

Rhamnus purshianus will sprout readily from stumps about 15 cm tall, slantcut across the top to allow rain water to drain away. The sprouts will flower in 3-4 years.

The species can also be propagated by layering and from softwood cuttings. The cuttings should be about 10-12.5 cm long and taken in July from the tip of outward-facing shoots growing in full sun. They must not be allowed to dry out between cutting and planting. Plant in rooting medium with mild bottom heat (24-27°C) under glass, and keep moist. A hormone rooting treatment may help.

Transplanting

Young plants up to 2 m tall transplant easily, especially when watered occasionally. They will take up to one year to reestablish. In the B.C. Native Garden at UBC we have transplanted a 6 m tall tree, which established well, even after blowing down in fall winds shortly after moving. No artificial watering was provided. Seedlings and plants grown in pots have presented no problems on transplanting.

Conditions for Growth

The rate of growth is rapid in the early years and then becomes moderate. *Rhamnus purshianus* is hardy to Zone 6 or 7 (U.S.D.A.). The longevity of the species has not been fully determined, but trees 15-30 cm DBH are 18-40 years old when grown in dense stands. The species will grow well in any reasonably good soil in full sun or semi-shade, provided there is plenty of moisture.

Rhamnus purshianus requires little pruning other than the thinning of crowded shoots in February, and the removal of dead wood. The species can be persuaded to form a tree more readily if the bottom 0.9-1.2 m of the trunk is pruned of branches as the crown is being built up during the early years.

Many species of *Rhamnus* are secondary hosts of Oat Crown Rust and are prohibited plants in many areas. Therefore, local regulations should be checked before growing *R. purshianus*.

Landscape Value

Rhamnus is a genus that contains a large number of hardy species, but few are used as ornamentals. *Rhamnus purshianus* is only occasionally cultivated in gardens, and then mainly in western Europe and eastern United States, yet it is not unattractive. It is particularly noteworthy because of the attractive foliage and picturesque branching patterns, and often forms a handsome small tree with a broad leafy head of erect or spreading branches. The leaves turn a very attractive yellow to rusty-brown in the fall, and the berries are very attractive to birds. It also has medicinal interest in that the bark is the source of the laxative Cascara Sagrada. It is attractive as a specimen tree or in shrubberies, and can also be used as a hedge or shelterbelt.

Availability

Few nurseries seem to carry *Rhamnus purshianus*, although it may be possible to obtain specimens from specialist nurseries.

Other Uses

The wood is of no commercial value, mainly because of its small size, but has been used locally for posts, built-up turned articles, and fuel. The flowers are a leading source of honey in Sonora, California, because of the long flowering period (25 days or more). The honey is very dark, non-granulating, and has a mildly laxative effect. The fruit may be eaten raw or cooked, but is said to give a transient reddish cast to the skin if eaten in excess. The tree also has important uses in providing habitat and food for wildlife, and in forest management and watershed plantings.

The chief value of *Rhamnus purshianus* is in the bark, the source of the laxative Cascara Sagrada. The bark was well-known for its properties to both the Indians and the early settlers, and entered the American Materia Medica in 1877 when Dr. J.H. Bundy of Colusa, California, published a paper on its therapeutic uses. The bark contains many constituents, including cascarin (or frangulin), emodin, and purshianin. Frangulin is also present in the berries, seeds, and root bark, and is responsible for the bright yellow color and bitter nauseous taste of the bark. The active ingredients are also present in smaller amounts in the wood. Cascara Sagrada possesses tonic laxative properties, and is believed to act by toning or strengthening the peristaltic muscles of the intestinal wall until they regain their normal function. It is used for habitual constipation, dyspepsia and digestive complaints, and also in the treatment of piles.

