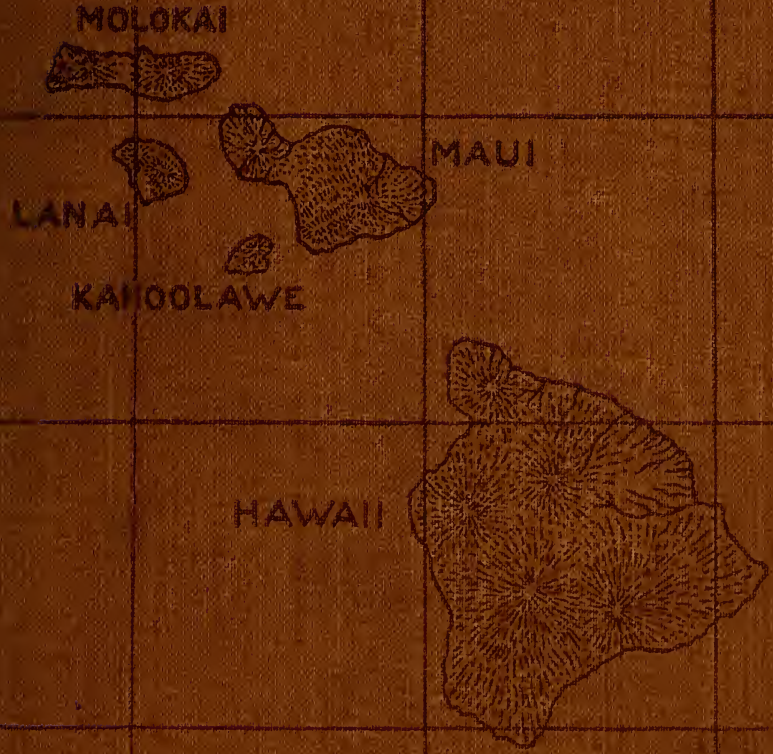
GEOGRAPHY OF THE HAWAIIAN ISLANDS

CHARLES W. BALDWIN

REVISED



OLOKELE CANYON, ISLAND OF KAUAI.

GEOGRAPHY

OF THE

HAWAIIAN ISLANDS

BY

CHARLES W. BALDWIN

REVISED

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W. P. 1

PREFACE

THE first edition of the Geography of the Hawaiian Islands, while truly a home geography, has been revised and amplified in this new edition more fully to meet the requirements of this phase of geographical instruction.

The course of study for the schools of the territory includes an outline in home geography, which all teachers are being especially trained to carry out. There are a number of excellent geographical texts that require but few changes to meet our island conditions. The geographies now in use in our schools devote considerable space to home geography.

This text is designed to be used with grades below the fifth as a teacher's desk book, the subject matter being presented *topically*. In grades beginning with the fifth upward it is to be in the hands of the pupil, and is to be correlated with all the work in geography.

The author wishes to call particular attention to the *index* to the revised edition. It should add materially to the usefulness of the book.

Like other texts in geography, this book is brief. Teachers should make liberal use of the references suggested on pages 125 and 126 of the appendix. Many of these references are from "Hawaii's Young People," of which copies are to be found in all the schools. The bound volumes of the "Hawaiian Annual" (Thrum's Almanac) are valuable, as is also the "Natural History of Hawaii," by Professor W. A. Bryan of the College of Hawaii.

CHARLES W. BALDWIN.

HONOLULU.

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GEOGRAPHY OF THE HAWAIIAN ISLANDS

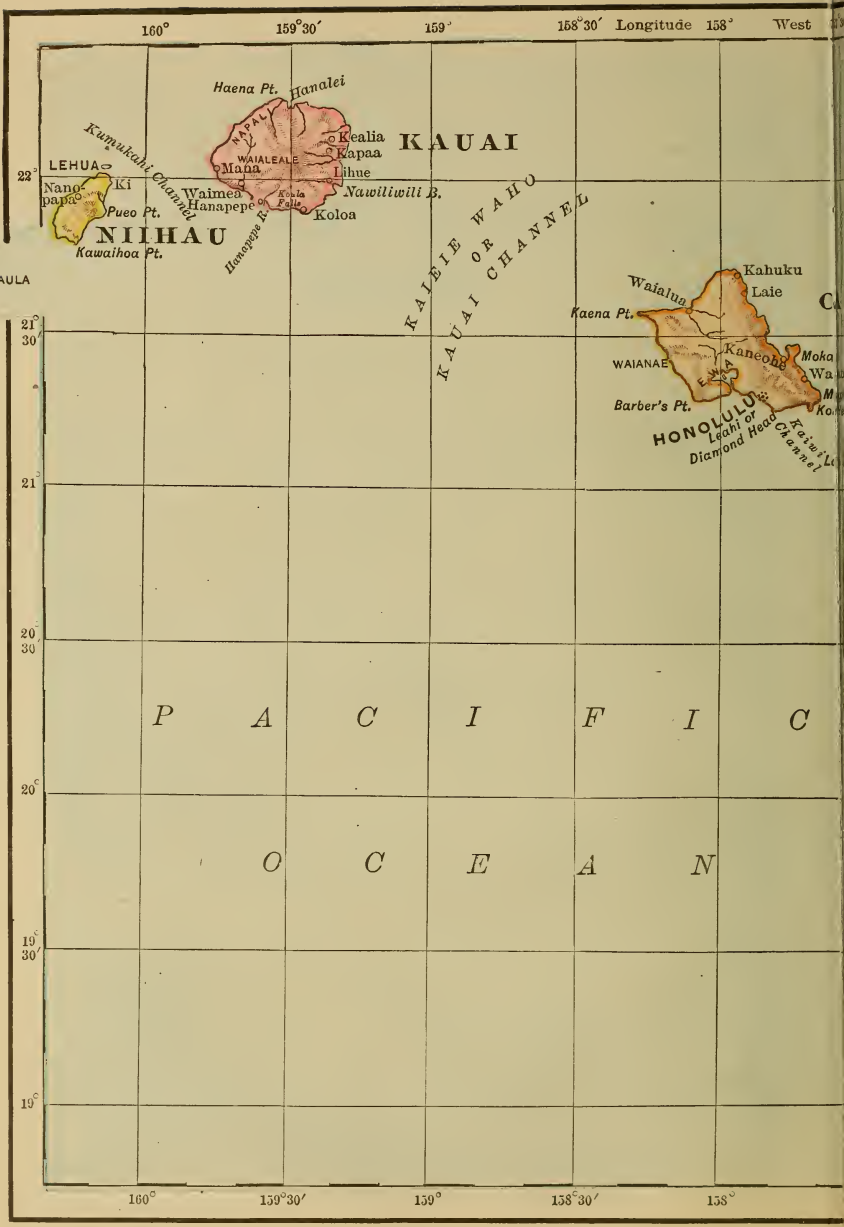
INTRODUCTION

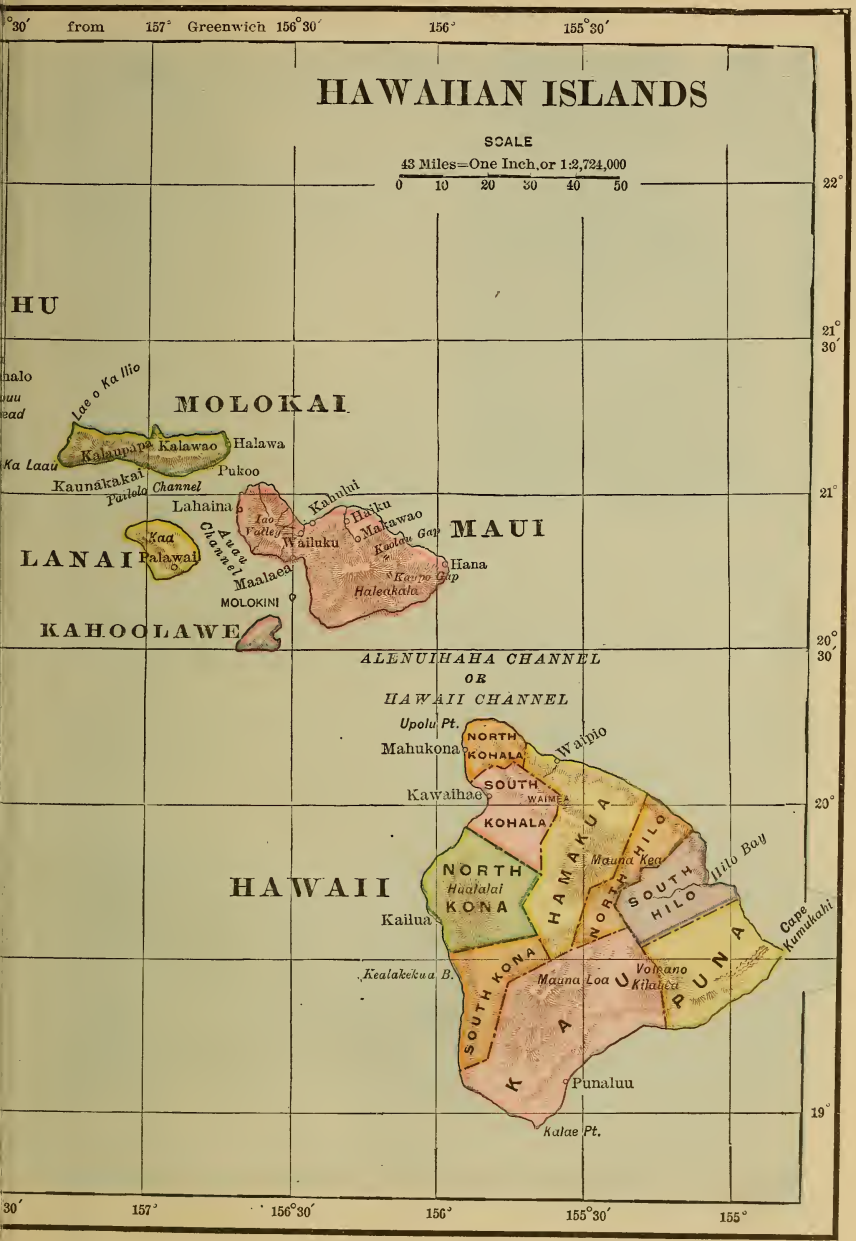
The Hawaiian Islands are a part of an archipelago in the North Pacific, extending from the island of Hawaii on the extreme southeast to Ocean Island on the northwest — a distance of about 2000 miles. With the exception of Necker Island, the islands northwest of the main group are coral atolls, many of them barely rising above the surface of the sea, being hardly more than reefs or sand banks. The largest of these islands is Midway Island, which is a low coral atoll nearly 18 miles in circumference, inclosing several small islands. It is prominent as a cable station. These islands are probably the topmost peaks of a range of mountains extending northwest and southeast; they have been named as follows: Necker Island, French Frigates Shoal, Gardner Island, Dowsett Reef, Maro Reef, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Island, and Ocean Island.[1]

The Hawaiian Islands proper consist of a group of twelve islands lying between latitude 18° 55′ and 23° north, and longitude 154° 40′ and 162° west. They are about 2100 miles from San Francisco, and 4700 miles from Manila. Eight of these islands—Hawaii,[2] Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahoolawe — are inhabited, and are named in the order of their size. The remainder — Molokini, Lehua, Kaula, and Nihoa (Bird Island) — are but barren rocks.

[1] "The Geographic Position of the Islands," W. A. Bryan, *Natural History of Hawaii*, pages 94–98.

[2] For pronunciation of Hawaiian names, see Appendix F


160°
159°30′
159°
158°30′
Longitude
158°
West
Haena Pt.
Hanalei
KAUAI
Kealia
Kapaa
Lihue
Nawiliwili B.
Koloa
WAIALEALE
Mana
Waimea
Hanapepe
Kumukahi Channel
LEHUA
Nanopapa
Ki
Pueo Pt.
NIIHAU
Kawaihoa Pt.
KAULA
KAIEIE WAHO OR KAUAI CHANNEL
Waialua
Kahuku
Laie
Kaena Pt.
WAIANAE
Kaneohe
Barber's Pt.
HONOLULU
Leahi or Diamond Head
Kaiwi Channel
PACIFIC OCEAN
22°
21°30′
21°
20°30′
20°
19°30′
19°


HAWAIIAN ISLANDS
SCALE
43 Miles=One Inch, or 1:2,724,000
0 10 20 30 40 50
from Greenwich
157°
156°30′
156°
155°30′
22°
21°30′
21°
20°30′
20°
19°
155°
HU
MOLOKAI
Lae o Kalilio
Kalaupapa
Kalawao
Halawa
Pukoo
Kaunakakai
Pailolo Channel
Lahaina
Kahului
Iao Valley
Wailuku
Haiku
Makawao
Kaulou Gap
MAUI
Hana
Kaupo Gap
Haleakala
LANAI
Kaa
Palawai
Auau Channel
Maalaea
MOLOKINI
KAHOOLAWE
ALENUIHAHA CHANNEL
OR
HAWAII CHANNEL
Upolu Pt.
Mahukona
NORTH KOHALA
Waipio
SOUTH KOHALA
WAIMEA
Kawaihae
HAWAII
NORTH KONA
Hualalai
Kailua
HAMAKUA
NORTH HILO
SOUTH HILO
Mauna Kea
Hilo Bay
Cape Kumukahi
PUNA
SOUTH KONA
KAU
Kealakekua B.
Mauna Loa
Volcano Kilauea
Punaluu
Kalae Pt.

The Hawaiian group, which formed along a fissure in the earth's crust extending northwest and southeast, consists of craters built up from the bottom of the ocean by outpoured lava.[1]

Undoubtedly the volcanic fires first ceased on Kauai. As this island is greatly eroded and has more forms of plant life, it is called the oldest island of the group; but some one of the other islands, even Hawaii which is still in the process of making, may have been the first to actually appear above the surface of the ocean.

The surface features of the group are characterized by lofty mountains with gentle slopes, which are cut up by many gorges of great depth. The valleys of West Maui and Kauai are among the grandest in the world. The windward or northeast sides terminate in cliffs, which on Hawaii and Molokai are several thousand feet high in places. The upper slopes of the mountains are covered with a dense tropical growth of great beauty, which extends nearly to the sea on the windward side.

Situated at the crossroads of the steamer routes across the Pacific, the Hawaiian Islands occupy a position of great commercial and strategic importance, and thus well merit the appellation "The Key of the Pacific."

Rock. — With the exception of some uplifted coral reefs, and a little sandstone and sedimentary rock, all the rock of the group is volcanic, consisting of basaltic lavas.

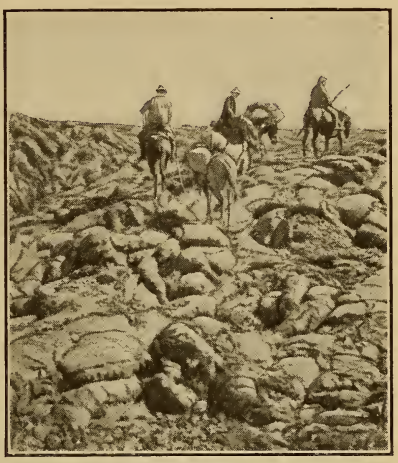
This volcanic rock may be divided into two general classes: (1) completely fused lava (pahoehoe and aa), and (2) that which has been ejected in particles of various sizes and shapes (tufa). In many cases the tufa was in a partly fused mass, or contained cementing material which bound it into loose, friable rock.

Pahoehoe and aa are similar in composition and may be parts of the same flow. Aa presents a rough, jagged appearance, while pahoehoe is smooth lava. Pahoehoe is the natural form for lava to take in cooling, and just why lava should take the aa shape it is difficult to state.[2] The first part of a

[1] "Hawaiian Islands, How Formed," C. W. Baldwin, *Hawaii's Young People*, February, 1898 (1899 on outside cover).

[2] "Lava Flows of Hawaii" (pahoehoe and aa), C. W. Baldwin, *Hawaii's Young People*, January, 1902.

lava flow is usually aa, the latter flow being pahoehoe. As pahoehoe presents a smooth, rolling surface, animals can find a path upon it without difficulty, but not so with aa, which presents an impassable barrier.



Pahoehoe.

The sandstone, which is sea sand cemented by the lime of which it is partly composed, makes in some cases a very durable stone equal to that found anywhere. Some of the Anglican church buildings are made of this stone, which was quarried on the island of Oahu.

The blue lava rock, of which some of the finest buildings in Honolulu are constructed, is a solid, compact pahoehoe.

Aa.

Soil. — With the exception of a small percentage of vegetable mold, all the soil of the group is formed by the disintegration or weathering of lava rock. This soil may be divided into

three classes: (1) lava soil; (2) tufa soil; and (3) sedimentary soil.

Dark red soils are formed by the weathering of normal lavas (aa and pahoehoe) in a warm atmosphere with a small amount of rainfall; as in the regions about Makaweli on Kauai and Paia on Maui, and the uplands of Waialua on Oahu. These dark red soils are always good soils.

We should naturally expect to find nearly all the soil of the group dark red, and this would undoubtedly be true, were it not for the fact that (1) a great deal of the original material has been covered up under the débris of the tufa cones which are so numerous in some localities, and that (2) normal lavas form yellow or grayish yellow soils when the weathering takes place where there is a heavy rainfall.

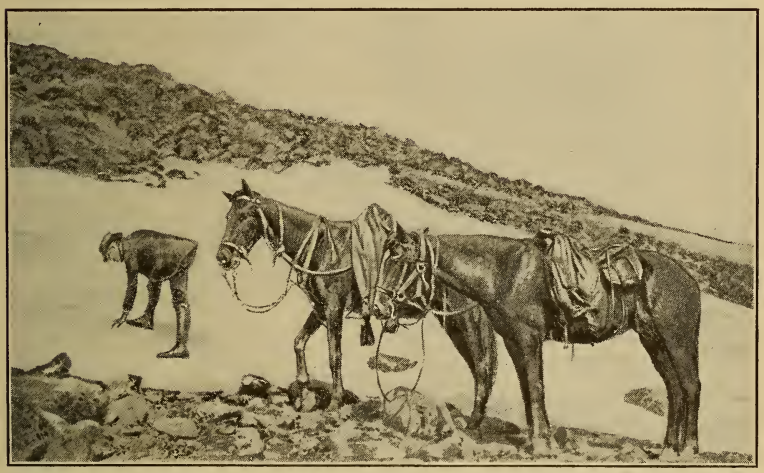
While tufa has a common source with the other lava rock, it differs radically from it, due to changes caused by the action of steam and gases at the time it was ejected. Tufa weathers as light red and yellow soil. Regions covered by tufa soil are the districts of Honolulu, Lihue, and Hilo. These light red and yellow soils are not so good as the dark red soils.

In localities subject to a heavy rainfall the grayish yellow soil, formed from normal lavas, is likely to have lost some of its ingredients, which have been dissolved in water and carried away; this usually forms a subsoil covered by vegetable mold, which is sometimes several feet in thickness, as in Olaa. Where forests have been cleared away, this subsoil is often exposed by the washing away of the surface layer, which accounts for the poor soil in some places on the windward side of the group, as Hanalei on Kauai, Huelo on Maui, and Kaneohe on Oahu.

Sedimentary soils are found in the valley bottoms and along the lowlands of the coastal plain. As the sedimentary soils generally contain vegetable mold, they are usually of a brown color. They form the best soils of the group. Lahaina on Maui, the Ewa Plantation on Oahu, and Kekaha on Kauai are typical sedimentary soil regions.

The action of heat on our soil is to turn it red; hence much of the soil of the group has been burned red by overflows of lava.[1]

Climate. — Owing to the trade winds which blow continuously for nine months in the year, and the currents which cool the ocean about the islands, the temperature of the group is 10° lower than that of any other part of the world in the same latitude.[2] At sea level the temperature ranges from 60° to 85°, with an average of about 75°. At an elevation of 1200 feet the temperature is 70°.



Summit of Mauna Kea in Midsummer.

The islands are exempt from cyclones or hurricanes, and thunderstorms are rare. During December, January, February, and March the southwest wind blows during the cessation of the trades. It is the storm wind known as Kona.

As a rule there is a sharp contrast between the northeast or windward side, and the lee or southwest side of the various islands; the former being excessively rainy and the latter extremely arid.

[1] "Lavas and Soils of the Hawaiian Islands," Walter Maxwell.

[2] "Cold Current System of the Pacific," Dr. Bishop, *Hawaiian Annual*, 1905, page 74.

Owing to the height of the islands above sea level a great variety of climate may be found, ranging from torrid heat at sea level on the lee side of the group to a freezing temperature on the snow-capped summits of the highest mountains.

