

# KAALA BOG PLANT GUIDE

KAALA NATURAL AREA RESERVE

MT. KAALA, OAHU

Specimens Identified and Described by  
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Department of Land and Natural Resources  
Division of Forestry and Wildlife

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## INTRODUCTION

Kaala Bog Trail starts at the Kaala Natural Area boardwalk gate at the top of Mt. Kaala approximately 150 feet from the paved road next to the military installation. The boardwalk and trail through this unique bog to the opposite natural area sign is about 3/4 mile in length. On clear days there is a spectacular view of the leeward coast about 0.2 miles past the end of the boardwalk.

This mountain summit, the highest on Oahu at 4,017 feet elevation, has a high amount of cloud cover, fog, wind, and rain. This creates special climatic conditions that can be seen in the stunted plant growth. Most native flowering plants within the bog are endemics, i.e. occurring only within the State of Hawaii or on Oahu, while others are indigenous to the Hawaiian Islands and elsewhere.

## THE PLANTS

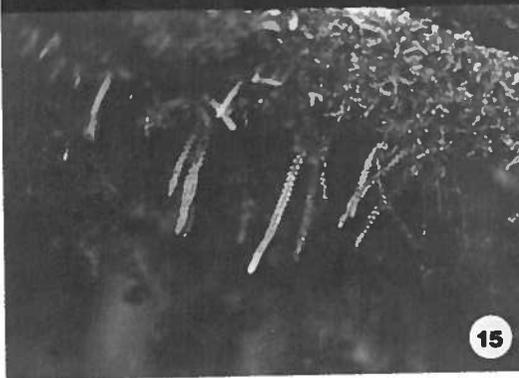
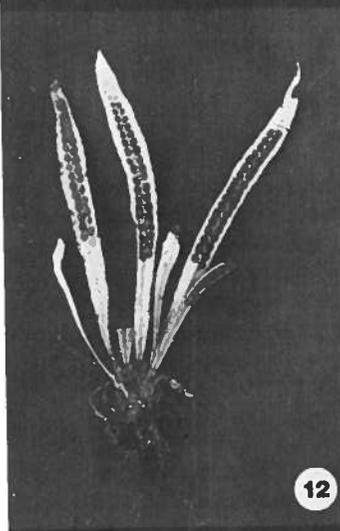
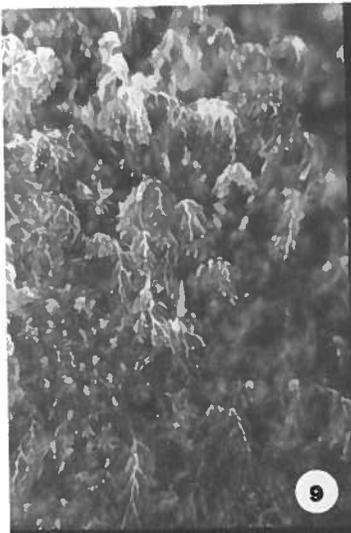
This guide illustrates and gives information on 61 native wet forest plant species, including 4 clubmosses, 23 ferns, and 34 flowering plants, that occur along or near the boardwalk between the two trailside natural area reserve signs. Recent plant introductions not illustrated in this trail guide include: prickly Florida blackberry (Rubus argutus), a rush (Juncus planifolius), narrow-leaved carpet grass (Axonopus fissifolius), and several sedges.

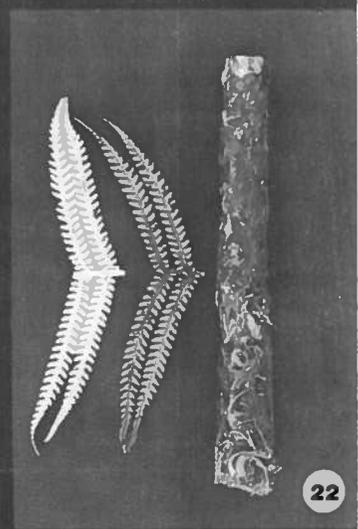
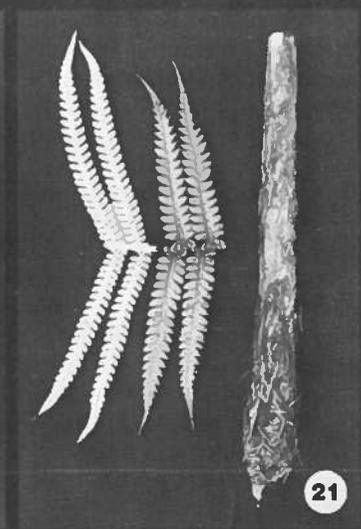
The scientific names and island distributions of flowering plants follow Warren L. Wagner, Derral R. Herbst, and S. H. Sohmer (1990) The Manual of the Flowering Plants of Hawai'i. The scientific names of ferns and clubmosses follow C. H. Lamoureux's unpublished checklist. Common names are derived from various sources. Those most frequently used are: Pukui, M. K. and S. H. Elbert (1986) Hawaiian Dictionary and J. R. Porter (1972) Hawaiian Names for Vascular Plants. The main islands in this publication refers to the six largest islands of Hawaii, Maui, Oahu, Kauai, Molokai, and Lanai.

1. Lycopodium cernuum L.                      Wāwae'iole; nodding clubmoss  
Lycopodiaceae

The nodding clubmoss has upright branches that arise from creeping stems. At maturity the upright branches produce drooping cone-shaped structures with spores inside. These spores are wind-dispersed and produce a very small alternate generation of plants. Clubmosses were among the first land plants to evolve on earth and are known from extensive fossil records. Hawaiians suffering from rheumatism reportedly bathed in water in which wāwae'iole had been boiled for three hours.





