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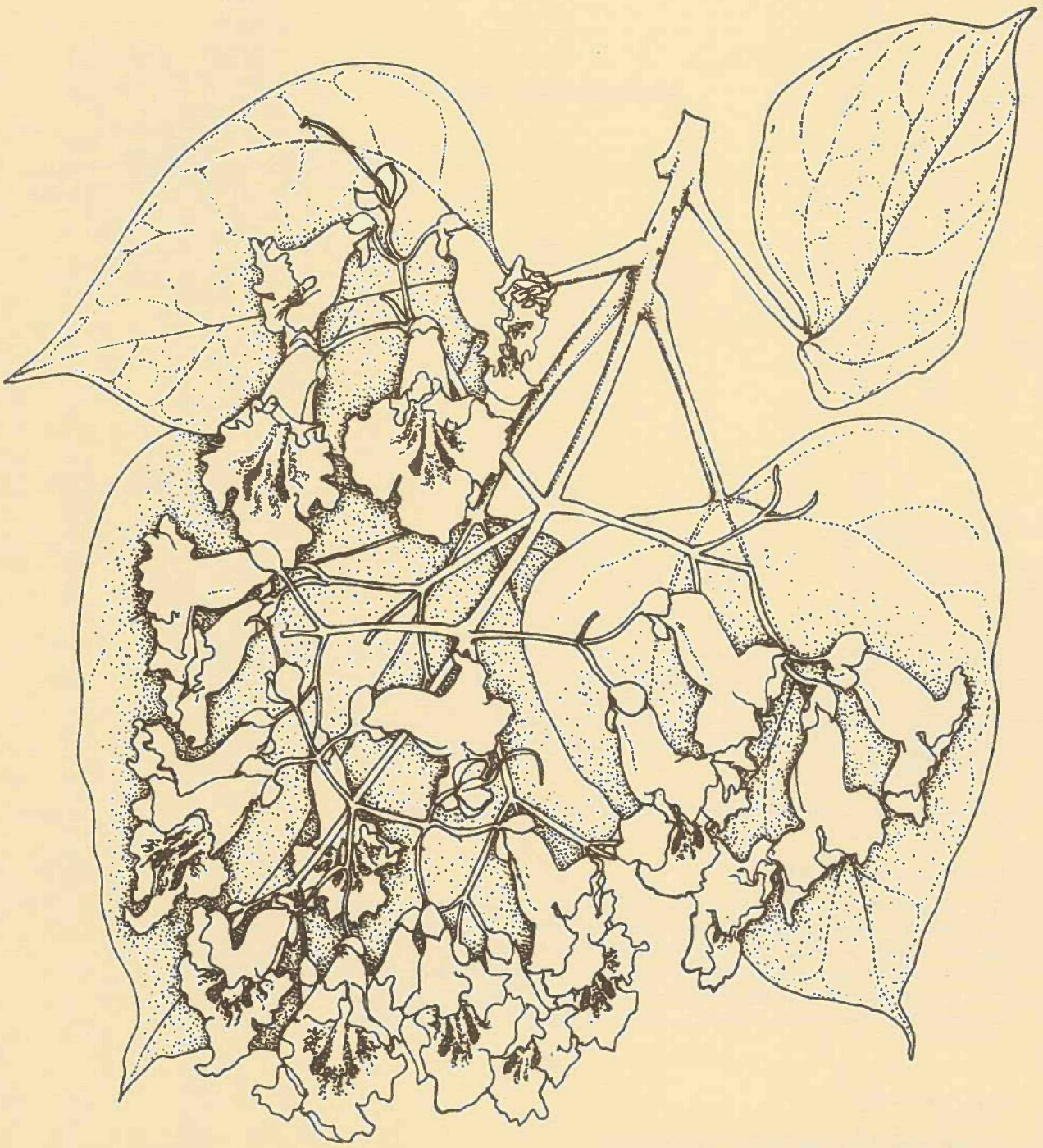
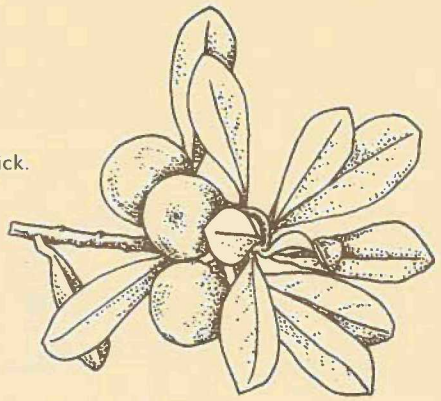


Cover:
Catalpa bignonioides, an American species of the Foxglove Trees.

Arctostaphylos uva-ursi, Kinnikinnick.



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Acknowledgements

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The Foxglove Trees

A. PETER WHARTON*

The two genera *Catalpa* and *Paulownia* have given horticulture some of the most outstanding ornamental flowering trees that can be grown in the warmer temperate areas of the world. Their flowers, as the title of this article implies, resemble those of *Digitalis*, which is closely related to these two genera. Several species described in this article have been grown with a fair degree of success in the Lower Mainland region of British Columbia. *Catalpa*, belonging to the Bignoniaceae, and *Paulownia*, a member of the Scrophulariaceae, are closely allied and it has been suggested by Willis (1973) that both genera are close to the point where branching occurred in the ancestral stock that gave rise to these two plant families.

Catalpa

Catalpas, numbering 11 species, are distributed in eastern Asia, north and central America and the West Indies. In an open situation they develop into widespread bushy-headed deciduous trees. This habit is largely due to the fact that the leading shoots never form a terminal bud. The young wood is stout and pithy, the leaves are either opposite or in threes, large and long-stalked. The flowers are produced in panicles, corymbs or racemes at the end of the current year's shoots. The corolla is bell-shaped at the base with 5 spreading frilled lobes, calyx 2-lipped, stamens 5, only 2 of which as a rule are fertile. Both *Catalpa* and *Paulownia* species leaf very late in the spring.

Three Asiatic species have been introduced, but none has proved superior to the two American species *Catalpa bignonioides* and *C. speciosa*. These species are very effective as specimen trees on a lawn, where their seasonal form and color can best be appreciated.

Catalpas respond to rich soil conditions preferring a deep moist loam, and an open sunny site, protected from strong winds. One of the finest locations in which I have seen Catalpas growing was in an old quarry, where the flowering trees could be observed to great effect by looking down onto the countless flower masses.

It is advisable to train the young tree up to 3 m to allow the development of a good main stem. The naturally spreading habit of the tree can then be allowed to proceed. This develops when the side shoots develop around the terminal bud, which remains inactive, causing bi- or tri-furcation and encouraging a widespreading habit.

Propagation of *Catalpa* species is by seed, cuttings, and grafting of cultivars. However, young plants derived from seed generally make more vigorous and long-lived trees. The fruits should be collected when brown and dry, stored dry at 5°C, and the seed sown in late spring. No pre-germination treatments are necessary. Softwood cuttings, 10–15 cm long, may be taken in June, treated with a hormone rooting powder, and planted under mist with basal heat. Root cuttings, 7.5–10 cm long, may be taken from 1–2 year old roots in January or February, dusted with a fungicide and planted in a compost of one part each peat, grit and loam.

The most popular *Catalpa* in the Lower Mainland area of British Columbia is the Indian Bean Tree or Southern Catalpa (*Catalpa bignonioides* Walt.), which is often planted in parks and gardens or as a street tree. It is indigenous to riparian environments in southwestern Georgia, western Florida, and central Alabama and Mississippi. *Catalpa bignonioides* makes a tree 7.5–15 m tall, with a rounded, wide-spreading, much branched head when grown in an isolated situation. The leaves are broadly ovate with a heart-shaped base, 10–25 cm long, 7.5–20 cm wide, with short slender points, and are sometimes slightly lobed at the sides. The panicles are broadly pyramidal, 20–25 cm long and wide, and many-flowered. The corolla is 3.8 cm long and wide, and is frilled at the margin. The tube is bell-shaped, white, with two ridges and 2 rows of yellow spots, and numerous purple spots on the tube and lower lobe.

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This species flowers from mid-July to early August. It is, without doubt, one of the most beautiful flowering trees grown in the Vancouver area. It has been used as a street tree in the past, a practice that has now ceased due to its unsuitability for that role, being weak-crotched and prone to decay, plus its ability to produce masses of debris, notably long, pendant seed-pods and large leaves, which cause street and drain maintenance problems. A further structural problem with existing trees is a past history of topping that has greatly disfigured the young developing trees. Subsequent growth has disguised much of the damage caused by this misguided practice, but it has left a legacy of untreated and rotten cavities within the major branches and stem, which have weakened the trees structurally and could lead to their final demise. If at all possible, major branches should not be removed, as the heartwood of this species is very prone to rot. *Catalpa bignonioides* is not a long-lived tree, and frequently declines when 40–50 years old. At the nursery stage, the tree should be trained with a leader from 1.8–2.5 m high, as it is difficult to maintain a leader once branching has been established.

A very fine yellow-leaved form of the Indian Bean Tree, *Catalpa bignonioides* cv. Aurea, is well worth cultivating. It retains, if not improves, its yellow hue as the season advances.

Various hybrids have arisen in cultivation between *Catalpa bignonioides* and the Chinese species *Catalpa ovata*, which have been given the name *Catalpa* × *erubescens* Carr. The best known form of this cross was raised by J.C. Teas at Bayville, Indiana, U.S.A., around 1874. The unfolding leaves are purplish, broad-ovate, cordate, and up to 31 cm long. The flowers are white, stained with yellow and speckled with purple dots. The individual flowers are smaller than *C. bignonioides* and not as numerous. The hybrid has shown considerable vigor in south-central U.S.A., with leaves reaching 61 cm in width and panicles carrying over 300 flowers. This hybrid can grow in the Vancouver area, but our unreliable summers are likely to reduce the quantity of flowers produced.

The Chinese species *Catalpa bungei* C.A. Meyer is rare in cultivation. It makes a bushy tree 6–9 m tall, which makes it a possible choice for a small garden. The leaves are 5–19 cm long, 3.8–11.5 cm wide, ovate or somewhat triangular, with a wedge-shaped or straightly cut base, sometimes entire, but often coarsely scalloped. This species flowers rather sparsely in the Pacific Northwest. The white and purple spotted flowers are produced in groups of 3–12 in a flattish corymb. It is native to China and is especially frequent in the neighborhood of Beijing. It should adapt well to the climate of the interior of British Columbia where weather conditions are more continental, allowing better hardening-off of young growth and more reliable flowering.

Another Chinese species, *Catalpa fargesii* Bureau, is largely unknown in the Lower Mainland area of British Columbia. It makes a tree 9–18 m high, and is easily identifiable by the velvety branching hairs covering the shoots, undersurface of the leaves and the inflorescences, which fall away by the end of the season. The leaves are ovate, straight or slightly heart-shaped at the base, long and taper-pointed, 7.5–15 cm long, and 5–12.5 cm wide. The flowers are 3.8 cm long and nearly as wide, pinkish, spotted in and around the throat with brownish red, and stained with yellow, and are produced seven to fifteen together in corymbs. The flowers do much to commend its planting, but its gaunt narrow-crowned habit makes it less desirable than *C. bignonioides*.

A third Chinese species, *Catalpa ovata* G. Don, grows well on the campus of the University of British Columbia. It grows vigorously to 6–9 m tall, and in very favorable locations to 14 m, with a spreading head of branches as much or more in diameter. The leaves grow from 12.5–25 cm long on average, and as much wide. They are broadly ovate with a heart-shaped base. The flowers are held in panicles that are 10–25 cm high, narrowly pyramidal, and are produced in July and August. The corolla is dull white stained with yellow and spotted with red inside, and about 2.5 cm long and wide.

This species is native to China, but has been cultivated in Japan for centuries. It differs from the two American species by its more conspicuously lobed leaves and smaller flowers, and from *C. bungei* by the larger downy leaves and smaller flowers. At the Botanical Garden we grow the cultivar *C. ovata* cv. Flavescens with flowers even smaller than the type. The whole corolla is suffused with yellow.

The largest Catalpa in stature is *C. speciosa* Warder ex Engelm., the Western Catalpa, a native of the U.S.A., which is found west from the Alleghenies and extends further north in the Mississippi Basin than *C. bignonioides*. It makes a tree over 30 m high in favorable localities in the wild, with a tall trunk 3 m or more in circumference. The leaves are ovate, with a heart-shaped or rounded base and a long tapering point, 12.5–31 cm long, 7.5–20 cm wide. The flowers are borne in panicles that are 15–20 cm long and rather more wide, with comparatively few flowers. The corolla is white, and 5 cm long and wide. The tube is bell-shaped, the lobes spreading and frilled at the margin, the lower one has yellow spots and ridges, but is less freely spotted with purple.

This species differs from *C. bignonioides* in its taller growth, more tapering leaves, the larger fewer flowers in the panicle, and less profusely purple-spotted corolla. *Catalpa speciosa* is a pyramidal tree and naturally

develops a leader through the tree. This needs to be maintained, especially after transplanting, as transplanting often has a retarding effect on the leader. The wood of this species is much valued in the U.S.A. because of its extraordinary durability when in contact with moist ground.