On the whole, the climate, which is a remarkably equable one, is as nearly perfect as can be found anywhere in the world. An ideal climate, coupled with its tropical growth, has given the group the sobriquet, " Paradise of the Pacific."

Vegetation.[1] — The upper mountain slopes are covered with a heavy forest growth, which reaches nearly to the seashore on

At the Sea Beach in Kona.

the windward side. At one time these forests extended much lower than at present, but they have been destroyed to a great extent by cattle and fires, or have given way to cane fields.

The flora of the Hawaiian Islands may be divided into three groups: (1) indigenous plants, which mainly comprise the upper forest growth; (2) plants that were brought from islands farther south by early inhabitants; and (3) plants that were introduced after the islands were visited by Captain Cook in 1779.

[1] "Flora of the Group," W. A. Bryan, *Natural History of Hawaii*, page 189.

Among the trees of the ancient forest there are a number of ornamental and timber woods, as koa, kauila, mamane, and ohia. From the koa, with infinite toil, the Hawaiians hollowed out their canoes, using the light wiliwili and hau wood, for the outrigger. The heavy, hard wood of the kauila furnished spear and oo handles and kapa beaters. From the fiber of the olona shrub, cord was made for fish lines and nets.

Forest in Hawaii.

The only woods from the original forest trees that are of any commercial value now are the koa (Hawaiian mahogany), which is used in the finest cabinet work, and ohia, which makes excellent lumber for all hard wood purposes. A great many young sandalwood trees have sprung up in the forests, but not in sufficient quantities to warrant a revival of the trade which nearly resulted in their extermination.

The plants introduced by the ancient Hawaiians form a very interesting group, as they not only determined the future agricultural pursuits of the group, but indicate the purpose and direction of the early voyages. Among these plants are the

breadfruit, coconut, banana, taro, sugar cane, ohia (so-called mountain apple), mulberry, hala, hau, kukui, milo, and kamani, which yielded food and material for cloth, rope, mats, and other domestic articles.[1]

The lower forests are composed of kukui (candle-nut tree), hau, and hala; the leaves of this last-named tree furnish the material from which are woven the mats and hats that are so

Kukui and Hala on Waipio Cliff.

common about the islands. On the lowlands near the beach or in the sand of the beach itself, groves of coconut grow.

When the islands were discovered there were but few fruits and vegetables to be found. Of the fruits introduced many are now to be found growing wild, as the guava, orange, lime, mango, Cape gooseberry (poha), and others.

Animals.[2]—At the time of Captain Cook's visit, in 1779, hogs, dogs, mice, domestic fowls, lizards, and a few harmless insects

[1] "Introduced Plants," W. A. Bryan, *Natural History of Hawaii*, page 231.

[2] "The Animal Life of the Group," W. A. Bryan, *Natural History of Hawaii*, page 291.

HOOKENA BEACH, HAWAII.

were found, but by far the greater proportion of animals were birds, of which there were about seventy varieties — comprising a number of small forest birds, waterfowl, beach and sea birds.

In 1793 Vancouver landed cattle, sheep, and goats; and horses were brought later. Some of these animals are now found in a half-wild state on parts of the group.

During the months from November to March flocks of ducks, plover, and curlew migrate to these shores from the northwest coast of America. Owing to the recession of the forests to the higher mountain slopes, the forest birds are fast disappearing. The mamo, from which the finest feathers were procured for the famous feather cloaks of the chiefs, has long been extinct. To replace the disappearing, insect-eating forest birds, a number of birds have been introduced, such as the mynahs, turtledoves, larks, rice birds, sparrows, and quail.

On the leaves of forest trees and shrubs or in the shrubbery on the ground are found 341 species of land shells (achatinella). These achatinella are peculiar to the Hawaiian group, and excel in beauty of form and color the land shells of any other part of the world. The largest number are found on the island of Oahu.[1]

[1] "Land Shells of the Hawaiian Islands," D. D. Baldwin, *Hawaii's Young People*, May, 1900.

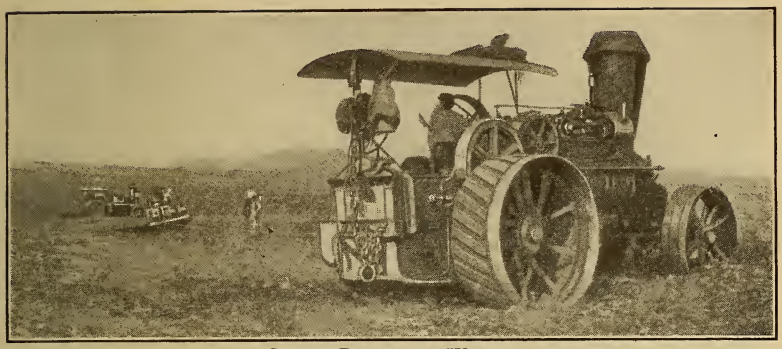
Experiment Stations. — Territorial and Federal experiment stations have been established in Honolulu with branch stations on the other islands. Through the territorial Bureau of Agriculture and Forestry denuded tracts have been reforested and insect pests curbed, while the chief work of the Federal Government, through the United States Experiment Station, has been the introduction and development of new plants of economic value. The sugar planters also have an experiment station, which makes a special study of the sugar cane and all that pertains to it.

Through the indiscriminate introduction of plants, fruit, and seeds from other parts of the world, many injurious blights and insects have been brought into the territory. Owing to the mild nature of the climate, these have multiplied very rapidly, threatening to destroy many forms of plant life, including some of great economic value. However by a world-wide search the natural insect enemies of these pests have been found, and so they have been kept in check. The most noted case of the introduction of beneficial insects was that of the egg-parasite for the leaf hopper, when this pest menaced the sugar industry. The most destructive of these injurious insects are the cottony cushion scale, cane leaf hopper, Mediterranean fruit fly, melon fly, Japanese beetle, army worm, cane borer, and corn leaf hopper.[1] [2]

Industries. — The sugar output includes 82 per cent of the value of the industries of the group, which are almost entirely agricultural. There are now about fifty plantations on the islands, which in 1918 had an output of 576,852 tons of sugar. All of this sugar, with the exception of that from one plantation, is sent as raw sugar to San Francisco, Philadelphia, or New York to be refined, and thus, undoubtedly, some of it returns to Hawaii. One mill refines its entire output, but this is exported. Some of the mills make a washed sugar for home consumption, which is known as brown sugar.

[1] "Important Economic Insects," W. A. Bryan, *Natural History of Hawaii*, pages 379 and 390.

[2] "Introduction of Beneficial Insects in Hawaii," *Hawaiian Annual*, 1915, page 128.

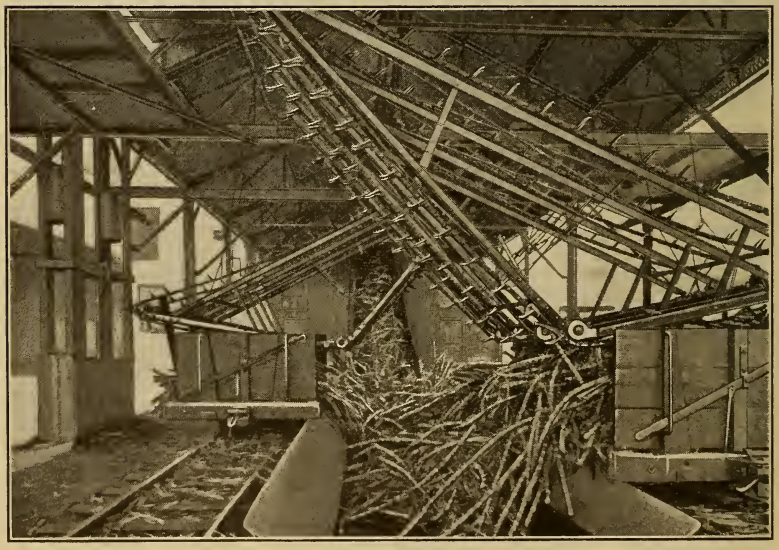


Steam Plows at Work.

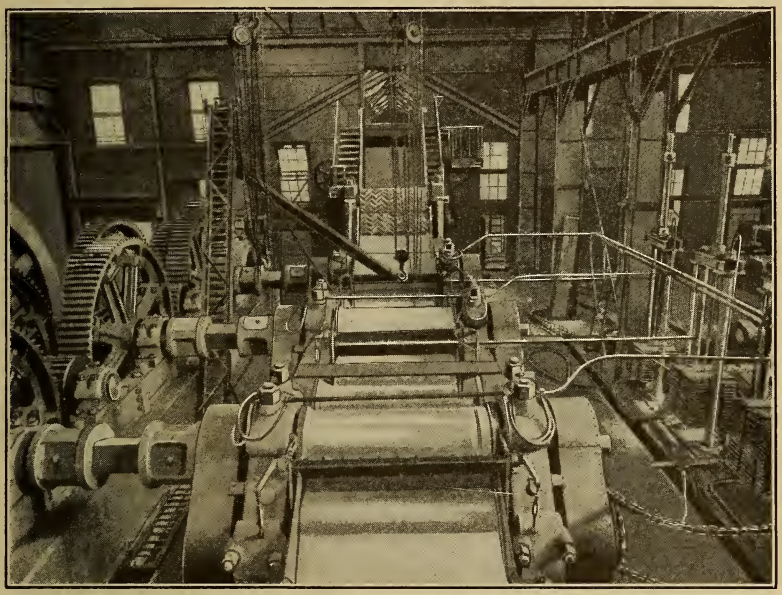
Planting Cane Field.

Cutting Cane.

Loading Cane Cars.



Unloading Cane on Carrier.



CANE-CRUSHING MACHINERY.

MILL INTERIOR — BAGGING SUGAR.

Hawaii is, no doubt, the most advanced sugar-producing country of the world. While this is due in part to the introduction of improved methods of harvesting and milling, the result has been chiefly brought about by the efforts of the Hawaiian Sugar Planters' Association Experiment Station in developing better varieties, and even originating new canes, besides devising the best methods for the propagation and cultivation of the sugar cane.

This experiment station, which is located in Honolulu, is one of the most efficiently equipped and organized experimental stations of its kind in the world.

The sugar mills are the most interesting features of the plantations: with all their wonderful processes from the human-like unloaders, and huge rollers, which press the juice from the cane stalks, to the swiftly whirling centrifugals where the sugar making process is completed.

Most of the plantations have complete systems of railway tracks which connect the mills with the fields and landings. Where water is plentiful, as on the windward side of Hawaii, the cane is flumed to the mill. When the mountain slope is abrupt, gravity roads and overhead trolley cables are used.

Water has been conveyed through miles of irrigation aqueducts to dry sections, so that nearly all of the arable land of the group is now under cultivation. These ditches, traversing as they do the most inaccessible regions of the group, represent great feats of engineering. The water is carried over the gulches through huge siphon pipes, and along inaccessible precipices in a series of tunnels within the rock face of the cliff. The big ditches have a daily capacity varying from 30,000,000 to 80,000,000 gallons of water.

In places wells have been sunk and water forced by powerful pumps through long lines of pipe to higher levels. In other sections water has been secured by tunneling the mountains.

With the exception of the cane raised on the windward side of the island of Hawaii, all of the sugar cane of the group is grown by irrigation; the northeast side of Hawaii has sufficient rainfall to raise cane without irrigation.[1]

[1] "The Sugar Industry," W. A. Bryan, *Natural History of Hawaii*, page 271.

PREPARING RICE FIELD.

COFFEE ORCHARD.

PINEAPPLE FIELD.

PINEAPPLE CANNERY.

to the world. He named them Sandwich Islands for his patron, the Earl of Sandwich. Cook first landed at Waimea on Kauai; on a later visit he was killed in a quarrel with the natives at Kaawaloa in Kealakekua Bay on Hawaii.

In 1795 Kamehameha, king of Hawaii, united the Windward Islands under one head by the conquest of Oahu; and in 1810 Kauai was formally ceded to him by Kaumualii. Thus the group, which had previously been ruled over by a number of independent petty chiefs, was finally united under one head.

The Kamehameha dynasty continued as rulers until 1874, when by popular election Kalakaua came to the throne.

In 1819 idolatry was abolished, and in 1820, American missionaries arrived. They immediately reduced the language to writing, organized the present school system, and were actively instrumental in creating a constitution and establishing laws.

In 1876 a reciprocity treaty[1] was concluded with the United States, by which, for the cession of Pearl Harbor, sugar was admitted free of duty to the United States. This immediately gave a tremendous impetus to the sugar industry, and caused the country to prosper to a greater degree than ever before; and it was the chief factor in making possible the annexation of the Hawaiian Islands later.

Upon King Kalakaua's death, Queen Liliuokalani came to the throne in 1891. About two years after her accession to the throne, she attempted to force a new constitution on the people restoring the old powers of royalty. This resulted in an uprising, when the queen was deposed and a provisional government established.

Upon the failure to secure annexation to the United States through the opposition of President Cleveland, the Republic of Hawaii was organized July 4, 1894, with Sanford B. Dole as President. On the 12th of August, 1898, annexation to the United States was finally accomplished. Two years later, on June 14, 1900, Congress passed the Organic Act which made the

[1] Reciprocity Treaty: — By the terms of the first treaty, passed by Congress in 1875 and ratified by the Hawaiian Legislature in 1876, Hawaii agreed not to cede any port or territory to any other government as long as the treaty lasted, and, further, to allow the United States to import free of duty about everything it manufactured or produced except drugs and liquor. In return Hawaii could send raw sugar, rice, and a few other things produced at that time to the United States free of duty. In 1887, a new treaty was passed with an added clause which gave the United States the exclusive use of Pearl Harbor for a naval coaling and repair station.

Hawaiian Islands a Territory of the United States. This "Act" gave Hawaii the same form of government as other territories, with the exception that, owing to its distance from the central seat of government, the legislative and executive powers are less strictly drawn.

Population. — In 1920 the total population of the group was 255,912. When the islands were discovered, the population was probably about 250,000; in 1878, it had fallen away to 57,985. The years following this show a very rapid increase in population, brought about by the importation of laborers to meet the growing needs of the planters, due to the impetus given to the sugar industry by the reciprocity treaty. These laborers were brought in under the contract system, and were chiefly Chinese, Japanese, and Portuguese.

Of the present population about three fifths are Asiatics; less than one sixth are Hawaiians and those of Hawaiian extraction; the balance, about one fourth, is made up of Americans, Porto Ricans, Portuguese and other Europeans. The greater part of this latter division consists of Portuguese and Americans, about evenly divided.

Government.[1] — The legislative department consists of a senate and a house of representatives. Senators are elected for four years and representatives for two years. The sessions of the legislature are biennial.

The executive branch of the government includes a governor, secretary, superintendent of public works, commissioner of public lands, auditor, treasurer, attorney-general, high sheriff, tax assessor, surveyor, and superintendent of public instruction. Of the foregoing the governor and secretary are appointed by the President, with the approval of the Senate of the United States. The other officials are appointed by the governor, with the approval of the Territorial senate.

The judicial department comprises a supreme court, and circuit and district courts. The judges of the supreme and circuit courts receive their appointments from the President, with the approval of the Senate of the United States, while the district justices are appointed by the chief justice.

The Federal Government maintains a district court, district attorney, marshal, collector of customs, and collector of internal revenue; also an

[1] "Synopsis of the Government of the Territory of Hawaii," *Hawaii's Young People*, October, 1907.

immigration station, a quarantine station, a weather bureau, and an experiment station.

The Territory elects a delegate to the Congress of the United States, who has a seat in the House of Representatives, but no vote.

The Territory is divided into five counties: Hawaii, Maui, City and County of Honolulu, Kauai, and Kalawao. Maui includes Lanai, Kahoolawe, and Molokai, except Kalawao County, and Honolulu includes Midway Island, while Kauai includes Niihau.

Education. — Education is compulsory, free, and universal. The Department of Public Instruction consists of a superintendent and six commissioners, who have control of all educational affairs, public and private, throughout the group. The commissioners are selected to represent the different islands as follows, two each being chosen from Oahu and Hawaii, and one each from Maui and Kauai. Supervising principals report regularly concerning the work of the schools.

There is a thoroughly equipped normal school in Honolulu, which includes a training school with a full corps of critic teachers. High schools are maintained at Honolulu and on Hawaii, Maui, and Kauai, and industrial schools for boys at Lahainaluna on Maui, and at Waialee, near Kahuku on Oahu.

A College of Agriculture and Mechanic Arts (College of Hawaii), established by the Territory at Honolulu in 1908, is maintained jointly by the Territory and the Federal Government.

Besides the public schools there are a number of excellent denominational schools; as Oahu College, the Kamehameha Schools, St. Louis College, Mid-Pacific Institute, Anglican Church Schools, Convent of Sacred Heart, and Honolulu Military Academy.

Oahu College, which is situated at Punahou in the suburbs of Honolulu in parklike grounds, is the most thoroughly equipped school in the Territory. The curriculum of this school includes elementary grades as well as a year of university studies.

The Kamehameha Schools, which were handsomely endowed by the late Bernice Pauahi Bishop, include boys' and girls' schools, which are fully equipped for manual work. The boys' department comprises a course in military training.

The Mid-Pacific Institute, which includes boys' (Mills) and girls' (Kawaiahao Seminary) departments, is well situated in Manoa Valley.

The Anglican Church Schools, consisting of St. Andrew's Priory for girls and Iolani College for boys, are located in the Cathedral grounds.


158° 10′
158° 0′
21° 40′
21° 30′
21° 20′
Waimea Bay
HALEIWA HOTEL
Kawaihapai
Waialua Bay
WAIALUA
Kaena Pt.
Mokuleia
Mill
WAIALUA
Makua
Kaala
WAIANAE
Wahiawa
Mauna Lahilahi
Makaha
Waianae
Waianae Landing
Honouliuli
PEARL HARBOR
Ewa Mill
Oahu R.R.
Sisal
Barber's Pt.


157°50′
157°40′
21°40′
21°30′
OAHU
Compiled from Gov't. Survey Maps
by
Baldwin & Alexander
Civil Engineers
MILES
0 1 2 3 4 5 6 7 8 9 10
Kahuku
Laie Bay
Hauula
Punaluu
Kahana Bay
Kualoa
Mokolii
Waikane
KANEOHE BAY
Moku Manu
Mokapu Point
Kailua Bay
Mokulua
Olomana
Waimanalo
Rabbit Island
Makapuu Pt.
Honolulu Harbor
HONOLULU
Waikiki
Hanauma Bay
Koko Head
Leahi or
Diamond Head

OAHU

Physical Features. — The island of Oahu lies midway between Kauai and Maui. It contains 598 square miles and is the third in size of the Hawaiian Islands.

In general outline this island resembles a four-sided figure, the northeast and southwest sides being parallel. The points of the figure are Kahaku on the northeast, Kaena on the northwest, Barber's Point on the southwest, and Makapuu on the southeast.

The shore line of Oahu is much more irregular than that of the other islands of the group. It is this feature which gives

HONOLULU HARBOR.

the island its prominence as the most important one in the group; for excellent harbors have been thus afforded. On the south there is the bay on which is situated Honolulu, the capital and chief commercial city of the Territory, and Pearl Harbor.

On the windward side of the island there is the deep inlet at the mouth of the Kahana Valley, and Kaneohe Bay; this latter is inclosed on one side by Mokapu Point and on the other by the Kualoa headland. The so-called Waialua Bay on the northwest is hardly more than an open roadstead.

More coral is found about Oahu than about the other islands. Along the windward and lee shores of the island there are extensive growing coral reefs, and a large portion of the narrow

coastal plain which surrounds Oahu, with the exception of the Kaena Point and Makapuu Point regions, is composed of uplifted coral reefs. Honolulu is built on one of these uplifted reefs.

At one time the island of Oahu was deeply submerged (800 or 700 feet) and then uplifted (150 or 300 feet). The coral reefs were built while the island was depressed, the subsequent elevation bringing them to the surface.

The fact that the island of Oahu has been depressed helps us to explain some of its features: thus Kaneohe Bay is a sunken region; Kahana Bay was the mouth of the valley at one time; Pearl Lochs may be submerged valleys, though undoubtedly the immense amount of fresh water which escapes beneath the surface in this region helped keep the passageways open by preventing the building of the coral, and so played an important part in the formation of the Lochs.