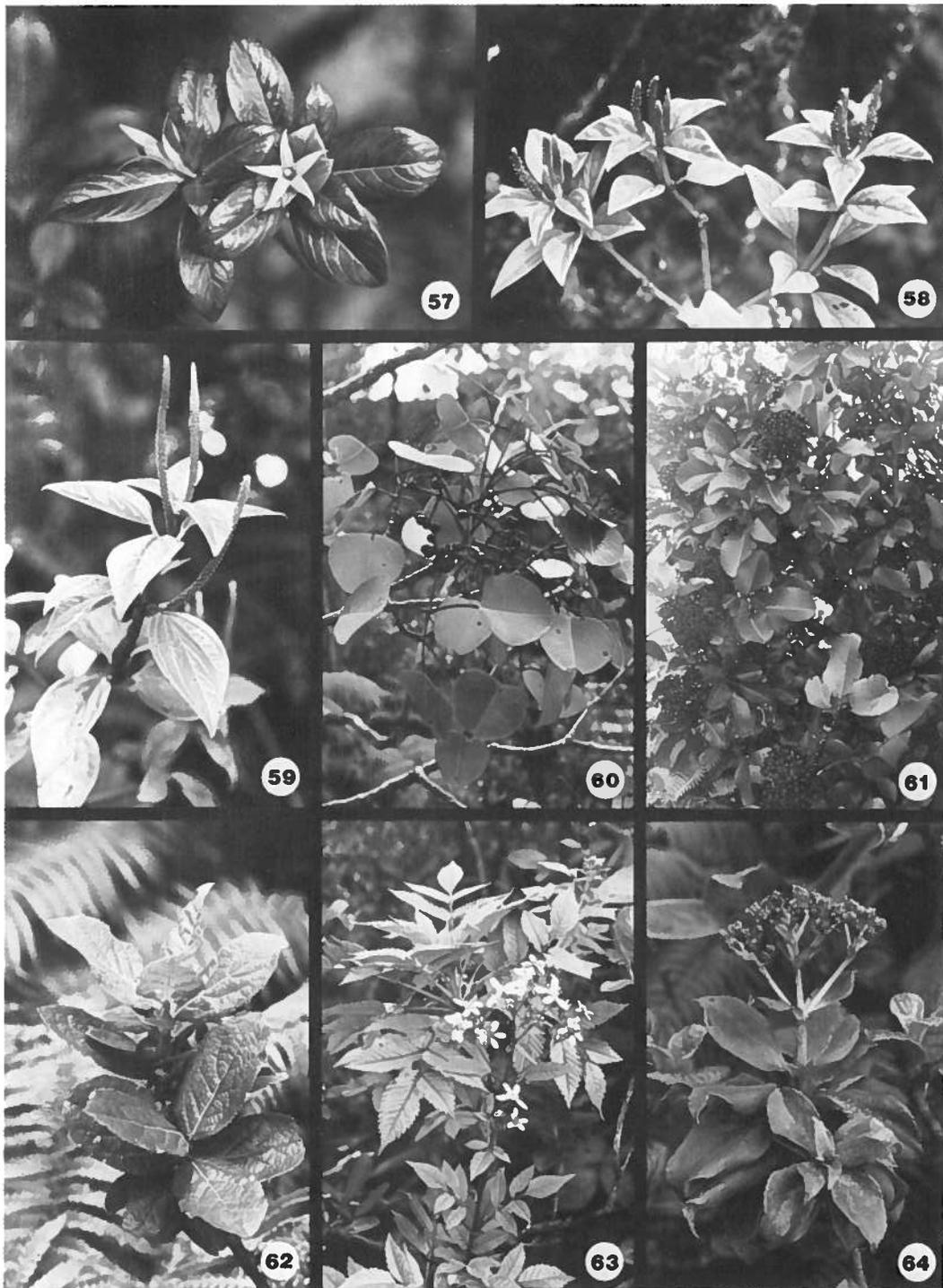












2. Lycopodium venustum Gaud.      Wāwae'iole; Hawaiian running pine  
Lycopodiaceae

This second clubmoss or wāwae'iole creeps over the ground and produces erect spore bearing structures. It grows on the main islands in wet, open forests above 3,500 feet elevation and is related to L. clavatum of North America and Eurasia.

3. Psilotum nudum (L.) Beauv.      Moa; moa nahele; psilotum  
Psilotaceae

Closely resembling one of the oldest land plants, the moa occurs on the ground or on trees from dry to wet habitats in many tropical regions of the world. The green stems function as leaves; the underground stem functions as a root with a symbiotic fungus, which helps the plant get food. Moa was used by Hawaiian children to play a game called "fighting cock". They would interlock branches of two plants, then pull them apart. The one holding the undamaged plant would crow like a cock. The Hawaiians used the spores as talcum powder, the plant as an emetic, and made a tea for treating thrush.

4. Psilotum complanatum Sw.      Pipi; moa nahele; psilotum  
Psilotaceae

Whereas the moa (#3) has upright stiff branches, the related, less common pipi (#4) has branches which droop like a horse-tail from the trunks of trees and treeferns. Its Hawaiian medicinal uses are similar to the moa (#3). Pipi also occurs in tropical America, the Society and Philippine Islands.

5. Dicranopteris linearis (Burm.)      Uluhe; false staghorn fern  
Underw.      Gleicheniaceae

This native fern, which also grows in tropical and subtropical Asia, New Zealand, and other Pacific Islands, frequently forms thickets from 500 to 3000 feet elevation in disturbed areas, landslides, and in open 'ōhi'a forest. A second uluhe species (D. emarginata) has rusty brown, cobweb-like hairs underneath its fronds. Both species possess numerous dormant buds which may develop into 30 foot fronds growing over 10 to 15 foot trees and shrubs. Uluhe retards the growth of seedlings which germinate beneath it. In the dry season the dried fronds become a fire hazard. Hawaiians prepared an infusion from uluhe which they drank as a laxative. A sap-sucking insect (Saphonia sp.) causes extensive dieback of uluhe.