Diseases and Insect Pests

Leaf spot is particularly troublesome during rainy seasons. Infection by three fungi, *Phyllosticta catalpae, Alternaria catalpae* and *Cercospora catalpae*, is thought to be initiated by bacterial infection and injury by the Catalpa Midge. Tiny water-soaked spots, scattered over the leaf, appear in May. These increase in size till they reach a diameter of 6 mm. If infection is very heavy the whole leaf may fall away prematurely. To control this disease, spray Bordeaux mixture when the leaves unfurl, when half grown, and again when full grown.

The Indian Bean Tree (*Catalpa bignonioides*) is extremely susceptible to heartwood decay caused by the fungus *Polyporus versicolor. Polyporus catalpae* causes basal trunk decay near the soil line. To prevent these fungal diseases, avoid wounds and keep the tree in good vigor by fertilizing and watering, particularly in drought years.

The Catalpa Midge (*Cercidomyia catalpae*) causes distortion of the leaves, and circular areas inside the leaves are chewed, leaving a papery epidermis, as a result of infestation by tiny yellow maggots. The adult is a tiny fly that appears in late May or early June to lay eggs on the leaves. The winter is passed in the pupal stage in the soil. To control this pest, cultivate the soil beneath the trees to destroy the pupae, and spray in late May with malathion.

FIGURE 1. *Paulownia tomentosa*, the Empress Tree, × 0.33.

Paulownia

The genus *Paulownia* is closely related to *Catalpa*, but the 17 species are all confined to Asia.

Their leading characteristics include smooth bark, pithy branchlets, and opposite leaves, which are either entire or lobed. The flowers are borne in 3- or 5-flowered, stalked or almost sessile cymes in the axils of the fallen leaves, and are produced in the spring from buds developed in the previous year.

Paulownias need a rich soil, preferring a deep light loam with a pH of 6.5–7.5, and a somewhat sheltered position. Propagation is usually by seed or root cuttings, although greenwood and leaf cuttings have also been used. The fruits should be collected when dry and the seed sown in the spring in a flat or an outdoor seed bed, shaded with saran cloth. Root cuttings may be taken as described for *Catalpa*.

The rather tender species *Paulownia fortunei* (Seem.) Hemsl. is rare in cultivation in North America, but would be worth more planting in Oregon and California. It is found wild in south and southeast China, Taiwan and Indo-China, where it reaches 26 m tall in favorable situations. In North America, half this height is more common. The striking leaves are ovate, 14–25 cm long, 7–12.5 cm wide, acuminate at the apex, and cordate at the base. The cymes are mostly three-flowered and are in the form of a narrow panicle. The calyx is funnel-shaped and about 2 cm long. The corolla is funnel-shaped, lavender-purple in the bud and retaining that color on the outside, but white or creamy-white inside and heavily spotted with dark purple, 9–10 cm long and about 5 cm wide at the mouth.

Young plants raised from seed, like all *Paulownia*, display great vigor, producing 0.9–1.25 m of soft growth per year, but are heavily damaged if planted out as 2–3 year old saplings. This underlines the importance of giving winter cover until the young trees have reached 1.8–2.5 m, by which time the stems will have had a chance to become woody.

The Empress Tree, *Paulownia tomentosa* (Thunb.) Steud. (Figures 1, 2), is the best known of all the Paulownias. It is a native of China, but was introduced from Japan where it has been in cultivation for centuries. It makes a round-topped deciduous tree, 9–15 m high, with thick stiff branches and a rather open habit. This habit encourages the development of vertical water-shoots, which arise from the main lateral limbs. As the specific name implies, all young growth is more or less downy. The leaves are opposite with the larger ones 3- and 5-lobed. Leaf dimensions are very variable; on a mature tree, they are 12.5–25 cm long and wide, dark green with scattered hairs above, and covered beneath with a soft, greyish wool. The panicle is terminal, and up to 30.5 cm long. The flowers form during the fall, but do not open until the following May. The corolla is blue-purple, 3.5–5 cm long, and shaped like a huge foxglove. The flowers have a delicate sweet fragrance.

Few more beautiful flowering trees than this exist, but although the tree is fairly hardy and sets its flowers, they often fail to develop in the coastal areas of British Columbia. The alternating frosty and mild spells of

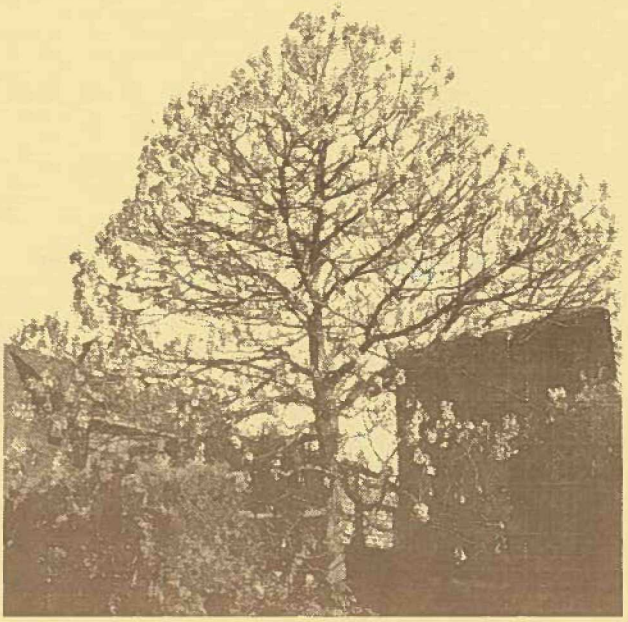

FIGURE 2. *Paulownia tomentosa*, photographed in April on Point Grey Road on the south side of English Bay, Vancouver.

our winters often kill the developing flower buds. The tree can be treated as a herbaceous foliage plant by cutting the plant down to near ground level each year and encouraging the most vigorous new shoots, but feeding and watering are necessary. Well-grown plants can produce sturdy stems 3.5 m tall and leaves between 60–90 cm in width in one season.

During Wilson's final expedition for the Arnold Arboretum in 1907–1908, he found *P. tomentosa* growing in the wild in western Hubei and sent seeds back under his number W. 769. This form has proved to have a more vigorous constitution, attaining greater dimensions and is longer-lived than those in general cultivation. It appears there is considerable regional variation in this species, and it is likely that hardier and more floriferous forms may be obtained in the wild.

A closely related species, *Paulownia lilacina* Sprague, differs from *P. tomentosa* mainly in its unlobed leaves and lilac flowers, which are pale yellow in the throat.

A recently introduced species from western China is *P. fargesii* Franch. It is claimed to be the finest species of the genus, making a sizable tree up to 25 m high, with a large rounded head, coming into bloom at an early age. It is deciduous with large leaves often 45 cm broad, and it bears its flowers in erect panicles. The tubular flowers are purple, speckled in the throat with deep purple and with a creamy-yellow basal stain. They emit a delicious warm Eastern fragrance. This species appears to be better suited to our west coast climate and should be propagated and distributed more widely in the Pacific Northwest region.

Two new Paulownia species, *P. kawakamii* and *P. taiwaniana*, have recently been received from the Taiwan Forestry Research Institute and are being grown at The Botanical Garden. Hopefully, they will be distributed more widely in the Pacific Northwest in due course.

Diseases and Insect Pests

Two species of fungus, *Ascochyta paulowniae* and *Phyllosticta paulowniae*, cause leaf spot in Paulownias in very rainy seasons. To control this pest, the fallen leaves should be burnt and preventative sprays containing copper or dithiocarbamate fungicides can be used on valuable trees in exceptionally wet seasons.

The fungi *Polyporus spraguei* and *Polyporus versicolor* are constantly associated with wood decay in Paulownias. As recommended with *Catalpa*, feeding and watering to keep the trees healthy and vigorous is advised.

The Foxglove Trees should always be borne in mind by landscape architects, landscapers and gardeners when a spacious sheltered sunny location requires a summer flowering tree with fine distinctive foliage. I have considerable reservations about the suitability of these trees for use as street trees, because their widespreading low crowns often interfere with service wires, there is a problem with debris in the form of leaves and fruiting bodies clogging drains and contributing to slippery road conditions in the fall, and, lastly, their susceptibility to basal stem rot, a fault that is particularly serious where vehicular contact is a constant danger. However, this group of plants will always have a place in large public and private gardens, as they provide color and interest throughout the year.

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Stachys cooleyae Heller — A Hummingbird Flower?

DEREK B. MUNRO*

Hummingbird-pollinated flowers are usually red to mauve in color and tubular in shape, with a length and diameter suited to the beaks and tongues of these birds. In 1979 I collected live specimens of *Stachys cooleyae* Heller in southwestern British Columbia for study in Ottawa.

The size, shape, and purple-red color of the flower led us to believe that *Stachys cooleyae* may be pollinated by hummingbirds. The tubular corolla of each flower averages 15–20 mm in length, with basal nectaries secreting a sweet-tasting colorless liquid that collects at the base of the tube. Four stamens are exserted before the single stigma, and the anthers are held against the upper lip. This would allow pollen to be placed on top of a hummingbird's beak.

I took some plants to my home and planted them in a flower bed frequented by hummingbirds. I was quickly rewarded with visits by both a male (Figure 3) and female Ruby-throated Hummingbird foraging for food. Several flowers were visited on each inflorescence. Further visits occurred over the next few days, suggesting a continued production of nectar by the flowers.

These observations would imply that *Stachys cooleyae* is pollinated by western hummingbirds throughout the range of the species. If any reader could confirm this hypothesis, I would be most interested in receiving a short note on visits by hummingbirds to these plants.

FIGURE 3. A male Ruby-throated Hummingbird feeding at the inflorescence of *Stachys cooleyae*.

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Necklaces from Nature — Seed Jewelry

DALE LEADBEATER HOY[1] and PAUL M. CATLING[2]

"Jewels, my pretties! Beads to adorn you!!". Bracelets, baubles and necklaces — from time immemorial men and women have sought to ornament themselves by hanging, piercing or pinning jewelry to their bodies. The original jewelry was made from materials easily obtained, and although gold, silver and copper have always had something of an edge, jewelry made from seeds and plant parts share a part of the market, even today in our North American stores. Initially those red, black, orange and brown organic baubles are merely delights to the eye. But to a botanist, they represent so much more! Seed necklaces are often a by-product of some other economic activity. If a tree is cultivated for its sap and happens to have ornamental seeds, they generally find their way into necklaces. Ubiquitous trees and shrubs with attractive seeds are also primary candidates for use in necklaces because the seed is easy to obtain. Many of the seeds are valued for use in drinks, potions, medicines and, sometimes, poisons.

Poison jewelry

Some of the most attractive seeds used in jewelry are very poisonous. That lovely, innocent necklace may quickly become lethal in the hands of a child who tastes every bright and shiny object that catches his or her eye. There have been many cases of child poisonings that could have been avoided if the owner knew the seeds. In most cases, they are not difficult to identify, and the number of seeds that are potentially dangerous are in the minority.

One of the most poisonous seeds is that of the Precatory-pea or Jequirity-bean (*Abrus precatorius*, Figure 4A), belonging to the Pea (Legume) family (Fabaceae). It is also one of the most attractive, the seeds being shiny, red and black, and about 5–8 mm in length. One of these seeds can be fatal to a man. Since its highly toxic properties are widely known (Gunn, 1969; Hardin and Arena, 1969; Niyogi, 1970; Davis, 1978), it is not commonly encountered for sale in North America. However, in spite of the laws prohibiting its import and sale, a few are occasionally brought in by an unsuspecting tropical traveller. Its alluring beauty has promoted the Precatory-pea for wide use in bracelets, necklaces, placemats, and even as eyes of dolls. *Abrus* grows throughout the tropics and subtropics, and artifacts containing it come from many parts of the world.

Several other members of the Legume family resemble *Abrus*, but most, if not all, are quite harmless. The Jumbie-bean (*Ormosia coccinea*) is reported to be poisonous (Lewis and Elvin-Lewis, 1977), but this is a relatively large red and black seed (more than 1.3 cm long, similar to Figures 5A, 9V), that so far has not been reported in North American seed jewelry. The seeds of *Ormosia* and of smaller legumes that resemble the deadly Precatory-pea are readily distinguished by the fact that the hilum (the scar marking the point of attachment of the fruit) in the Precatory-pea is located in the black part of the seed coat. The imposters have their hila totally in the red area of the seed coat and/or are much larger in size.

Another highly poisonous seed used in necklaces and more frequently encountered in North America is that of the Castor-bean (*Ricinus communis*, Figure 6A), a member of the Spurge family (Euphorbiaceae). These plants are most important as a source of castor oil used in medicines, soaps and lubricants. The seeds have a most beautiful, brown, mottled appearance, and are often called "tiger beans". Although the plant is sometimes cultivated as an ornamental for its large palmate leaves, it appears to be more of a poisoning problem in the form of a necklace. If the seed is swallowed with the seed coat intact, it may pass through the digestive system with no ill effect. However, when the seed coat of a seed is perforated for the stringing of necklaces, any toxin that is present readily escapes and may induce poisoning. The seeds of Castor-bean can cause death by kidney failure up to 12 days after eating (Malizia *et al.*, 1977). One to three can be fatal to a child. Most of the Castor-bean necklaces that we have seen have come from Mexico and South America.