Honolulu Harbor was formed by the coral reef which extended across the entrance, an opening being left in the reef for the escape of the fresh water of the Nuuanu and adjoining streams. This channel has been deepened by dredging, and now forms the passageway at the entrance of the harbor. The coral has also built across the entrance to Kaneohe Bay, leaving two narrow but deep openings by which vessels can enter. The interior of the bay is filled with coral, and is navigable only for small-sized craft.

There are a number of small islands across the entrance to Kaneohe Bay, which are undoubtedly summits of sunken areas. Mokolii near Kualoa Point is the largest of these islands. The islands off Waimanalo are of a similar formation.

Pearl Harbor. — Pearl Harbor consists of a nearly land-locked body of water which is separated into two main divisions, East and West Lochs, by a long, low peninsula. The East Loch, which is the larger, is in turn divided by what is known as the "Peninsula," its western section forming the Middle Loch. Just within the passageway to the East Loch is Ford's Island, which, with a part of the eastern shore opposite, is the site for the naval station. The passageway and a portion of the eastern section of the harbor have been dredged so that the largest ships may enter.

OAHU


PACIFIC OCEAN
KOOAU
OKIO

Mountains. — The island of Oahu consists of two parallel ranges of mountains: the Koolau range extending along the eastern side, and the Waianae range along the southwestern side. At one time these two ranges constituted separate islands, the space between them having been filled by lava flows from the Koolau range, and finally by wash from both ranges.

Both of these ranges have been denuded by cattle of forest trees, except on the higher slopes. However, the upper slopes have now been made forest reserves and are being reforested.

Waianae Range. — The Waianae range is much older than the other; it is probably as old as Waialeale of Kauai. The highest point of Oahu is in this range — Kaala, 4030 feet above sea level. Originally this range was much higher than it is at present, and probably consisted of a single dome which had very much the exterior appearance of Haleakala; but it has been washed down and cut up by erosion until now only the skeleton of the former mountain remains.

The range is broken midway by the Waianae gap, through which a trail passes to the site of the Waianae Plantation.

At first sight it would appear that while the erosion on the southwest slopes of this range has been very extensive, comparatively little has taken place on the northeast; but later observation will show that there has been fully as much on this side, but that the valleys and ridges so formed have been buried out of sight beneath the lava flows from the Koolau range, and later by wash from that range.

The Koolau Range. — The Koolau Mountains of Oahu are the longest of our island ranges, extending from Makapuu Point to Kahuku, a distance of 37 miles. The southern end of the range terminates abruptly in Makapuu Point, the base of which is washed by the sea, but the northern end spreads out in several ridges that terminate in cliffs overlooking the lowlands between Kahuku and Waimea Valley. Konahuanui, 3105 feet high, and Lanihuli, 2775 feet high, are the highest peaks.

The range is broken by three gaps of erosion, at the head of the Nuuanu, Kalihi, and Kaukonahua [1] gulches. At the Nuuanu

[1] The Kaukonahua gulch is the one that leads up from Wahiawa.

gap (the Pali), a fine macadamized road has been built, connecting Honolulu with the Koolau side of the island. The trails in the Kalihi and Kaukonahua gaps are seldom used now, though in ancient times they were frequently traveled by the natives in passing from one side of the island to the other.

As the Koolau range is stretched directly across the course of the trade wind, there has been a very heavy rainfall on the windward side of the island, and consequently great erosion.

THE "PALI."

So great has the erosion been that the ridges dividing the different valleys are hardly visible in many places, leaving an unbroken stretch of pali from 1000 to 2000 feet high. Such is the case back of Kailua and Kaneohe. The formation is so unusual here that it has been often accounted for by the theory that this part of the island was once a crater, the northeast rim of which slid off into the sea.

The scenery on the windward side of this range is very grand, being somewhat similar to that on the north of Kauai.

The lee side of the Koolau range may be divided into two parts — that which is protected by the Waianae range, and that portion lying back of Honolulu which is exposed to the Kona storms; the former is not cut up by erosion to any extent, but the latter contains many deep gulches, among which are Manoa, Nuuanu, and Kalihi, which have become important suburban areas of the city of Honolulu. These gulches are all fine examples of erosion, the streams having worn their way back to the core of the mountain; at Nuuanu the back ridge has been cut through, forming the gap at the Pali.

Central Plain of Oahu. — The plain between the mountain ranges is 800 feet high at its highest point, near Wahiawa. The water north of the divide flows to Waialua and that south to Pearl Harbor. So the streams from both slopes of the mountain turn at right angles, flowing either towards Waialua or Pearl Harbor. This central plain which, not long ago, was not much more than a pasture, presents to-day, with its well-equipped military posts, waving fields of sugar cane and endless rows of growing pineapples, a sharp contrast to what it was then. This change has been brought about by water development: artesian water is pumped from wells along the sea coast; a huge dam was built across a deep gulch to store flood waters; and a mountain range was pierced to tap the streams on the other side.

Tufa Cones. — Near Honolulu there are a number of tufa cones which not only play an important part in the general topography of the country, but are of historic interest as well. The most important of these are: Koko Head, Diamond Head, Punchbowl, and the Salt Lake Crater (Aliapaakai). These cones are composed of cinders and tufa; the eruptions which formed them were probably of very short duration.

Diamond Head is a picturesque as well as a prominent feature of the landscape. This interesting crater is in a very good state of preservation, the inclosing rim being intact except in one spot on the western side, and its bowl is still unfilled. It is now a part of the system of fortifications which defend the entrance to the harbor of Honolulu, and has been named the " Gibraltar of the Pacific."

Punchbowl (just back of Honolulu) is much older than Diamond Head, its crater being almost entirely filled with débris washed from the sides. The material thrown from this cone thickly covers the surface of the coastal plain upon which the main part of the city stands. Punchbowl was the site of a battery of cannon placed there by Kamehameha I to defend the town. These guns have now been removed.

The Salt Lake Crater (east of Pearl Harbor) is a twin cone. In the bowl of the larger cone there is a salt lake which is supposed to be connected with the sea. During dry times a thick crust of salt forms on the surface of this lake. The other cone contained a fresh-water pond, but this has been drained away and the bowl planted with sugar cane.

The peculiar black sand which is so commonly found about the city came from the Tantalus series of tufa cones, upon which there are now a number of suburban residences.

Drainage and Water Development. — Owing to the nature and arrangement of its mountain ranges, Oahu is not supplied with as many or as large running streams of water as are found on the other islands. Except in times of southerly storms, the rainfall on the Waianae range is not great, as the wind is first intercepted by the Koolau range; so that there are only a few small streams on this part of the island. The trade wind carries the heavy rainfall of the Koolau range over the top to a part of the lee slope. Owing to the gradual slope and deep valley heads on this side, a large part of this rainfall is conserved, reappearing lower down as springs or underground streams.

Artesian Wells. — The fact that a great deal of fresh water was escaping at sea level along the south shore led to the discovery of the artesian storage basin of Oahu, which has played such an important part in the industrial development of the island and in the growth of the city of Honolulu. The first well was sunk in 1897 at Honouliuli, not far from the Ewa Mill. This was followed by borings in Honolulu which gave a fine flow of water. Immediately a great many wells were sunk, some of which supplied water for the city. Now there are about 500 wells at various places on the coastal plain between Diamond

Head and Kahuku. The water in these wells does not rise higher than 42 feet above sea level in Honolulu. In dry times the general level in the wells falls. Artesian water is found on the lowlands of the larger islands, but the flowing wells, or gushers, are peculiar to Oahu and to Kealia on Kauai. The plantations use powerful pumps to force this artesian water through miles of gigantic pipes to the higher fields.

The discovery of this artesian water gave an immediate stimulus to the rice industry, and led to the establishment of the extensive sugar estates on the coastal plain of Oahu.

Waiahole Tunnel. — The Waiahole tunnel, which pierces the Koolau range at a point opposite Waiahole, taps the streams on the windward side of Oahu, bringing the water on to the high lands of the central plain above Waipahu.

An immense amount of water was encountered in the mountain, which, while it added to the supply, greatly hampered the workmen and increased the difficulties of the engineer in charge. To illustrate the magnitude of the work, there are twenty-seven intake tunnels feeding into the main tunnel on the Waiahole side and extending as far as Kahana. The tunnel has a capacity of one hundred and twenty million gallons daily, but it has never carried more than half of this amount.

Wahiawa Dam. — To supply the fields on the north section of the central plain above Waialua with water, a huge dam was constructed across the junction of the north and south forks of the Kaukonahua gulch at Wahiawa. When the dam is filled the water backs up in the gulches, forming a lake which extends four miles inland.

Industries. — Four of the sugar plantations[1] of Oahu, Waipahu, Ewa, Waialua, and Aiea, are among the largest in the group. All of these are well-kept sugar estates with fine types of mills. Of those named Ewa Mill is, perhaps, the most noted as it is often visited. As the plantations of Oahu depend largely upon artesian wells for their water supply, very little of the cane is flumed, but it is carried to the mills by a system of both permanent and portable tracks.

[1] See Appendix A for list of plantations.

The Oahu Sugar Company at Waipahu is the second largest plantation in the Territory. Its cane fields extend from the sea coast well up on the southern section of the central plain. The Waiahole tunnel supplies the higher fields with water.

The Ewa Plantation occupies the low, flat lands on the west side of Pearl Lochs and above Barber's Point, which is an elevated coral reef covered by wash from the highlands. The soil

Waipahu Sugar Mill.

is particularly well adapted for cane growing, the average yield per acre being greater than that of any other plantation on the islands. The entire water supply is from artesian wells.

The Waialua Agricultural Company includes all of the northern section of the central plain, its fields reaching up close to Wahiawa and on the opposite side to the United States Military Reservation at Leilehua. The cane on the uplands is irrigated from the Wahiawa Dam.

The Honolulu Plantation Company at Aiea is the only one in the group which has a refining plant, and so completes the

manufacture of sugar in its own mill. The entire crop is refined and then exported. The cane fields of this plantation reach to the suburbs of Honolulu.

The Waianae Plantation occupies two of the broad valleys on the lee side of the Waianae range.

Kahuku is on the north end of Oahu; the cane planted at the Mormon settlement at Laie is ground here.

The Waimanalo Plantation is a small one occupying a flat near the southwest end of the island.

Rice Fields at Moanalua. Koolau Range in Background.

On the lowlands about Honolulu and Pearl Harbor a great deal of rice is grown. On the windward side of the island it is the chief industry, the narrow coastal plain of Koolauloa and Koolaupoko being occupied by an almost unbroken stretch of rice fields.

The central plain of Oahu is well adapted for the growth of pineapples, which are planted extensively at Wahiawa and above Pearl City. Some of the pines are canned on the ground, but the larger part are sent to the factories in Honolulu. There are also many pineapple fields on the windward side of the island in the region about Kaneohe and at Ahuimanu. At the latter place there is a model factory near the shore which is visited as one of the points of interest on the round-the-island trip.

The pineapple canneries in Honolulu are located near the railroad depot. As the pineapple crop has a way of ripening all at once, a great many carloads of ripe fruit come from the fields to the cannery every day, which, to be of the best quality, must be put up in cans immediately. These factories are very

large establishments, and it is said that they are the largest canneries in the world.

There are fish canneries also in the city, where tuna is put up for export.

There is a lime-making plant in Honolulu which manufactures lime from coral rock. Most of the output from this factory is sent to the plantations, where it is used extensively as a fertilizer.

Sisal is grown near the Ewa Plantation and on the slopes of the Waianae range above the Ewa and Waipahu cane fields, where there are mills which prepare the fiber for market.

The lands of Oahu not utilized for agriculture are devoted to cattle raising. There are a number of small ranches on different parts of the island.

Fish Ponds. — Owing to the shallowness of the water along the shore and the number of protected bays and sheltered coves, there are a great number of fish ponds about the island of Oahu. These are most extensive along the Koolauloa, Koolaupoko, and Honolulu shores. Most of the ponds were built in ancient times; in some cases a wall was built across the entrance to a small bay, but more often semicircular walls were made inclosing a portion of sea water. The walls were loosely constructed of stones to allow free access to the sea water, and were provided with gates so that the fish could be driven into the ponds.

This industry has almost entirely passed into the hands of Chinese, who have repaired the walls of disused ponds and carry on the industry as they were taught by the Hawaiians. Mullet (ama-ama) are chiefly raised in these ponds, though awa and other small fish breed there also. When a part of the fish are large enough, they are caught in nets. The ponds are allowed to rest for a while, when the fish are again caught.

Transportation and Communication. — The Oahu Railroad follows the coastal plain from Honolulu to Kahuku, from which point the Koolau Railway makes an extension as far as Kahana. At Waipahu there is a branch road to Wahiawa and the military posts, Schofield Barracks and Camp Castner. While this road was built as a means of conveyance to and from the plantations, it has naturally fostered a number of industries in different parts

of the island by affording a ready means of transportation to a market.

The Commercial Pacific Cable Company has made Oahu a relay station for its Pacific Ocean system. The other stations are San Francisco, Midway, Guam, Manila, and Shanghai, with a branch from Guam to Yokohama. This cable lands at Waikiki where it is connected with the main office in Honolulu.

Wireless Telegraph. — Under "Commerce," on page 28, it was noted that Oahu has been made an important center for wireless telegraph plants. The most powerful radio-station in the world is at Pearl Harbor. It is one of the links in the Arlington, Darien, San Diego, Pearl Harbor, Cavite wireless telegraph system, which is used by the United States government for military purposes only.

The Koko Head and Kahuku stations, which are receiving and sending units respectively for the Marconi system between California and Japan, are the largest wireless stations in the world. Both are operated from the Koko Head station, being connected by numerous telegraph lines. These radio plants with their many towering masts, 24 at Kahuku and 12 at Koko Head, and the great buildings at Koko Head, give the impression of permanence. Both of these wireless stations are now controlled by the United States government.

The inter-island wireless station for Oahu is located at Wahiawa.

Districts. — The districts of Oahu are Honolulu, Ewa and Waianae, Waialua, Koolauloa, and Koolaupoko.

The district of Honolulu is a small one, but it contains about one third of the population of the whole group. Ewa and Waianae comprise more than a third of the island; and, with the Honolulu district, constitute the most important section of the group. Koolauloa and Koolaupoko occupy the entire windward side of the island.

Towns. — Honolulu, the capital and chief commercial city of the Territory, had a population of 83,327 in 1920.

It is well situated on a protected bay on the southeastern part of Oahu, and at the pass in the mountains to the other side of the island. Back of the coastal plain on which the city stands are a number of broad valleys that serve as catch basins for the rainfalls, insuring the city a good water supply. These valleys become the best residence sections.

The harbor has been deepened and enlarged and the port facilities increased from time to time to meet the needs of a continually growing commerce. Plans have been formulated for a "Greater Honolulu Harbor," which will not only further increase its capacity, but give it the required sea room as well.[1] [2] The naval wharves occupy the eastern side of the harbor, while the railroad slips, the main coaling pier, and floating dry dock are on the opposite side.

Aside from the fact that it is a military outpost and a scenic center for the group, Honolulu owes its importance entirely to commerce. It is the distributing point for the territory, being

City of Honolulu.

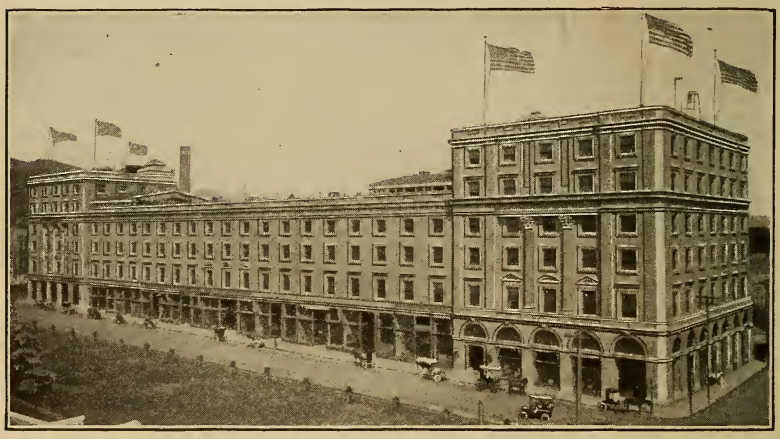
connected by railroad with all parts of Oahu, and with the other islands by frequent steamer service. Hawaii is on or near the principal trade routes across the Pacific Ocean, being the only place between America and Asia where ships may replenish their supplies of water, coal, and fuel-oil. So it has come about that nearly all the steamships plying between Pacific ports and

[1] The plan is to extend the western side of the harbor by dredging a channel towards the Kalihi basin. The southern, or Sand Island, section of this channel will be converted into wharves and slips, warehouses being erected on the site of the present quarantine station, when the whole will be connected with the town by a belt road. This area will serve as the transfer or re-assembly point in case Honolulu is declared a free port.

[2] Through the foresight of the Inter-island Steamship Company the port of Honolulu has been enabled to meet the demands made upon it for the repair and coaling of ships, brought about by the expanding trade of the Pacific Ocean due to the opening of the Panama Canal. The old marine railway has been replaced by a ten-thousand ton floating dry dock, and wharves have been built and equipped with the latest coal-loading machinery.

Asia and Australia, or those taking the Panama Canal route bound for Asia, make Honolulu a port of call or halfway station. Its unique position has given Honolulu, in common with Hawaii, the Territory, the name, " The Crossroads of the Pacific."

Honolulu is modern in its appointments, having all the conveniences of an up-to-date American city. There is a fine electric car system, an automatic telephone system, many parks, playgrounds, and places of amusement. In the main business area, near the intersection of Fort and King streets, there are some excellent mercantile buildings. Among the many churches and schools the most noteworthy are St. Andrew's Cathederal



Alexander Young Hotel, Honolulu.

and the three splendidly equipped private schools in the suburbs — Oahu College, Mid-Pacific Institute, and the Kamehameha Schools. Some of the city's edifices are prominent as foreshadowing its growth, such as the Alexander Young Hotel, the Moana on the beach at Waikiki, the Young Men's Christian Association, Mission Memorial, and Library of Hawaii. Of historic interest is the Capitol, which was formerly the royal palace.

Some features of interest about the city are Waikiki, Nuuanu Valley and the Pali, the Round-Top-Tantalus auto scenic drive, Kapiolani Park and the Aquarium of tropical fishes, the Pan-Pacific Japanese Tea Garden, Moanalua, Manoa Valley with its educational institutions, the Bishop Museum, Royal Mausoleum, and the schools.

Waikiki sea beach, noted for its surf boating and surf-board riding, is located in the suburbs on a cove in the shelter of Diamond Head. The

ARMY AND NAVY YOUNG MEN'S CHRISTIAN ASSOCIATION.

beach is protected by a barrier reef inclosing a lagoon which has neither undertow nor is it ever entered by the larger sea fishes. With the temperature of the water in this lagoon at about 78° the year round, it makes an ideal bathing spot. There are a number of bathing resorts on the beach, the chief of which is the beautiful Moana Hotel.

The Pali commands a splendid panoramic view of the opposite side of the island. It is in the Nuuanu Valley where Kamehameha by his victory over Kalanikupule finally made himself master of the group. It is said that the remnant of the defeated army were brought to bay at a point near the Pali, and that here they leaped to death rather than suffer the tortures of capture.

Moanalua is a beautiful country residence, the parklike grounds of which are open to the public.

At the Kamehameha Schools is the Bishop Museum. The chief feature of this museum is its Hawaiian collection, but it also includes the world's finest collection of Polynesian relics and antiquities. There is also a fine Hawaiian and Polynesian ethnological collection in the museum.

Other Places. — Waipahu, Ewa Mill, and Aiea are important plantation settlements located on the railroad. Waipahu, being situated at the junction of the main line with its branch to Wahiawa and the military posts, has become the second largest town on Oahu.

The public cemetery is located at Pearl City, from which a branch line of the railroad extends to the Peninsula, where there are a number of suburban residences. Otherwise this place is of little importance.

Watertown is the civilian settlement connected with Fort Kamehameha and the Marine Barracks, where it is located.

Waianae is the only place of importance on the southwest side of the island. It is chiefly a plantation community.

There is a large settlement at Waialua, which, while it is scattered over a considerable area, all goes by the general village name. The public school here, which is centrally located, is the largest of the Oahu country schools. A fine hotel is located on the beach at the old landing, which is the half-way house on the round-the-island trip.

Kahuku is at the main plantation camp where the mill is located. It is also the junction for the Oahu and Koolau railroads. A short distance northwest of Kahuku, strung along the shore in a double column, are the twenty-four poles of the great Marconi wireless station.

Laie is a thrifty Mormon village, whose chief occupation is the cultivation of sugar cane. The area cultivated extends as far as Kahana Bay, the terminus of the Koolau Railroad, which is operated by this colony. A handsome tabernacle has been erected on the hill overlooking the village.