6. Elaphoglossum alatum Gaud. var. alatum      'Ēkaha 'ula  
Elaphoglossaceae

One of six Hawaiian species of 'Ēkaha, this E. alatum variety grows only on Oahu in wet forests and on grassy, windswept ridges above 1,000 feet elevation. This fern is distinguished by many narrow, 1/2-inch long brown scales which cover the

rhizome and a leathery frond blade with veins which fuse to form a continuous marginal vein. *Elaphoglossum* is a Greek name meaning 'stag' and 'tongue' that refers to the frond shape.

7. *Elaphoglossum hirtum* (Sw.) C. Chr. var. *Māku'e; Iaukahi*  
*micans* (Mett.) C. Chr. *Elaphoglossaceae*

This fern is distinctive because of a covering of tan scales on its stems and blades. Although chiefly an epiphyte, it occasionally grows on the ground in open, dry to wet forests on the main islands above 1,000 feet elevation.

8. *Elaphoglossum wawrae* (Luers.) C. Chr. *'Ēkaha; Iaukahi*  
*Elaphoglossaceae*

This fern occurs on the five largest islands on mossy tree trunks, usually from about 3000 feet elevation on the wet, windward slopes of the islands to 6500 feet elevation. The frond frequently lacks scales and has obscure veins which do not fuse at the blade margin. It is named after the botanist, Heinrich Wawra.

9. *Sphaerocionium lanceolatum* (Gaud.) Copel. *Palai hinahina*  
*Hymenophyllaceae*

This common, endemic filmy fern has small, hairy, bronze-color fronds which grow among mosses on tree trunks in wet forests on the main islands.

10. *Mecodium recurvum* (Gaud.) Copel. *'Ōhi'a kū*  
*Hymenophyllaceae*

This small, transparent green fern is sometimes confused with a moss. It grows in wet forests on damp rocks and on moss-covered trees, from which its common name, 'Ōhi'a kū, is derived. The one-cell thick fronds can absorb moisture directly from the atmosphere. It is distinguished from the previous filmy fern *S. lanceolatum* (#9), by its lush green color, larger size, and lack of bronze colored hairs.

11. *Pleopeltis thunbergiana* Kaulf. *'Ēkaha 'ākōlea; pākahakaha*  
*pua'akuhinia*  
*Polypodiaceae*

The simple, erect, leathery fronds occur in intervals along a creeping rhizome. This fern is common on rocks and trees in the forests on the main islands and in other tropical countries.

12. *Grammitis hookeri* (Kaulf.) Copel. *Māku'e lau li'i*  
*Grammitidaceae*

The small hairy blades distinguishes this fern from two related endemic *Grammitis* species. The māku'e lau li'i grows in wet forests of the main Hawaiian Islands, Samoa, and Fiji.

13. Grammitis tenella Kaulf. Kolokolo; mahinalua  
Grammitidaceae

This small epiphytic fern is commonly associated with mosses on the main islands. The undersides of the small fronds have large spore-bearing sori which are wider than the leaf itself. Kolokolo refers to the creeping habit of the rhizome.

14. Adenophorus tamariscinus (Kaulf.) Hook. et Grev. var. tamariscinus Wahine noho mauna  
Grammitidaceae

This fern is known as wahine noho mauna or mistress of the mountains. These small ferns with twice divided fronds occur in mesic to wet forests and bogs.

15. Xiphopteris saffordii (Maxon) Copel. Kihe  
Grammitidaceae

This small fern has a distinctive frond shape intermediate to two related genera--Grammitis (#13) and Adenophorus (#14). Kihe is occasionally found on moss-covered tree trunks in wet forests of the main islands.

16. Athyrium microphyllum (J. Sm.) Alston 'Ākōlea  
Athyriaceae

This dainty, native fern is common in wet forests from 1,500 to 6,500 feet elevation on the main islands. It can be recognized by a series of small upward-pointed projections along the frond mid-ribs. The rhizome was occasionally cooked by the Hawaiians for food.

17. Polypodium pellucidum Kaulf. 'Ae; pellucid polypody  
Polypodiaceae

The 'ae is a common fern growing in open forests and lava flows on the main islands. The fronds, when held up to the light, have transparent branching veins. Excess salts are expelled on the upper surface of older fronds through microscopic openings at the end of these veins. The lower surface of mature fronds usually bear large, round, brown sori containing spores. The thick rootstocks are densely covered with brown scales. Two types occur--the one on open lava flows has overlapping frond segments which tend to fold against each other while the one in forests has flat fronds. The introduced laua'e fern and ēkaha 'ākōlea (#11) are also in this fern family (Polypodiaceae).

18. Asplenium contiguum Lam. ---  
Aspleniaceae

This fern with no known common name is one of 12 Asplenium species which occurs on Oahu. It grows on the main Hawaiian Islands, Africa, Ceylon through Malaya, Philippine Islands, and

New Zealand. *Asplenium* ferns are among the most attractive and diversified in appearance. They vary from the well-known, epiphytic bird's-nest fern (*A. nidus*), which has simple fronds, to terrestrial plants that may have compound fronds.

19. *Cibotium* sp.