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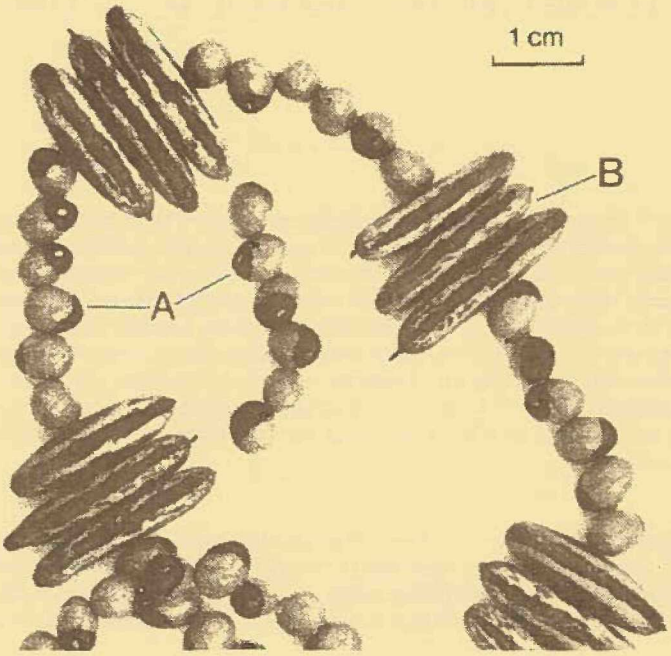


FIGURE 4. A. Precatory-pea (*Abrus precatorius*) VERY POISONOUS, B. Royal Poinciana (*Delonix regia*).

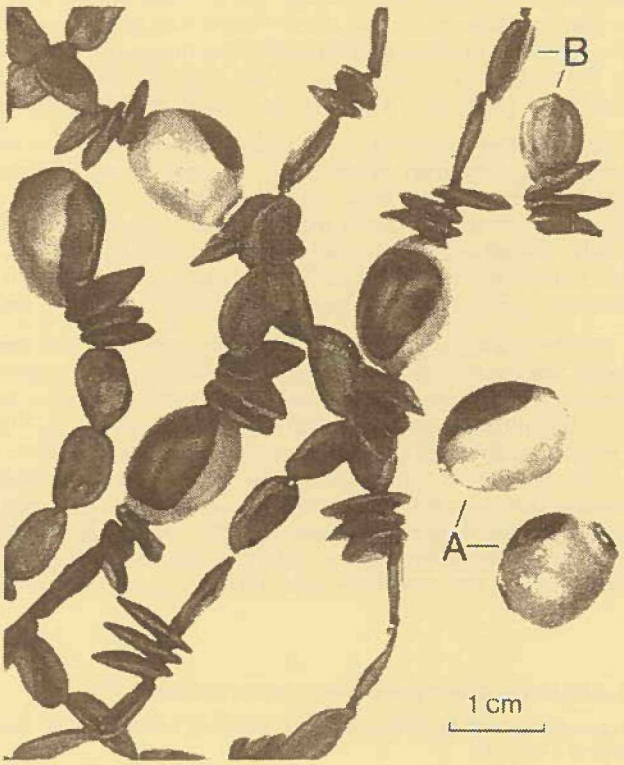


FIGURE 5. A. Jumbie-bean (*Ormosia* sp.) SOME POISONOUS, B. Leucaena (*Leucaena leucocephala*).

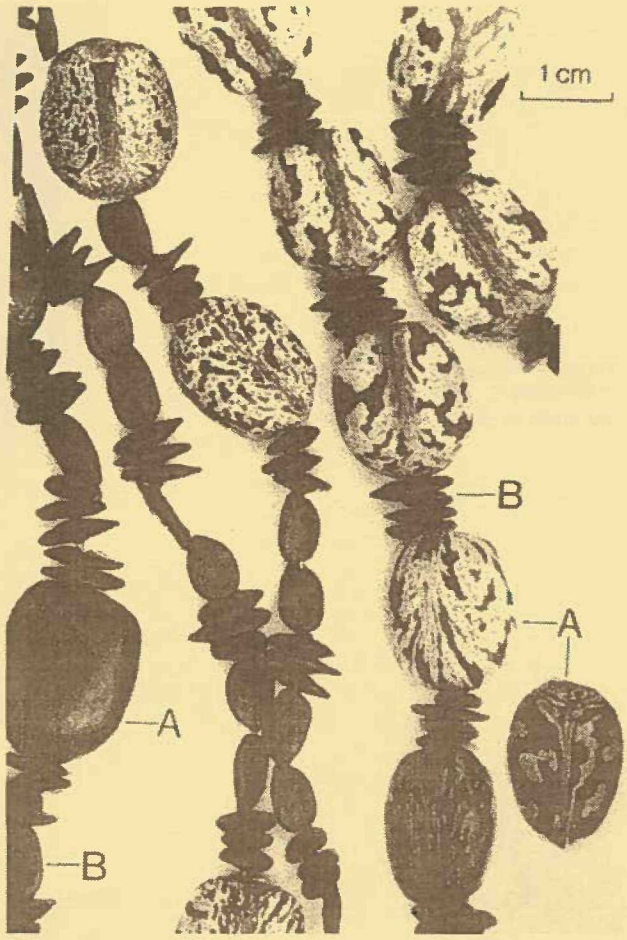


FIGURE 6. A. Castor-bean (*Ricinus communis*) POISONOUS, B. Leucaena (*Leucaena leucocephala*).

Anyone owning the attractive seeds of these species should take them to a local police department, agricultural station, museum or university botany department to be safely disposed of, since they represent a very real potential danger.

Another bead that may be harmful is the seed of the Chinaberry (*Melia azedarach*, Figure 7) in the Mahogany family (Meliaceae). The ridged, cream-colored seeds contain a poisonous alkaloid that could be fatal if enough of them are eaten.

Seeds from the genus *Erythrina* (Figures 8A, 15A) in the Legume family are used in tropical necklaces from many parts of the world. They are popular due to their shiny red, or red and black seed coats, and have a variety of names including Kaffirboom, Coral Tree and Lucky-bean Tree. There are over one hundred species in North and South America alone, ranging in habit from twining herbaceous vines to small trees. They, too, contain a poison, which is similar to curare, the South American arrow poison. Although deadly if refined and injected into the bloodstream, the seeds appear to be harmless when eaten. The human kidney efficiently excretes this particular poison faster than it can accumulate to a toxic level.

A few other poisonous seeds are used in necklaces, such as Sandbox (*Hura crepitans*, Figure 9Q, Appendix), Lucky-bean (*Afzelia cuanzensis*, Figure 9K, Appendix), Lucky Nut (*Thevetia peruviana*, Figure 9R, Appendix), some Macadamia (*Macadamia* spp., Appendix) and the pits of Apricot (*Prunus armeniaca*, Figures 17A, 20A), which contain hydrocyanic acid. These are less serious poisoning problems because of their relative infrequency in seed jewelry available here and/or their large size (making ingestion less likely), and/or lower toxicity. Candlenut seeds (*Aleurites moluccana*, Figure 9N, Appendix) are edible when roasted but poisonous when raw (Hardin and Arena, 1974).

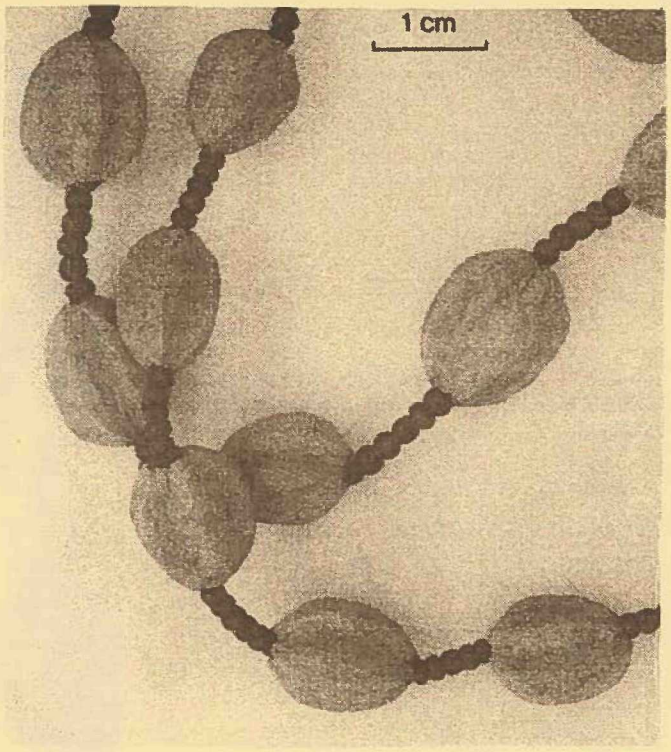


FIGURE 7. Chinaberry (*Melia azedarach*) POISONOUS. The smaller dark beads are made of plastic.

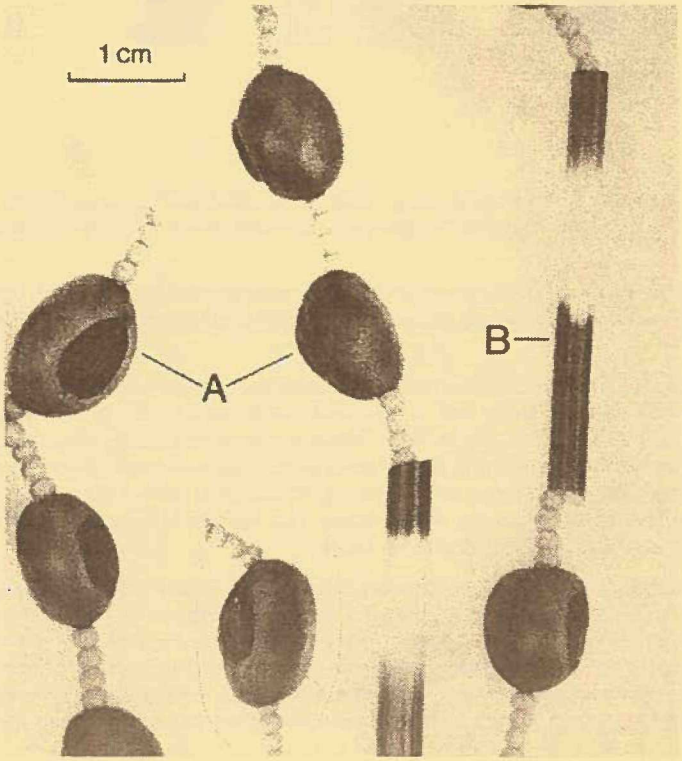
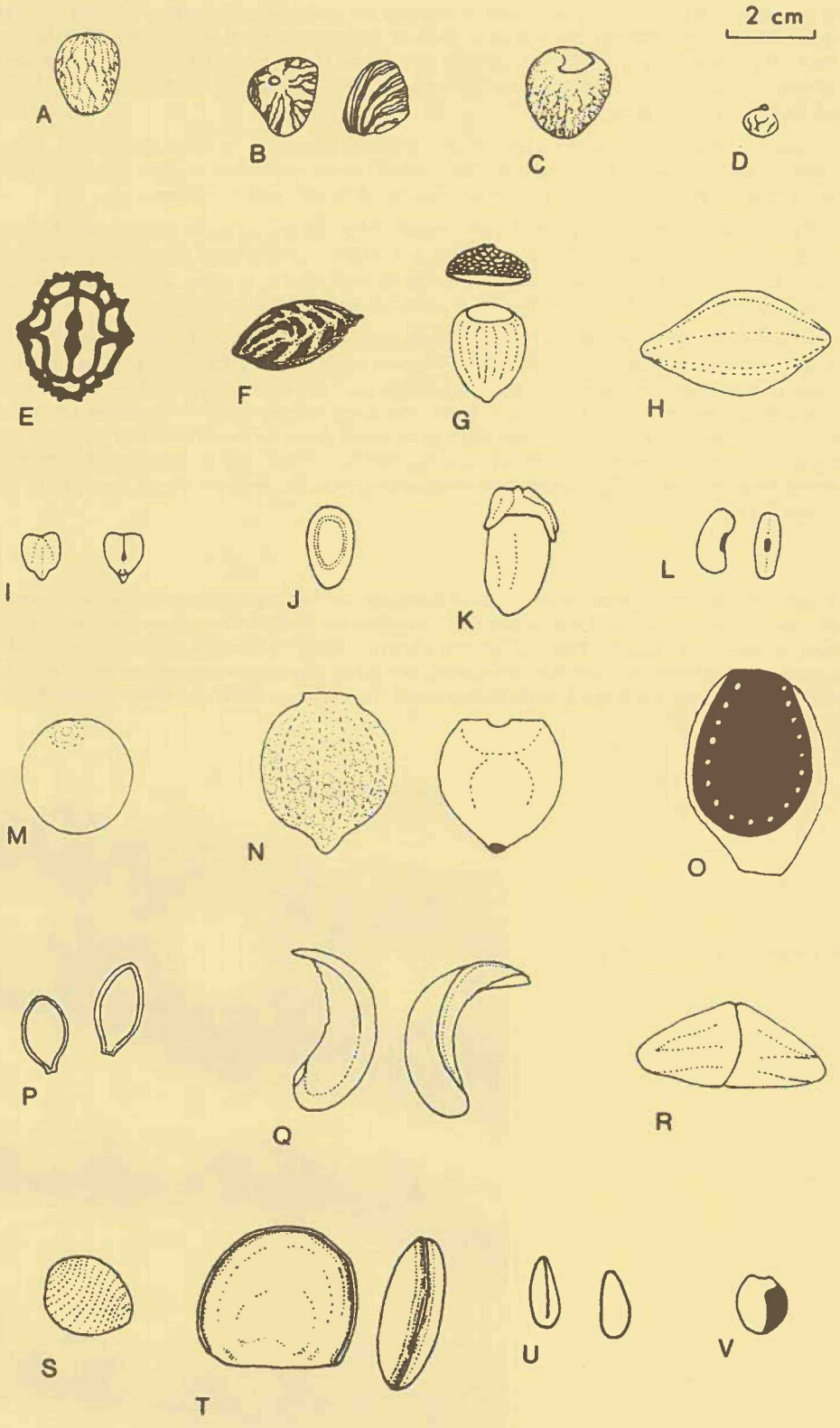


FIGURE 8. (left). A. Coral Tree (*Erythrina* sp.), B. quills of the Old World Porcupine (*Hystrix* sp.).