The bark is collected from April until the end of August from trees in northern California to southern British Columbia, and forms an industry of some importance to rural regions. The trees are either stripped of the bark and left standing or stripped and felled, leaving a stump about 15 cm tall to regenerate. Bark is stripped from the branches of felled trees, but not from those of trees left standing. The bark is then spread to sun-dry on platforms, with the outer surface upwards, for 4-5 days before being mechanically broken into pieces about 20 cm long by 2.5 cm wide, packed into sacks or bales, and shipped to the dealers. It is usually stored for at least one year before it is considered cured for pharmaceutical use (artificial drying at 38°C for one hour may be substituted). The fresh bark tends to cause griping and nausea, but chemical changes occur during storage and drying that make it more acceptable. In addition, various ingredients are added to the extract to give an agreeable taste and color to the otherwise bitter medicine, and about 20% alcohol is added to the liquid form as a preservative.

The total annual harvest is about 2 million kg, even though some cascara principles can now be produced synthetically. The average yield of bark per tree is 4.5 kg — between 1914 and 1922 680,000 kg (1½ million pounds) of bark were shipped from a limited area in the Fraser Valley of British Columbia. Because so many trees were killed by stripping the Provincial Government passed an Order-in-Council in 1942 specifying that the trees had to be cut down to 30 cm high stumps to allow regeneration. It is still against the law to cut trees on Crown land without a permit. It has proven almost impossible to obtain present-day figures on the annual harvest of Cascara bark in British Columbia, because both the Federal and Provincial Governments combine it with other plants under "Pharmaceutical Products", and there is no simple way to obtain individual figures. It appears that the collection of Cascara bark may now be reduced to a "cottage industry" in British Columbia, although there are still companies advertising that they will buy Cascara bark, especially on Vancouver Island. It should be noted that a product labelled "Cascara" or "Extract of Cascara" must contain Cascara bark by law.

The early settlers in Washington made a cold infusion by soaking a piece of bark overnight in water, and then drank the liquid as a tonic. They prepared a laxative by either boiling fresh bark for several hours or by pouring boiling water over a small amount of pulverized bark, and then letting it cool before use.

A bitter cascara extract has been used in liqueurs, and debittered extract is used as flavoring in soft drinks, ice cream, and some baked goods.

Ethnobotany

The coastal Indian peoples valued the bark as a tonic and laxative. The Thompson Indians of British Columbia made a strong decoction of bark, and sometimes of the wood, and drank it as a physic. They used a milder decoction as a laxative. The Skagit Indians of western Washington boiled the bark to make a green dye used on mountain goat wool. They also burned the bark, mixed the charcoal with grease, and rubbed the mixture on "swellings". The Squaxin Indians used an infusion of the bark to wash sores.

The berries are edible, but were not eaten by British Columbian Indians who seemed to ignore them as a source of food, possibly because it is difficult to collect large quantities of them. Some people believed that the fruit had the same laxative properties as the bark. The Makah Indians of western Washington ate the fresh berries in summer, while the Quileute believed that pheasants ate the berries and that it made their meat taste better.

Diseases and Problems of Cultivation

The growth of *Rhamnus purshianus* is slender when grown in dense shade, and shrubby if insufficient moisture is provided. The fruit is readily eaten by birds, and the seeds so far dispersed that they may become a pest as they germinate.

Rhamnus purshianus is attacked by few insects or diseases, but it is an alternate host for *Puccinia coronata* Corda, which causes Oat Rust on oats and Yellow Leaf Spot on *Rhamnus*. For this reason, *Rhamnus* species should not be planted in the same vicinity as oats, and there are regulations prohibiting such plantings in landscaping, as well as the importation of some species, in various parts of Canada. *Rhamnus purshianus* is permissible under any circumstances in British Columbia because strains of oat have been developed in Canada that are resistant to the strains of *Puccinia coronata* found on this species. The status of all other species of *Rhamnus* must be checked with the local Plant Quarantine Office before plantings are made.

Toms (1964) lists *Phyllosticta rhamni* West, Leaf Spot, and *Puccinia coronata* Corda, Rust or Yellow Leaf Spot, as occurring naturally on the coast of British Columbia.

