PIHEA TRAIL PLANT GUIDE

NA PALI-KONA FOREST RESERVE—KAUAI

State of Hawaii

Department of Land and Natural Resources

Division of Forestry and Wildlife

EXECUTIVE CHAMBERS

HONOLULU

MESSAGE FROM GOVERNOR JOHN WAIHEE

Kauai's unique native plants, wet forest, bogs, birds, and exceptional views of Kalalau Valley, Mount Wai'ale'ale and the Alakai Wilderness are special features of the Pihea Trail. This guide will help you recognize and appreciate its native plants.

Please keep the trail clean and beautiful for others to enjoy, and do not collect our native plants so that others are not deprived of their beauty.

JOHN WAIHEE

Cover photo: Koli'i (Trematolobelia kauaiensis) along Pihea Trail - by Galen Kawakami

PIHEA TRAIL PLANT GUIDE

NA PALI KONA FOREST RESERVE

PIHEA, KAUAI

Specimens Identified and Described by

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State of Hawaii

Department of Land and Natural Resources

Division of Forestry and Wildlife

1991

INTRODUCTION

Pihea Trail, which starts at the end of Highway 550, at Puu O Kila Lookout, provides access to spectacular views of Kalalau Valley and an opportunity to sample some of the Alakai Wilderness. It also serves as an access to the Alakai Swamp Trail.

From the Kalalau Valley rim, the trail turns generally south, crosses the Alakai Swamp Trail, descends to Kawaikoi Stream, and terminates at the Kawaikoi Camp, adjacent to the Mohihi-Camp 10 Road. Total trail length is 3.75 miles.

This guide illustrates many native wet forest plants seen along the Pihea Trail from Puu o Kila to a trailside bench and overlook at 3,800 feet elevation. The wet forest species give way to a drier, mesic forest after crossing the Alakai Swamp Trail intersection and one begins to descend the ridge. Most native plants within the Alakai Wilderness are endemics, i.e. occurring only within the State of Hawaii or a single island, while others are indigenous to the Hawaiian Islands and elsewhere.

The wet forest is largely composed of native plants that occur on one or more Hawaiian Islands with a few cosmopolitan weeds and/or exotic plants. Recent plant introductions include: gold fern (Pityrogramma calomelanos), a sedge (Mariscus meyenianus), a rush (Juncus planifolius), narrow-leaved carpetgrass (Axonopus fissifolius), vasey grass (Paspalum urvillei), Glenwood grass (Sacciolepis indica), broomsedge (Andropogon virginicus), Kahili ginger (Hedychium gardnerianum), montbretia (Crocosmia Xcrocosmiiflora), firetree (Myrica faya), prickly Florida blackberry (Rubus argutus), thimbleberry (Rubus rosifolius), fireweed (Erechtites valerianifolia), and hairy cat's ear or gosmore (Hypochoeris radicata).

THE PLANTS

This guide includes information and illustrations of most native clubmosses, ferns, and flowering plants seen along the trail. 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. Some plants are illustrated using one-half inch scale background. The main islands in this publication refers to the six largest islands of Hawaii, Maui, Oahu, Kauai, Molokai, and Lanai.