The other places on the windward side of Oahu are small, the only one of importance being Kaneohe.

At Waialee, near Kahuku, is the Boys' Industrial School, which is a model institution of its kind.

Not far from the Ewa Mill, below Sisal, is the United States Magnetic Station.

Oahu an Outpost. — The Federal government has made of Oahu an important naval and military outpost of the Pacific, thus making this island the strategic center of the group. A chain of forts along the seashore protects the entrances to Honolulu and Pearl Harbors. Three splendidly equipped military posts have been established on the island: Fort Shafter in the suburbs of Honolulu at Moanalua, and Schofield Barracks and Camp Castner at Leilehua. Schofield Barracks is the main infantry post and Camp Castner is the cavalry camp.

Pearl Harbor, with its big dry dock, the largest in the Pacific Ocean; huge floating crane, and machine shops, which are the finest of their kind; and its up-to-date coal loading plant, has been equipped for a naval coaling and repair station. So this splendid harbor of the Pacific, which, seemingly, was made on purpose for a great naval station, is fulfilling its destiny.

Fort Kamehameha, which defends the passageway to Pearl Harbor, is the main fortress on Oahu. The principal fortifications protecting the harbor of Honolulu are Fort de Russy located at Waikiki, and Fort Huger near Diamond Head.

HAWAII

Physical Features. — Hawaii is at the extreme southeastern end of the group. This island, which is 4015 square miles in extent, includes about five eighths of the area of the whole group. It is somewhat smaller than Connecticut, and larger than Porto Rico by 580 square miles.

Northeast Coast, Hawaii.

Roughly speaking, Hawaii is a triangle, the chief capes — Upolu Point, Kumukahi Point, and South Point (Ka Lae) — being at the angles. On the windward side there are high cliffs; near the Waipio and Waimanu valleys these cliffs are several thousand feet high. Hilo, Kealakekua, Kailua, and Kawaihae are the chief bays of Hawaii. These bays were formed by lava flows which have pushed their way out into the sea on one or both sides. None of the bays have protecting coral reefs such as are found on the other islands. The reef in Hilo Bay is a submerged lava flow. Coconut Island is a portion of the same flow.

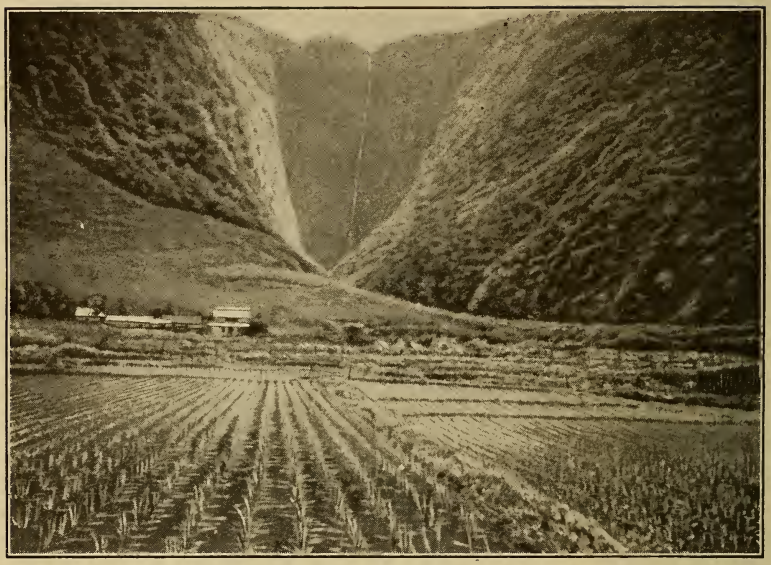

Longitude
West
156° 0'
155° 40'
155° 20'
20° 0'
19° 40'
19° 20'
19° 0'
Upolu Pt
Honoipu
Hawi
Makapala
Niulii
Pololu
Honokane
Awini
Mahukona
Puu Hue
Waimanu
Waipio
Kukuihaele
Paauhau
KOHALA Mts
5489
HONOKAA
Koholalele
Kawaihae Bay
Kawaihae
Waimea
Ookala
Puako
MAUNA KEA
13825
Kiholo
Makalawena
Keahole Pt
Huehue
HUALALAI
Puu Waawaa
Puu Oo
Kalaieha
Kaiwi Pt
Kailua
Kailua Bay
HOLUALOA
Kahaluu
Keauhou
Kainaliu
Kealakekua Bay
Napoopoo
Honaunau
MAUNA LOA
13675
MOKUAWEOWEO
Crater
Kulani
Hookena
Pahoehoe
Ainapo
Halfway House
Papa
Puu o Keokeo
Hoopuloa
Milolii
Honomalino
Okoe
Kapua
Pahala
Punaluu
Honuapo
Waiohinu
Na Puu a Pele
Puu Ki
Kaalualu
South Point
(Ka Lae)

As Hawaii is a new island, there is little coral found about it; and its beaches are mostly of black sand, or white and black sand mixed.

The island of Hawaii consists of the mountain masses of the Kohala range, Mauna Kea, Hualalai, and Mauna Loa. The sea has eaten its way deeply into the slopes of the Kohala Mountains and Mauna Kea on the windward side, forming a long line of cliffs several thousand feet high in places, but no inroads to speak of have been made on the Hualalai and Mauna Loa slopes on the opposite side. The spaces between the mountains were waterways, no doubt, at one time, but these were filled by lava flows, and are now plateaus.

Kohala Mountains. — The Kohala range is the oldest of Hawaii's mountains, being as old as West Maui and Waianae of Oahu. We judge this to be so from the amount of erosion which has taken place. The highest point of this range, which seems to consist chiefly of a collection of cinder cones, is 5489 feet above sea level.

The Waipio and Waimanu region is a part of this range. The remarkable gulches and stupendous sea cliffs which are found here may not be wholly



Waipio Valley and Hiilawe Fall.

the work of erosion, but perhaps partly the result of a great fault which caused a section of the coast here to break off into the sea.

The summit of the Kohala Mountains, which is said to consist of a peat bog, is heavily wooded, as are also the windward slopes.

The Waipio Valley is the largest of the Hawaiian gulches. It is not a pretty one, however, with the exception of the spot where the beautiful Hiilawe Fall takes its plunge of 1700 feet. But there is no Hiilawe now, except in very rainy times, for the Kukuihaele Plantation has taken the water for fluming cane. This gulch runs back for three or four miles and then turns at right angles, running past the head of the Waimanu Valley.

Waimanu is deeper than Waipio, but is not so wide. This gulch is chiefly remarkable for the amazing semicircular pali at its head, with its numerous waterfalls. The Waimanu is a short gulch, extending only four miles back to the ridge that separates it from the Waipio Valley.

There is a trail from Waipio to Waimanu which crosses twelve ravines in the distance between the two great gulches.

In rainy weather this path is not a safe one to travel on horseback. Both of these gulches contain wide flood plains, having a gentle slope inland from sea level. In their lower sections the valley bottoms are entirely planted with rice.

Mauna Kea. — Mauna Kea occupies more than half of the northern part of Hawaii, nearly the whole of the South Kohala, Hamakua, and Hilo districts being on its slopes. It is the highest island mountain of the world, being 13,825 feet high.

Summit of Mauna Kea.

Mauna Kea does not end in a peak, but has a summit platform about five miles long and two miles wide. Upon this platform there are a dozen or more huge cinder cones. A great number of these cinder cones are also found about the upper part of the mountain — they are Mauna Kea's striking feature.

The north and east sides of Mauna Kea have a heavy rainfall, the lower slopes of Hilo and Hamakua being cut up by many gulches. These gulches are of a good size, but do not compare with those of West Maui, Oahu, and Kauai, for they hardly extend to the base of the summit dome, while the great valleys on the other islands have eaten their way into the very heart


HUALALAI
MAUNA LOA
KILAUEA
KAU DESERT

of the mountain. The upper part of the windward slope has not suffered much from erosion yet, while the opposite side shows scarcely any weathering at all. The lower slopes are heavily wooded on the windward side (north and east), but on the opposite side they are quite bare.

During winter storms this mountain, as well as Mauna Loa, is heavily covered with snow, which reaches more than halfway to the forest line at times.

On the south side of Mauna Kea's platform, 12,000 feet above sea level, is the ancient quarry of Keanakakoi, where the natives made their stone adzes. Also, among the cinder cones on the summit is Lake Waiau — a small lake of a few acres in extent, and having a depth of 40 feet, which is fed from the melting snows.

Hualalai. — Hualalai is a much smaller mountain than Mauna Kea, but otherwise it is very similar. Like Mauna Kea, Hualalai has no crater on its summit. Probably the craters on both of these mountains were filled with lava and then buried out of sight beneath the sand and fragments thrown from the cones on their summits. Hualalai is 8269 feet high.

The mountain is almost entirely within the district of Kona. Near the sea the slope is gradual, but above this it is abrupt. The north side of the mountain is bare, but the other sides are wooded, though not heavily. There are no gulches whatever on the slopes of this mountain.

The last flow from Hualalai was in 1801. This flow broke out low down on the mountain not many miles north of Kailua.

Kamehameha visited it and threw a lock of his hair into the flowing lava to appease the wrath of Pele.

Mauna Loa. — Mauna Loa covers the whole southern half of Hawaii and a part of the Hamakua and Hilo districts. Here we find the forces which have made our islands still at work in the volcanoes of Kilauea and Mokuaweoweo.

Trail to Summit of Mauna Loa.

Mauna Kea can be ascended easily on any side, but not so Mauna Loa; for on every side there are wide regions of the roughest of lava flows extending from near the summit to the sea-shore. Where there is rain, these flows are covered with heavy forests, and are fast being converted into soil, but in the rainless regions they are as bare and rugged as when they first came down from the volcano.

The cones found on Mauna Loa mark the spot where outbreaks of lava occurred. The slope on the upper part of the mountain is much less abrupt than that on Mauna Kea. Like Mauna Kea, it, too, has the summit platform. Sunk in this platform is its crater, Mokuaweoweo — the second largest active volcano in the world.

Mokuaweoweo is not always active, but is so only at times. When it is active, there is a lake of lava in the lower part of the crater, with playing fountains, presenting a magnificent spectacle at night from the brink. This activity usually lasts a few days and then the lava forces its way through the side of the mountain, making a lava flow. When the lava thus finds an outlet lower down, the eruption in the crater ceases.

Eruption in Mokuaweoweo Crater, 1903.

Night View of Eruption in Crater.

Mauna Loa is 13,675 feet high, its platform being higher than that of Mauna Kea; it is the cinder cones of this latter mountain which carry it 150 feet higher than Mauna Loa. The crater of Mokuaweoweo is $3\frac{3}{4}$ miles long and $1\frac{3}{4}$ miles wide; it is inclosed by walls from 500 to 1000 feet high.

Mauna Loa, including the crater of Mokuaweoweo, is one of the areas of the Hawaii National Park.

Lava Cascade in Crater of Kilauea.

Crevice in Floor of Crater.

Kilauea. — The crater of Kilauea, with the region about it, contains many unique features of intrinsic as well as of geologic value, and is now a national park area.

Kilauea is on the northeastern slope of Mauna Loa at an elevation of 4000 feet above sea level. The crater [1] is three miles long and two miles wide. The side towards the Volcano House is 500 feet high in places, but the opposite side is very low.

The crater is a huge, lava-covered pit. This pit rises towards a spot near the south side, giving it, as seen from the Volcano

Volcano House.

House, the appearance of being nearly filled. At one time the crater was much deeper than it is now, containing a pit within a pit. But the lava has buried the lower pit out of sight and is gradually filling the other. Formerly a lake of lava was always to be found in the crater of Kilauea, but of late this lake has disappeared at times. At such times there is a huge pit (Halemaumau) where the lake was, from which a dense cloud of sulphurous smoke constantly rises, and spots about the pit are very hot. In 1918, this pit was partly filled with molten lava, which subsided after actually overflowing the brink on to the

[1] "Crater of Kilauea," Charles W. Baldwin, *Hawaii's Young People*, November, 1900.

floor of the main crater. It is hard to imagine a grander or more inspiring spectacle than that of Kilauea in action. It may be that Kilauea's fires will cease again for a time, but this great crater, with the added features of its surrounding area, will always be an object of absorbing interest.

Among the many points of interest near Kilauea are the sulphur banks, tree molds, koa and fern forests, deep pit craters of Kilauea Iki and Keanakakoi, craters on the Puna trail, and the desert region south of the crater. A seven-mile auto-driveway, terminating on the crater floor near the fire-pit, Halemaumau, presents many interesting features.

On the brink of the crater near the Volcano House is the observatory of the Hawaiian Volcano Research Society. It is equipped with all the modern instruments necessary for the study of volcanic phenomena.

Hawaii National Park. — The three areas which include the craters of Kilauea, Mauna Loa (Mokuaweoweo), and Haleakala on Maui constitute the Hawaii National Park, and as such they are listed with and are subject to the rules and regulations governing the great national playgrounds of the American people.[1]

Table-lands. — The grass-covered table-land between the Kohala Mountains and Mauna Kea is from 2500 to 3000 feet high. While this plateau is devoted almost entirely to cattle raising, it has an excellent soil and a climate well suited to the growing of many farm crops.

The plateau between Mauna Kea and Mauna Loa is from 5000 to 6000 feet high. In contrast to the other one this is but a tangled mass of lava flows of the roughest kind. A large number of the more recent flows from Mauna Loa have passed over this region, flowing to the sea between Puako and Kiholo, or towards Hilo. As the greater part of the plateau is in the rainless region between the two mountains, even the oldest of the lava flows have changed but little. The Humuula Sheep Station uses part of the region as a sheep pasture, but the larger part of the plateau must remain forever a useless lava waste.

Lava Flows. — A striking feature of Hawaii is its lava-covered regions and lava flows. In the rainless sections many of

[1] See report of Director of National Park Service for 1917 and 1918.

TRAIL OVER LAVA FIELD.

the flows look new, but no one knows when they occurred. Within the last hundred years there have been eleven great flows; nine from Mauna Loa, one from Hualalai, and one from Kilauea.[1]

Five of the flows broke from a spot on Mauna Loa's northeastern slope, 11,000 feet high. Three of the flows (1852, 1855. and 1881) which broke from this spot seriously threatened the town of Hilo; one of them, the 1881 flow, came within three quarters of a mile of Waiakea, and the 1855 flow was seven miles from the town, when, for some unknown reason, it began spreading and banking, which continued for thirteen months.

Three of the flows (1868, 1887, and 1907) broke out on the southern slope, and one (1859) on the northwestern slope of the mountain, flowing around Hualalai into the sea at Kiholo.

The flow of 1840 from Kilauea forced its way along just below the surface, finally breaking out and flowing eight miles to the sea in Puna. The flows from Kilauea have usually occurred in this manner. They have flowed chiefly over Puna.

Usually these lava flows have broken out very quietly, a bright light upon the mountain side being the only indication

[1] "Lava Flows of Hawaii," C. W. Baldwin, *Hawaii's Young People*, December, 1901; January, 1902.

that an eruption was in progress. The 1868 eruption was an exception, for a week before this outbreak occurred the Kau district was shaken by the most fearful earthquakes. The lava finally forced its way out through a long rent in the mountain side two miles above the present Kahuku Ranch houses, pouring out an overwhelming flood, which soon reached the sea.

During one of the heaviest of the 1868 earthquakes a water-soaked pali near the Kapapala Ranch in Kau was torn off and hurled down over the land a distance of three or four miles, overwhelming a native village. This is known as the "Mud Flow"; thirty lives were lost in it. (The Mud Flow is now planted with sugar cane, the best cane grown on the Pahala Plantation being on the flow.)

This same earthquake caused a disastrous tidal wave to sweep the Puna and Kau coasts, destroying the village of Honuapo and drowning a number of people. It also opened a deep fissure (1868 Crack) eighteen miles in length, through the lower end of which, at a point above the sea between Punaluu and the old Keauhou landing, the lake of lava in the crater of Kilauea emptied itself, forming a pahoehoe flow.

It is not known that any lives have been lost in the lava flows of Hawaii. These flows have passed over waste regions, with the exception of those of 1868 and 1887, which destroyed the best of the Kahuku pastures.

Mokuaweoweo was usually active a few days before one of these outbreaks, the activity in the crater ceasing when the lava forced its way out lower down. The lava pouring out in a great fountain of fire, and the fiery stream hurrying down the mountain side, presented a spectacle seldom equaled for grandeur.

Climate. — Owing to the height and position of its mountains, Hawaii has a greater variety of climate than the other islands of the group. Usually the trade wind reaches nearly all parts of our islands by blowing over and around them, but the mountains of Hawaii are too high and large, hence the whole western side of the island, which includes the larger part of South Kohala and both the Konas, is entirely free from this wind.

That portion of the island sheltered from the trade wind is

generally dry, but Kona is an exception to the rule. There is a dry belt near the sea, a mile or so wide, but above this the rainfall is abundant. The mountain slope a short distance back from the shore is abrupt, hence the sea breeze is turned upwards, meeting the colder air above before it has had a chance to lose its moisture, and rain is the result. Kona's rainy season is during the summer months, and its dry season in the winter.

The region extending from Kalapana in Puna on one side to Papaaloa in Hilo on the other is directly exposed to the trades, yet this wind is seldom felt here. This is due to the position of the mountains back of this part of the island, which check the wind, turning it upward and to one side. The moisture-laden wind thus turned upwards meets the cold air above, and causes the heavy rainfall of this region. The town of Hilo, which is near the center of this tract, has been well named the " Rainy City," having as great a rainfall as almost any place in the world. Owing to the heavy rainfall the Hilo and Puna districts are covered with dense forests.

The rainless regions of Hawaii are the plateau between Mauna Loa and Mauna Kea, a wide district from Kawaihae to Kiholo, and a belt of land near the sea extending through Kona, Kau, and into southern Puna. This dry belt is very narrow in Kona, but widens before South Point is reached in Kau.

The larger part of this rainless tract is covered with lava flows which appear quite fresh, though they may be hundreds of years old. The regions from Puako to Kiholo, Hoopuloa to South Point, and between Punaluu and Kalapana are very interesting, being covered by the newest of the flows. There is a trail over the lava from Puako to Kiholo which is often traveled, but the two latter sections are never crossed.

Vegetation. — With the exception of the section between Hualalai on the south and the Kohala Mountains on the north, Hawaii is encircled with a wide forest belt. On the windward side this forest belt formerly extended to the cliffs along the coast. The finest and most impenetrable forests of the group are those found in the Hilo and Puna districts.

These forests do not differ in make-up from those on the

other islands, except that there are groves of young sandalwood trees found in parts of Kona and Kau, and in the Olaa jungles there are a great many loulu palms. (These latter are a species of fan palm, from the undeveloped leaves of which the finest Hawaiian hats are made.)

Forest in Olaa.

The forest belt extends as high as 6000 and 7000 feet; above this there are shrubs and a species of long grass which grow up to an elevation of 11,000 feet; still higher the mountains are bare of plant life.

The North Kohala section of the island has been denuded of forest trees by fire and cattle to such a degree that the watersheds have been affected, causing springs to dry up and the rainfall to decrease.

Industries.—Hawaii has twenty-three sugar plantations,[1] and produces one third of the whole amount of sugar produced in the group. Most of the sugar comes from the windward side of the island, where cane is grown without irrigation. From Olaa to Waipio is an almost continuous belt of sugar cane, broken only by the gulches.

Nearly all of the coffee grown on the Hawaiian Islands comes from the Hamakua and Kona districts.

[1] See Appendix A for list of plantations.

HEIAU (ANCIENT TEMPLE) AT KAWAIHAE.

ENTRANCE TO HEIAU.

The Waipio, Waimanu, and Pololu valleys are the only places on Hawaii where rice is raised. This rice is packed to the landing on the backs of mules.

The areas of Hawaii above the cane fields are well adapted to the growing of fruits and vegetables, and no doubt a great many such would be raised by the homesteaders and small farmers, were it not for the difficulty and expense of getting the products to market.

Dry-land taro is chiefly raised on Hawaii. This is planted among the forest trees, requiring only to be weeded a few times to produce a good crop.

Cattle raising is an important industry on Hawaii, large tracts in various parts of the island being used for that purpose. Most of these rough, lava-covered regions would not be fit for anything else, but the finest of cattle are raised on them.

In parts of South Kona and Puna the chief industry is fishing, the fish being dried and sent to the Honolulu market.