Hāpu'u; Hawaiian treefern  
Dicksoniaceae

Treeferns are common in wet forests from 1,000 to 6,600 feet elevation. At least three of six *Cibotium* species occur on Oahu. Much of the outer portion of the trunk is composed of aerial roots which absorb moisture, protect the tree trunk from damage, and offer a place for seeds and spores to grow. Wild pigs uproot them to feed upon the starchy trunk core or pith. Hawaiians also cooked and ate the pith in times of famine. The uncoiled fronds are sometimes cooked and eaten. The pulu or silky hair which surrounds the buds was used by the Hawaiians as surgical dressing and for embalming the dead. Between 1851 and 1885 pulu was extensively gathered, dried and shipped to California and elsewhere for stuffing mattresses, pillows and upholstery. Around 1920 a short-lived fern starch industry near Hilo produced a good quality starch for laundry and cooking purposes. Cut trunks are used in landscaping, as posts, and along muddy trails to assure hikers' footing and route drainage flow.

20. *Cibotium chamissoi* Kaulf.

Hāpu'u 'i'i; Hawaiian treefern  
Dicksoniaceae

Hawaii's largest treefern, the hāpu'u 'i'i, may have a trunk up to 25 feet in length. It is distinguished by stiff dark hairs along the frond base and a light green underside of the frond which lacks hairs. This species honors Ludolf Karl Adalbert von Chamisso (1781-1838), German naturalist and explorer.

21. *Cibotium glaucum* (J. Sm.) Hook. & Arnott

Hāpu'u  
Dicksoniaceae

A second *Cibotium* treefern species on Kaala has matted light red to blond pulu, white frond undersides, and overlapping earlike lobes of the basal pinnules. It is uncommon in wet forests of Kauai, Oahu, Molokai, Lanai, and Hawaii from 800 to 6,000 feet elevation. The pulu was used for absorbent surgical dressing, embalming the dead, and stuffing mattresses and pillows.

22. *Cibotium splendens* (Gaud.) Kraj.

Hāpu'u pulu  
Dicksoniaceae

This third native *Cibotium* treefern has a more delicate frond than *C. chamissoi* (#20). It is distinguished by golden brown hairs or pulu at the base of the frond stems, cobweb-like hairs

on the underside of pinnule segments, whitish to light green frond undersides, dead frond stubs on a rough trunk, and no overlapping pinnules. Hāpu'u pulu is common in wet forests from 1,000 to 6,000 feet elevation on Oahu, Molokai, Maui, and Lanai. It has similar uses as the hāpu'u (#21).

23. Hypolepis punctata (Thunb.) Mett.

Olua; mana  
Hypolepidaceae

Olua grows in summit bogs of the main Hawaiian Islands, Japan, Australia, and Polynesia. The creeping rhizomes produce two to three foot fern fronds that have abrupt right angles between each frond portion. The brown stems are covered with hairs up to 1/2-inch in length. Hawaiians made hats from the outer portion of the mature brown stems.

24. Sadleria cyatheoides Kaulf.

'Ama'uma'u  
Blechnaceae

This 'ama'uma'u with earlike frond projections that overlap the stem is native to the main islands. It is a common pioneer species on lava flows, wet forests, and open areas to 5,500 feet elevation. Usually smaller than the Cibotium treefern, Sadleria is known only from the Hawaiian Islands. The soft scales or pulu 'ama'uma'u protecting the uncoiled fronds were used to stuff pillows and mattresses. Hawaiians used various portions of the ferns--the fronds for sizing, ground cover, and mulch; the trunk to produce red kapa dye; the stems for weaving baskets, fishtraps, and house trim; and the trunk core and young fronds were cooked and eaten in times of famine. Recently a weevil which bores into the stems and causes leaf damage has become a pest. Six endemic species of Sadleria grow on the main islands. A second species, S. pallida, known as 'ama'u, ama'u i'i, or 'i'i, also grows here. Whereas the veins are obscure on the underside of S. cyatheoides pinnules, they are visible and translucent when S. pallida pinnules are held up towards a light source.

25. Sphenomeris chinensis (L.) Maxon

Pala'ā; lace fern  
Lindsaeaceae

This common lace fern occurs throughout Polynesia to Japan, Asia, and Madagascar. It thrives in dry to wet areas from nearly sea level on windward slopes to partly shaded habitats in higher forests. A brownish-red dye was prepared from the fronds by the Hawaiians. The fronds are plaited into leis.

26. Dryopteris glabra (Brack.) O. Kuntze

Hohiu  
Aspidiaceae

This endemic fern is occasional in open forests on the main islands, except Lanai. It is one of four Dryopteris species on Oahu. Its fronds can be three to four times divided.

27. Ctenitis rubiginosa (Brack.) Copel. ---  
Aspidiaceae

All five Hawaiian species of *Ctenitis* grow on Oahu. This fern species grows in wet forests from 3,000 to 4,500 feet elevation on the five largest islands. Short multicellular hairs are present on the upper surface of the fronds with brownish scales along the frond stem.

28. Marattia douglasii (Presl) Baker Pala; Douglas mulesfoot fern  
Marattiaceae

This endemic rare fern is found only in wet forests of the main islands where pigs cannot get to it. One frond is produced per year from the hoof-shaped frond bases. Hawaiians used the pala for medicine, in heiau ceremonies, and as a famine food. Frond portions mixed with maile reportedly enhance their fragrance. The genus name honors Giovanni Francesco Maratti (1723-1777), an Italian botanist and clergyman at Rome University.

29. Dianella sandwicensis Hook. & Arnott 'Uki'uki  
Liliaceae

'Uki'uki is native to the Hawaiian and Marquesas Islands. It has fragrant pale blue to white flowers and grows in a variety of habitats on the main islands. The sedge-like leaves were used for twine, rope, and thatching the inner walls of grass houses. The juice of the blue fruits was used to dye kapa cloth. The genus is named after Diana, the Roman mythology goddess of chastity, hunting, and the moon.