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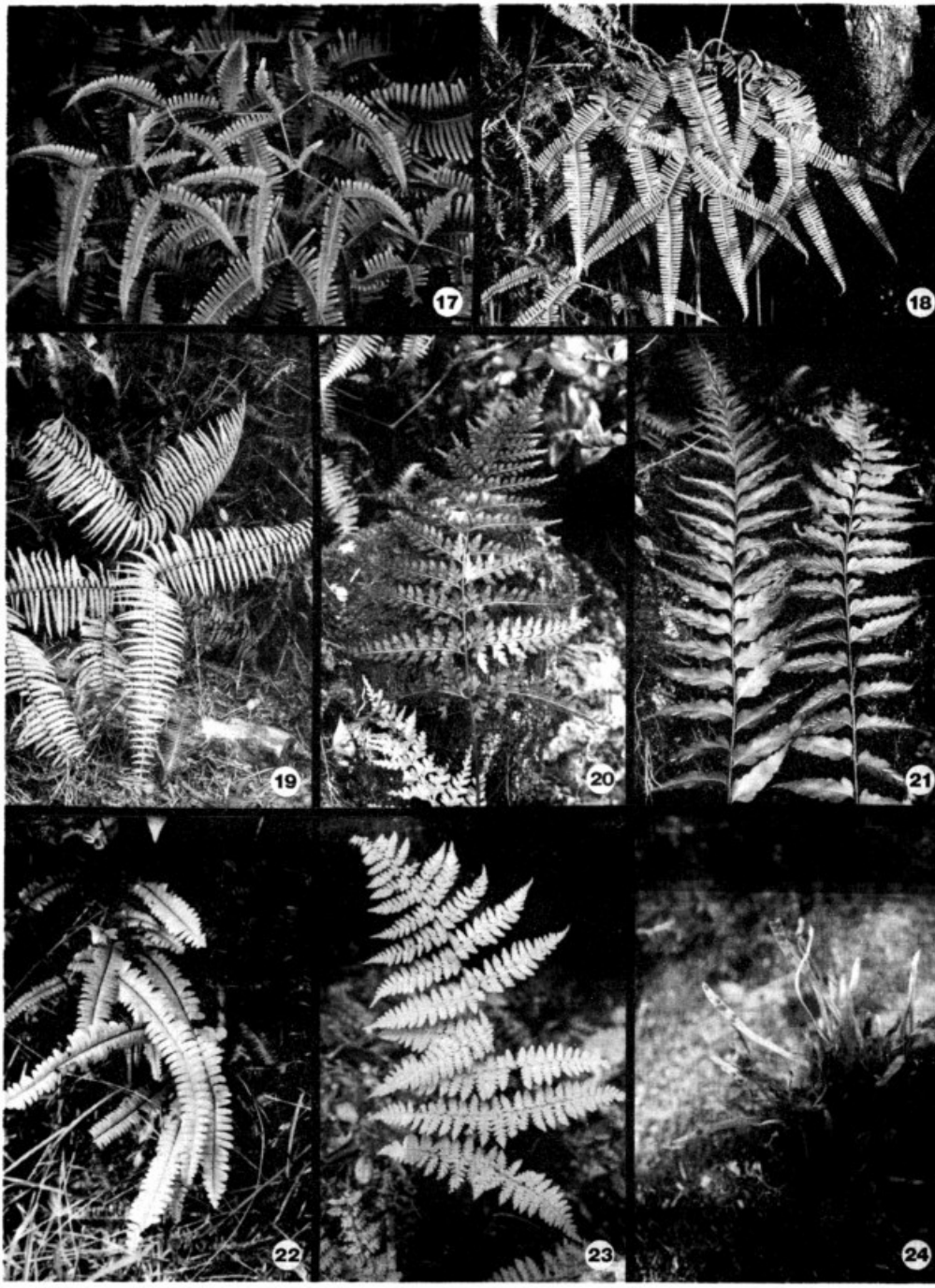
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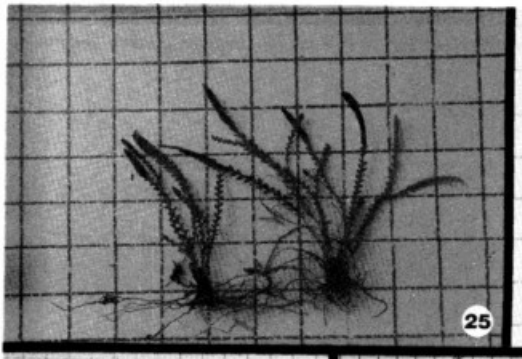
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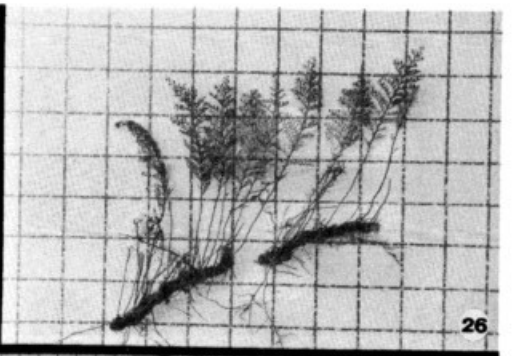
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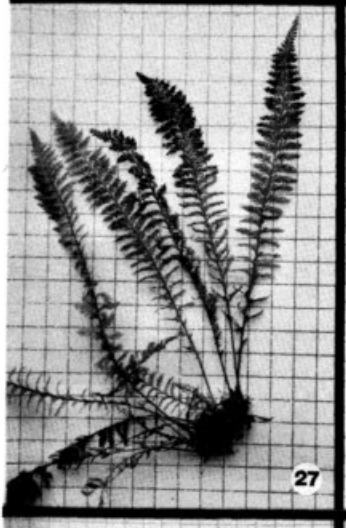
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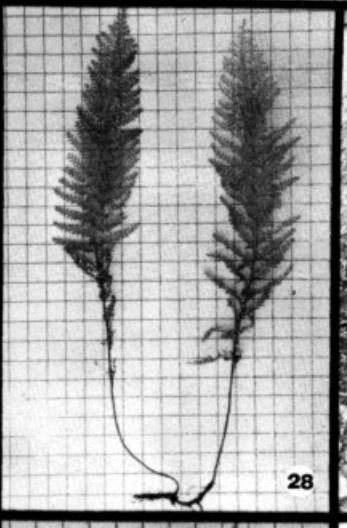
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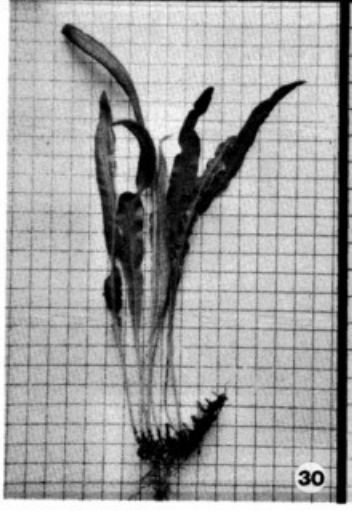
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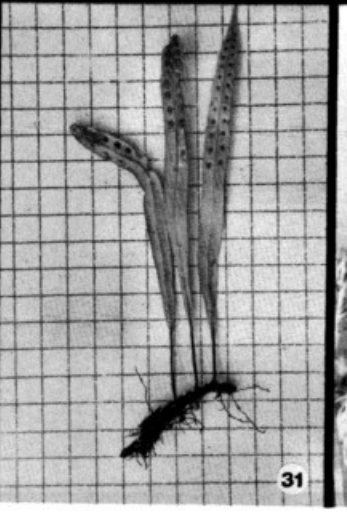
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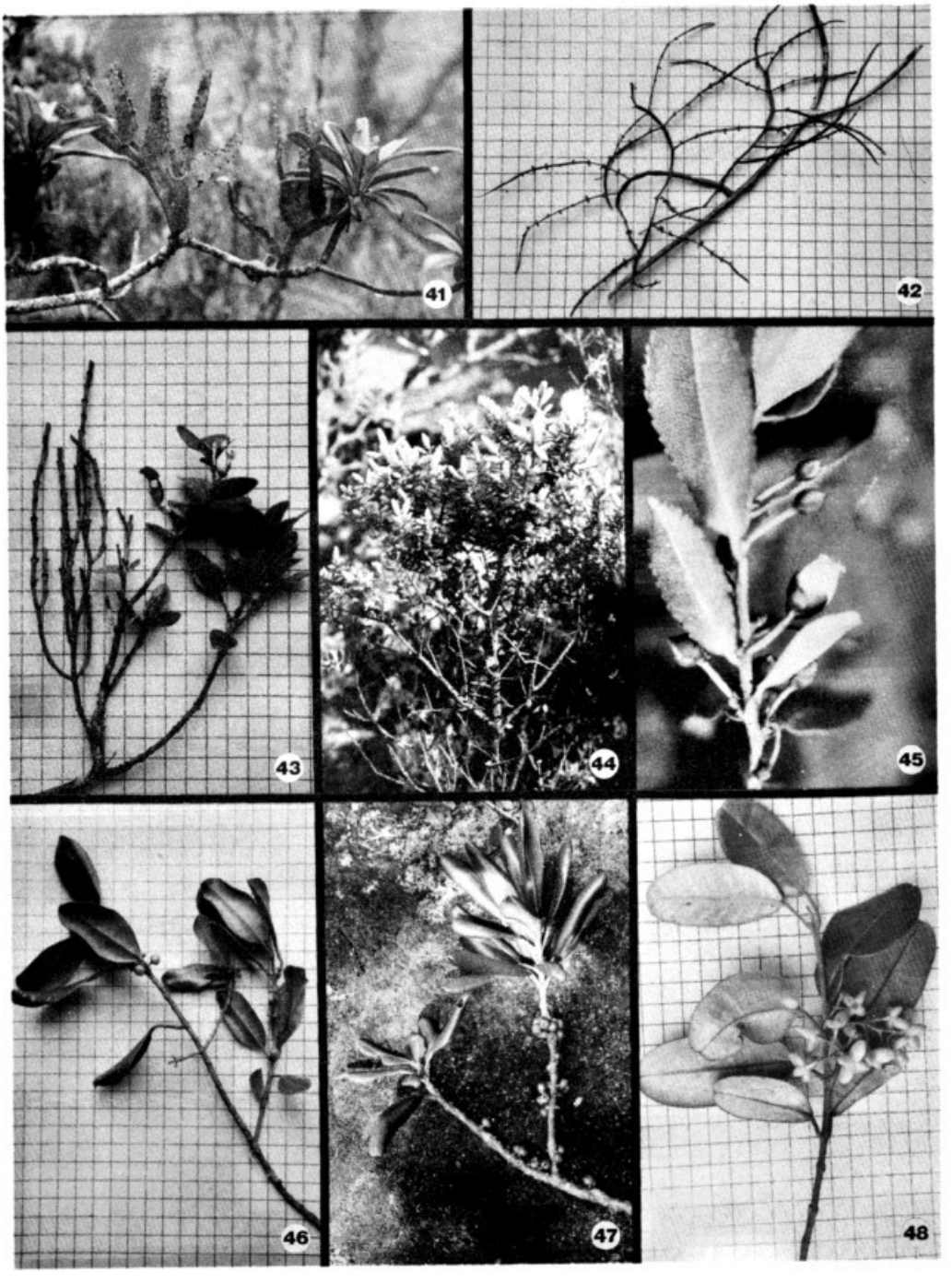
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1. Lycopodium cernuum L. — Wāwae'iole; nodding clubmoss
Lycopodiaceae