Districts. — The districts of Hawaii are North Kohala, South Kohala, Hamakua, North Hilo, South Hilo, Puna, Kau, North Kona, and South Kona.

South Kohala. — South Kohala is almost entirely within one of the dry regions, hence is not of much importance. The chief occupation of the district is grazing, the largest and most important cattle ranch in the group, the Parker Ranch, being located here on the Waimea plateau. The extensive reaches of grass land make this plain an ideal ranching spot.

Sections of the Waimea plain afford excellent agricultural lands, but owing to the distance from a market and the lack of shipping facilities to the port of Kawaihae, it does not pay very well to farm these lands.

Waimea village, located on the plateau, is chiefly important as a center for ranching interests. It has a fine, bracing climate.

Kawaihae is the port for South Kohala, being also the mail and passenger landing for Hamakua. It is an important cattle port. The wireless station for Hawaii is located here.

On a hill overlooking the bay and village of Kawaihae is the heiau of Puukohola, built by Kamehameha in the year 1791. This was one of the largest and most recent of the heiaus built. It is very well preserved, the inclosing walls being almost perfect. The heiau was built as a favor to the gods to secure to Kamehameha the kingdom of Hawaii, and so was undoubtedly the incentive which led the impatient conqueror to the treacherous murder of the brave Keoua as he leaped ashore on the sands almost within its shadow.

Statue of Kamehameha in Kohala.

North Kohala. — For many years the growing crops in Kohala were dependent upon the rainfall for their chief water supply, but now all of the cane fields are irrigated with water supplied from the Kohala Ditch. This aqueduct extends into the Kohala Mountains to a point not far from the head of the great Waipio Valley, traversing a rugged, inaccessible region. The greater part of the ditch is tunnels. It conveys the water to the lands above Honoipu, adding materially to the cane area of the Kohala district. The water from this ditch is leased by the plantations, or is apportioned according to the share each holds in it.

The area occupied by the Kohala plantations, of which there

are six, is smaller than that of some of the larger sugar estates of Oahu. Hawi is the chief plantation, producting two fifths of the whole crop for the district.

Mahukona is the port for North Kohala. It is connected by railroad with the plantations. Sugar is shipped direct to the mainland from this port.

The term Kohala is usually applied to that part of the district occupied by the plantations. The chief place is Kapaau, which is the civic and business center.

On the grounds of the Ainakea School not far from Kapaau is the statue of Kamehameha I, of which that in Honolulu is the replica. It is said that Kamehameha was born on this spot.

Centrally located in this district is the Kohala Seminary for girls, which is the complement to the Hilo Boys' Boarding School.

Owing to the fact that the plantation settlements are not far apart, Kohala has more community life than is usually found in the outer districts.

Hamakua. — Outside of the Waipio region Hamakua has no running streams, or even springs. This is due to the abrupt slope of this part of the island, which allows the water to run off readily, and to the fact that the gulches run up towards the Waimea plateau, thus having no good watershed back of them.

While the rainfall in this district as a rule is abundant, at times there are severe droughts when water is very scarce. To overcome this difficulty two ditches were constructed which bring the Waipio water upon the Hamakua lands. The plantations nearest the gulch use this water for irrigating and fluming their cane, and a portion is used for establishing waterworks for the different villages. Unfortunately these ditches run dry at times as they tap the streams in the mountain area above Waipio Valley, which is also affected by the drought.

Owing to the abrupt slope and the lack of water for fluming purposes, the plantations of Hamakua have had great difficulty in finding means for transporting their cane to the mills. At Paauilo a permanent railroad track has been built which by

many turnings reaches the higher fields. At Kukaiau a complete system of trolley cables has been installed. The cane is tied up in bundles and sent directly to the mill, or to an assembly station on the plantation railroad. In other cases the cane is sent down on gravity roads, or in flumes to stations on tracks which extend out on each side of the mill.

The Kukaiau Plantation has merged its interests with the Hamakua Mill Company. The cane is ground by the mill of the latter at Paauilo. The cane of the Pacific Sugar Mill Company (Kukuihaele) is ground at the Honokaa Mill.

The Hamakua Mill sends its sugar by railroad to Hilo for transshipment. The other plantations maintain their own landings. The sugar is swung out to the boat or vessel by means of a derrick operated by a donkey engine. At the best these are hazardous landings, while in rough weather they cannot be used at all.

Hamakua next to Kona is the chief coffee section of the group. The finest and largest coffee estate in the islands is located in this district at Kalopa, above Paauhau — that of Louisson Brothers. Some splendid coffee fields are to be found on this estate, due to the care and cultivation the trees receive. There is a model mill here which prepares and grades the coffee beans for market.

The areas in this district above the plantation cane fields are excellent farm lands, but owing to the distance from market and the cost of transportation to the landing, only a small portion is used for general farming purposes. There are important homestead tracts in this section where the main crop is sugar cane.

The Hamakua settlements are divided between the government road, which is a mile or more from the sea, and the mills that are located near the bluffs along the shore.

Honokaa, the civic center, has long been the main settlement in this district owing to its central location.

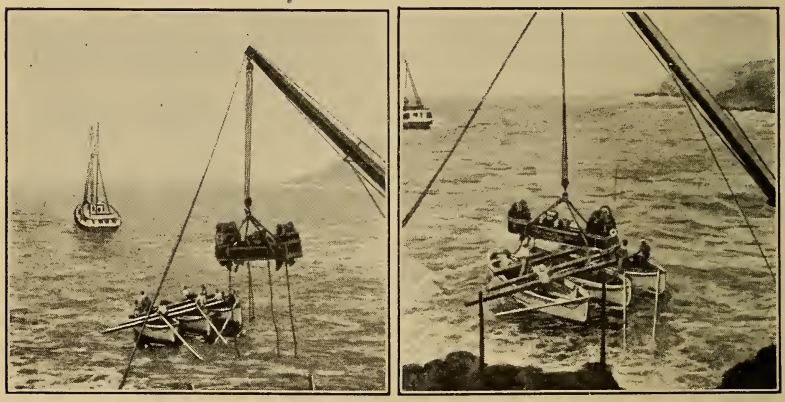
Paauilo, which is the terminus for the railroad, is gradually displacing Honokaa as the principal place in Hamakua. The railroad terminus is at the mill, a mile below the main plantation camp on the government road.

The largest place in Hamakua is Honokaa. Paauhau, Paauilo, Waipio, and Kukuihaele are important places as well.

Waipio is connected with Kukuihaele by a steep trail up the east side of the valley. A road was once built around the sea

cliffs from Kukuihaele to Waipio, but large sections of this road were destroyed by landslides, making it impassable.

In ancient times Waipio was one of the chief places of Hawaii, having a large population. It was here that Kamehameha landed after the sea fight off Waimanu to bury his dead, marching the next day to Waimea, up historic "Mud Lane."



Honokaa Landing, Hamakua.

North Hilo and South Hilo. — In contrast to Hamakua, these districts have many deep gulches, each of which has a large, ever-running stream. However, with the exception of the gorge of the Wailuku, which probably began in a lava tunnel, these gulches, though they are large near the sea, do not extend far inland.

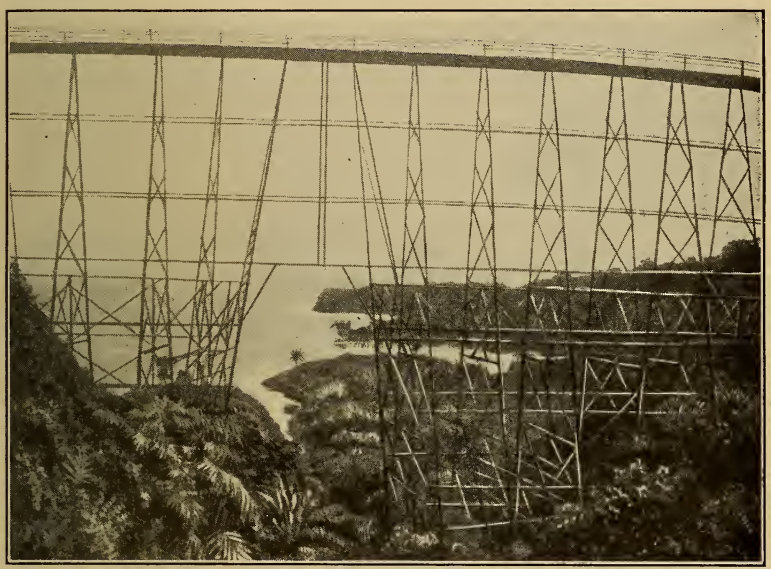
These districts are among the most pleasant places of the group, being always green and free from high winds or dust. At night there is a gentle land breeze from Mauna Kea, and during the day the air is kept cool by the sea breeze.

As water is abundant in these districts, it is used almost entirely for transporting the cane from the fields to the mill. The highest and longest flumes on the islands are found here. Portable flumes are used for getting the cane to the main flumes, which carry it to the mill.

As in the Hamakua district, most of the plantations have their own landings, except that in this case the sugar is conveyed to

the steamer by a trolley traveling on a cable extending from the cliff over her deck.[1]

The chief places of these districts, named in order from north to south, are Laupahoehoe, Papaaloa, Honomu, Onomea, Papaikou, and Hilo Town. (Waiakea and Wainaku are suburbs of Hilo.)



Cane Flume, Hilo.

The town of Hilo is superbly situated, the view from the bay with the peaks of Mauna Loa and snow-capped Mauna Kea in the distance making a scene of rare beauty.

Hilo owes its importance to the fact that it has the only good harbor on the east side of Hawaii, and that it is the landing for the volcano of Kilauea. It has a population of about 10,500, and is the county seat for the island of Hawaii.

The harbor is partially protected by a submerged reef which extends out into the bay from the east shore. A breakwater

[1] With one exception the plantations along the north Hilo coast still ship their sugar from such landings as are shown on page 74. However, they use the railroad for some of their supplies, which come from Hilo.

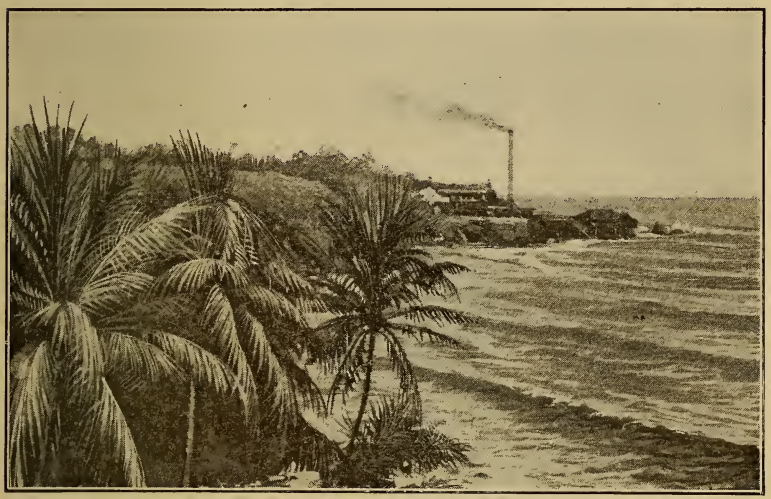
has been built for over a mile along this reef. When the projected extension of this breakwater is completed, Hilo will have a splendid deep-water harbor. Within the shelter of the breakwater a long landing wharf has been built which is connected with the town two and one half miles away by railroad and a good driveway.

Plantation Landing.

Hilo is the distributing center for the Puna, Hilo, and Hamakua districts. A railroad (Hawaii Consolidated Railroad) runs as far as Paauilo in Hamakua on the one side, and to Glenwood, nine miles from the volcano of Kilauea, on the other, with a branch road to Kapoho. This railway is of standard gauge with modern equipment. The Hamakua extension of this railroad, which crosses over 200 streams, is a remarkable feat of engineering. While this section of the road was built for commercial purposes, nowhere is there a finer stretch of scenic railway. Hilo is connected with Honolulu by regular steamer service, and also with San Francisco and other Pacific ports.

Hilo's abundant water supply is used to develop electricity, which is furnished at a low cost. An electric street railway is projected for the town. Hilo has the first Federal building erected in the Pacific. There are a public library and some good mercantile buildings. The town is well supplied with schools; besides large Catholic schools for boys and girls, there is a high school and a well-equipped grammar school. Also located here is the Hilo Boys' Boarding School, from which General Armstrong patterned the famous Hampton Institute of Virginia.

The Wailuku River flows through the town, being spanned by some fine bridges.



Sugar Mill in Hilo District (Wainaku).

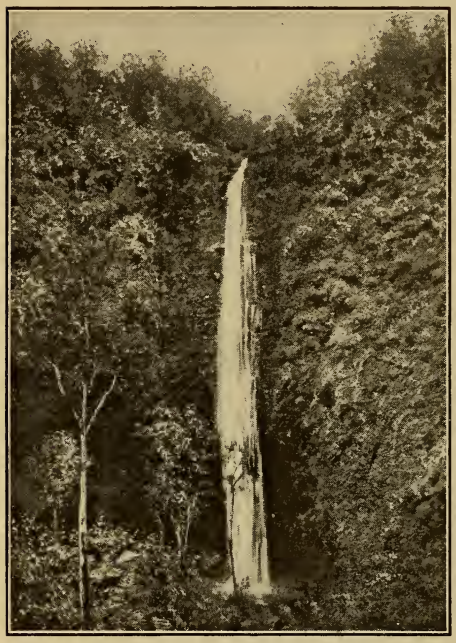
Points of special interest near Hilo are Coconut Island, the bathing resort of the city; Rainbow Falls, Onomea Gulch and Arch, the pretty Akaka Fall at Honomu, and the Kaumana Caves (lava channels of the 1881 flow); but the whole section about the town, with its enveloping woods and waterfall-studded gulches, abounds in spots of scenic beauty.

The Onomea Sugar Company's mill is at Papaikou, which is the most important place in North Hilo north of the town of Hilo.

Laupahoehoe village, which is built on a tongue of lava jutting out from the mouth of the gulch, is the halfway house between Hilo and Hamakua. The landing, which has long been an im-

portant one on this coast, is no longer used by the regular mail and passenger boats.

Honomu, Hakalau, and Pepeekeo are large plantation settlements, the two former being on the main road, while the latter is near the mill a short distance below the road. The Laupahoehoe Mill is located at Papaaloa on the bluff two miles from the village.



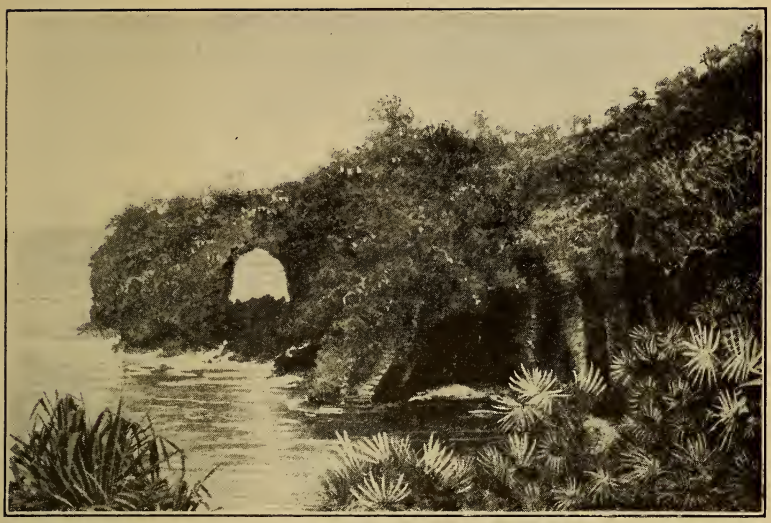
Akaka Fall, 500 Feet High.

Puna. — There is a tradition which says that at one time Puna was one of the most fertile districts of Hawaii, but while the chief of the district was in Hilo, Pele paid him a visit, pouring over his possessions a terrible flood of lava. However, the rainfall is so great in parts of the district that this lava has been rapidly decomposed, and the heaviest of forests are to be found, as in Olaa and the region about Pahoa.

A large part of the soil of upper Olaa is ash which probably came from Kilauea; the great fertility of this soil is due to the decayed vegetable matter which has been added to it.

There are no streams or springs in Puna, the only dependence for water being tanks.

Olaa. — The lower part of the Olaa section of Puna is occupied with the cane fields of the Olaa Sugar Company; above this there are a number of homesteads where the farmers raise for market dairy products, hogs, poultry, berries, and some garden truck. This latter area has a splendid forest growth, and in



Onomea Arch.

Cliff at Laupahoehoe.

common with the rest of Olaa has a very heavy rainfall. It is a fine agricultural region where many tropical fruits and plants grow well, and no doubt in time will develop into an important farming district. Glenwood, the terminus for the railroad, is the shipping center for this section. Not far from the crater of Kilauea, near the road leading to it, are a number of summer homes.

The Olaa Plantation, which is the largest sugar estate on this island, occupies nearly all of the available cane land of the Puna district, including the Pahoa and Kapoho tracts. The Hawaii Railroad winds through the Olaa fields on its way to the volcano station at Glenwood. The plantation makes use of this road for transporting its cane to the mill.

Keaau, sometimes referred to as Nine Miles and Olaa, is the chief place in Puna. The Olaa Mill is located near this place. Mountain View, Pahoa, and Kapoho are largely plantation camps. Kalapana is an isolated fishing village of South Puna. This section is but thinly settled, and too rocky to ever be of much use.

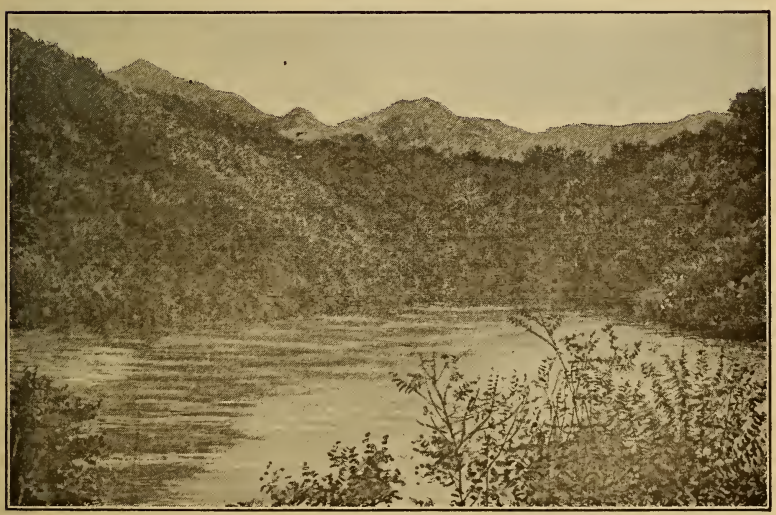
A long section of the Puna coast, thirty or forty miles, shows evidences of having sunk. Coconut trees are found below the tide level, or their dead stumps stand out in the sea.

At Kapoho there is a warm spring, which is a pool about sixty feet in length and thirty feet wide, with a depth of twenty-five feet, filling a cleft in the lava rock. The water is remarkably transparent and buoyant, and is of blood heat.

Other interesting features of Puna are: the lava tree casts found in the forest above Kapoho; Green Lake, a pretty pond of water in a volcanic cone at Kapoho; the bowlders strewn along the coast near Pohoiki by the great 1868 tidal wave; and the heiau of Wahaula in farthest Puna. (A facsimile in miniature of this heiau as it would appear if restored is to be seen in the Bishop Museum.)

Kau. — Near the sea in Kau there is a low belt several miles in width which is hot and dry, but above this the land rises abruptly, and has a good rainfall. Upon this highland cane is planted, and grows well without irrigation. The section cultivated with sugar cane is the older portion of the district; being higher it was not covered with lava.

Lava Tree Casts, Puna.



Green Lake, Puna.

With the exception of a few small gulches, Kau is without valleys and streams — the so-called Wood Valley is nothing more than a depression in the mountain side made by just such a catastrophe as that which caused the Mud Flow. Mountain springs have been developed and storage reservoirs built so that the plantations have sufficient water to irrigate some of their lower fields and flume nearly all the cane to the mill.

There are two plantations in Kau: the Pahala, or Hawaiian Agricultural Company, and Naalehu and Hilea, which comprise the Hutchinson Sugar Company. Pahala is one of the largest and best plantations on Hawaii. Cane is planted higher here than in any other part of the group. The Hilea Mill is at Honuapo. Each plantation has a railroad to the landing — Pahala shipping its sugar at Punaluu, and Naalehu and Hilea at Honuapo. Honuapo is the chief landing of Kau. It is the passenger landing for the volcano of Kilauea when the trip is made by way of West Hawaii.