30. Astelia menziesiana Sm. Kaluaaha; pua'akuhinia; pa'iniu  
Liliaceae

The genus *Astelia* has about 25 species primarily found in the southern hemisphere. *Kaluaaha*, one of three Hawaiian species of *pa'iniu*, occurs on the main islands in mesic to wet forests and bogs from 2,000 to 6,800 feet elevation. The silvery green leaves contrast with the clusters of orange berries, which are produced on female plants in late summer. The orange berries with black seeds are eaten and dispersed by birds. The Hawaiians occasionally stripped the skin from the silvery leaves and interwove various flowers to form a garland called lei painiu. 'Uhi'uhi (#29) is also a member of the lily family (Liliaceae).

31. Anoectochilus sandwicensis Lindl. Jewel orchid  
Orchidaceae

One of three species of native orchids, the jewel orchid has a creeping stem with honohono-like leaves and small, yellowish-green flowers that may have pink spots. The flower color and shape is variable. These inconspicuous rare orchids grow in

dense shade usually on the ground among mosses, but may be epiphytic on lower tree trunks and tree ferns. They occur in wet forests from 1,000 to 5,400 feet elevation on the main islands.

32. Liparis hawaiiensis H. Mann 'Awapuhiakanalao  
Orchidaceae

The most common of Hawaii's native orchids, 'awapuhiakanalao grows in a variety of habitats, from open, seasonally wet to wet forests as an epiphyte among mosses or on the ground from 1,500 to 6,000 feet elevation on the main islands. The rhizome with numerous pseudobulbs is suited to habitats subject to dry spells. The pseudobulb gives rise to several pale green glossy leaves, small pale green flowers, and occasionally a few capsules with many, small seeds. This species is similar to several species in southeastern Asia. The genus is cosmopolitan with about 200 species. The name is derived from Greek liparos meaning oily or smooth, in reference to the glossy leaf surfaces.

33. Machaerina angustifolia (Gaud.) T. Koyama 'Uki  
Cyperaceae

Two species of Machaerina or 'uki are native to Oahu. This species is also native to New Guinea and the Society Islands. It occurs in wet forests and along bog margins from 1,500 to 6,000 feet elevation on the main islands. These sedges with flattened, leathery leaves produce inflorescences sometimes used in haku leis & dry bouquets. The Hawaiians used the 'uki leaves for tying and lashing thatch to houses.

34. Pycnus polystachyos (Rottb.) P. Beauv. ---  
Cyperaceae

This variable sedge grows within disturbed, open, grassy areas at the entrance of the trail. Two subspecies grow from mesic coastal sites up to 4,500 feet elevation in wet forests on the main islands, Niihau, and Midway. The species is native to other tropical and subtropical areas.

35. Freycinetia arborea Gaud. 'Ie'ie; 'ie  
Pandanaeae

Ie'ie is a tall woody climber in the pandanus or hala family (Pandanaeae). Widespread in Polynesia, 'ie'ie is fairly common in Hawaii on exposed ridges and slopes in mesic to wet forests on the main islands. Female flowers are clustered into terminal fleshy spikes surrounded by pink to orange leafy bracts. Rats feed on the fleshy portions. Birds pollinate the flowers and probably disperse the red berries. Hawaiians used the tough aerial roots to make durable baskets, sandals, fish traps, for tying parts of their houses together, and the wicker

framework for idols and helmets. The genus honors Captain Louis de Freycinet (1779-1840), who was commander of the French Exploring Expedition to Hawaii (1817-1819).

36. Smilax melastomifolia Sm. Hoi kuahiwi; aka'awa  
Smilacaceae

Hoi kuahiwi is the only native representative of the greenbrier family (Smilacaceae). This vine has dark green, shiny, heart shaped or round leathery leaves with two tendrils at each leaf base. Green or blue berries are borne on female plants. It grows on the main islands in mesic to wet forests and bog margins from 250 to 6,200 feet elevation. The tuberous roots were reportedly eaten by the Hawaiians in times of famine. Sarsaparilla, which is widely used for flavoring, is made from the dried roots of several related South American species.

37. Perrottetia sandwicensis A. Gray Olomea; pua'a olomea  
Celastraceae

Olomea is the only native representative of the bittersweet (Celastraceae) family in Hawaii. This endemic shrub or tree grows to 20 feet in height in dry and wet forests on the main islands from 1000 to 6000 feet elevation. The shiny leaves with toothed margins have reddish veins and petioles. Many small flowers may produce bright red two to four seeded berries in October and November. Hawaiians rotated the golden-brown harder wood of olomea against the soft hau (Hibiscus tiliaceus) wood to produce fire by friction. The genus name honors George Samuel Perrottet (1793-1870), Swiss-born French botanical explorer and gardener.

38. Ilex anomala Hook. & Arnott Kāwa'u  
Aquifoliaceae

This variable tree or shrub in the holly family (Aquifoliaceae) has shiny, net-veined leaves, small white flowers, and purple-black, berry-like fruits. Male and female flowers are on separate plants. It grows in Tahiti, Marquesas, and the main Hawaiian Islands in mesic to wet forests and bogs to 6,000 feet elevation. Hawaiians used the whitish wood for kapa anvils, canoe trim and rigging, saddletrees, and carrying sticks.

39. Gunnera petaloidea Gaud. 'Ape'ape; 'ape  
Gunneraceae

This unusual, giant perennial herb grows on steep, wet cloud swept slopes on Oahu, Molokai, Maui, and Hawaii. Its thick prostrate stem may rise to six feet in height. The large rhubarb-like leaves may grow to two feet across on leaf stems one to three feet in length. Flowering stalks to three feet in length produce numerous small reddish flowers followed by yellow to orange fruits. Blue green algae, which inhabit the

mucilage glands of the stem and petiole bases, help supply nitrates to the plant which lives in nitrogen-poor conditions. This family (Gunneraceae) has one genus with some 50 species, growing largely in the Southern Hemisphere. Hawaii has one additional species restricted to Kauai. *Gunnera* species vary in size from those with tiny, one-half inch diameter leaves to the world's largest herb with leaves over ten feet in size. The genus is named in honor of Johan Ernst Gunnerus (1718-1773), Norwegian botanist and clergyman.