The nodding clubmoss often grows in open places with the **uluhe** fern. The upright branches arise from creeping stems to produce at maturity drooping cone-shaped structures with spores inside. These spores in turn are wind-dispersed to give rise to a very small alternate generation of plants. Clubmosses are among the first land plants to evolve 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 venustulum Gaud. — Wāwae'iole; Hawaiian running pine
Lycopodiaceae

This second clubmoss, like #1, is called **wāwae'iole**. It creeps over the ground like the nodding clubmoss, but instead of producing nodding spore-bearing structures, produces erect ones. It grows on the main islands in wet, open forests above 3,500 feet in 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 or **'ea**.

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 horsetail 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. Cibotium chamissoi Kaulf. — Hāpu'u 'i'i; Hawaiian treefern
Dicksoniaceae

Treeferns are common in our native wet forests from 1,000 to 6,600 feet in elevation. At least four of six Hawaiian species

of **Cibotium** occur on Kauai. **Hāpu'u 'i'i**, our largest treefern, may have a trunk up to 25 feet in length. 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 sometimes used in landscaping, as posts, and along muddy trails to assure hiker's footing and route drainage flow. This species honors Ludolf Karl Adalbert von Chamisso (1781-1838), German naturalist and explorer. A second species, C. st.-johnii, may be seen along this trail.

6. 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.

7. Elaphoglossum pellucidum Gaud. **'Ēkaha**
Elaphoglossaceae

One of six Hawaiian species of **'ēkaha**, this fern has noticeable veins in its translucent blades that distinguish it from the other 'ekahas (#8-10 & 30). It grows on trees and rocks in mesic forests above 1,000 feet elevation on Kauai, Oahu, Molokai, Maui, and Hawaii.

8. Elaphoglossum aemulum (Kaulf.) Brack. **'Opeha; hoe-a-Māui**
Elaphoglossaceae

This **'opeha** grows on Kauai, Oahu, Molokai, Maui and Lanai above 1,000 feet elevation in moist places often near streams. It occurs usually on tree trunks and logs, but occasionally on the ground. **Elaphoglossum** means "elephant-tongue" in Greek referring its stiff frond blades. The rhizome is obscured by golden to dark brown scales; the smooth blade has veins that do not fuse at the blade margin.

9. Elaphoglossum hirtum (Sw.)C. Chr. var. micans (Mett.) C. Chr. — Māku'e; laukahi; Elaphoglossaceae

This fuzzy **māku'e** is distinctive because of a covering of tan scales on its stems and blades. Although chiefly an epiphyte, it occasionally grows on soil and rocks. It is found on the main islands above 1,000 feet elevation from open, dry to wet forests.

10. Elaphoglossum alatum Gaud. var. crassicaule (Copel.) Anderson & Crosby — 'Ēkaha 'ula; Elaphoglossaceae

This **'ēkaha** occurs only on Kauai in wet forests and along grassy, windswept ridges above 800 feet elevation. The rhizome scales are dark brown with curled tips It is distinquished from three other **Elaphoglossum** species along this trail by the blade which has veins that fuse and form a continuous marginal vein.