FIGURE 9. (opposite). A. Stilt Palm (*Socrates* sp.), B. African Oil Palm (*Elaeis guineensis*) POISONOUS, C. Betel Nut Palm (*Areca catechu*), D. Juniper (*Juniperus* sp.) E. Walnut (*Juglans* sp.), F. Peach (*Prunus persica*), G. Oak (*Quercus* sp.), H. Kenari Nut (*Canarium* sp.), I. Chick Pea (*Cicer arietinum*), J. Elephant's-ear (*Enterolobium cyclocarpum*), K. Lucky-bean (*Afzelia cuanzensis*), L. Bean (*Phaseolus* sp.), M. Macadamia (*Macadamia* sp.), N. Candlenut (*Aleurites moluccana*), O. Vegetable Ivory (*Borassus* sp.), P. Pumpkin (*Cucurbita pepo*), Q. Sandbox (*Hura crepitans*) POISONOUS, R. Lucky Nut (*Thevetia peruviana*) POISONOUS, S. Cat's Claw (*Caesalpinia bonduc*), T. Vulture's Eye (*Dioclea* sp.), U. Sweetsop (*Annona squamosa*), V. Jumbie Bean (*Ormosia* sp.) SOME POISONOUS.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Harmless jewelry

In contrast to the deadly and infamous seeds are many that are completely harmless. One of the most commonly used in necklaces from around the world is that of the grass called Job's-tears (*Coix lacryma-jobi*, Figure 10). In fact, this is not truly a seed, but rather a part of the stem tissue that surrounds the developing fruit. It hardens into a shiny gray or cream-colored teardrop. These beads may be dyed many colors and are frequently combined with other species.

Another grass used in necklace making, particularly in North America, is Corn (*Zea mays*, Figure 11A). Other edible seeds found in necklaces include Chick-peas (*Cicer arietinum*, Figure 9I) and Navy beans (*Phaseolus vulgaris*, Figure 16A). Like *Coix*, they are often dyed bright, riotous colors.

The so-called "apple seed" necklaces come from a tropical tree of the Legume family called Leucaena or Wild-tamarind (*Leucaena leucocephala*, Figures 5B, 6B, 12). Many variations of the "apple seed" necklace originate from the Philippines and are sometimes combined with shells, another popular group of organic beads. Leucaena seeds are edible and are sometimes roasted and brewed for coffee.

Several other members of the Legume family (Fabaceae) must be mentioned. Both the Bead Tree (*Adenanthera pavonina*, Figure 13A) and the Royal Poinciana (*Delonix regia*, Figures 4B, 13B, 17B) are tropical trees. Royal Poinciana is native to Madagascar, but is widely cultivated for its luxuriant red blossoms for which it has received another common name: the Flame Tree. The long woody pods or legumes of this tree are familiar to many of us who have had a midwinter holiday in the tropics. Its seeds are flat, narrowly ovate and attractively mottled brown and cream. The Bead Tree has brilliant shiny red or orange seeds that resemble two rather pointed hemispheres badly joined at a pronounced equator. Both of these species are attractive components of necklaces.

Drift seeds

It is perhaps not fortuitous that some other seeds of members of the Legume family that are found so often in necklaces are seeds that are buoyant and apparently adapted for dispersal by sea water. Oceanic dispersal is most prevalent in the tropics (Gunn, 1968; Gunn and Dennis, 1976). The seeds are frequently washed up in profusion on sandy tropical beaches, and are sometimes carried by the ocean currents to beaches many miles outside the tropics. The strong, hard seed coats that protect the embryos from sea water during their voyage,

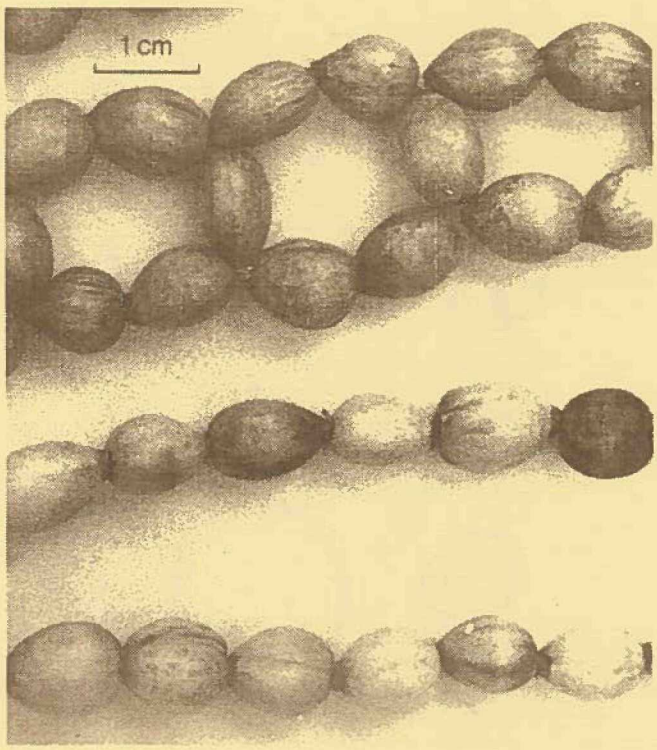

FIGURE 10. Job's-tears (*Coix lacryma-jobi*).

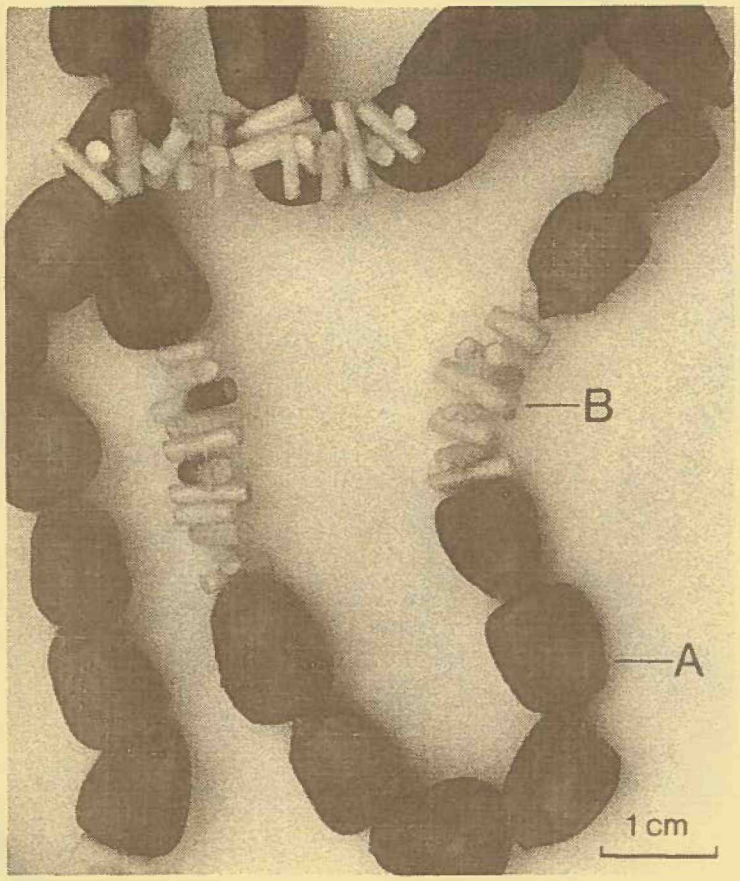

FIGURE 11. A. Corn (*Zea mays*), B. quills of the North American Porcupine (*Erethizon dorsatum*).

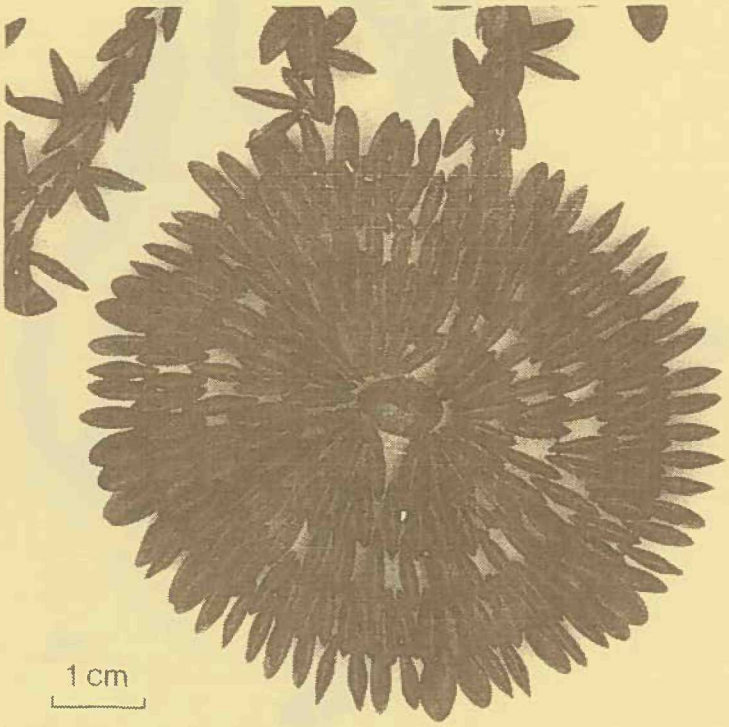

FIGURE 12. Leucaena (*Leucaena leucocephala*).

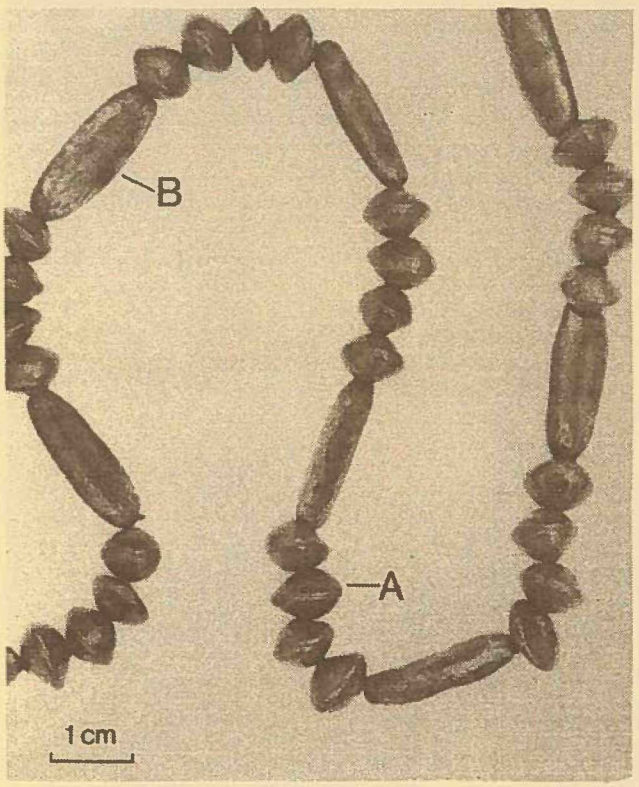

FIGURE 13. A. Bead Tree (*Adenanthera pavonina*), B. Royal Poinciana (*Delonix regia*).