40. *Trematolobelia macrostachys* (Hook. & Arnott) Koli'i  
A. Zahlbr. Campanulaceae

This spectacular Hawaiian genus of four species has two species which grow on Oahu. This uncommon shrub grows on windswept wet ridges and cliffs from 1,800 to 5,500 feet elevation on Oahu, Molokai, Maui, Lanai, and Hawaii. The scarlet, rose, or pink flowers appear on five to 20 horizontal branches which radiate outward like the spokes of a wheel. The flowers are visited by native honeycreeper birds which feed upon the nectar and insects. The fleshy fruits decompose leaving woody structures with pores, through which the small, winged seeds are shaken out, like a salt or pepper shaker, and dispersed by the wind.

41. *Syzygium sandwicensis* (A. Gray) Nied. 'Ōhi'a hā; hā; kauokahiki  
Myrtaceae

'Ōhi'a hā grows in mesic to wet forests and bogs to 4,000 feet elevation on Kauai, Oahu, Molokai, Lanai, and Maui. It may become a tree 60 feet or more in height with a three foot trunk diameter in dense rain forest; on open, exposed ridges, it tends to be stunted and shrubby. Insipid pink to red berries are produced from small white flowers. An insect causes deformed inflorescences. Hawaiians used the bark to make a black dye for staining kapa and the hard, reddish wood for house timbers, paddles, and fuel. Java plum, rose apple, mountain apple, eucalyptus, 'Ōhi'a, and guava also belong to this large family of over 3000 species.

- 42-3. *Metrosideros polymorpha* Gaud. 'Ōhi'a  
Myrtaceae

'Ōhi'a is the most common native tree in Hawaii. The flowers, called 'Ōhi'a lehua, are usually red in color, but may range from light yellow to salmon pink and orange. It is the official flower of the Island of Hawaii and is used in leis. Hawaiians considered them sacred to Pele, goddess of the volcanoes. They would gather them on their return journey to the mountains so they would not become lost in the afternoon rain and mist. Native and introduced birds feed on the flower nectar. This highly variable species grows in dry to wet habitats from sea level to 8,600 feet elevation on the main

islands. In bogs it often is a shrub or small tree; in well drained rainforests it may grow as a tree over 100 feet in height. It is also a pioneer on hot, dry lava fields. The species name *polymorpha* means many forms. Two different forms or varieties are illustrated--var. *polymorpha* with hairy round leaves (#42), and var. *glaberrima* (#43) with smooth, oblong leaves. Additional leaf shapes can be detected along this boardwalk. Young red leaves called *liko lehua* are used in leis and as a folk remedy for thrush, a common childhood disease. Hawaiians also boiled the young leaves with other plants to make a tonic to induce drowsiness. The brown and red wood is hard and strong, but tends to shrink upon drying. The Hawaiians used the wood for construction, carved images, wear-strips along gunwales of canoes, and household implements, such as bowls, poi boards, kapa beaters, and troughs. Modern uses include flooring, pallets, fenceposts, ship blocking, marine construction, irrigation canal stakes, and decorative poles. In the early part of this century, the Santa Fe Railroad used it as railroad crossties until the wood was found not to be durable. Seeds of the tree commonly germinate on trunks of tree ferns. After the seedlings send roots to the ground, the tree fern gradually decays leaving the 'ōhi'a tree supported by stilt roots. Because of this habit, the early Hawaiians regarded the tree fern as the "mother of the 'ōhi'a tree".

44. *Myrsine lessertiana* A. DC Kōlea lau nui  
Myrsinaceae

This large-leaved kōlea is variable in leaf shape and branching habit. The leaves often are clustered at ends of branches with the young leaves pink or red in color. The purplish-black berries which form along the branches are about 1/4-inch in diameter. This shrub or tree is widespread on the main islands primarily in mesic to wet forests in open sites from 700 to 4,000 feet elevation. The mottled pinkish wood was used by the Hawaiians for house posts and beams, and kapa anvils. A kapa dye was made from its red sap and charcoal.

45. *Myrsine sandwicensis* A. DC Kōlea lau li'i  
Myrsinaceae

Within the bog this small-leaved shrub is common. Like kōlea lau nui (#44), it has slightly fleshy leaves and purplish-black berries which form along the branches. It grows in mesic to wet forests and bogs from 1,000 to 4,500 feet elevation on Oahu, Molokai, Maui, Lanai, and Hawaii. Oahu has nine of 20 endemic Hawaiian species of *Myrsine*.

46. *Broussaisia arguta* Gaud. Kanawao; pū'ahanui  
Hydrangeaceae

The hydrangea family (Hydrangeaceae) is represented in Hawaii by this single native species. Kanawao is a common shrub, or

occasionally a tree to 20 feet tall, in wet forests from 1,000 to 6,200 feet elevation on the main islands. Its flowers form terminal, compact clusters that are visited by insects. The flower petals vary in color from greenish blue to pink, with male and female flowers on separate plants. Birds are attracted to the red to maroon-colored berries with many small seeds. Hawaiians used the plants for medicinal purposes. The genus is named in honor of Francis-Joseph-Victor Broussais (1772-1838), French physician and physiologist.