11. Sadleria sp. — 'Ama'uma'u; Blechnaceae

This endemic genus of six species occurs from near sea level to the summits of all but the highest mountains of Hawaii's main islands. Some are small in stature; others like this one may grow to 16 feet in height. The leaves were used by the Hawaiians to thatch native houses when **pili** grass was scarce, and sometimes to cover the house walls. The three largest **'ama'uma'u** species, S. cyatheoides (with opaque leaves) (#12), S. pallida (with transparent leaf veins), and the largest species, S. souleyetiana, occur along this trail.

12. Sadleria cyatheoides Kaulf. — 'Ama'uma'u; Blechnaceae

This **'ama'uma'u** with earlike basal pinnules that overlap the stipe 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 for dryland vegetable crops; the trunk to produce red **kapa** dye; the stems for weaving baskets, fishtraps, and house trim; and the trunk core and young fronds cooked and eaten mainly in times of famine. Recently a weevil, which bores into the stipes and causes leaf damage, has locally become a pest.

13. 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.

14. Diplazium sandwichianum (Presl) Diels — Hō'i'o
Athyriaceae

The large older fronds usually have distinctive elongated reproductive bodies on their undersides. Also the frond stems are concave to U-shaped in cross-section. These fronds are coarser than the related **'ākōlea** (#13). The **hō'i'o** grows on all the main islands. The young fronds are sometimes eaten raw.

15. Sphenomeris chinensis (L.) Maxon — Pala'ā; lace fern
Lindsaeaceae

This common lace fern occurs throughout Polynesia to Japan, Asia, & Madagascar. It thrives in dry and moist areas along dirt banks, roads, and trails from nearly sea level on wetter, windward slopes to partly shaded habitats in higher forests. A red dye was prepared from the fronds by the Hawaiians. Today, the fronds are plaited into leis.

16. Polypodium pellucidum Kaulf. — 'Ae; pellucid polypody
Polypodiaceae

The **'ae** is an common fern growing in open woods and lava flows on the main islands. The fronds, when held up to the light, have visible 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 is also in this fern family.

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

This native fern, which also grows in tropical and subtropical Asia, New Zealand, and other Pacific Islands, frequently forms thickets from 500 to 3,000 feet in elevation in disturbed

areas, landslides, and in open **'ōhi'a** forest. A second **uluhe**, D.emarginata, which occurs along the beginning of the Alakai Swamp Trail, has rusty brown, cobweb-like hairs on the underside of 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 may 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.

18. Sticherus owhyensis (Hook.) Ching — **Hawaiian sticherus; uluhe**
Gleicheniaceae

Hawaiian sticherus is related to the **uluhe** fern (#17), but has leaflets extending over the last two or three forkings of the frond. It is uncommon in open rainforests at higher elevations of the main islands. It does not produce compact, extensive thickets like the **uluhe.**

19. Diplopterygium pinnatum (Kunze) Nakai — **Uluhe lau nui; giant false staghorn fern**
Gleicheniaceae

Uluhe lau nui grows on the main islands, China, Malesia, and Australia. It is related to the **uluhe** (#17) and **Hawaiian sticherus** (#18). Whereas the **uluhe** has once pinnate fronds, this **uluhe lau nui** has twice pinnate fronds that give it a large, lacy appearance. It thrives in wet rain forests and windswept embankments.

20. Asplenium lobulatum Mett. — **'Anali'i; pi'ipi'ilaumanamana**
Aspleniaceae

Pi'ipi'ilaumanamana is common in rain forests on the main islands. It also occurs in the Philippines, New Guinea, and other Pacific Islands. **Asplenium** ferns are among the most attractive and diversified in appearance. They vary from the well-known, epiphytic birds nest fern, which has simple fronds, to terrestial plants, which may have compound fronds.

21. Asplenium polyodon Forst. — **Pūnanamanu**
Aspleniaceae

The largest number of native fern species in our state belong to the genus **Asplenium.** This confusing group has 18 different kinds--13 species are found on the Island of Kauai. Although their frond shapes and sizes vary, they can be recognized by linear reproductive structures on the underside of mature fronds which often angle outward from the midribs. This asplenium occurs on all the main islands.

22. Nephrolepis cordifolia (L.) Presl — Kupukupu, ni'ani'au; narrow swordfern
Nephrolepidaceae

This pantropical species of swordfern has narrower fronds than the naturalized **Nephrolepis** ferns. It occurs on the main islands on tree trunks and on the ground in open forest at mid-elevations. The Greek name **Nephrolepis** refers to the kidney-shaped tissue which protects the spores on the underside of the mature fronds. A close relative of this narrow swordfern is the house or Boston fern. Two related species that are naturalized in Hawaii are: the fishtail fern, N. biserrata (uncommon) and N. multiflora (common).

23. Dryopteris glabra (Brack.) O. Kuntze — Hohiu
Aspidiaceae

This fern is occasional in open forests on Kauai, Oahu, Molokai, Maui and Hawaii. This endemic fern is one of five **Dryopteris** species on Kauai. Its fronds can be three to four times divided.

24. Grammitis tenella Kaulf. — Kolokolo
Grammitaceae

A common epiphyte on trees and rocks, this small fern is endemic to the main islands. Commonly associated with mosses, it has disproportionately large, sparse, fruiting bodies on the underside of the small fronds. **Kolokolo** refers to the creeping habit of rhizome.

25. Xiphopteris saffordii (Maxon) Copel. — Kihe
Grammitaceae

This small fern has a distinctive frond shape intermediate to two other genera of this family--**Grammitis** (#24) and **Adenophorus** (#26). **Kihe** is occasionally found on moss-covered tree trunks in wet forests of the main islands.

26. Adenophorus abietinus (D.C. Eaton) K.A. Wilson — Kihe
Grammitaceae

The smallest of the three illustrated **Adenophorus** ferns along the trail, it shares its common name, **kihe**, with **Xiphopteris** (#25). It is an occasional epiphyte on trees in rainforests from 2,000 to 6,000 feet in elevation. Native to Kauai, Oahu, and Lanai, it has smaller fronds than **wahine noho mauna** (#27).