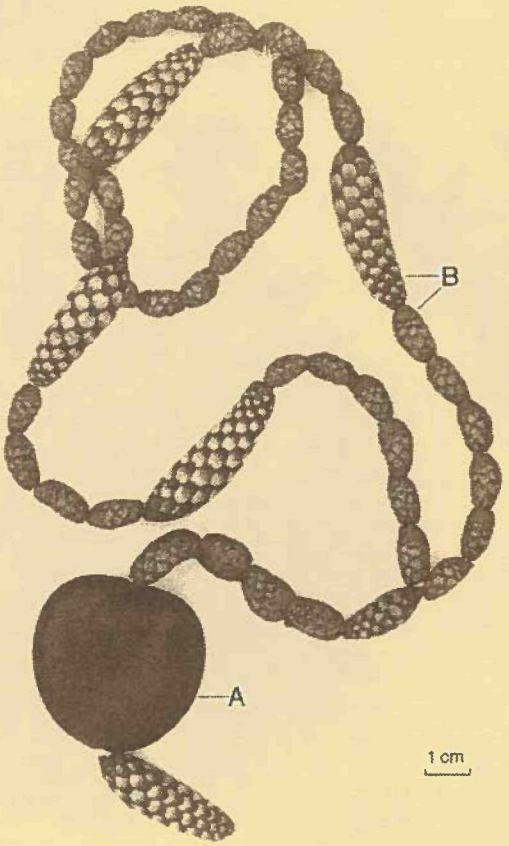

FIGURE 14. A. Cuban Heart (*Entada* sp.), B. Raffia Palm (*Raphia* sp.).

make these seeds especially appropriate to withstand the battering received by necklaces. Perhaps the best known of these drifting legume seeds are the Cuban Heart or Sea Heart (*Entada* sp., Figure 14A), the Donkey's Eye (*Mucuna* sp., Figure 15B), the Cat's Claw (*Caesalpinia bonduc*, Figure 9S), and the Vulture's Eye (*Dioclea* sp., Figure 9T).

The Cuban Heart has the longest fruit in the Legume family, often reaching two metres in length. The Donkey's Eye is a tropical vine with hairy pods, that, in some species, are poisonous and can cause unbearable burning and itching upon contact. The dark brown spherical seeds, however, are harmless and have even been eaten as an aphrodisiac. The hilum of the Donkey's Eye is belt-like, encircling the seed for three-quarters of its circumference. The Cat's Claw is appropriately named for the seed pods are covered with stout, 1 cm long spines, making them quite threatening. The seeds are very distinctive, being 2 cm in diameter, gray and irregularly ovoid. The seed coat is marked by many fracture lines, a feature unique to this species. These hard round seeds were once used in Europe as buttons, and continue to be a source of folk medicine. The Vulture's Eye is also used medicinally and as a toy in a game of marbles. The seeds of this woody, pantropical vine are 2.5–3.5 cm in diameter, slightly compressed, and distinctive in that, like the Donkey's Eye, the hilum runs more than half way around the circumference. They differ in being reddish-brown in color, and not so spherical in shape.

Economic jewelry

Imagine gliding into your next cocktail party with the basis of a multi-million dollar industry around your neck! You could be wearing coffee-beans (*Coffea arabica*, Figure 15C), which are a major component of seed necklaces from Guatemala, Peru and Columbia. Or you may be sporting the flat, shiny brown seeds of *Manilkara achras* (*M. Zapota*), the Sapodilla or Chiclé (Figure 16B). From these seeds have sprung the chewing

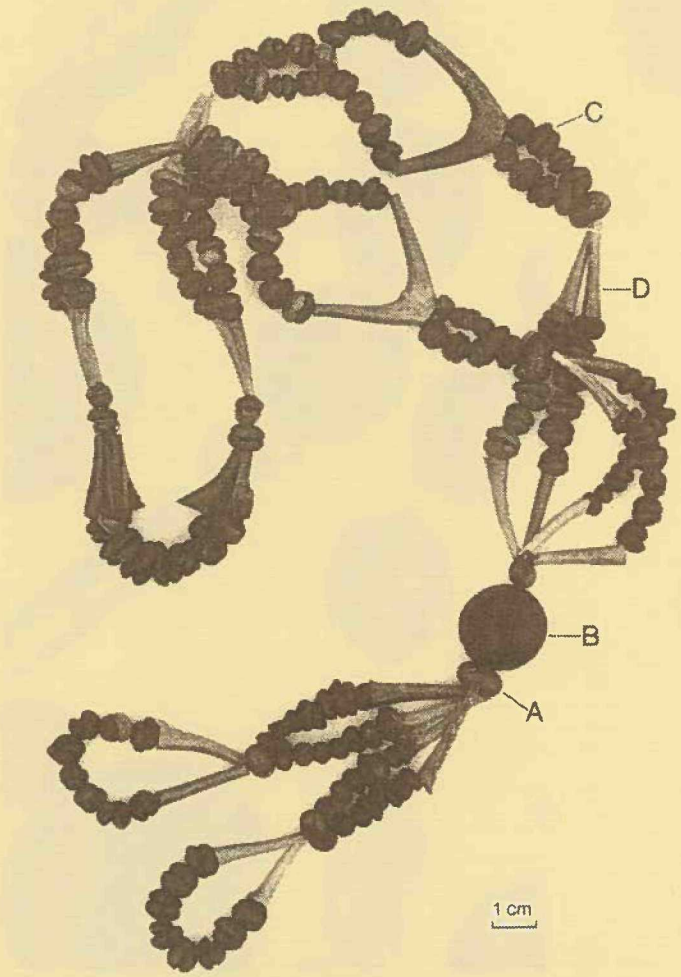

FIGURE 15. A. Coral Tree (*Erythrina* sp.), B. Donkey's Eye (*Mucuna* sp.), C. Coffee (*Coffea arabica*), D. Bullhorn Acacia (*Acacia* sp.).

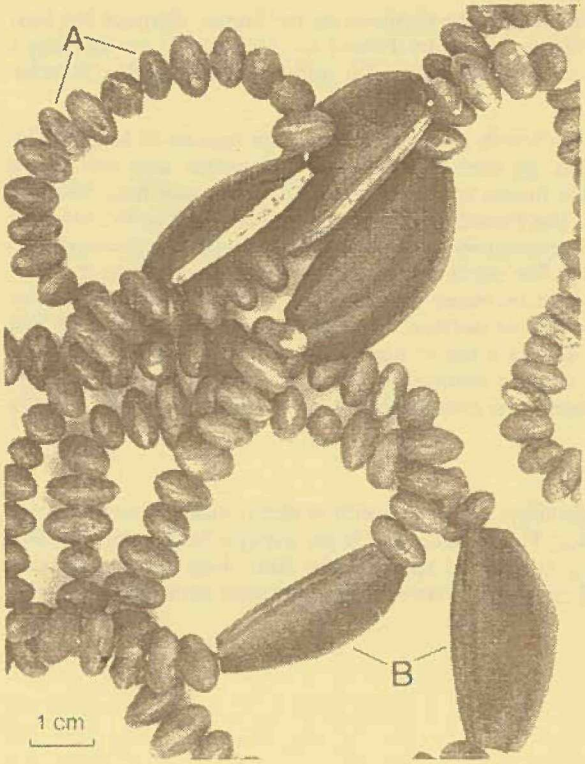

FIGURE 16. A. Navy Bean (*Phaseolus vulgaris*), B. Chiclé (*Manilkara achras*).

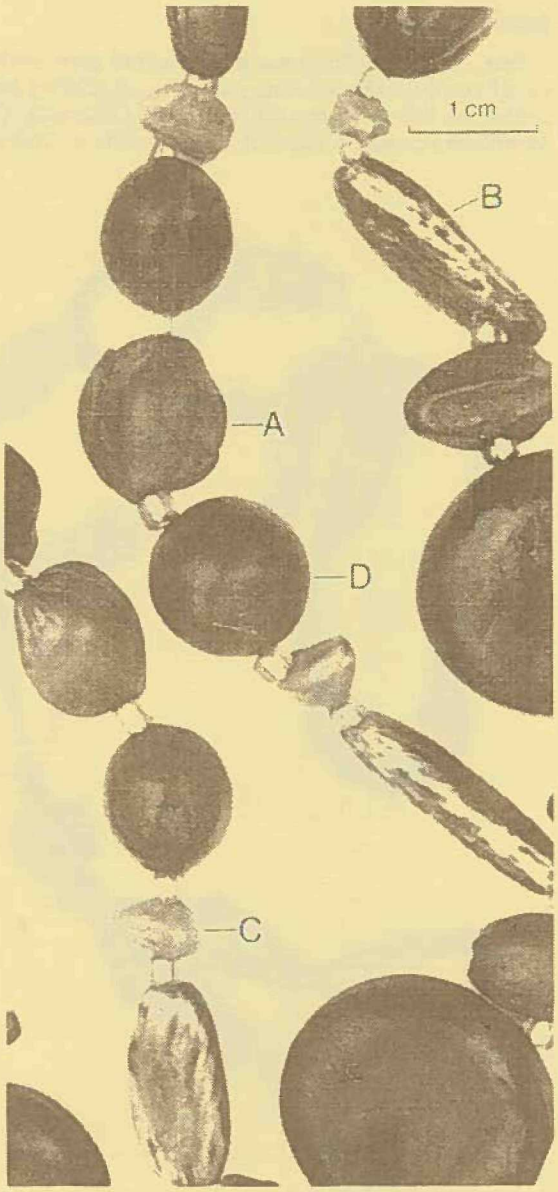

FIGURE 17. A. Apricot (*Prunus armeniaca*) POISONOUS, B. Royal Poinciana (*Delonix regia*), C. Hawthorn (*Crataegus* sp.), D. Soapberry (*Sapindus saponaria*).

gum industry. The gum exuded from slashes in the tree trunks is combined with sugar and flavoring to produce that ubiquitous confection of North America. Also found in necklaces from the Honduras are the brown, angular seeds of Sweetsop or Sugar Apple (*Annona squamosa*, Figure 9U), whose fruit is considered among the most exquisite of tropical fruits in both taste and texture.

Necklaces from Taiwan tend to feature members of the large, economically important Rose family (Rosaceae). Peach (*Prunus persica*, Figure 9F) and Apricot (*Prunus armeniaca*, Figures 17A, 20A) pits are frequent components in conjunction with Chinaberries, and seeds of Flame Trees, Hawthorns (*Crataegus* sp., Figure 17C) and the African Oil Palm (*Elaeis guineensis*, Figure 9B). Soapberry seeds (*Sapindus saponaria*, Figure 17D) are often found in these necklaces, and also in those from South America. It is so named because the seeds contain 30% saponin, which will produce suds in water. They have been used as a source of fish poison, but the effects on warm-blooded animals are minimal. These seeds are like black marbles, marked with a distinctive groove 5 mm long. They should not be confused with those of *Canna indica*, commonly known as Indian-shot (Figure 18). Its seeds are much smaller, and marked with a tiny pore, not a groove. *Canna* seeds may be found in necklaces from Africa and South America.

North American seed jewelry

Seed jewelry is by no means confined to parts unknown! Indians in the Canadian prairie provinces make necklaces with the striped seeds of Buffalo-berry (*Elaeagnus commutata*, Figure 19A), which are first removed from a dry, mealy, edible berry. The whole fruits, dried, were also used by Interior Indians in British Columbia (Turner, 1979). Necklaces are made in Arizona with the attractive, two-tone seeds from berries of the local One-seed Juniper (*Juniperus monosperma*, Figure 19B). These necklaces are dazzling compared to a more modest product made in Canada using the entire berries of the Prostrate Juniper (*Juniperus communis*, Figure 9D). Some of the prettiest North American seed necklaces are made with Pumpkin seeds (*Cucurbita pepo*, Figure 9P, Appendix).

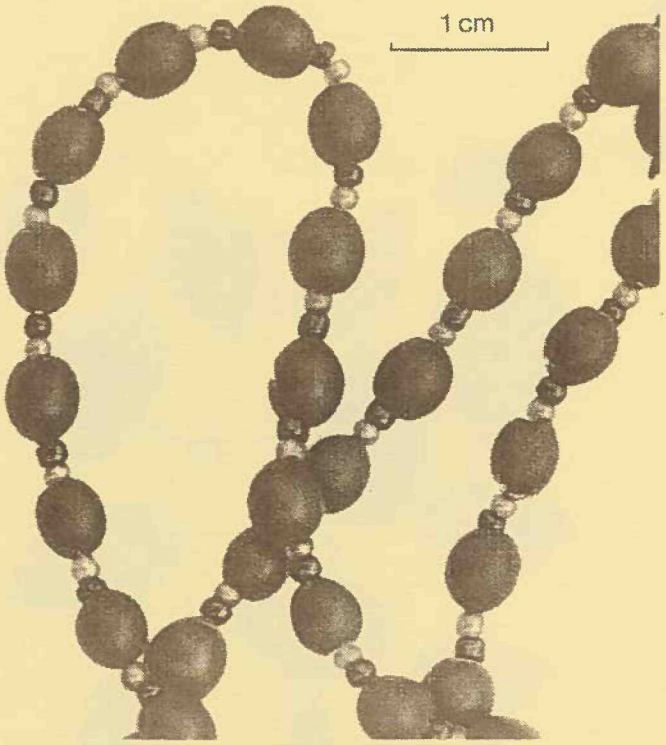

FIGURE 18. Indian-shot (*Canna indica*). The smaller black or white beads are plastic.