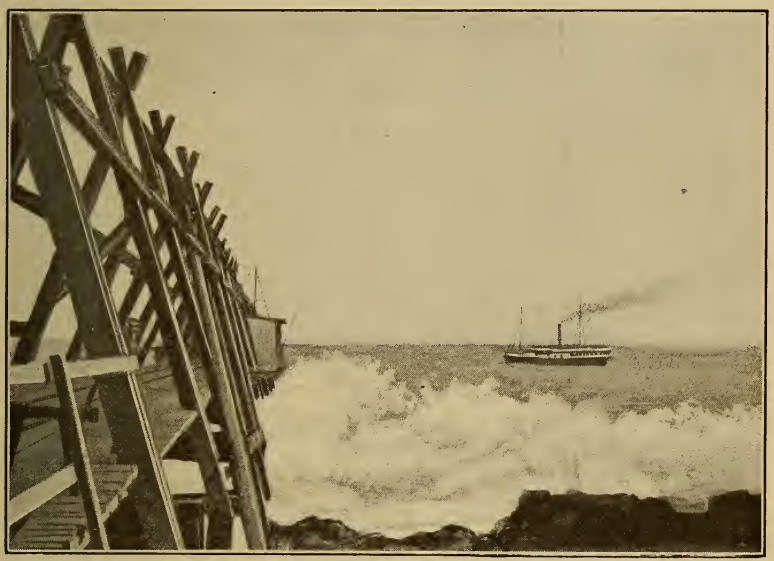
Kapapala and Kahuku are cattle ranches. They occupy chiefly the lava regions of Kau. The 1868 and 1887 flows covered the best of the Kahuku pastures.

Besides the landings and plantation settlements, the only other place of importance in Kau is Waiohinu. (The landings at Kaalualu and Keauhou have long since been abandoned.) Waiohinu was a flourishing place at one time, being the chief market for barter and trade of a large farming population occupying the land between the village and Kahuku. But these people have gone elsewhere, and the town has lost its prestige.

In olden times Kau had a large native population. These people cultivated upland patches, but lived chiefly near the sea. Their favorite place seems to have been the lava region from Honuapo to Punaluu. Near Punaluu a large underground stream runs into the sea, and at other points along the coast there are springs, which accounts for the selection of this dreary spot for a home by these people.

North Kona and South Kona. — The entire surface of these districts is composed of partly decomposed lava flows. There are very few level patches, and no place where a baseball ground or a polo field could be laid out.

There are no gulches or streams, and but very few springs. Small freshets cross the road in a few places in North Kona at times when it rains heavily, but are lost in the rocks before they reach the sea. There is only one such place in South Kona, where, during a storm, the water may be heard roaring above, though it scarcely ever crosses the road.



HONUAPO LANDING.

There is a warm, dry belt near the sea throughout these districts, but above this the land rises abruptly into a cool and bracing climate, where rain is plentiful.

Road building is difficult and expensive in Kona, owing to the abrupt slope and rocky nature of the surface; hence there is but one main road which extends the entire length of these districts. This road is from one to four miles above the shore. Branch roads extend to all of the landings, but all other places must be reached by trails. Donkeys are used entirely for transportation over these trails. A great many of these useful animals are found in Kona.

These districts comprise one of the finest agricultural sections in the group; everything grows well, even though seemingly planted right among the rocks. However, many things cannot be cultivated with profit, owing to the distance from any market and the expense of transporting produce to the landings.

The chief industry of Kona is coffee — everywhere there are coffee fields. Most of these fields are cared for by Japanese. There are several good coffee mills in both districts, where the coffee is prepared in the best way for market.

Tobacco growing is an important industry in South Kona. There are extensive curing sheds here where the leaf is prepared for market. However, this industry may be abandoned for the reason that the tobacco raised here is not of the best quality.

Cane planting is not carried on so extensively here as it is in the other districts, because cultivation and transportation are difficult, owing to the rocky nature of the ground, the abrupt slope, and the lack of running water.

On the upper slopes of Hualalai and Mauna Loa, which afford fine grazing land, there are a number of cattle ranches. Owing to the rocky nature of this region, cattle driving is difficult and hazardous.

Kailua is the civic center for both districts, and the chief port in North Kona. There are two coffee mills here where the beans are prepared and graded for market. A great deal of coffee is shipped from this port. Kailua's most striking feature is its great stone church built in the year 1835, when there was a large native population in this region.

Holualoa is an inland village at the junction of the main road with that leading to the sea beach and the Kailua landing. The large school here indicates it to be one of the chief population centers of Kona.

Konawaena, which is situated on the boundary line between the two districts, is the community center for this part of Hawaii. There is a community house here, two branch banks, a central church, and a large school.

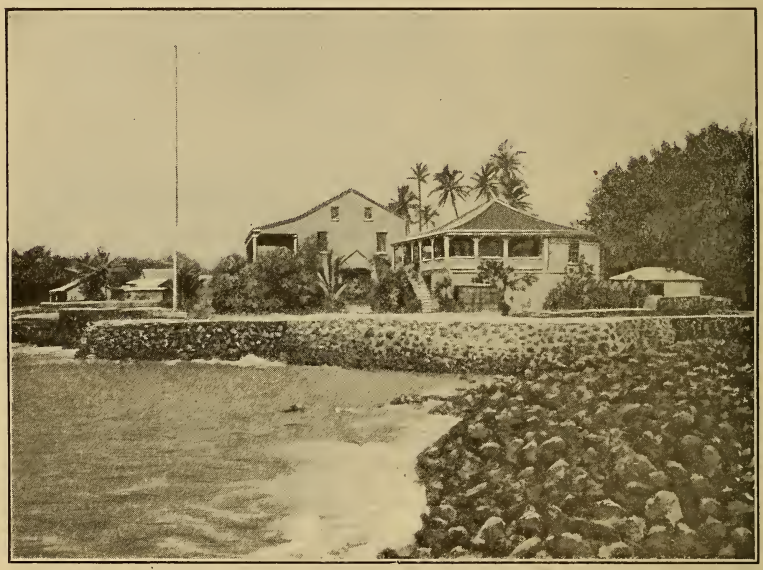
Napoopoo, famous as the landing place of Captain Cook, is located on the eastern side of Kealakekua Bay opposite the

Fishing Village, Kona.

Loading Cattle at Kailua.

spot where the Great Circumnavigator's monument stands, which is in plain view from the village. Napoopoo is the chief landing for South Kona. Like Kailua it is an important coffee port.

Kealakekua is a small inland village on the main road north of the bay.



Old Palace, Kailua.

Hoonaunau is now two miles inland, there being but a few huts which guard the historic spot where the ancient village stood by the sea.

The ruins of the ancient temple and city of refuge at Hoonaunau, which have been partially restored, are kept in a state of preservation.

Hookena is only of importance as the landing for the interior country.

Many of the places in Kona are so much scattered along the upper road, or divided between that road and the seashore, that it is a little difficult to name them.

City of Refuge, Honaunau, Kona.

Cook's Monument, on Kealakekua Bay.

In ancient times Kona was one of the favorite places of the natives, and had a large population. These people lived chiefly along the seashore, where it was warm and dry, and where the placid waters afforded the best of fishing. Trips were made inland to the forests, where dry-land taro was planted.

Kona abounds in places and objects of historic interest as: the famous City of Refuge at Honaunau; Kaawaloa (on Kealakekua Bay), where Cook was killed; the great stone toboggan slide just above Keauhou; the Judd road, extending from the shore between Kailua and Keauhou in a direct line fifteen miles towards Hilo; the stone wall built to exclude the pigs from the agricultural land above, and running through the entire district.

An obelisk has been erected at Kaawaloa to the memory of Captain Cook, bearing the following inscription: —

IN MEMORY OF
THE GREAT CIRCUMNAVIGATOR
CAPTAIN JAMES COOK, R.N.
WHO
DISCOVERED THESE ISLANDS
ON THE 18TH OF JANUARY, A.D. 1778
AND FELL NEAR THIS SPOT
ON THE 14TH OF FEBRUARY, A.D. 1779

THIS MONUMENT WAS ERECTED
IN NOVEMBER, A.D. 1874
BY SOME OF
HIS FELLOW COUNTRYMEN

Though Cook was killed at Kaawaloa, it was at Napoopoo that he landed and did his bartering with the natives.

The City of Refuge occupies six or seven acres of a low, rocky (pahoehoe) point on the south side of the little bay of Honaunau. The inclosing walls on the south and east sides are still standing, but the others have been destroyed by tidal waves. The walls are about twelve feet in height and eighteen feet in width. The Hale-o-Keawe stood upon the platform of rock at the northeast corner facing the bay. Below this there is a larger platform, which marks the site of the lower temple. On either side of this latter platform there are two huge altar stones, called Keoua's and Kaahumanu's stones.

MAUI

Physical Features. — The Maui group, including Maui, Molokai, Lanai, and Kahoolawe, is midway between Hawaii and Oahu, Maui itself being nearest to Hawaii.

While Maui is second in size of the Hawaiian Islands, containing 728 square miles, it is only about one fifth the size of the island of Hawaii.

Maui is a double island, with the smaller lobe lying towards the northwest. It has no distinct promontories or capes. Kauiki Head is the rim of a crater which incloses on one side Hana Bay. The so-called Kahakuloa Point is but one of a succession of points, being prominent because of its peculiar formation rather than because of its size.

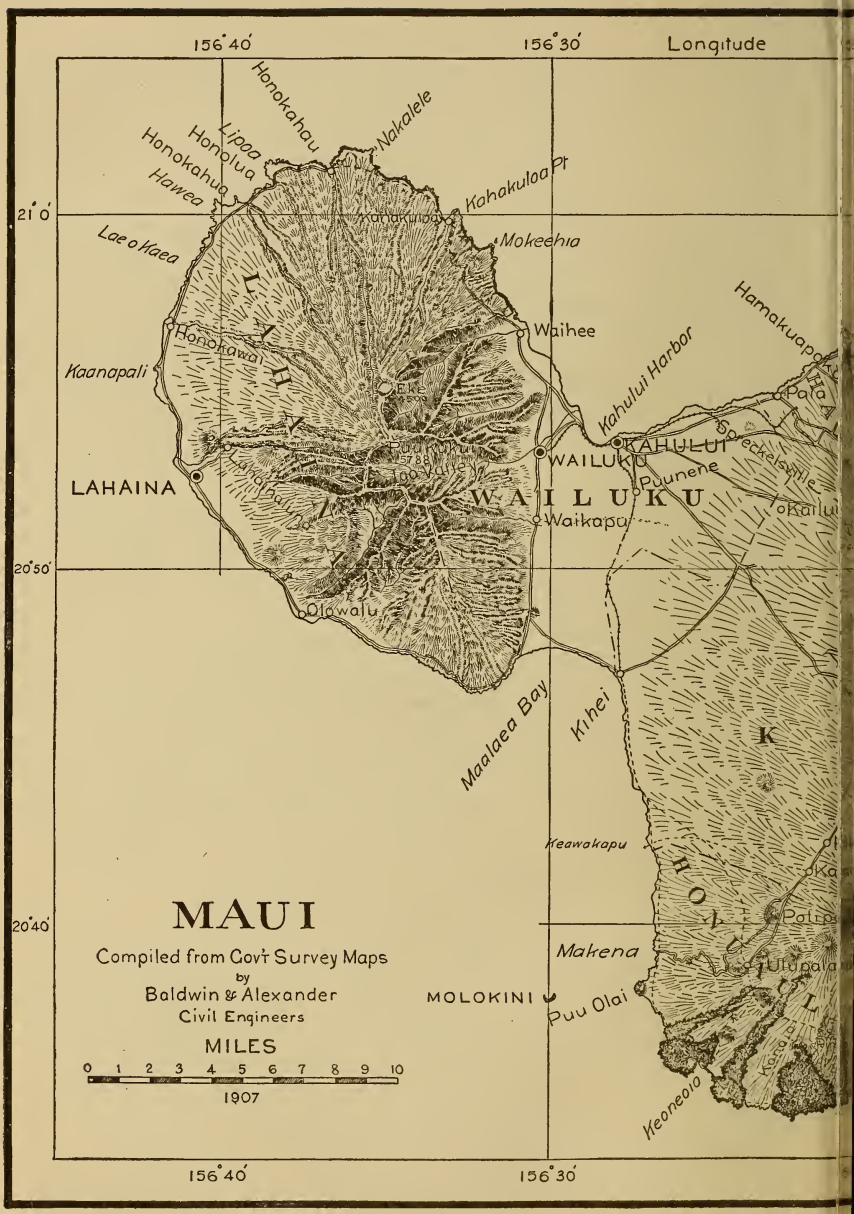
Maui is made up of two distinct mountain masses joined by a low, flat isthmus. Haleakala occupies the whole of the eastern section, comprising the larger part of the island, while the West Maui Mountains fill the smaller or western section of the island.

On the north and south sides of the isthmus are the bays of Kahului and Maalaea respectively. On the north side the coral has built out from the mainland on both sides, forming the Kahului Harbor. Through the opening in the reef there is a deep channel which the largest vessels can enter.

Along the northeast coasts of both Mauis there are cliffs, but they are not of great height.

Off the Lahaina side of West Maui there are extensive coral reefs and a sand beach extending many miles along the shore. Much coral is also found about East Maui, where the conditions are favorable for its growth, but, as this part of the island is much newer than the other, the reefs are not so extensive.

West Maui Mountains. — The West Maui section is much older than Haleakala, being possibly as old as the island of Kauai, the Waianae range of Oahu, or the Kohala Mountains of Hawaii.


156°40′
156°30′
Longitude
21°0′
20°50′
20°40′
Honokahau
Nakalele
Lipoa
Honolua
Honokahua
Hawea
Kahakuloa Pt
Kahakuloa
Mokeehia
Lae o Kaea
Waihee
Hamakuapoko
Honokawai
Kaanopali
Kahului Harbor
Paia
Spreckelsville
KAHULUI
WAILUKU
Puunene
LAHAINA
Lahaina
Waikapu
Iao Valley
Olowalu
Maalaea Bay
Kihei
Keawakapu
Makena
MOLOKINI
Puu Olai
Ulupalakua
Kaupo
Keoneolo
MAUI
Compiled from Govt Survey Maps
by
Baldwin & Alexander
Civil Engineers
MILES
0 1 2 3 4 5 6 7 8 9 10
1907


West from
156°10′
Greenwich
156° 0′
21° 0′
20°50′
20°40′
Halehaku
Huela
Kailua
Honomanu
Keanae
Nahiku
Kaupakulua
Kakoma
Makawao
Nahiku
Keawaiki
Hana Bay
Kauiki Head
Hana
Alau
Hamoa
Kipahulu
Ahole
Mokulau
Ka Lae o Kailio
Nuu
Kaupo
Waiakoa
HALEAKALA CRATER
10000
KAUPO
KIPAHULU
HANA
KOOLAU
AHIKINUI

As these mountains are stretched directly across the track of the trade winds, they have been subject to a very heavy rainfall, and have been tremendously cut up, furnishing as fine an example of erosion as can be found anywhere. So great has the cutting been that it is difficult for us to imagine that the great gulches we find here, such as Iao, Waihee, Olowalu, and Honokahau, are purely the result of erosion. However, we have examples on a smaller scale with just such results as we find here; so undoubtedly the great amphitheaters at the head of these valleys are areas of erosion, and not old craters, as we might suppose them to be at first sight.

The highest peak of West Maui is Puu Kukui, 5788 feet high.

The scenery in the Iao Valley, which is the most accessible of the West Maui gulches, has been described as being almost equal to that of Yosemite, but that of Waihee and Olowalu is fully as fine. The view from the top of Puu Kukui, looking almost perpendicularly down into the wonderful gorges of Iao and Waihee and out over East Maui and the top of Haleakala to the snow-capped mountains of Hawaii, is said to be one of the finest in the world.

Owing to the narrowness of the ridges and the dense vegetation which covers them, these mountains can be scaled in only a few places. There was once a way from Lahaina to Wailuku over the dividing ridge between the Olowalu and Iao valleys, known as the Olowalu Pass, but this road is now impassable, owing to landslips.

On a narrow ridge between the Waihee and Honokahau valleys is the crater of Eke. The peculiar position of this crater, which is a small one, is due entirely to erosion.

Near the summit of Puu Kukui there is an extensive bog or marsh, which is the source of all the streams on the Lahaina side of the mountain. Though this side of the mountain is exceedingly dry, having rain only during the Kona storms, it is abundantly supplied with water from the fine watershed afforded by the mountains back of it.

Owing to the heavy rainfall, the upper slopes of West Maui are covered with a dense growth of vegetation, but lower down they are entirely bare.

There is a narrow coastal plain on the sheltered side of West Maui formed by wash from the mountain; fine crops of cane are grown on this land.

Haleakala and East Maui.[1] — Haleakala Mountain, which rises to a height of 10,032 feet above sea level, contains the greatest of the world's extinct volcanoes — the crater of Haleakala. The greatest length of the crater is seven and one half miles, and its width two and one third miles, its circumference being twenty miles. Owing to the shape and nature of the crater, it is difficult to give any true conception of its size by stating that it is so long and so wide, and so many miles in circumference. We might give a better idea of its size by stating that it is 2000 feet deep, that one of the cones in the crater is over 700 feet high, and that in its bottom there is room enough for one of the great American cities. Haleakala crater is an area of the Hawaii National Park.

Haleakala is unique among our island mountains in that it retains intact the great crater which formed the mountain. In every other case (Mauna Loa has its crater, but this mountain is still in process of formation) the central crater has been filled up and so completely obliterated that not the slightest trace of it can be found. But in this case the crater is entire, excepting two great openings or gaps, one on either side, through which the lava flowed to the sea. This can be explained by a great fault which caused the eastern section of the island to slip away and down, thus forming the crater and the Koolau and Kaupo gaps. Instead of filling up the crater, as it would otherwise have done, the lava now flowed through these gaps to the sea.

With its cones and sand-covered bottom, the crater of Haleakala resembles the top of Mauna Kea in general appearance. With the exception of two typical aa flows, which came from a fissure high up on the eastern wall, flowing some distance along the bottom, and an old pahoehoe flow in the extreme eastern end, the lava floor of the crater is thickly covered with sand, being exposed only where this sand has been washed away by the weather.

[1] "Haleakala," Charles W. Baldwin, *Hawaii's Young People*, April, 1898 (1899 on outside cover).

MAUI

The crater is nearly bare of vegetation, showing here and there but a few bushes and scattering silver-swords, except on the eastern side, where there is a good growth of scrub ohia, mamane, etc., while in the extreme eastern corner there is a grove of forest trees and abundant fodder for animals; in the brook beds on the sides water can be found.

The gaps are wide where they open out from the crater, the cliffs on either side towering to a great height. The fissure

HALEAKALA CRATER, LOOKING EAST.

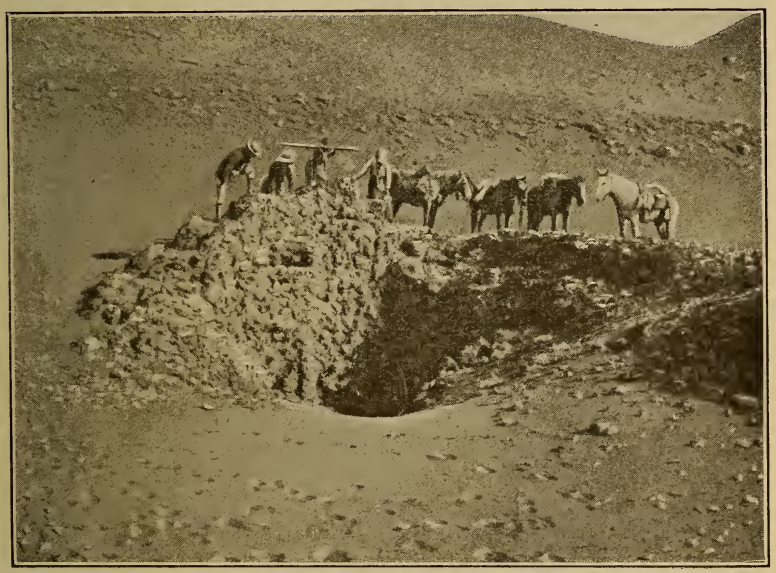
which formed these gaps extended to the sea, making the Keanae Valley on one side. The Kaupo gap descends abruptly to the sea, while that on the Koolau side has a gradual incline for most of the distance. There is a trail through the Kaupo gap which is used by cattlemen.