27. Adenophorus tamariscinus (Kaulf.) Hook. et Grev. — Wahine noho mauna
Grammitaceae

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. Three varieties of this species are recognized--two of them are on Kauai.

28. Adenophorus tripinnatifidus Gaud. **Wahine noho mauna**
Grammitaceae

This lacy, small fern is a common epiphyte in our rainforests on Kauai, Oahu, Molokai, Maui, and Hawaii. This Hawaiian genus of 11 taxa has six occurring on Kauai. They vary from having simple to three times divided fronds as this species name implies.

29. Grammitis baldwinii (Baker) Copel. ---
Grammitaceae

Of three Kauai **Grammitis** fern species, this one occurs only in Kauai's summit rainforests. Unlike the related **kolokolo** (#24), this species is epiphytic with a discrete rhizome. The simple, lax fronds with round reproductive bodies on the underside of some fronds should not be confused with the more upright leathery frond of **pākahakaha** (#31).

30. Elaphoglossum wawrae (Luers.) C. Chr. **'Ēkaha; laukahi**
Elaphoglossaceae

One of five **Elaphoglossum** species found along this trail, this narrow-leaved one is named after the botanist, Heinrich Wawra. It occurs on Kauai, Oahu, Molokai, Maui, and Hawaii on mossy tree trunks from near sea level on the wet, windward side of the islands to about 6,500 feet elevation. The frond has scattered scales along the upper blade midrib and veins that do not fuse at the blade margin.

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

The simple, erect, leathery fronds occur at 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.

32. Gahnia vitiensis Rendle ssp. kauaiensis (Benl) T. Koyama ---
Cyperaceae

This subspecies of sedge occurs only on Kauai in openings of wet forest and bog margins. Its range overlaps with the more common, coarser species, G. beecheyi, at the head of Kalalau Valley. The genus is named in honor of Henrik Gahn, a student of Linnaeus. Of some 30 species of **Gahnia** which occur in Australia, eastern tropical Asia and Pacific Islands, two of five species are occur on Kauai. This species, G. vitiensis, also occurs in Fiji.

33. Eragrostis grandis Hillebr. Lovegrass
Poaceae

One of 10 native Eragrostis species, this perennial lovegrass prefers partial shade. It occurs on the main islands in mesic forest on moist to wet slopes.

34. Astelia argyrocoma A. Heller ex Skottsb. Pa'iniu
Liliaceae

The genus **Astelia** has about 25 species primarily in the southern hemisphere. This **pa'iniu**, one of three Hawaiian species, occurs only on Kauai as an epiphyte in mesic to wet forests from 2,000 to 4,200 feet elevation. The orange berries are eaten and dispersed by birds. **'Uki'uki** (#39) is also a member of this lily family (Liliaceae).

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

Hoi kuahiwi is the only native representative of the greenbrier family (Smilacaceae). This woody 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.

36. Carex kauaiensis R. Krauss ---
Cyperaceae

Carex, a large sedge genus of about 2,000 species, has eight species native to the Hawaiian Islands. Hawaiians call all sedges **mau'u** or **kāluhāluhā**. Most stems are triangular in cross-section. This native sedge grows in open sites of wet forest only within the Alakai-Waialeale plateau. It has shiny black seeds and a more congested inflorescence than C. alligata, which also occurs in the vicinity and it closely resembles.

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

Kauai has two native species of **Machaerina** or **'uki**. This species is also native to New Guinea and the Society Islands. It occurs in wet forests & 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.

38. Luzula hawaiiensis Buchenau var. hawaiiensis — **Common woodrush** — **Juncaceae**

This perennial herb can be distinguished by its soft leaves and tufted whitish hairs along the leaf margins. It is the only Hawaiian species in the widespread genus of about 75 species. The **common woodrush** occurs on the main islands in open, rocky sites & open areas in mesic forest, shrub and grassland from 2,400 to 8,000 feet in elevation.

39. Dianella sandwicensis Hook. & Arnott — **'Uki;'uki'uki** — **Liliaceae**

This **'uki** is native to the Hawaiian and Marquesas Islands. It has fragrant 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 genus name is derived from Diana, the Roman mythology goddess of chasity, hunting, and the moon. **Pa'iniu** (#34) is also a member of the lily family.

40. Pritchardia minor Becc. — **Loulu** — **Arecaceae**

Hawaii has a single native palm genus, **Pritchardia**, called **loulu**. This species occurs in the Alakai-Kokee-Na Pali Coast area in mesic to wet forests up to 4,000 feet elevation. Five of the 19 **Pritchardia** species occur on Kauai. Today the **loulu** palm is mainly used as an ornamental. Hawaiians used these palms to weave hats, mats, and baskets from the young leaves; the mature leaves for thatching and fans; the trunks to make fences; and the inmature soft seeds for food. The genus was named in honor of William T. Pritchard, British consul in Fiji (1857-1863) and author of the book Polynesian Reminiscences.

41. Korthalsella latissima (Tiegh.) Danser — **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 sticky seeds are

explosively ejected from the small globular fruits and dispersed by birds, which feed upon the fruits. These parasites, although injurious to the host plant upon which they feed, seldom cause its death. This species of mistletoe, with flattened branches that often grow pendent, occurs on various host plants, including **'ōhi'a**, **kōlea**, **alani**, **kāwa'u**, **'ōlapa**, and **cyrtandra**. It occurs in wet and mesic forests from 3,200 to 4,000 feet elevation primarily on Kauai.

42. Korthalsella platycaula (Tiegh.) Engl. **Hulumoa; kaumahana**
Viscaceae

This native mistletoe or **hulumoa** has narrow, flattened stems found often on **kalia** (#51). The species occurs also on Oahu, Lanai, Maui, Tahiti, the Marquesas and Austral islands. 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 eastward into southeast Asia, Japan, Australia, New Zealand, and many Pacific Islands.