Origin of the Name

The generic name *Rhamnus* is variously believed to be derived from the Celtic *ram* or *rham*, 'a tuft of branches', or from the Greek *rhamnos*, the classical name for the Buckthorn. The specific epithet *purshianus* commemorates Frederick Traugott Pursh (1774-1820), a German explorer, collector, horticulturist and author who lived in the United States from 1799 to 1811, and who published the first description of the species (as *R. alnifolius*) in 1814 in his book "Flora Americae Septentrionalis". This specific name had already been given to another shrub by Charles Louis L'Heritier de Brutelle. The error was corrected by Augustin Pyramus de Candolle (1778-1841) in 1825, and he recognized Pursh's important contribution to botany in the specific name. Pursh died in Montreal while collecting material for a publication on the flora of Canada. The common name Cascara is derived from the Spanish *cascara*, meaning 'bark'. Sagrada is derived from the Spanish *sagrada*, 'holy' or 'sacred'. Thus, Cascara Sagrada means sacred (or holy) bark, possibly being derived from the supposed resemblance of the wood to that used in the Ark of the Covenant. Alternatively, the name may have been given by the early Franciscan missionaries of California, who were told of the bark's therapeutic properties by Indian neophytes.

The type locality is "On the banks of the Kooskooskee" [Clearwater] in Idaho, where it was collected by Meriwether Lewis in 1807 during the Lewis and Clark Expedition. The exact location is believed to be Camp Chopunish, opposite Kamiah, Idaho. Lewis and Clark had noticed the tree in Montana in 1805-1806, but did not collect it until the following year. It is believed that Archibald Menzies saw the tree at Dabob Bay on the eastern side of the Olympic Peninsula, Washington, on May 12, 1792.

One other species of *Rhamnus*, *R. alnifolius* L'Heritier or Alder-leaved Buckthorn, is present in British Columbia. *Rhamnus alnifolius* is a deciduous shrub, 0.5-2(-3) m tall, with scaly winter buds. The leaves are (3-)6-11 cm long and have 5-7(-8) pairs of prominent veins. The flowers are dioecious (sexes on separate plants), 2-5 in axillary sessile umbels, and there are no petals. The berries are black, 6-8 mm long, and poisonous. The shrub is found from British Columbia east to Quebec and Maine, and south on the east side of the Cascade Mountains to the central Sierra Nevada in California and to Idaho, Montana and Wyoming. *Rhamnus alnifolius* is present in British Columbia in marshy places and dry swamps in the Interior. It is limited in range in the Province, but is common in the Kootenay River Valley (where it overlaps with *R. purshianus*), east of Creston, in the vicinity of Kimberley, and eastwards to the Rocky Mountains. The bark also contains Cascara Sagrada. The specific name *alnifolius* means 'with leaves like the alder'. The type locality is "In America septentrionale", and the shrub was first cultivated in Great Britain in 1778.

Key to separate the species in British Columbia

Large shrub to medium-sized tree; winter buds naked; leaves with 10-15 pairs of prominent veins; flowers in pedunculate umbels; petals 1 mm long or less, greenish or greenish-yellow . . . . . *Rhamnus purshianus*

Shrub; winter buds scaly; leaves with 5-7(-8) pairs of prominent veins; flowers in axillary sessile umbels; petals absent . . . . . *Rhamnus alnifolius*

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Climatological Summary*

Data 1980	JANUARY	FEBRUARY	MARCH
Average maximum temperature	3.6°C	8.2°C	8.2°C
Average minimum temperature	-1.6°C	3.3°C	2.9°C
Highest maximum temperature	9.2°C	13.4°C	12.2°C
Lowest minimum temperature	-9.3°C	-0.7°C	-1.7°C
Lowest grass minimum temperature	-13.2°C	-4.7°C	-5.5°C
Rainfall/no. days with rain	86.4 mm/12	174.7 mm/19	115.6 mm/22
Total rainfall since January 1, 1980	86.4 mm	261.1 mm	376.7 mm
Snowfall/no. days with snowfall	10.6 cm/5	0	0
Total snowfall since October 1, 1979	10.6 cm	10.6 cm	10.6 cm
Hours bright sunshine/possible	85.6/265.3	58.5/278.2	112.5/361.1
Ave. daily sunshine/no. days total overcast	2.8 hr/11	2.0 hr/13	3.6 hr/11