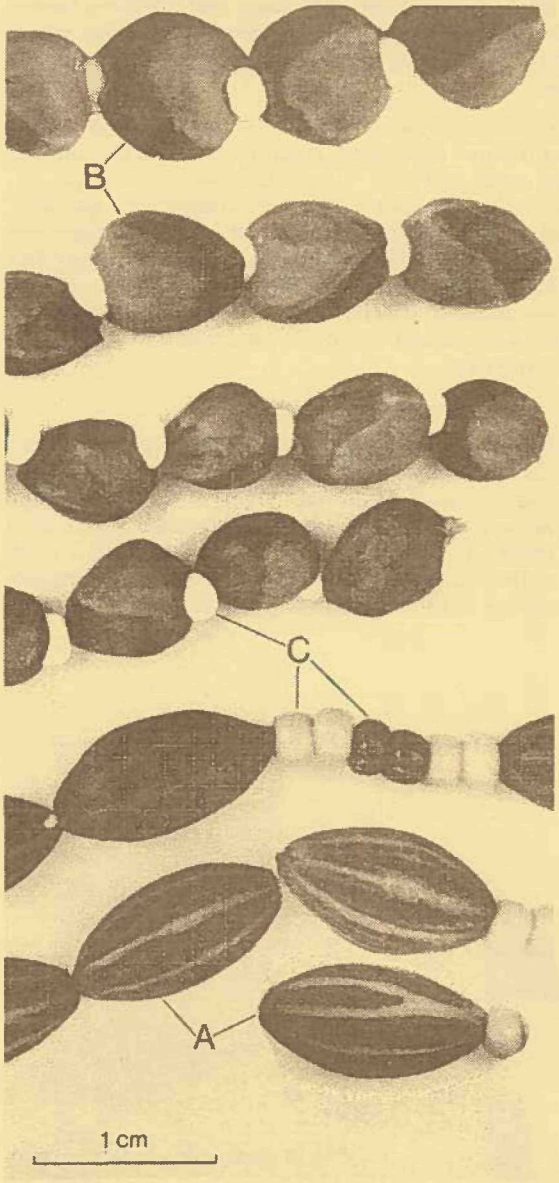

FIGURE 19. A. Buffalo-berry (*Elaeagnus commutata*), B. One-seed Juniper (*Juniper monosperma*), C. plastic beads.

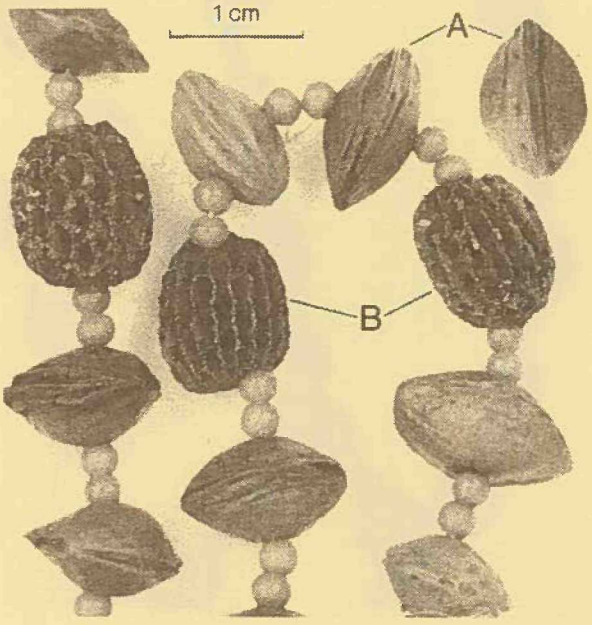

FIGURE 20. A. Apricot (*Prunus armeniaca*) POISONOUS, B. Horse-tail Tree (*Casuarina* sp.).

Other Organic materials

Plant materials in necklaces are not confined to seeds. The fruits of the Horse-tail Tree (*Casuarina* sp., Figure 20B) and of lepidocaryoid palms (for example, *Raphia* sp., Figure 14B) are also often used. *Raphia* is economically important as the source of raffia fibre, a popular craft item. Necklaces from South and Central America often feature the Y-shaped hollow thorns of the Bullhorn Acacia (*Acacia* sp., Figure 15D). Ants live in the hollow thorns of some Bullhorn Acacias and if the shrub is disturbed, the ants attack and drive off the intruder. Woody reeds are also used in necklaces from this part of the world, and a necklace from Taiwan featured lengths of bamboo. Sometimes animal material is also used to add interest to a seed necklace, such as Porcupine quills (Swaziland and Canada, Figures 8B and 11B respectively), sea urchin spines (Philippines), fish scales and beetle wings (both South America).

Yellow Oleander (Figure 9R), Macadamia nuts (Figure 9M), Ivory Nut Palm seeds (Figure 9O), Acorns (Figure 9G), Walnut cross sections (Figure 9E), Elephant's-ear seeds (Figure 9J); the list of seeds, nuts and fruits in jewelry seems endless and grows constantly (see Appendix). Forty-three are identified here. Some defy identification, and others have been cut, polished or carved to the point where they scarcely resemble seeds. But these organic necklaces share with us fascinating stories, reminders of strange plants, unusual customs and exotic resources. Gold and silver are a little dull by comparison!!

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APPENDIX. List of seeds, nuts, fruits and other organic material used in jewelry-making.

Species are arranged in alphabetical order of genus, and the common name and corresponding figure numbers are provided. Brief notes are included for certain species not described or discussed in the main text.

Abrus precatorius L. (Fabaceae), Precatory-pea. (4A)

Acacia sp. (Fabaceae), Acacia (thorns). (15D)

Adenanthera pavonia L. (Fabaceae), Bead Tree (13A)

Afzelia cuanzensis Welw. (Fabaceae), Lucky-bean, Mahogany Bean. (9K). The shiny blackish or dark brownish seeds have a prominent bright-orange or red aril, the latter being edible. The seed, however, contains a cyanogenetic poison (Irvine, 1961; Menninger, 1977). Mostly found in necklaces originating from tropical Africa.

Aleurites moluccana (L.) Willd. (Euphorbiaceae), Candlenut, Kukui. (9N). In Hawaii particularly, the seeds from this tree are cut and polished to produce shiny, dark brown beads. The kernel of the seed was once used as a source of oil for burning as a light source.

Annona squamosa L. (Annonaceae), Sweetsop, Sugar Apple. (9U). Brown angular seeds in necklaces from Central and South America.

Areca catechu L. (Palmaceae), Betel-nut Palm. (9C). Yellowish, brownish or reddish kernels (endosperm) with light markings and a crescent-shaped or semi-circular scar. A tree to 31 m tall, especially common in the East Indies where the seeds are valued for chewing by over 400 million people (thus out-rivalling chewing-gum), turning the teeth black and the saliva red.

Borassus sp. (Palmaceae), Vegetable Ivory. (9O). The brown seeds of the Borassoid Palms are carved so as to reveal the "ivory" (hardened endosperm) beneath. Vegetable ivory from Africa appears to be mostly from this genus. Neotropical palms of the genera *Iriartea* and *Phytelephas* also furnish a vegetable ivory used similarly for beads, buttons and carving into ornaments.

Caesalpinia bonduc (L.) Roxb. (Fabaceae), Cat's Claw, Gray Nickernut. (9S). Brownish or grayish, more or less round, smooth and often shiny seeds. Encountered in necklaces from Central and South America, Africa and the West Indies, where they were once much used as buttons. The seeds characteristically have a series of 15–25 concentric circular crack marks that aid in identification.

Canarium spp. (Burseraceae), Kenari Nut, Java Almond. (9H). Large trees native to the East Indies where the kernels of the nut are eaten. The hard brown three-edged "nuts" are often polished and carved.

Canna indica L. (Cannaceae), Indian-shot. (18)

Casuarina sp. (Casuarinaceae), Horse-tail Tree. (20B)

Cicer arietinum L. (Fabaceae), Chick Pea. (9I). An important food item in tropical semi-arid regions. The pale brown seeds may be dyed or painted.

Coffea arabica L. (Rubiaceae), Coffee. (15C)

Coix lacryma-jobi L. (Poaceae), Job's-tears. (10)

Crataegus sp. (Rosaceae), Hawthorn. (17C)

Cucurbita pepo L. (Cucurbitaceae), Pumpkin. (9P). Light yellowish-brown flattened seeds.

Delonix regia (Bojer) Raf. (Fabaceae), Royal Poinciana, Flame Tree. (4B, 13B, 17B)

Dioclea spp. (Fabaceae), Vulture's Eye. (9T). Flat, shiny black or dark brown seeds mainly in necklaces from the East Indies.

Elaeagnus commutata Bernh. (Elaeagnaceae), Buffalo-berry. (19A)

Elaeis guineensis Jacq. (Palmaceae), African Oil Palm. (9B). Brown kernels (endosperm) with light markings. An important source of oil cultivated in Africa and the East Indies.

Entada sp. (Fabaceae), Sea Bean, Cuban Heart. (14A)

Enterolobium cyclocarpum (Jacq.) Griseb. (Fabaceae), Elephant's-ear. (9J). A tree native to the neotropics with dark brown seeds having a lighter brown oval delineation on each convex face.

Erethizon dorsatum (a mammal), North American Porcupine (quills). (11B)

Erythrina sp. (Fabaceae), Coral Tree. (8A, 15A)

Hura crepitans L. (Euphorbiaceae), Sandbox. (9Q). The large brown seeds of this neotropical tree are poisonous (Hardin and Arena, 1969), but are unlikely to be ingested because of their size.

Hystrix sp. (a mammal), Old World Porcupine (quills). (8B)

Juglans sp. (Juglandaceae), Walnuts, Butternuts. (9E). Usually the walnuts are used as cross-sections and are seen in necklaces originating from Central America and southeast Asia.

Juniperus monosperma (Engelm.) Sarg. (Cupressaceae), One-seed Juniper. (19B)

Juniperus spp. (Cupressaceae), Juniper. (9D). Blackish, hard wrinkled berry. Occasionally in necklaces made by North American Indians.

Leucaena leucocephala (Lam.) DeWit (Fabaceae), Leucaena, Wild-tamarind. (5B, 6B, 12)

Macadamia spp., (Proteaceae), Macadamia, Queensland Nut. (9M). A group of trees native to northeastern Australia but introduced and cultivated elsewhere, especially in Hawaii, for their edible fruits. The perfectly circular brown "nuts" are mostly *Macadamia integrifolia* but a poisonous species with pointed "nuts" (*M. whelanii*, Menninger, 1977, p. 24) is also occasionally used in necklaces.

Manilkara achras (Mill.) Fosberg (*M. zapota*) (Sapotaceae), Chiclé, Sapodilla. (6B)

Melia azedarach L. (Meliaceae), Chinaberry. (7)

Mucuna sp. (Fabaceae), Donkey's-eye. (15B)

Ormosia sp. (Fabaceae), Jumbie-bean. (5A, 9V). Scarlet and black, shiny seeds seen in necklaces from Bolivia and Equador. The seed of *Ormosia coccinea*, reported to be poisonous (Lewis and Elvin-Lewis, 1977), is very similar to the one illustrated.

Phaseolus vulgaris L. (Fabaceae), Navy Bean. (9L, 16A)

Prunus armeniaca L. (Rosaceae), Apricot. (17A, 20A)

Prunus persica (L.) Batsch (Rosaceae), Peach. (9F). Pale brownish or yellowish pits, pitted and grooved.

Quercus sp., (Fagaceae), Acorns from Oak trees. (9G). Brownish or yellowish nuts with circular scar and with or without a "cap" of hard overlapping bracts. Although acorns are largely regarded as "squirrel food", they have been important as a food source to man, and some tribes of North American Indians were largely dependent upon acorn crops.

Raphia sp. (Palmaceae), Raphia Palm. (14B)

Ricinus communis L. (Euphorbiaceae), Castor-bean. (6A)

Rosa spp. (Rosaceae), Wild Roses. (Not illustrated). Reddish-orange fruits, usually called "hips", sometimes used in necklaces by Western North American Indians (Turner, 1979). The fruits represent a hypanthium or fleshy receptacle with bony achenes inside.

Sapindus saponaria L. (Sapindaceae), Soapberry. (17D)

Socratea sp. (Palmaceae), Stilt Palm. (9A). Brown kernels (endosperm) with light reticulate markings. Neotropical tree.

Thevetia peruviana (Pers.) K. Sch. (Apocynaceae), Lucky Nut, Yellow Oleander. (9R). Seed brown and broadly triangular. This small tree is native to the West Indies where it is considered to be a lucky charm. It has been introduced elsewhere in the tropics. The plant contains poisonous juices and seeds contain a poisonous glycoside (Watt and Breyer-Brandwijk, 1962).

Zea mays L. (Poaceae), Corn. (11A).