43. Korthalsella remyana Tiegh **Hulumoa; kaumahana**
Viscaceae

One of six native Hawaiian species of **hulumoa**, this species is parastic on **'ōhi'a**, **koa**, **lama** and Syzygium. This variety occurs only on Kauai and is common on dwarf **'ōhi'a** in and around bogs. It has round cylindric stems compared to the flattened stems of two other mistletoes (#41 and 42) seen along this trail. The Hawaiian Islands with four endemic and two indigenous species of Korthalsella--four on Kauai--probably evolved from three independent introductions. This species is endemic to the main islands in dry to wet forests and open bogs from 1,000 to 4,000 feet in elevation.

44. Styphelia tameiameiae (Cham. & Schlechtend.) F. Muell. **Pūkiawe; 'a'ali'i mahu; kānehoa**
Epacridaceae

This plant 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.

45. Eurya sandwicensis A. Gray — **Ānini; wānini**
Theaceae

Ānini is the only native member of the tea family in our state. Its flowers are usually either male or female; its fruit is a bluish-black berry. It is a rare tree or shrub which grows in mesic to wet forests, often along ridges, from 1,500 to over 5,000 feet elevation.

46. Melicope anisata (H. Mann) T. Hartley & B. Stone — **Mokihana**
Rutaceae

The aromatic seed capsules of **mokihana**, known as the "flower" of Kauai, are symbolic of the island and strung into leis. They have an aromatic oil, anethole, which gives them an anise-scent. These capsules when worn on moist skin can cause a photosensitive skin reaction. Hawaiians used the plant to perfume their **kapa** cloths. These shrubs or trees to 26 feet tall are native only to Kauai in mesic to wet forest, 1,200 to 4,200 feet elevation.

47. Melicope clusiifolia (A.Gray) T. Hartley & B. Stone — **Alani; kūkaemoa**
Rutaceae

This **alani** with whorled leaves is the most common of 47 endemic Melicope species in the state. It is a variable shrub or tree to 30 feet in height which occurs on the main islands in mesic to wet forests. A member of the citrus family (Rutaceae), it has leaves when crushed that may emit a weak anise odor. The fleshly flowers are of one or both sexes in units of four parts. **Alani** has a yellowish-white wood used by Hawaiians for **kapa** beaters, canoe trim and rigging.

48. Melicope kavaiensis (H. Mann) T. Hartley & B. Stone — **Pilo 'ula**
Rutaceae

Pilo 'ula occurs only in the high central plateau of Kauai. This shrub prefers the dense shade of the wet forest near bog margins. This genus, also known as **Pelea**, has leaves when they are bruised that often emit citric, anise, or root beer odors. Their capsules vary in shape from round, square, to cross-shaped. Members of this family include citrus, rue and curry leaves which are used in cooking.

49. Metrosideros polymorpha Gaud. — **'Ōhi'a; 'ōhi'a lehua; lehua**
Myrtaceae

'Ōhi'a is the most common native tree in the state. 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 volcanoes. They would gather them on their return journey to the mountains so they would not become lost in the afternoon rain & 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 with silvery leaves; 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. Young leaves 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. The Santa Fe Railroad made crossties from **'ōhi'a** 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". Related plants in the myrtle family (Myrtaceae) include: guava, eucalyptus, rose apple, mountain apple, and java plum.

50. Labordia waialealae **Wawra** — **Kāmakahala lau li'i**
Loganiaceae

Labordia is an endemic genus of 15 species of trees and shrubs, of which seven occur on Kauai. It is named in honor of M. Laborde, a marine officer who died at sea on the voyage of the Uranie. Although some species have green flowers, this species has small fleshy, yellow flowers. This shrub which grows to six feet in height has two forms--one small and compact, the other less compact with larger leaves. It occurs only on Kauai in wet forest and bog hummocks from 3,700 to 4,700 feet elevation.

51. Elaocarpus bifidus **Hook & Arnott** — **Kalia**
Elaeocarpaceae

This tree from mesic to wet forests on Kauai and Oahu has soft, whitish wood. The Hawaiians made string and cordage from the fibrous inner bark. The slender branches were used in houses as thatch supports; the larger branches were used as rafters. The trees harbor mistletoe and their inflorescences often are

attacked by mites, which results in a red witches' broom. The genus **Elaocarpus** is derived from Greek for its olive-like fruit.

52. Wikstroemia oahuensis (A. Gray) Rock — **'Ākia; kauhi**
Thymelaeaceae

The genus **Wikstroemia** or **'ākia** has 5 of 12 Hawaiian species native to Kauai. These variable shrubs or small trees have small, sweet night-scented, yellow flowers which produce orange to red berries. In this area two varieties of this species occur--a small bog variety palustris under three feet in size and a larger mesic forest variety oahuensis to 15 feet in height. The Hawaiians used the bark with strong fibers for rope and the wood for **'auamo** or bearing sticks. The bark and leaves of some species were pulverized, placed in grass or coconut leaves in salt-water pools to narcotize fish for harvest. Criminals are reported to have been fed a deadly drink prepared from the roots and bark of **'ākia** together with other plants. Some species containing alkaloids were used medicinally by the Hawaiians, and may have antitumor properties. Another species, W. furcata, is common in Kokee. The genus is named in honor of J. E. Wikstrom (1789-1856), a Swedish botanist who studied this family of plants.

53. Hedyotis terminalis (Hook. & Arnott) W.L. Wagner & Herbst — **Manono**
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 Kauai.

54. Alyxia oliviformis Gaud. — **Maile**
Apocynaceae

Maile is a viney shrub with glossy leaves, small white flowers, and milky sap. In the same family as the oleander, plumeria and periwinkle, it contains coumarine, which imparts a pleasant fragrance when its leaves are crushed. The bark and leaves are stripped from the twigs to make a garland, or **lei**. Hawaiians used it for skin disorders, to decorate their houses, and placed the fresh leaves in calabashes where their **kapa** was kept to perfume it. It is associated with the hula goddess **Laka** and figures prominently in songs, hulas, and chants. The species is variable in leaf shape and size and grows near sea level to 6,000 feet elevation in dry, open sites to dense, wet forests on the main islands.