**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

Botanical Garden News and Notes

Supervisor of Operations Retires — Mr. Ken Wilson, the first Supervisor of Operations at The Botanical Garden, retired officially on February 29, 1980. Mr. Wilson has been with the Garden since its inception in 1969, and has been closely involved with the development of the overall program, as well as playing a key role in the development of the Garden. A reception for him was held on March 20, 1980, and was well attended by Botanical Garden staff and members of the University community. We wish Ken and Nora, his wife, the very best in their retirement, and look forward to seeing them back at the Garden on many occasions in the future.

Vancouver Home and Garden Show — The Home and Garden Show 1980 was a resounding success, and the Botanical Garden show "Easy Access Gardening" was enjoyed by the many visitors to the Exhibition. The combination of Botanical Garden staff and Friends of the Garden volunteers served to make this special ten-day program a much appreciated exposure to The Botanical Garden activities at the University of British Columbia.

Selected Plant Distribution — Plant material from The Botanical Garden that was unusual and of possible use in landscaping was selected during 1979 through a cooperative arrangement with the B.C. Nursery Trades Association (BCNTA) and the B.C. Society of Landscape Architects (BCLIPA). The final distribution of the 1979 plants from The Botanical Garden was made in March to BCLIPA members in the Lower Mainland.

Development at The Garden — A new contract was authorized for the building of the new Main Garden Public Service Centre, or Phase 3 of the building program in The Botanical Garden. The contract calls for completion of the building by August 1st this year. This new building will provide public facilities for visitors to the Main Garden area, and also will serve as an information and display centre for activities in the Garden.

All-America Selection Display Garden — The All-America Demonstration Garden will again be featured in the Main Garden area this summer. The planting this year will be in the new Economic Garden area, adjacent to the new Public Service Centre.

The University of British Columbia Arboretum Study — The study detailing the history and development of the University of British Columbia Arboretum has now been completed. A copy has been deposited with Special Collections in the Main Library at UBC, and a copy has been retained in the Botanical Garden Library. This program was completed by Sarah Curtis, who was employed through the Summer University Employment Program sponsored by the British Columbia Provincial Government. We would like to thank Mrs. Edna B. Davidson, wife of the late Professor John Davidson, for her help in reviewing the personal files of Professor Davidson, who was responsible for the original planning of the Arboretum.

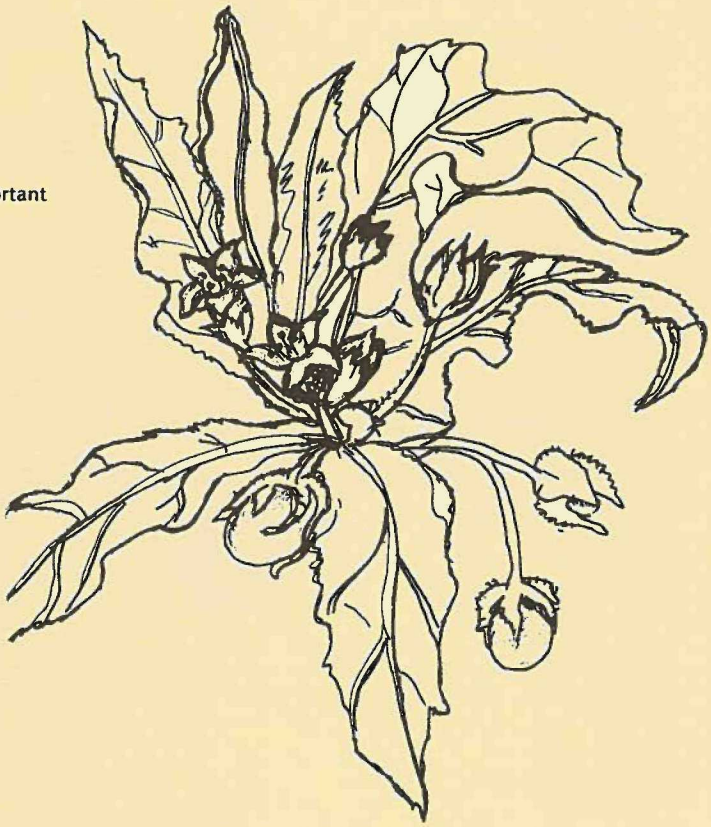
Youth Employment Program — The Botanical Garden has been awarded two Summer Student Youth Employment Program positions for the summer of 1980. The students will work in various activities within The Botanical Garden.