Prunus emarginata in British Columbia*

Bitter Cherry

Member of the Family Rosaceae

Natural Distribution and Habitat

Prunus emarginata (D. Douglas ex W.J. Hooker) Walpers occurs from southern British Columbia and Vancouver Island south through the Coast and Interior ranges of Washington and Oregon to southern California, and inland to western Nevada (Washoe Mountains) and northern Arizona (the San Francisco Mountains). The species grows in moist woods or along streambanks, or less commonly on dry hillsides. In the northern part of the range, it is found from sea level to 913 m, and from 1525–2750 m in the southern part. At higher levels the species usually prefers dryish to moist gravelly soils, and rich sandy or gravelly soils at lower elevations. The species reaches its largest size on Vancouver Island, in western Oregon and Washington, and on the Santa Lucia Mountains in California. *Prunus emarginata* often forms large dense pure shrubby thickets at higher levels, and nearly pure stands on limited areas lower down. It is sometimes especially abundant on cutover and burned areas in Douglas Fir forests. It is associated with Douglas Fir and Western Dogwood at lower elevations, and with White Fir and Douglas Fir at the higher elevations.

In British Columbia, the species is present at lower elevations on Vancouver Island and the southern Coastal Zone (to about 55°N), extending east in the Interior Wet Belt to the Kootenay — Arrow Lakes region. It is found at about 1220 m in Manning Park and east. *Prunus emarginata* grows in moist, sparsely wooded areas along streams, in the open woodlands of the Interior, and is often present on cutover and burned over areas as an early arrival.

Description

Prunus emarginata is a very variable species, depending largely on the type of soil, climatic factors, and the elevation at which it is growing. It ranges from a straggly, generally several-stemmed shrub or small tree, 0.9–6(–9) m tall, to an erect, somewhat spreading tree, 9–15(–20) m tall, with a slender straight trunk, 15–30(–60) cm in diameter. The tree has a narrow symmetrical crown consisting of slender, ascending branches, and the branch-free portion of the trunk is relatively short. The shrub is commonly found on poor soils, on dry and exposed sites, and at high altitudes. It is often much bent in high rocky and exposed places, and often forms dense thickets.

The roots are widespreading, running up to 15 m under the surface, and sending up shoots along their length. There is no tap root. There are nodules containing nitrogen-fixing bacteria on the roots.

The bark is deep reddish-purple when young, becoming grayish to dark reddish-brown with age, about 6 mm thick, smooth to lightly roughened, and marked with conspicuous, large, widely-spaced, orange to grayish, powdery, horizontal lenticels. There may also be horizontal interrupted bands of light gray on the bark. The bark and inner bark are extremely bitter to taste.

The twigs are slender, deep red, and glabrous to densely pubescent when young, becoming reddish-brown and glabrous to glabrescent with age. The lenticels are large, pale, and conspicuous. The pith is rounded, uniform, and pale colored to light brown. The leaf scars are alternate, raised, horizontal, half-elliptical, and at least 2 mm wide. There are (2)3 usually minute bundle traces. There are stipule scars on each side of the leaf scar.

* By Roy L. Taylor and Sylvia Taylor.

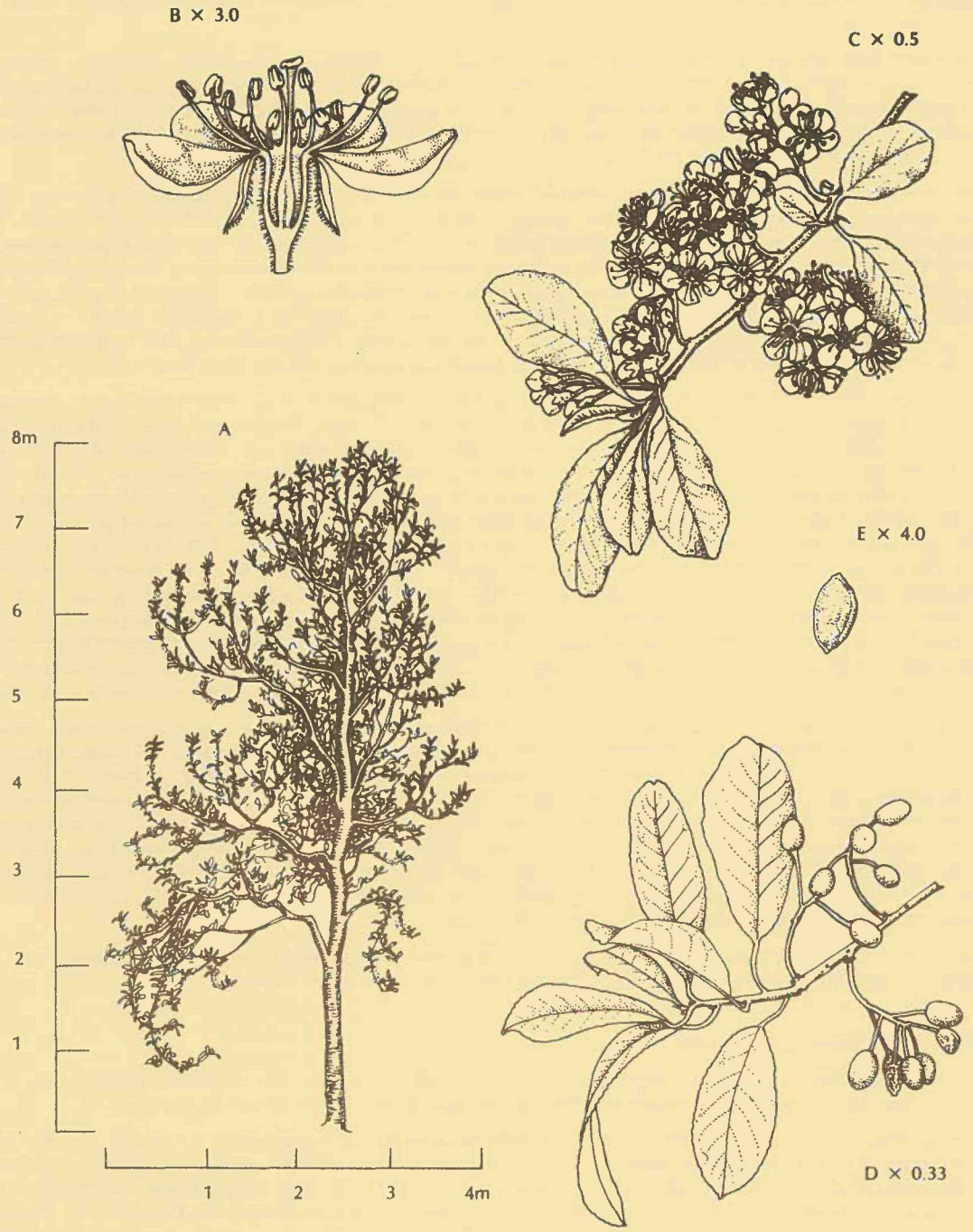

FIGURE 21. *Prunus emarginata*. A. Habit, B. section through a flower, C. flowering branch, D. fruiting branch, E. seed.

The wood is close-grained, porous, soft, brittle, and rots quickly, especially when in contact with the soil. The heartwood is brownish and often streaked with green, and the softwood is paler and very thick. It has no commercial value.

The winter buds are about 3 mm long, glabrous, subglobose to usually ovoid with an acute apex, chestnut-brown, and covered by many imbricate scales. The outer scales are often slightly scarious on the margins, while the inner ones are acuminate with bright-red tips and are glandular-serrate above the middle. The buds are solitary in the leaf axils, but become more clustered towards the ends of the twigs. A true terminal bud is present. The leaves are conduplicate in bud.

The leaves are deciduous, and are very variable, especially in size and degree of pubescence present. They are alternate, simple, thin, fragile, somewhat upright from the twig, and slightly folded along the midrib. The leaf blade is usually narrowly ovate or ovate to obovate, 2–5(–9) cm long, 0.8–3.5 cm broad, dull yellowish-green or dark green and glabrous above, paler and glabrous to more or less pubescent or tomentose beneath. The apex is usually obtuse to somewhat acute, and the base is somewhat cuneate or tapered. The margins are finely and bluntly serrate. The petiole is 3–6(–12) mm long, usually pubescent, and often bears 1–3 (3 or 4), minute, dark, glandular projections near the base of the leaf blade. The stipules are free from the petiole, minute, usually lanceolate with an acuminate apex, glandular-serrate, and are soon deciduous.

The flowers are perfect, regular, fragrant, showy, 8–12(–15) mm across, and occur in axillary or terminal, sessile, corymbose clusters of (3–)5–10(–12) on twigs of the previous year. The rachis is often leafy-bracteate. The flowers appear with the leaves in April to June, depending on the elevation, throughout the range. The calyx tube or hypanthium is campanulate, 2.5–3.5 mm long, glabrous to pubescent outside, and is lined with a glandular, often colored, disc. The 5 calyx lobes are short, entire, oblong, obtuse and usually emarginate at the apex, about 2 mm long, and become reflexed after anthesis. The margins of the lobes are sometimes slightly glandular. The 5 petals are dullish white, often faintly tinged with green, 4–5(–7) mm long, obovate with a rounded emarginate apex, and are contracted below into a short claw. The petals are often pubescent on the lower (dorsal) surface. There are usually (15–)20(–30) stamens arranged in 3 alternating rows, with the outer row opposite the petals. The stamens have long slender filaments, oval anthers, and are exserted. There is a single long style with a terminal discoid stigma. The ovary is superior at the base of the hypanthium, and is 1-celled with 2 pendulous ovules. The pedicels are 2.5–16 mm long, with the lower pedicels being longer than the upper ones, slender, and pubescent. The flowers produce plentiful nectar, which is collected by bees.

The fruit is a fleshy, edible drupe, occurring in corymbose clusters in June to August (September), depending on the locality and elevation, throughout the range. The drupe is red becoming black, ovoid to globose, 6–12 mm in diameter, glabrous, and usually not glaucous. The remains of the flower are present at the base. The flesh (exocarp) is thin, very bitter, and astringent. The bony endocarp or stone contains 1 seed, derived by abortion of 1 of the 2 ovules. The stone is swollen and nearly globose, somewhat pointed at the ends, ridged and prominently grooved on one side, rounded or slightly grooved on the other, and is about 3 mm long. The seed occupies almost all the space inside the stone, and the seed coat is thin, membranaceous, and pale brown. The pedicel is about 12 mm long, and branches from a stouter central stem that is 12–25 mm long. The species usually produces abundant seed nearly every year.

The bark, foliage and seeds contain a cyanogenic glycoside that releases hydrocyanic (prussic) acid on hydrolysis, and have a characteristic bitter almond taste and smell when crushed.

Varieties and Ornamental Cultivars

Prunus emarginata is extremely variable in height, size of leaves, and the degree of pubescence. It is, therefore, not surprising that a number of different segregates have been named in the past.

Two varieties are now generally accepted. *Prunus emarginata* var. *emarginata* is usually shrubby with several stems, 0.9–9 m tall, and has grayish bark. The leaves are dull yellowish-green, and vary from glabrous to rather heavily pubescent. The petals are frequently hairy on the back. This variety is present chiefly in and east of the Cascades in British Columbia, Washington, Oregon, and southward, and also in the Olympic Mountains. *Prunus emarginata* var. *mollis* (D. Douglas ex W.J. Hooker) Brewer is usually a tree, up to 15(–20) m tall, and has dark reddish-brown bark. The lower surface of the leaves and the calyx are heavily pubescent. It is present mainly west of the Cascades and on lowland moist sites from British Columbia to southern Oregon.

The ranges of *Prunus emarginata* and *P. pensylvanica* Linnaeus fil., Pin Cherry, overlap in the North Thompson and Shuswap Valleys in British Columbia, and hybrid forms have been reported from this area.

Hybrid forms may also be found around towns and farms, resulting from cross-pollination between *P. emarginata* and domestic cherry trees.

No ornamental cultivars are reported.

Propagation

Prunus species are best propagated from seed, but the seed does show embryo dormancy, and requires a period of stratification before germination will occur. The seed should be cleaned of all pulp and juices, but softening, cracking or removal of the hard endocarp is not necessary. It may be stored air dry for up to one year. The seed may be sown immediately in fall or stratified in a moist peat or peat-sand mixture before sowing early in the spring. Seedlings are undercut and transplanted after one to two years.

Prunus emarginata seeds should be stratified for 90–126 days at 3–5°C in a moist medium before sowing. This treatment, followed by germination conditions of 24°C day and night for 60 days, has resulted in the low germination rate of 4%. In nature, scattered seedlings of the Bitter Cherry are frequently found in moist mineral soil and humus.

Many *Prunus* species may also be propagated from softwood cuttings taken when the base of the new growth begins to harden. These are prepared as nodal or heel cuttings. A rooting hormone may be used to hasten rooting, and gentle basal heat may be an advantage.

Root cuttings may also be used.

Transplanting

Prunus species should be transplanted in the fall or late winter to early spring as either bare root or balled and burlapped specimens. It is imperative that transplanting be followed by watering during the first season.

Conditions for Cultivation

Prunus species in general are all of easy culture and easily grown, and are hardy to very hardy. They do best in a well-drained, loamy soil, which should contain some lime or chalk, although too much lime will cause chlorosis. They are not particularly tolerant to pollution.