55. Dodonaea viscosa Jacq. **Hawaiian hopseed; 'a'ali'i; kūmakani**
Sapindaceae

Almost all **Dodonaea** species are endemic to Australia; however, this species has a widespread distribution. It is a highly variable shrub or tree to 30 feet in height, which grows from sea level to 8,000 feet elevation in dry to wet habitats on the main islands and Niihau. The male and female flowers are borne on separate plants. The conspicuous capsules, sometimes inflated, have two to four wings which are yellowish to bright red in color. These are used in leis. Hawaiians produced a red ink for dying **kapa** from the red capsules. They also used the leaves for medicinal purposes, the flowers to impart a bitter tonic flavor, and the very hard, heavy wood for house posts, spears, and other weapons. **'A'ali'i** was sacred to **Laka** and **Kapo**, the goddesses of the **hula**. The genus **Dodonaea** honors Rembert Dodoens (1517-1585), a court physician & professor of medicine at Leiden.

56. Trematolobelia kauaiensis (Rock) Skottsb. **Koli'i**
Campanulaceae

This spectacular Hawaiian genus of four species has one species which grows on Kauai. It is uncommon in mesic to wet forests from 2,000 to 5,200 feet elevation. The scarlet flowers appear on 5 to 10 horizontal branches which radiate outward like the spokes of a wheel. These flowers are visited by native honeycreeper birds which feed upon the nectar and insects.

57. Trematolobelia kauaiensis (Rock) Skottsb. **Koli'i**
Campanulaceae

The fleshy fruits of **koli'i** (#56) decompose leaving woody structures with pores as seen in this photograph. Like a salt or pepper shaker, the small, winged seeds are shaken through these pores and are wind dispersed.

58. Clermontia fauriei H. Lev. **Hāhā-'ai-a-ka-manu**
Campanulaceae

This is the only one of 22 species of the endemic genus **Clermontia** that is native to Kauai. This shrub or tree has milky juice and showy flowers which are greenish or purplish on the exterior and cream colored within. Native honeycreeper birds feed upon the flower nectar. It grows in mesic to wet forests from 1,200 to 4,400 feet elevation on Kauai and Oahu. The milky sap of some clermontias was used as bird lime. The genus commemorates M. le Marquis de Clermont-Tonnerre, who was Minister of the French Navy at the time of the Freycinet Expedition (1817-1820) to Hawaii.

59. Scaevola glabra Hook. & Arnott — **'Ohe naupaka**
Goodeniaceae

Seven of the nine Hawaiian species of **Scaevola** are native to Kauai. These species occur fron arid sand dunes near the ocean to wet rain forests. This **'ohe naupaka** with distinctive large yellow, waxy flowers grows only in wet forests on Oahu and Kauai. Chemical and genetic evidence suggest this species is derived from a different island introduction than other naupaka species.

60. 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 small to medium sized tree is widespread through the major 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. M. wawraea, a second large-leaved **kōlea**, may be seen along this trail.

61. Myrsine punctata (H. Lev.) Wilbur — **Kōlea**
Myrsinaceae

This much branched shrub has slightly fleshy leaves with purplish-black berries. It is one of several small-leaved koleas along this trail, and grows in mesic to wet forests and bog margins on Kauai and Oahu. Kauai has 12 of the 20 endemic Hawaiian species of **Myrsine** or **kōlea**.

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

'Ōhi'a hā occurs in mesic to wet forests and bogs to 4,000 feet elevation on Kauai, Oahu, Molokai, Lanai, and Maui. In the dense rainforest, it may become a tree 60 feet or more in height with a 3-foot trunk diameter while on open, exposed ridges, it tends to be stunted and shrubby. Insipid pink to red berry-like fruits are produced from small white flowers. An insect causes deformed inflorescences, similar to the **kalia** (#51). 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 3,000 species.

63. Coprosma elliptica W. Oliver — Pilo; hupilo
Rubiaceae

This shrub grows only in the upper plateau of Kauai in bogs and the surrounding forest from 3,700 to 5,000 feet in elevation. A member of the coffee family (Rubiaceae), it has small white flowers, which are either male or female, and yellowish-orange fruits. The genus **Coprosma** has nearly 90 species which occur throughout the Pacific, but grow chiefly in New Zealand, New Guinea, Australia, and Hawaii. Kauai has four of the 13 Hawaiian **Coprosma** species.

64. Coprosma kauensis (A. Gray) A. Heller — Kōī
Rubiaceae

This shrub or tree to 20 feet in height has male and female flowers on separate plants. The berries are bright reddish-orange. This **kōī** grows only on Kauai in mesic to wet forests between 2,000 and 4,200 feet elevation. The name **Coprosma** refers to the foetid odor emitted when some species are bruised.

65. Cheirodendron platyphyllum (Hook. & Arnott) Seem. subsp. kauaiense (Kraj.) Lowry — 'Ōlapa; lapalapa
Araliaceae

'Ōlapa, a tree 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 Kauai in the wet forests from 2,200 to 5,000 feet elevation. The leaves and bark when injured give off a carrot-like or turpentine odor. The soft wood burns when freshly cut. Hawaiians made a distinctive **lei** from the leaves. Some hula dancers, known as **'ōlapa**, have agile, graceful bodies which bend similar to the **'ōlapa** leaves and stems waving in the breeze. **Cheirodendron** is a host plant for native **Drosophila** flies and a food plant for an endemic insect genus, **Nesiomeris**.

66. Cheirodendron trigynum (Gaud.) A. Heller subsp. trigynum — 'Ōlapa; lapalapa
Araliaceae

This **'ōlapa** may grow 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. The Hawaiians made a bluish dye for staining **kapa** from its fruit, 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.

67. Ilex anomala Hook. & Arnott — **Kāwa'u; 'aiea**
Aquifoliaceae

Kāwa'u, also known as **'aiea** on Kauai, is a variable tree or shrub in the holly family (Aquifoliaceae). It has shiny, net-veined leaves, small white flowers, and purplish-black, berry-like fruits. Male and female flowers are on separate plants. It occurs in Tahiti, Marquesas, and the main Hawaiian Islands in mesic to wet forests and sometimes in open bogs up to 6,000 feet elevation. Hawaiians used the whitish wood for **kapa** anvils, canoe trim and rigging, saddletrees, and **auamo** or carrying sticks.