Next to the gaps the most striking feature of Haleakala is its sand cones. There are thirteen cones in the crater, seven of which are sand cones, one of them being over 700 feet high. These cones, which are placed over vents in the lava of the crater, contain craters from which was erupted the sand of which they are formed and which so thickly covers the bottom.

Growing in the sand of the cones, or from crevices in the floor of the crater, are numbers of silver-swords (Argyroxiphium). These curious and interesting plants are not found anywhere else in the world.

Other interesting features of the crater are: the Bottomless Pit (a blowhole); Pele's Pigpen (a small, partly filled crater); Hunter's Cave; Crystal Cave and the Chimneys; and the Natural Bridge — the four last-named are craters along a rent which marked one of the eruptions within the crater.

Judging from the lava flows found in its bottom, the crater of Haleakala may have been active two or three hundred years ago.



"Bottomless Pit," Haleakala Crater.

A well-marked trail leads from Makawao to the summit of the crater, where there is a rest house. The trail into the crater, with the exception of three miles along the brink, is a good one.

The side of Haleakala exposed to the wind is cut up into a countless number of gulches. These gulches are large near the seacoast, but do not extend far up on the mountain side. The Keanae Valley is the extension of the Koolau gap. The Kipahulu Valley, which is separated from the crater by a narrow precipitous ridge, was caused by that portion of the land be-

SILVER-SWORD IN BLOOM, HÂLEAKALA CRATER.

SAND CONE IN HALEAKALA CRATER.

tween the Kaupo gap and the valley splitting away from the main body and not sliding as far, when the fault occurred which formed the crater.

On the wedge-shaped piece on the northeastern side of the crater is Lake Waianapanapa, directly above the head of the Kipahulu Valley.

The southeastern slope of Haleakala is barren, a portion of it being covered with lava flows; some of these flows are quite recent — being perhaps one hundred and fifty years old.

The northwestern slope of the mountain, being protected from the wind, presents an almost unbroken stretch to the isthmus.

The Isthmus. — The isthmus which joins East and West Maui is eight miles wide at its narrowest point. At one time this isthmus must have been a waterway, when the Mauis were separate islands. This channel was filled by flows from Haleakala, and finally covered by wash from the mountains on both sides, forming the central plain of Maui.

The sand dunes of the isthmus near Wailuku were no doubt caused by an upheaval of this part of Maui, as they are two hundred feet high and contain fragments of coral and sea shells; but the sand hills on the lower part of the isthmus are the product of the wind.

Formerly numbers of these dunes could be seen slowly moving across the isthmus, finally being lost in the sea on the opposite side; but most of the isthmus land has now been reclaimed by irrigating ditches, and the rest is rapidly being covered with algaroba trees; hence but a few of these traveling dunes are to be seen to-day.

Districts. — The districts of Maui are Lahaina, Wailuku, Makawao, and Hana.

Lahaina. — The Lahaina district includes all of the northern, the western, and a part of the southern slope of the West Maui Mountains. The island of Lanai is included in this district.

This district, being mostly sheltered from the wind, is a dry one, receiving rain only during the Kona season. Though the main part of the district is practically a rainless one, yet it is well supplied with water from many never-failing streams whose source is the Puu Kukui watershed.

Former Missionary Home, Lahaina.

There are two plantations in this district — the Pioneer Mill Company, at Lahaina, and the Olowalu Company.

The Pioneer Mill Company is one of the oldest sugar plantations of the group. By means of artesian wells, tunneling in the mountains, and a long ditch from the Honokahau Valley, water has been developed, so that this is now one of the largest and most prosperous plantations of the Territory. The cane land of this plantation comprises that on the Lahaina flat, the slopes back of the town, and the lower part of the Honokawai lands. The sugar is carried out by railroad to Black Rock (Kaanapali Landing), where it is shipped. The largest vessels can come close in shore here.

The Olowalu Company is a small plantation situated on the flat near the mouth of the Olowalu gulch.

At Honolua is a cattle ranch which embraces the larger part of the lands on the northern part of West Maui. Pineapples are also planted here, and there is a cannery.

The only place of importance in this district is the village of Lahaina. At one time the town occupied the whole flat, but now most of this flat is planted with sugar cane, the main part

of the town being strung out along the shore. There is a protecting coral reef here with an opening through which boats may enter.

Lahaina was the ancient capital of the group, and was then a large and flourishing town. The prosperity of the place was largely due to the whaling fleet which made this a port of call for water and supplies during its cruise in the north Pacific. It took from one to three years to secure a full cargo of oil, and then the ship sailed for New Bedford by way of Cape Horn. At one time there were as many as 89 whaling ships anchored off the town.

Old Ruin, Lahaina.

The port of Lahaina, which is an open roadstead, is well sheltered by the West Maui Mountains, except from the south wind. As this wind only blows for short periods during the winter months, the harbor is usually a safe one.

The regular boats do not touch at the Maalaea Bay landings, but mail and passengers for East Maui are landed at Lahaina, which is connected with Wailuku by a good road.

The wireless station for Maui is located at Lahaina.

Two and a half miles above Lahaina on the hillside is the Lahainaluna Seminary. This school was established in the year 1831, and was long the leading institution for the education of Hawaiian youth. In the year 1905 the school was furnished with new buildings, and is now one of the leading industrial schools in the Territory.

Wailuku and Makawao.—The Wailuku and Makawao districts, which occupy the entire central section of Maui, have so many activities in common that they may be studied together.

Wailuku includes the island of Kahoolawe and Honuaula on the extreme southern section of Maui. Makawao, which includes Kula, covers the larger part of the western slope of Haleakala. As it is mostly on the sheltered side of the mountain, there are no deep gulches except in the eastern part.

Central Plain and Irrigation Aqueducts. — This plain, the greater part of which is arid, furnishes a good example of what may be accomplished by human energy and enterprise in reclaiming waste land. Water was supplied through a system of irrigation canals extending forty and fifty miles into the rugged mountain region on the northern slope of Haleakala.

These canals were built in sets, the upper one not only bringing the water out at a higher elevation, but carrying it further along the plain. There are four of these ditches, with a fifth, still higher up, which is to be completed in two or three years. While these aqueducts are usually spoken of as the Maui ditches, each has its own name. The Hamakua Ditch was completed in 1877, being probably the first of its kind ever attempted anywhere. The Koolau Ditch is noted for its "Ditch Trail" scenery, being one of the regular feature trips of Maui. The two plantations which occupy the central plain coöperate in the use of the water from these ditches.

Water has also been supplied to the plain from a ditch into the West Maui Mountains, and from a system of wells on the lowlands from which water is pumped.

Industries. — By means of the water conveyed to it by the irrigation aqueducts spoken of, the greater part of the central plain, which was once a barren, dust-swept region, has been converted into what is now the finest and largest sugar estate of the group — the Hawaiian Commercial and Sugar Company Plantation. The fields of this plantation occupy the greater part of the plain, reaching in every direction as far as the eye can see. Scattered among these fields are 25 workmen's villages (camps). The transportation system for getting the cane to the mill includes 75 miles of permanent railroad track and 8 miles of portable track, with 7 engines and 800 cane cars.

In good years this estate produces 60,000 tons of sugar. The mill is located at Puunene, which is the name usually applied to the plantation. It is the largest sugar mill in the Hawaiian Islands.

PUUNENE MILL.

WAILUKU TOWN AND IAO VALLEY.

The fields of the Maui Agricultural Company, which include the former Haiku and Paia plantations, occupy the higher lands of the plain and extend well up on the slopes of Haleakala. This is the third largest plantation of the group.

These two plantations, which occupy the main part of the central plain area, are among the most progressive of the Territory, having originated many of the things that have placed the sugar industry of Hawaii second to none in the world. Electricity has been developed and not only applied to running extensive machine shops, but used for operating the main irrigation pumps, all mill pumps and refrigerating plants, besides supplying lights for the hospitals, community houses, and the mill buildings generally.

These two plantations have also been particularly active in welfare work, not only furnishing their laborers with attractive homes, but maintaining highly equipped hospitals, day nurseries, kindergartens, places of amusement and athletic equipment, such as baseball fields, tennis courts, bowling alleys, and the largest swimming tank in the Territory, at Puunene.

A cement plant has been established on the beach below the mill at Paia, where Portland cement and a fine grade of lime are made in sufficient quantities for export. The lime is made from sea sand, and the cement from powdered, blue-lava rock mixed with the proper ingredients, which are found on the island.

At the Paia Mill there is a plant for the manufacture of denatured alcohol from mill refuse, and at Puunene a stock food is made from molasses and algaroba bean meal. Both of these products are for use where they are made.

The fields of the Wailuku Plantation occupy the eastern section of the central plain, fringing the West Maui Mountains, from which they draw an abundant water supply.

Pineapples are grown in large quantities in the Haiku section of Maui, where there is a cannery and can-making establishment.

The upper slopes of Haleakala are used for grazing purposes.

The Kula part of Maui is entirely sheltered from the trade winds, having a climate that is somewhat different from other parts of the group. The black soil found here is a vegetable loam, indicating that this section was once covered with a heavy forest growth, which was cleared by settlers or destroyed by cattle. The Kula farms are located in this black-soil area, which is at an elevation of two or three thousand feet above sea

level. Corn, beans, potatoes, and live stock are chiefly raised here. There is a sanitarium in Kula for the treatment of pulmonary diseases, the climate being well suited for this purpose.

Towns and Transportation. — Kahului is the chief seaport for the island of Maui. The harbor is well protected by breakwaters built out on each side of the bay, and has been enlarged by dredging, so that the deep-sea ships which enter here have ample sea room. Kahului is connected by railroad with all the principal places of Maui, being a busy port during the sugar season. It is the port of entry for the island, with a custom-house, a national bank, and some good stores; but Kahului is chiefly important as a shipping point. As the ground about the town is low and marshy, it is not a popular place of residence.

Wailuku, a pretty town and a scenic center located in the mouth of the Iao Valley, is the western terminal of the Kahului Railroad. Owing to its central location between East and West Maui, it was selected as the county seat. Many travelers come to Wailuku to visit the beautiful Iao gorge, where, by a short auto-drive, one may almost reach the heart of the wonderful West Maui Mountains. It was in the Iao gorge that Kamehameha defeated Kalanikupuli, the king of Oahu and Maui, in the famous battle of Wailuku, when it is said the stream ran red with blood. By this victory Kamehameha made himself master of Maui.

Puunene is the central camp for the Hawaiian Commercial and Sugar Company Plantation, the mill, executive offices and plantation residences being located here.

Paia is the community center for the Makawao district. The name is applied to a region which extends from the village on the main road near the sea beach to the point where the community house, church, and hospital are located, three miles above. In between lies the main plantation camp, where the mill, executive offices, and general store are located. The church, which is a memorial building, is a very beautiful structure.

The Maunaolu Seminary for girls is situated a short distance above the church. The Maui high school is located at Hamakuapoko.

Haiku is the eastern terminal of the Kahului Railroad, and the site of the Haiku Fruit and Packing Company's pineapple cannery. It is a homestead section.

The Makena landing is seldom used now, as the Kula farmers send their produce to Kahului for shipment.

Kihei is the present landing for Maalaea Bay, though it is not used by the regular mail and passenger boats.

Hana. — The Hana district is made up of the lands of Kahikinui, Kaupo, Kipahulu, Hana, and Koolau, in the eastern end of the island. It has a scattering and sparse population.

Kahikinui and Kaupo, being on the southern or sheltered slope of the mountain, are largely waste land; they are used chiefly for grazing purposes.

In contrast to that part of the district on Haleakala's southern slope, the eastern and northern section has a heavy rainfall, with a climate somewhat similar to parts of Hilo on Hawaii.

There is a good driving road from Kipahulu to Nahiku, but beyond this there is only a trail. This trail extends along the greater part of the northern slope of Haleakala. Formerly this trail was near the seashore, but now it has been built higher up on the slope of the mountain, where the gulches are small; and so the deep valleys, with their fords which are dangerous in the rainy season, are avoided. The scenery along this trail is very fine.

There are two small plantations in this district: the Kipahulu Sugar Company, and the Kaeleku Plantation at Hana.

Rubber growing was once a prominent industry in Nahiku, but the plantations were abandoned.

The principal place of the district is Hana town, which is picturesquely situated on the bay just back of Kauiki Head. The only good landing in the district is at Hana; large ships can find a safe anchorage in the bay here.

Keanae is a village at the mouth of the Keanae Valley. It is built partly on the peninsula formed by the lava which flowed into the sea through Koolau gap. Kaupo is a small place just below Kaupo gap.

During ancient times Hana Bay was a convenient landing for canoes coming from Hawaii. In times of war Kauiki hill was used as a fort. A paved road was built around East Maui in the sixteenth century; on the hillsides the flat cobblestones of which it was made were placed on edge. Portions of this ancient road are still in use.

MOLOKAI

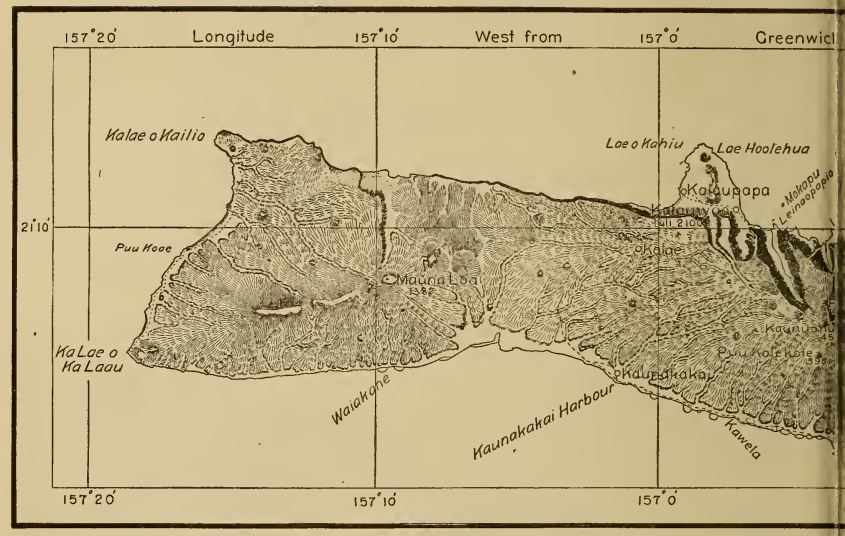
Physical Features. — Molokai is a long, narrow island lying east and west directly between Oahu and Maui.

The island, which is about forty miles long by ten miles wide, can be included in a rectangle whose length is four times its width.

Cliffs seen from Leper Settlement, Molokai.

The north coast is bold and rugged, showing on the northeast end extraordinary cliffs like those found on the windward side of Hawaii and on the northwest coast of Kauai.

An extensive barrier reef extends along the entire southern shore, which is low. At Kaunakakai, Kamalo, and Pukoo this reef has made excellent harbors.



Molokai is a double cone. The smaller cone, which lies towards the west, is dry and barren, and of no commercial value.

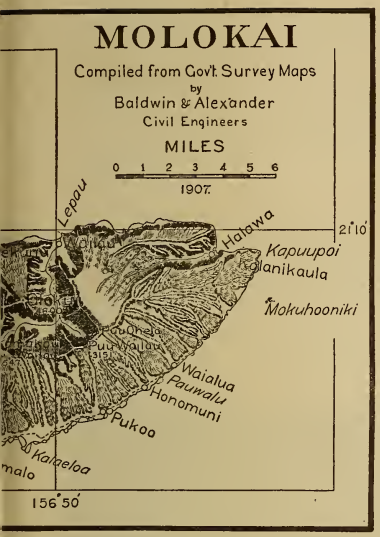
The highest point of the larger, or eastern, section of the island is Kamakou, 4958 feet above sea level. This peak is at the south end of the narrow ridge dividing the Pelekunu and Wailau valleys.

The unusual formation found in this eastern section of the island must have been the result of a great fault, when the north side of the mountain broke away and slipped into the sea, forming the cliffs along the coast. Since the fault, the region has been cut up by erosion, forming the inaccessible gulches of which the Wailau and Pelekunu are the largest. All together this is one of the most remarkable sections of the group.

Industries. — Owing to the lack of water in its desirable sections, Molokai is of no great commercial value.

The larger part of the island is devoted to cattle raising. Taro is grown in Pelekunu and Wailau for the leper settlement.

Formerly there were a great many fish ponds within the barrier reef along the southern shore of the island, but only a



few of the largest of these ponds are in use now. The inclosing walls of many have fallen to pieces, while others have become filled with débris washed down during storms.

There is a good harbor at Kaunakakai, where a wharf half a mile long has been built. Vessels can lie alongside this wharf, except in very rough weather. There are good landings also at Kamalo and Pukoo.

With the exception of the leper settlement at Kalaupapa, the places of Molokai are of no importance. Wailau and Pelekunu are accessible only from the sea.

Kalaupapa. — At the base of the cliffs near the middle of the north side of Molokai there is a peninsula which juts out into the sea, being an outflow of lava from the Makanaloa crater. The bowl of this crater is at sea level, and is filled with sea water which has a mean depth of 300 feet, falling away to 750 feet in one spot.

Located on this peninsula, midst rugged though not unattractive surroundings, is the leper settlement of Kalaupapa, cut off on the land side by cliffs 1500 feet high and on the other side by the sea. The peninsula contains 780 acres. Kalaupapa is the western section. The opposite, or eastern, side is called Kalawao.

In 1918 there were 702 residents at the settlement, 608 of whom were lepers. While the lepers are allowed land which they can cultivate, they derive their chief support from the government, which does everything possible to alleviate their unfortunate condition. Separate homes are maintained for the boys and girls of lepers, and for those who are helpless. There is also a general hospital and a nursery.

The Federal Leprosy Investigation Station which was started at the settlement has been removed to Oahu, where it is operated in connection with the Kalihi Hospital with a trained bacteriologist in charge. As the result of investigations carried on at this station, remedies have been discovered which appear in certain cases to have brought about a cure for the dread disease of leprosy.

Leper Settlement at Kalaupapa.

LANAI

Lanai is on the lee side of West Maui, its nearest point being nine miles distant. The island contains 139 square miles.

Lanai is a single cone 3400 feet high. On the west or lee side of the island there are cliffs three or four hundred feet high in places. This side of the island consists of a gently sloping plateau, or a succession of terraces.

Being on the sheltered side of Maui, Lanai does not show much erosion, though there are a number of small gulches. There are some springs on the island and one running stream.

There are small forest trees on the summit, and the plateau on the lee side is fine grazing land, but otherwise the island is barren.

Lanai is devoted to cattle and sheep raising. It is entirely free from noxious weeds.

There are two small government schools on the island.

KAHOOLAWE

Kahoolawe is the smallest of the inhabited islands of the group, containing 69 square miles.

The island consists of a single cone, 1472 feet high. It is almost entirely surrounded by cliffs, which are 200 feet high in places.

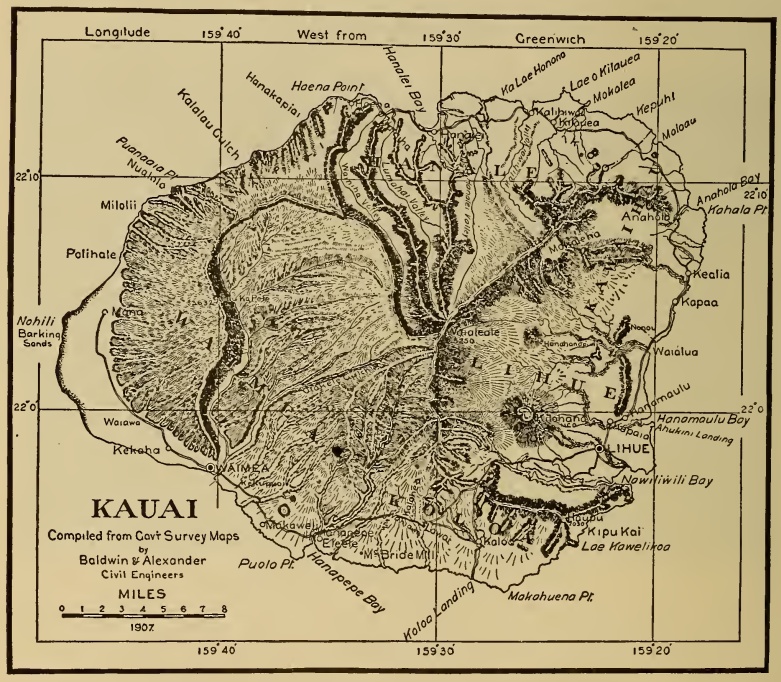
Being on the protected side of Maui, the island presents an even, unbroken surface. There are no streams or even springs on the island, which has very little vegetation.