47. Cyrtandra lessoniana Gaud. Ha'iwale; kanawao ke'oke'oke  
Gesneriaceae

The African violet family (Gesneriaceae) is represented in Hawaii by a single polymorphic genus, Cyrtandra, with at least 53 native species. Most cyrtandras occupy wet shady gulches, where more than one species may be present. From about four to six introductions, this genus has evolved into more species than any other plant group in the state. This shrub with white flowers produces elliptic, white berries. It occurs only on Oahu from 1,000 to 4,000 feet elevation.

48. Nertera granadensis (L. fil.) Druce Mākole  
Rubiaceae

This prostrate herb is widely scattered across the tropics from Indonesia to Colombia. The orange berries are produced on creeping stems, which may root at the nodes. It forms mats in wet soil, moss, and on logs in wet forest and bogs from 1,500 to 6,200 feet elevation on the five largest islands. The genus of at least 15 species has its name derived from Greek nerteros meaning lowly, in reference to its habit of growth.

49. Coprosma ochracea W. Oliver Pilo; hupilo  
Rubiaceae

This variable shrub or small tree to 20 feet in height has male and female flowers on separate plants and orange berries. It grows primarily in wet forests and bogs, and occasionally in mesic forests from 2,500 to 7,000 feet elevation on Oahu, Maui, Molokai, Lanai, and Hawaii. The genus has nearly 90 species which occur throughout the Pacific, but grow chiefly in New Zealand, New Guinea, Australia, and Hawaii. Oahu has three of 13 Hawaiian Coprosma species. The name Coprosma refers to the foetid odor emitted when some species are bruised. Other members of this large family (Rubiaceae) include: coffee, gardenia, alahe'e, 'ahakea, noni, kōpiko, mākole and manono.

50. Hedyotis terminalis (Hook. & Arnott) Manono  
W. L. Wagner & Herbst Rubiaceae

Manono is a shrub, vine, or small tree to 16 feet in height. The dark blue to purplish-black fruits are often present with

white to purple or yellowish-green flowers. The hard, light brown wood was used by the Hawaiians for canoe trim and rigging. This species occurs in rainforests, bogs, and shrublands from 900 to 6,200 feet elevation on the main islands. Eleven species of *Hedyotis* are present on Oahu.

51. *Korthalsella cylindrica* (Tiegh.) Engl. Hulumoa; kaumahana  
Viscaceae

A member of the mistletoe family (Viscaceae), the hulumoa is parasitic upon woody plants. Instead of a root system, a highly developed haustorium attaches the mistletoe to its host plant. The green stems replace the leaves in the manufacture of plant food. Small separate male and female flowers appear in minute clusters at the stem nodes. The small globular fruits are eaten by birds which scatter the sticky seeds from tree to tree. These parasites, although injurious to the host plant upon which they feed, seldom cause its death. This species is parasitic primarily on 'ōhi'a, but also grows on lama, 'akoko, and soapberry in dry to mesic forest and open bogs from 1,300 to 5,600 feet elevation on Oahu, Molokai, Maui, Lanai, and Hawaii.

52. *Korthalsella latissima* (Tiegh.) Danser Hulumoa; kaumahana  
Viscaceae

This second species of mistletoe has flattened branches. It occurs on various host plants, including 'ōhi'a, kōlea, alani, and cyrtandra. It grows in mesic to wet forests from 3,200 to 4,000 feet elevation, primarily on Kauai, Oahu, and Hawaii. The Hawaiian Islands with four endemic and two indigenous species of *Korthalsella*--all represented on Oahu--probably evolved from three independent introductions. The genus, named in honor of P. W. Korthals (1807-1892), Dutch botanist and traveler in the East Indies, has about 20 species occurring from Ethiopia through southeast Asia, Japan, Australia, New Zealand, and many Pacific Islands.

53. *Styphelia tameiameia* Pūkiawe; 'a'ali'i mahu; kānehoa  
(Cham. & Schlechtend.) F. v. Muell. Epacridaceae

This shrub is sometimes called Hawaiian heather because of its small leaves. Pūkiawe is the only member of the epacris family native to our state. It also grows in the Marquesas Islands, with most other family members occurring in Australia and Tasmania. Pūkiawe grows in areas ranging from lava flows to forests and bogs. Its small red, pink or white fruits are sometimes used in leis. The Hawaiians used the hard close-grained wood to cremate criminals. Also in ancient times the burning wood smoke freed the kapu-chief so he could mingle with the commoners without bringing harm to them or upon himself. This species was named in honor of King Kamehameha the Great (1758-1819), who united most of the islands into one kingdom.

54. Melicope christophersenii (St. John) Alani; alani kuahiwi  
T. Hartley & B. Stone Rutaceae

One of 47 alani species endemic to the Hawaiian Islands, this shrub or tree is rare in wet forests from 3,000 to 4,000 feet elevation in the Waianae Mountains, Oahu. Its four-lobed capsules are fused up to 2/3 their length. The capsules split at maturity to yield black shiny seeds attractive to birds. The genus, formerly called Pelea, has capsules that vary in shape from round, square, to cross-shaped. Other members of this family include: citrus, rue, and curry leaves, which are used in cooking.

55. Melicope clusiifolia (A. Gray) Alani; kolokolo mokihana  
T. Hartley & B. Stone Rutaceae

This common alani with whorled leaves is a variable shrub or tree up to 30 feet in height. It occurs on the main islands in mesic to wet forests. The fleshy flowers are four-parted unisexual or bisexual structures. M. clusiifolia is a member of the citrus family (Rutaceae) whose leaves may emit a weak anise odor when crushed. There is considerable variation among alani species in the presence of various alkaloids and the type of odor emitted by leaves and stems when they are crushed. The yellowish-white wood was used by Hawaiians for kapa beaters, canoe trim and rigging.