68. Dubautia knudsenii Hillebr. — **Na'ena'e; kūpaoa**
Asteraceae

Small tarweeds along the west coast of North America are the probable ancestors of Hawaii's endemic genera of **Dubautia**, **Argyroxiphium** (silversword) and **Wilkesia** (greensword). This species with yellow flowers grows in the Kokee area of Kauai. It is named after Valdemar Knudsen, a well-known Kauai naturalist.

69. Dubautia paleata A. Gray — **Na'ena'e pua kea**
Asteraceae

Eleven of the 21 species of **Dubautia** grow on Kauai as trees, shrubs, and vines. This shrubby species found only on Kauai has white flowers that bloom usually from July to December. **Na'ena'e pua kea** grows to 11 feet in height and occurs around the perimeters of bogs from about 3,500 to 4,800 feet elevation.

70. Dubautia raillardioides Hillebr. — **Na'ena'e 'ula**
Asteraceae

This somewhat lax shrub with white flowers grows only on Kauai in open, wet forest usually at the margins of bogs from 1,900 to 4,100 feet elevation. This endemic genus of the sunflower family (Asteraceae) is named in honor of J.E. Dubaut, an officer of the French Royal Marines. **Dubautia** is closely related to the silversword (**Argyroxiphium**) and greensword (**Wilkesia**).

71. 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 ripen usually between late December to August.

Hawaiians used the leaves to make a beverage. The erect shrubs to 16 feet tall tend to lose their leaves for one to three weeks from October through February.

72. Vaccinium dentatum Sm. — 'Ōhelo
Ericaceae

These sprawling, low shrubs in the heath family have edible red berries. Hawaiians made a beverage from the leaves. They occur in open areas of wet forest, bogs, and along windy, exposed ridges from 2,200 to 4,000 feet elevation on the main islands. The three native **'ohelo** species which grow on Kauai are related to the huckleberry, blueberry, cranberry, rhododendron, heather, and wintergreen.

73. 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.

74. Psychotria greenwelliae Fosb. — Kōpiko
Rubiaceae

Seven of 11 native species of **Psychotria** grow on Kauai. This slender tree species to 16 feet in height has white flowers with four to five petals. It grows only on Kauai in mesic to wet forests from 2,000 to 4,000 feet elevation. Other members of the family are **pilo**, **alahe'e**, gardenia, **'ahakea**, **noni**, and coffee.

75. Psychotria hexandra H. Mann — Kōpiko
Rubiaceae

This shrub or tree to 18 feet in height has white flowers with six petals. It is native to Kauai and Oahu growing in mesic to wet forests from 1,200 to 4,000 feet in elevation. Hawaiians used the wood for **kapa** anvils and fuel. The species belongs to a widespread tropical genus of over 1,500 species.

76. Peperomia hesperomannii Wawra — **Ala'ala wai nui**
Piperaceae

Kauai has 10 of 25 native species of **Peperomia** called **ala 'ala wai nui** or **kupali'i**. In Hawaii, the fleshly herbs occur on the ground or sometimes as epiphytes, varying in height from a few inches to four feet. The minute flowers sunk into the stalks give rise to a sticky fruit dispersed by animals. The plants were occasionally used by the Hawaiians as a medicine and to produce a gray dye for staining **kapa**. These plants are related to the peperomia house plants, **'awa**, and Piper nigrum, from which the black pepper of commerce is produced.

77. Pittosporum gayanum Rock — **Hō'awa; hā'awa**
Pittosporaceae

Hō'awa is the common name for 10 native **Pittosporum** species. This largely southern hemisphere genus has four species which occur on Kauai. This species has unisexual flowers which are dependent upon insects for pollination. The warty-looking capsules open at maturity to reveal black seeds conspicuous against the orange-red inner surfaces that are attractive to birds. It occurs only on Kauai from 2,000 to 4,800 feet elevation in mesic to wet forests and bogs. This species, named for Francis Gay of Kauai, has numerous reddish-brown hairs present on the lower sides of its leaves.

78. Cyrtandra longifolia (Wawra) Hillebr. ex C. B. Clarke — **Ha'iwale; cyrtandra; kanawao ke'oke'o**
Gesneriaceae

The African violet family (Gesneriaceae) is represented in Hawaii by a single polymorphic genus, **Cyrtandra**, of 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 successful species than any other plant group in the state. This species with white flowers produces elliptic, white berries. It occurs only on Kauai from 2,000 to 4,500 feet elevation. Other **ha'iwale** or **Cyrtandra** species may be seen along this trail.

79. Nertera granadensis (L. fil.) Druce — **Mākole**
Rubiaceae

This native species is widely scattered across the tropics from Indonesia to Colombia. The orange-red berries are produced on creeping stems, which may root at the nodes. It forms mats in

wet soil, moss, & on logs in wet forest & bogs from 1,500 to 6,200 feet elevation on Kauai, Oahu, Molokai, Maui, and Hawaii. The genus of at least 15 species has its name derived from Greek **nerteros** meaning lowly, in reference to its habit of growth. Quinine, coffee, gardenia and ixora are other members of this large family (Rubiaceae).

80. Stenogyne purpurea H. Mann -- **Lamiaceae**

This vine has weakly four-angled stems, pink-purple flowers, and dark purple fleshy fruits. It occurs only on Kauai in mesic to wet forests from 2,000 to 4,300 feet elevation. Two of the 20 species of this endemic genus occur on Kauai. Some other plants in the mint family include: thyme, basil, oregano, mint, rosemary, horehound, lavender, and catnip. Whereas most members of this family have dry fruits and scented flowers, the Hawaiian members have odorless flowers and fleshy fruits.

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FORESTRY AND WILDLIFE

HAWAII

Thanks,
Smokey