Prunus emarginata is hardy to U.S.D.A. Zone 7. The longevity of the species has not been fully determined, although one tree with a diameter of 23.8 cm was found to be 42 years old. It is intolerant of shade, enjoying full exposure to sunlight, and will grow well in a well-drained, rich, sandy or gravelly soil.

Prunus species do not, in general, require annual pruning. Specimens should be pruned in summer after flowering rather than in the fall, although potential fruits are lost in the process.

Landscape Value

Prunus species are useful for spring gardens, although the short season of bloom and undistinguished foliage has limited the use of many species.

Prunus emarginata is usually represented in cultivation by the variety *mollis*, which forms a small elegant tree with a neat habit. It has been planted as a shade tree in the Puget Sound area of Washington. Bees are attracted to the plant because of the copious nectar produced by the flowers, and birds and other animals are attracted by the fruit.

Availability

Prunus emarginata is not generally available from commercial nurseries.

Other Uses

Large trees of *Prunus emarginata* are chiefly used locally for firewood. In general, the species is important as a wildlife browse plant, and in erosion control. It is useful on dry, rocky slopes at high elevations where the stems, often bent low by heavy snows, help to prevent rapid run-off. The species also forms "nurse" trees for conifer seedlings.

The fruit is edible, although it is rarely eaten because of the very bitter and astringent taste.

Ethnobotany

Few Indians of British Columbia and Washington ate the fruit because of the taste. However, the Lillooet

tribe of British Columbia distinguished two varieties of *Prunus emarginata*, one of which had sweet fruits, which they ate fresh. The Okanagan-Colville people of British Columbia and Washington sometimes ate the fruit as a remedy for a "sour" stomach. They were said to have a laxative effect.

The bark can be peeled off in thin, horizontal strips or cut in a continuous spiral, and polished to a rich red color. Many Indian tribes used this bark, and also that from the roots, to imbricate and add color to split cedar-wood baskets. It was sometimes dyed black by soaking for several months in rich organic soil or in manure, or colored with vegetable dye. The bark was also used to add strength and decoration to items such as bows, "tomahawk" handles, and pipestems. Several of the Coastal tribes used the bark to cover the joints of underwater implements such as harpoons, dipnets, etc., because it was watertight, resistant to decay, and made a smooth union, especially when sealed with pitch. The bark was often imported into areas where it did not grow naturally.

The Bella Coola tribe boiled the roots and inside bark with a lot of water, and drank the decoction in quantity daily for heart trouble. The Kwakiutl used the bark to cover and protect dressings over wounds, using pitch to attach it onto the skin. The Lummi tribe of Washington chewed the bark to facilitate childbirth, and the Quinault boiled the bark, drinking the liquid as a laxative. The Makah people of western Washington burned the bark of *Picea sitchensis* with that of *Prunus emarginata*, and put the charcoal powder on an infant's navel when the cord was cut.

The Saanich people thought that the wood was an excellent fuel, and sometimes used it for the hearth and drill in making friction fires.

The Squaxin tribe of Washington mixed the seeds of *Holodiscus discolor* with those of *Prunus emarginata* and took them as a blood purifier.

The Lower Thompson Indians of British Columbia believed that the presence of many red worms in the fruit was a sign of a large salmon run.

Diseases and Problems of Cultivation

The bark, leaves and seeds are poisonous to humans and to livestock because of the presence of a cyanogenic glycoside.

Prunus species are not particularly tolerant of pollution. All the species tend to become chlorotic if there is too much lime present in the soil.

Numerous serious insect pests and diseases are associated with *Prunus* species, but trees kept in good health will not be seriously damaged. The insect pests include aphids, borers, scale, and tent caterpillars.

Toms (1964) reported that several fungi had been found on wild *Prunus emarginata* in the coastal region of British Columbia. These include:- *Cylindrosporium hiemalis* Higgins, Leaf Spot; *Dermea cerasi* (Pers. ex Fr.) Fr., Twig Blight; *Podosphaera clandestina* (Wallr. ex Fr.) Lév., Powdery Mildew; and, *Stereum purpureum* (Pers. ex Fr.) Fr., Trunk Rot. *Armillaria mellea* (Vahl ex Fr.) Kumm, which causes Root Rot, has also been reported on Bitter Cherry. *Taphrina wiesneri* (Rathay) Mix has been reported to cause Leaf Curl and Witches'-broom on *Prunus emarginata* in British Columbia.

Origin of the Name

The generic name *Prunus* is the classical Latin name for the Plum-tree, possibly derived from the Greek *prunos*, 'plum'. The specific and varietal epithet *emarginata* is derived from the Latin *emarginare*, 'deprive of its edge', referring to the shallow notch at the apex of the sepals and petals. The varietal name *mollis* means 'soft' or 'with soft hairs'.

The type locality for the typical *Prunus emarginata* is "On the upper part of the Columbia River, especially about the Kettle Falls", where it was discovered by David Douglas (1798–1834) in 1825. It was first described as *Cerasus emarginata* by Douglas in Sir William Jackson Hooker's "Flora boreali-americana" in 1832 or 1833. Hooker (1785–1865) was Regius Professor of Botany at Glasgow University in Scotland from 1820 until 1841, and Director of Kew from 1841 to 1865. The species was renamed in 1843 by Wilhelm Gerhard Walpers (1816–1853), the German author of "Repertorium Botanices Systematicae" published between 1842 and 1853. It was introduced to cultivation in Great Britain in 1865.

The type locality of *Prunus emarginata* var. *mollis* is "North-West coast of America near the mouth of the Columbia and on subalpine hills near the source of that river", where it was collected by David Douglas. It was first described as *Cerasus mollis* in "Flora boreali-americana". It was renamed in 1876 by William Henry

Brewer (1828–1910), an American geologist and botanist,, who published "Botany of California" with Sereno Watson (1826–1892) between 1876 and 1880. The variety was introduced to cultivation in Great Britain in 1861–62 as *Cerasus pattoniana*, and is now the form commonly grown.

It is interesting to note that *Prunus emarginata* was seen by Captain George Vancouver in May of 1792, on a sand spit at Port Discovery in Washington (the Pensylvania cherry tree mentioned below is now identified as *P. emarginata*).

> *". . . . . these, with the Canadian alder, small fruited crab,*
> *and Pensylvania cherry trees, constituted the forests,*
> *which may be considered rather as encumbered, than adorned,*
> *with underwood . . . . . "*
>
> Vancouver's Journal, 1978, 1st ed,
> (From: Jones, 1936)

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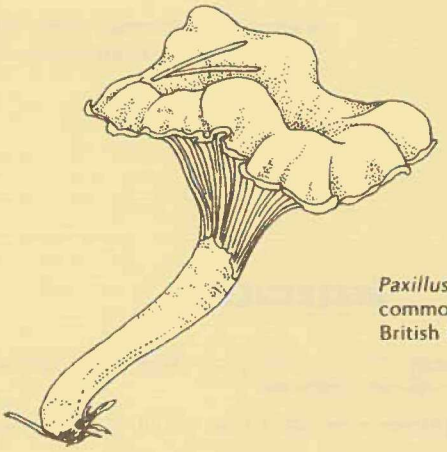
Special Apology

A special apology is tendered to Mrs. Monica McGavin, who was described in the article on the Official Opening of the Physick and Asian Gardens (Davidsonia 12:50–54) as the niece of Professor Frank Buck. Mrs. McGavin is Professor Buck's daughter.

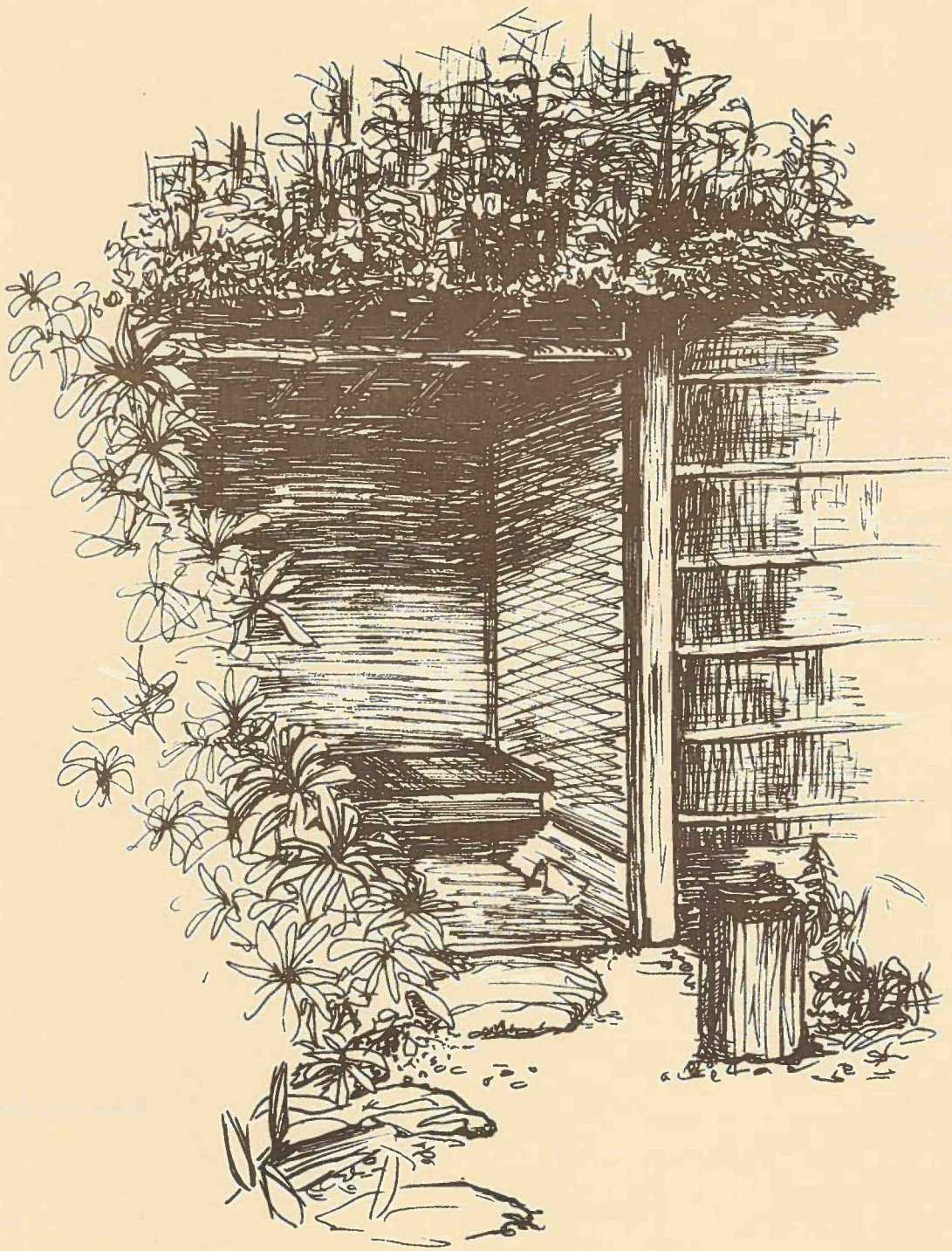


Paxillus involutus, Chantarelle, is one of the commonest mushrooms of wooded areas in British Columbia, × 0.33.

Climatological Summary*

Data 1981	JULY	AUGUST	SEPTEMBER
Average maximum temperature	19.4°C	21.8°C	18.0°C
Average minimum temperature	13.8°C	14.3°C	11.3°C
Highest maximum temperature	23.1°C	29.8°C	28.3°C
Lowest minimum temperature	10.8°C	10.2°C	4.7°C
Lowest grass minimum temperature	3.9°C	1.2°C	−0.3°C
Rainfall/no. days with rain	41.9 mm/10	43.1 mm/9	92.2 mm/13
Total rainfall since January 1, 1981	756.6 mm	799.7 mm	891.9 mm
Snowfall/no. days with snowfall	0	0	0
Total snowfall since October 1, 1980	39.3 cm	39.3 cm	39.3 cm
Hours bright sunshine/possible	251.5/482.5	304.7/439.0	177.3/372.2
Ave. daily sunshine/no. days total overcast	8.1 hr/3	9.8 hr/1	5.9 hr/1

**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



Koshikake-machiai, "Waiting Shed", in the Nitobe Memorial Garden. This is one of a series of four Handi-notes of scenes in the Nitobe Memorial Garden, drawn by Rachel Mackenzie, and available from The Botanical Garden.

Late afternoon,
the garden shimmers in September heat,
dahlias, asters blaze:
wasps suck the fallen apples,
white jasmine, scarlet roses incense heavenwards.

In the catalpa's shade the Woman sits.
A butterfly floats down the air,
lights at her feet,
brown wings, blue-tipped, swing open
and with a silken rhythm meet, and separate, and meet.

Her being knows this dance,
new, and eons old:
now, lifting up her arms,
the Woman, in the same slow motion,
steps into the waltz.

Elizabeth Gourlay
Songs & Dances, 1981

DAVIDSONIA

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