56. Melicope oahuensis (H. Lévl.) T. Hartley Alani; alani kuahiwi  
& B. Stone Rutaceae

A shrub or small tree to 23 feet in height, this third alani species within the bog emits a strong, pungent anise odor when its leaves are crushed. M. oahuensis occurs only on Oahu in mesic to wet forests from 1,500 to 4,000 feet elevation. The capsules are cube shaped. This species is closely related to mokihana (M. anisata), which grows on Kauai.

57. Labordia waiolani Hawra Kāmakahala  
Loganiaceae

This shrub has handsome golden yellow flowers and glossy, green leaves. It grows in mesic to wet forests from 1,000 to 4,000 feet elevation on Oahu, Molokai, and Lanai. It is named in honor of M. Laborde, a marine officer who died at sea on the voyage of the Uranie. Labordia is an endemic genus of 15 species of trees and shrubs--eight of which occur on Oahu. A second species, L. fragraeoidea, may also occur in the area.

58. Peperomia macraeana C. DC Peperomia; 'ala'ala wai nui  
Piperaceae

Oahu has nine of 25 native species of Peperomia called 'ala'ala wai nui. The fleshy herbs occur on the ground or sometimes as

epiphytes, varying from a few inches to four feet in height. The minute flowers sunk into the stalks give rise to small sticky fruits dispersed by animals. This species of *Peperomia* has two to four leaves per node and rather stout terminal spikes. It grows in wet forests from 2,000 to 6,300 feet elevation on the main islands, except Kauai.

59. *Peperomia membranacea* Hook. & Arnott Peperomia; 'ala'ala wai nui  
Piperaceae

This 'ala'ala wai nui is a fleshy herb that has longer, thinner flowering spikes than *P. macraeana* (#58). It grows in mesic to wet forests from 1,000 to 5,400 feet elevation on the five largest islands. Hawaiians occasionally used peperomia plants as a medicine and as a gray dye for staining kapa. They are related to the peperomia house plants, 'awa, and *Piper nigrum* from which the black pepper of commerce is produced.

60. *Cheirodendron platyphyllum* (Hook. & Arnott) Seem. subsp. *platyphyllum* Lapalapa  
Araliaceae

Lapalapa, a tree up to 30 feet in height, has leaflets in threes that are wider than their length. The leaves make a gentle sound when they flutter in the wind. This subspecies occurs only on Oahu in wet forests from 2,200 to 4,000 feet elevation. The leaves and bark give off a carrot-like or turpentine odor when bruised. The soft wood burns when freshly cut. *Cheirodendron* is a host plant for native drosophila flies and a food plant for an endemic insect genus, *Nesiomeris*.

61. *Cheirodendron trigynum* (Gaud.) A. Heller subsp. *trigynum* 'Ōlapa  
Araliaceae

The 'ōlapa is a tree to 50 feet in height in wet forests from 1,000 to 6,800 feet elevation on the main islands. Its leaves have three to seven leaflets which join together like fingers on the palm of a hand. Some hula dancers, known as 'ōlapa, have agile, graceful bodies which bend similar to 'ōlapa leaves waving in the breeze. The Hawaiians made a bluish dye for staining kapa from the fruits, leaves, and bark; made poles for catching birds; and used the bark to treat asthma. Native birds, such as the rare 'ō'ō, ō'ū, and 'ōma'o, are said to eat the blackish fruits. The genus *Cheirodendron* in the ginseng family (Araliaceae) is native to the Hawaiian and Marquesas Islands.

62. *Vaccinium calycinum* Sm. 'Ōhelo; 'ōhelo kau lā'au  
Ericaceae

'Ōhelo kau lā'au grows in wet forests and bogs from 1,600 to 5,500 feet elevation on the main islands. The insipid, bright red berries usually ripen between late December and August. Hawaiians used the leaves to make a beverage. The erect shrubs

can grow to 16 feet tall and tend to lose their leaves for one to three weeks from October through February. All three native 'ohelo species occur on Oahu. Other members of this family (Ericaceae) include: blueberry, huckleberry, cranberry, rhododendron, heather, and wintergreen.

63. Bidens torta Sherff Ko'oko'olau; ko'olau; beggartick;  
Spanish needle  
Asteraceae

Hawaii's 19 endemic *Bidens* species probably evolved from a single ancestor with barbed seeds that reached the Islands attached to bird feathers. Gradually the plants lost their dispersal mechanisms. This variable ko'oko'olau has yellow flowers and coiled seeds without barbs. One of nine native species on Oahu, this tall perennial herb in the sunflower family (Asteraceae) may grow to eight feet in height. It is common on dry ridges to wet forests and bogs from 1,000 to 4,000 feet elevation. Hawaiians used the native ko'oko'olau to treat a childhood disease called thrush and as a tonic or blood purifier. Plant parts are still harvested to make a herbal tea. The Spanish needle weed with barbs is related to the Hawaiian plants.

64. Dubautia laxa Hook. & Arnott Kūpaoa; na'ena'e pua melemele  
Asteraceae

Small tarweeds along the west coast of North America are the probable ancestors of Hawaii's endemic genera of *Dubautia*, *Argyroxiphium* (silverswords and greenswords), and *Wilkesia*. Four of the 21 species of *Dubautia* grow on Oahu. This shrub with yellow flowers grows to 16 feet in height and occurs in wet forests and bogs from 1,200 to 5,400 feet elevation on the main islands, except the Big Island. The genus is named in honor of J. E. Dubaut, an officer of the French Royal Marines. A second species, *D. plantaginea*, with more elongate flowering inflorescences also occurs in the area. Other native members of this sunflower family (Asteraceae) include: ko'oko'olau (#63), silverswords, greenswords, iliau, and nehe.

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