The Friends of The Botanical Garden Program — *Plantae Occidentalis: 200 Years of Botanical Art* will complete its national exhibition tour at the British Columbia Provincial Museum in Victoria from June through the end of August. Arrangements have been made for an evaluation of the exhibition during its display by Mrs. Patricia Dickason, a member of the volunteer group at the Provincial Museum. The evaluation will enable future planning to incorporate visitor responses to the exhibition.

The Friends of the Garden are now planning an exhibition entitled *"Cloud Flowers: Rhododendrons East and West"* to open at the time of the dedication in 1981 of the Asian Garden and Main Garden components of The Botanical Garden.

A special one week trip to California was arranged during March to acquaint members of the Friends of the Garden with similar programs at gardens in that state. The group of 12 FOG members was led by David Tarrant.

Mandragora officinarum, Mandrake, an important plant of early physic gardens, × 0.75.



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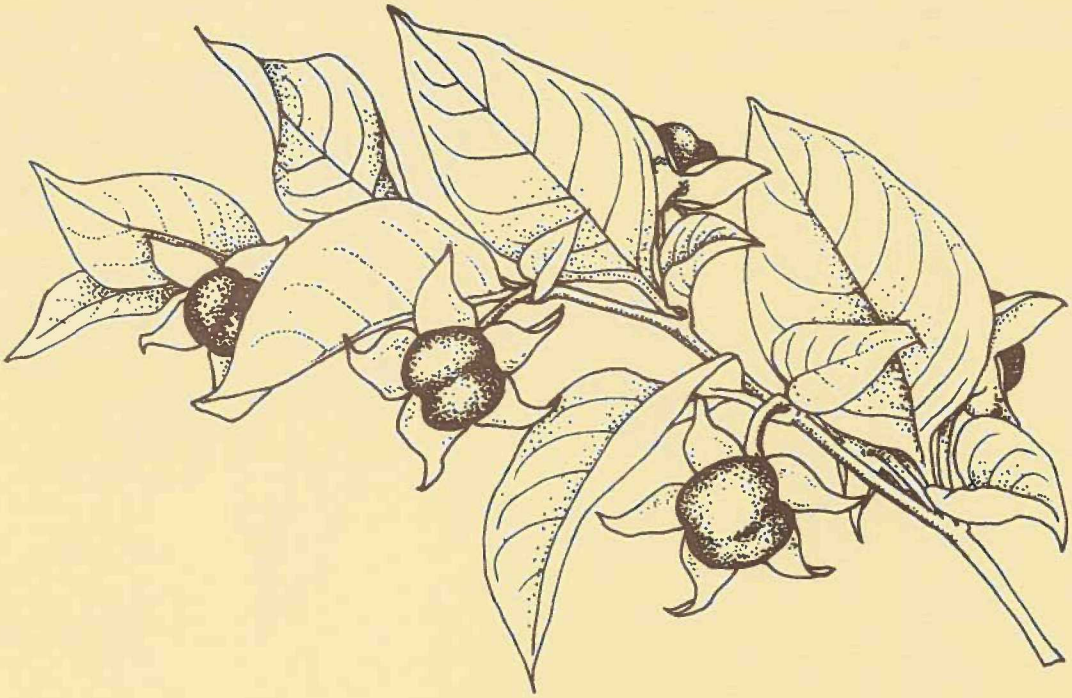
Atropa belladonna, Deadly Nightshade, × 0.80. This plant is the source of atropine, still widely used in ophthalmology.



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