Kahoolawe supports but a few head of cattle or sheep, and is of hardly any commercial value.

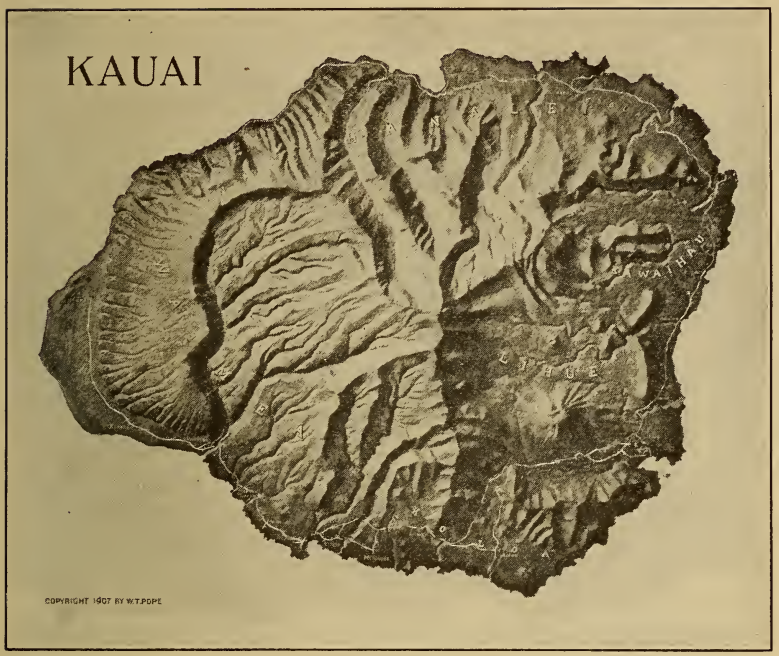
There are usually a few herders living on the island.

KAUAI

Physical Features. — Kauai is at the extreme northwest end of the main group, and is the smallest of the four larger islands. Its area is 547 square miles, which is 51 square miles less than that of Oahu.



Kauai is nearly circular, and, with the exception of the Mana flat, which is composed of an uplifted coral reef, could be included in a circle whose radius is a line from the Nawiliwili lighthouse to a point in the head of the Wainiha Valley west of Waialeale.



The coast line of Kauai is very regular, containing no prominent capes, or bays of any extent. The so-called Haena Point is one of two spurs of the Wainiha ridge, forming a headland which is separated from the sea by the coastal plain which forms Haena flat.

Hanalei Bay, which is as large as Kealakekua on Hawaii, is a typical Hawaiian inlet, with its protecting coral reef and passageway. Nawiliwili Bay has sea room for only small-sized vessels.

The shore is low, except on the northwest, where there are high cliffs extending along the coast for fifteen miles.

Owing to the depth of water near the shore, there are no coral reefs of any extent. It may be that there were such reefs off the coast of Kauai at one time, but the space between the reef and the shore has been filled with wash from the slopes above, thus adding to the coastal plain.

Waialeale. — Kauai is made up of the mountain mass of Waialeale, 5250 feet high. From the summit the ridges radiate in all directions, though on the eastern side they are very short.

The eastern and northern sides have been tremendously eroded, and on the east there is left scarcely a vestige of the original slope which is indicated by only a few short ridges. The opposite side is furrowed by a number of deep gorges, but the original contour is still preserved in the wide spaces between them, which comprise the upper cane fields of the plantations on this side of the island.

These ridges are low near the sea, and are gradually lost in the coastal plain, but become narrow and precipitous as the gulch extends inland, finally forming a veritable canyon.

The Hoary Head ridge on the southeast is a part of the original backbone of the mountain which was intersected by the gap north of Koloa, through which the government road to Lihue passes. The highest point of this ridge is Hoary Head (Haupu), 2030 feet high.

The Waimea gulch, which extends across the western slope of Waialeale, intersecting all the ridges on this side of the island, is not wholly the result of erosion, but originated in a fissure.

Originally Waialeale must have been much higher than it is now. The soil has been washed from the summit and slopes to form the coastal plain which encircles Kauai, with the exception of the northwest side.

From the amount of erosion that has gone on, we infer that Kauai is the oldest island of the group.

The section of the mountain between the Wainiha and Waimea valleys has a gentle slope towards the latter gulch, and is of a boggy nature. Were it not for the deep Koaieaie gorge which intersects it, this region would consist of almost a continuous swamp. Sections of this bog are covered with a thin turf, and are impassable. In ancient times, it is said, the northern section of the morass was crosssed by a path made of logs, but the passage was a hazardous one, for the logs were submerged in

places, and it was difficult to find this path in the dense fog which usually covers the mountain.

This swamp is the reservoir which feeds all the streams that go to make up the Waimea, Makaweli, and Hanapepe rivers, making a splendid watershed for the lee side of the island, which is thus abundantly supplied with water even though it may not rain for months at a time.

Owing to the difficult nature of the trip to the summit, which can be reached only by skirting the bog, Waialeale has seldom been ascended. For many years the true height of this mountain was not known.

Napali. — The northwest side of Kauai, known as Napali, is similar to the windward or North Kohala section of Hawaii, and the northeast or Wailau and Pelekunu section of Molokai, showing remarkable cliffs of the same kind rising almost perpendicularly from the sea to a height of more than a thousand feet in some places. However, it is to be noticed in this case that the cliffs are on the northwest, where they are partly protected from the wind, instead of being on the windward side of the island as in the cases of Hawaii and Molokai.

The gulches in this Napali section are short, ending at the ridge back of Waimea Valley. They show the effects of much erosion in many needle-like shafts and in wide amphitheaters at their heads. In that part of this section farthest south these gulches enter the sea through narrow, canyon-like walls, cutting off all view of the interior.

The Kalalau Valley is the largest of the gulches in this region. In ancient times there were a large number of natives living here, but only a few huts remain at present. It was among the inaccessible ridges in the head of this gulch that the leper Koolau intrenched himself, eluding all efforts of the authorities to capture him.

Some of the finest scenery in the Hawaiian Islands is to be found in this Napali region, but owing to its inaccessibility the place is seldom visited. There is a trail along the cliffs as far as Kalalau, but beyond this the journey to Mana must be made by a canoe trip of seven miles.

Valleys. — Kauai is noted for its gulches, which are among the finest in the world. They are longer than the gulches on the other islands, and are very deep in their upper portions, being confined between canyon-like walls. These gulches all contain large streams of water which, as they spread out on the low, flat lands of the coastal plain, are called rivers.

The Olokele Canyon, Kauai.

So inaccessible is the interior of Kauai that its real nature was not known till it was penetrated by the plantation tunnels and ditches in search of water. So the Olokele tunnel disclosed the wonderful canyon from which the ditch takes its name, and the Kauai Electric Company's ditch opened up the magnificent scenery in the great Wainiha gorge.

The Wainiha Valley is undoubtedly one of the finest of our Hawaiian gulches. This gulch has cut its way between perpendicular walls, several thousand feet high in its upper part, into the very heart of Waialeale, almost intersecting the ridge upon which the peak stands.

The Hanalei Valley contains the largest stream of any of our Hawaiian gulches. It is navigable for boats and small steam launches for three miles. The river is used for transporting the rice grown in the gulch.

Between the Hanalei and Wainiha valleys is the Lumahai

River. The Lumahai is now spanned by a bridge, and so has disappeared the last of the Kauai ferries, which were a characteristic feature of travel in this region at one time.

Wailua and Hanapepe are chiefly noted for their beautiful waterfalls. Boats can sail up the former for a distance of a mile and a half. The two branches of the Wailua unite near the sea, where the sea has cut its way through a ridge, forming a deep gorge.

The Waimea Canyon plays an important part in the drainage of the west side of the island, intersecting the slope of the mountain on this side and turning all the streams through its own channel toward the south, thus depriving the extreme western section of Kauai of any running streams of water. The scenery in this gorge has been compared with that of the Grand Canyon of the Colorado.

The Makaweli gulch has worn away the intervening ridge near the sea, and is now a branch of the Waimea; the Olokele in turn is a branch of the Makaweli.

Secondary or Tufa Cones. — There are a number of secondary cones on Kauai that have played an important part in the general topography of the island. These cones, like those on Oahu, were formed after the island had attained its present state of erosion. Some of the craters in these cones are used as reservoirs by the plantations.

The largest of these cones is the Kilohana crater west of Lihue, which is 1100 feet high. The material ejected from this crater covers all the region from the Hoary Head ridge to the Wailua River, burying beneath its débris the valleys and ridges that existed here at one time. The streams have been forced to cut new channels through this débris, flowing around the cone into the Wailua River on one side and the Huleia on the other.

In a similar manner the valleys and ridges of the mountain spur on the northeast have been covered up by material ejected from craters in that region. The bowl in one of these craters is used as a reservoir by the Kilauea Plantation.

At Koloa a dam has been constructed across the gap in an

old cone, and the lake thus confined furnishes a fine water supply for the plantation.

The cones near the Koloa landing mark the site of a comparatively recent pahoehoe outbreak, which was the last eruption on Kauai.

Haena Caves. — In the cliff at Haena there are a number of caves. Two of them are at sea level and are filled with water, that in one of them being entirely sweet. These caves are enlarged chambers of old lava tunnels, and evidently extend into the cliff for some distance. Owing to the water with which they are filled, it is impossible to explore them. A canoe has been placed in one of the caves for visitors.

Barking Sands. — The barking sands consist of a range of wind-blown sand hills half a mile in length, extending from Nohili towards Polihale. When thoroughly dry, this sand becomes resonant whenever its grains are set in motion.

While these sands are called "barking sands," they emit a great variety of sounds, according to the method of friction; at times the sound resembles subterranean thunder; again it will be a sighing or a faint groaning as of some one in pain; as the wind forms little cascades, there is a rustling sound as from a lady's silk skirts. The act of sliding down the sand hills produces a sound having cadence periods; they were probably named for this.

This phenomenon is a rare one, being common to only a few places in the world. It is said that there is a hill of barking sand at Makua on Oahu. In climate this latter place is similar to Mana, which is one of the hottest and driest spots of the group.

Vegetation. — At one time Kauai was covered with forests on the north and east to the water's edge, when it must have presented a very tropical appearance; this, taken together with the fact that the island is well watered in every part with running streams, undoubtedly gave it its sobriquet, "The Garden Island."

Industries. — An almost continuous belt of sugar cane girds the island of Kauai from Mana to Kalihiwai on the north.

All the lowlands of the coastal plain and valley bottoms are

planted with rice. The area on the north planted with rice exceeds that of any other part of the group. Rice mills are located at Waimea and Hanalei.

Pineapples are grown at Kapaa on the northeastern section of Kauai, and near Lawai in the southeastern part, where there are canneries.

On the uplands of Kauai there are a number of cattle ranches. At Hanalei buffalo grass has been sown in the fields, greatly improving the pasture.

KAUAI, THE "GARDEN ISLAND" (WAINIHA VALLEY).

The splendid water sources of Kauai have not only been utilized to bring under cultivation nearly all of the arable land on this island, but have been the incentive for a further step in the development of the sugar industry of the group, through the evolution of the tunnel-ditch and the application of electricity on a large scale to the running of plantation machinery.

The Kekaha Plantation [1] completed a new ditch in 1907, bringing the Waimea Valley water into its fields. Previous to this only the land on the low coastal plain was cultivated, but now a portion of the upland is planted as well. Pumps are still used for irrigation in some of the lowlands.

A great deal of made land has been added to this estate by the construction of dams, which caused the sediment carried in flood water to drop as its velocity was checked.

Makaweli, which is one of the most prosperous plantations of the group, occupies what was once a dry *kula*, capable of supporting but a few head of horses and cattle. Water was first

[1] See Appendix A for list of plantations.

secured from the Hanapepe Valley, and later from the Olokele canyon, which is the main branch of the Makaweli stream. These two ditches give an abundant supply of water even in the driest weather. The building of the Olokele ditch was a great engineering feat, the upper portion being a continuous tunnel for six miles within the cliff of the wonderful Olokele canyon.

The McBryde Sugar Company secures its water supply from pumps in the Hanapepe Valley, which are operated by electricity. This electricity is developed by water power in the Wainiha gulch on the opposite side of the island, and conveyed to the pumps by a system of wires and poles thirty-five miles long. The cane land of this plantation extends from Hanapepe into Koloa.

Koloa and Lihue are two of the oldest plantations on the Hawaiian Islands. The Lihue Plantation includes Hanamaulu. There is a separate mill at the latter place. Both plantations secure water from mountain streams and a system of reservoirs.

At Kealia there are a number of flowing artesian wells.

Kilauea is well watered, but the soil here is poor.

Transportation. — The Kauai Railway connects the Makaweli, McBryde, and Koloa plantations with Port Allen (Eleele) in Hanapepe Bay, where deep-sea vessels bring supplies for the plantations, taking sugar as a return cargo. The open roadstead at Port Allen has been protected with a breakwater which permits ships to approach fairly close to the shore, but which does not afford sufficient shelter from storm winds.

Aside from the three mentioned, the Kauai plantations maintain their own landings, with Honolulu as the distributing center. One of the best landings is at Ahukini in Hanamaulu Bay, where vessels can lie alongside the wharf, or very nearly so. The Lihue Plantation sugar is shipped from this landing.

Nawiliwili is the chief mail and passenger port for Kauai, though the landing is a rough one as it is exposed to the trade wind. Plans are ready for building a breakwater and deepening the bay by dredging, thus making a good harbor.

Districts. — The districts of Kauai are Waimea, Koloa, Lihue, Kawaihau, and Hanalei (including also Napali).

Waimea is the largest of these, occupying the whole western

part of the island, which includes the entire dry section of Kauai. This district includes also the island of Niihau.

Hanalei occupies the largest part of the northern section of the island; this is an extremely wet district, having as great a rainfall as Hilo on Hawaii.

Places. — Lihue is the county seat of Kauai County. The village is scattered along both banks of the Nawiliwili gulch. The wireless station is located near the Nawiliwili landing.

Waimea Village.

Waimea village is at the mouth of the Waimea River. At one time there was a large native population here, when it was the capital of Kauai. Captain Cook first landed on the Hawaiian Islands at the mouth of the Waimea River. On the bluff east of the river mouth are the ruins of a Russian fort built in the year 1815, ostensibly for Kaumualii, the king of Kauai, but with the secret purpose of annexing the island to Russia.

Koloa is a pretty village near the extreme southeast end of the island. The landing for the village is an open roadstead two miles away; this was the chief port for Kauai at one time.

Hanapepe, Eleele, and Kapaa are important villages. At each of the plantation mills there are also good-sized settlements.

Hanalei is one of the most picturesque parts of the group. The view looking down into the gulch from the east bank, with the broad river winding through rice fields in the foreground and the bay and cloud-capped peaks and ridges in the distance, is one of unsurpassed beauty.

HANALEI VALLEY, KAUAI.

There is a small settlement at Wainiha near the mouth of the river. The Kauai Electric Company's power house is located two miles above in the gulch.

NIIHAU

Niihau is 17 miles west of Kauai, from which it is separated by a deep channel. The island contains 97 square miles, and its highest point is 1300 feet above sea level.

This island has a high middle section, with a low plain at each end. On the north are precipitous cliffs where the highland joins the flat. Water is pumped from shallow wells. The island, which is a private estate, is devoted to sheep raising.

The famous Niihau mats are made from a reed that grows in the marshes. This reed has a red base; otherwise it is similar to the rushes found on other parts of the group. The mats are made chiefly at Mana on Kauai. A small white shell is found on the beaches, which is strung into necklaces.

With one or two exceptions, the people of Niihau are Hawaiians. The government maintains a school and road here.

APPENDIX A

OAHU

CAPES	BAYS AND HARBORS	TOWNS AND VILLAGES	PLANTATIONS
Kahuku Point			Honolulu Plantation Co.
Mokapu Point	Honolulu Harbor	Honolulu	
Makapuu Point	Pearl Harbor	Watertown	Oahu Sugar Co.
Diamond Head	Kaneohe Bay	Aiea	Ewa Plantation Co.
Barber's Point	Waialua Bay	Pearl City	Waianae Co.
Kaena Point	Kahana Bay	Waipahu	Waialua Agricultural Co.
		Ewa Mill	
		Waianae	Kahuku Plantation Co.
		Waialua	
		Schofield Barracks	Waimanalo Sugar Co.
		Wahiawa	
		Kahuku	Laie Plantation
		Laie	
		Hauula	
		Waikane	
		Heeia	
		Kaneohe	
		Waimanalo	

MOUNTAINS

	HEIGHT
Kaala Waianae Range	4030 feet
Palikea Waianae Range	3111 feet
Konahuanui	3105 feet
Lanihuli	2775 feet
Tantalus (Puu Ohia)	2013 feet
Olympus (Awawaloa)	2447 feet
Round Top (Ualakaa)	1049 feet
Punchbowl (Puowaena)	498 feet
Diamond Head (Leahi)	761 feet

HAWAII

CAPES	BAYS	PLACES	PLANTATIONS
Upolu Point	Hilo Bay	(Kohala)	(Kohala)
Kumukahi Point	Kealakekua Bay	Kawaihae	Puakea Plantation Co. (Planters only)
South Point (Ka Lae)	Kawaihae Bay	Mahukona	
	Kailua Bay	Hawi	Hawi Mill and Plantation
		Kapaau	
		Makapala	Union Mill Co.
		Waimea	Kohala Sugar Co.
			Halawa Plantation
		(Hamakua)	Niulii Mill and Plantation
		Waipio	
		Kukuihaele	

MOUNTAINS

	HEIGHT
Mauna Kea	13,825 feet
Mauna Loa	13,675 feet
Hualalai	8,269 feet
Kohala Mountains	5,489 feet
Crater of Kilauea	4,000 feet

(*Continued on next page.*)

HAWAII — *Continued*

PASSENGER AND MAIL LANDINGS	PLANTATION LANDINGS	PLACES	PLANTATIONS
	Kukuihaele	Honokaa	(Hamakua)
Kawaihae	Honokaa	Paauhau	Pacific Sugar Mill
Mahukona	Paauhau	Paauilo	Honokaa Sugar Co.
Laupahoehoe	Honohina	Kukaiau	Pauhau Sugar Plantation Co.
Hilo	Hakalau	(Hilo)	Hamakua Mill Co.
Honuapo	Honomu	Ookala	(Hilo and Puna)
Hoopuloa	Pepeekeo	Laupahoehoe	Kaiwiki Sugar Co. (Ookala)
Hookena	Papaikou	Papaaloa	Laupahoehoe Sugar Co.
Napoopoo	Wainaku	Hakalau	Hakalau Plantation Co.
Keauhou	Punaluu	Honomu	Honomu Sugar Co.
Kailua		Onomea	Pepeekeo Sugar Co.
		Papaikou	Onomea Sugar Co.
		Hilo Town	Hilo Sugar Co.
		(Puna)	Hawaii Mill Co.
		Keaau (Nine Miles)	Waiakea Mill Co.
		Mountain View	Olaa Sugar Co.
		Pahoa	(Kau and Kona)
		Kapoho	Hawaiian Agricultural Co.
		Kalapana	Hutchinson Sugar Plantation Co.
		(Kau)	Kona Development Co.
		Pahala	
		Hilea	
		Honuapo	
		Naalehu	
		Waiohinu	
		(Kona)	
		Papa	
		Hookena	
		Honaunau	
		Napoopoo	
		Kealakekua	
		Konawaena	
		Keauhou	
		Holualoa	
		Kailua	

MAUI

CAPES	BAYS	PLACES	PLANTATIONS
Kahakuloa Point	Kahului	Lahaina	(Lahaina)
Kauiki Head	Maalaea	Olowalu	Pioneer Mill Co.
	Hana Bay	Waikapu	Olowalu Co.

MAUI — *Continued*

MOUNTAINS	HEIGHT
Haleakala	10,032 feet
Puu Kukui	5,788 feet
Eke	4,500 feet

LANDINGS	
Kahului	Kihei (Maalaea Bay)
Keanae	Olowalu
Nahiku	Lahaina
Hana	Kaanapali (Kekaa)
Kipahulu	Honolua
Kaupo	
Makena	

PLACES	PLANTATIONS
Wailuku	**(Wailuku)**
Waihee	Wailuku Sugar Co.
Kahului	Hawaiian Commercial and Sugar Company Plantation
Puunene	
Spreckelsville	
Paia	
Haiku	
Hamakuapoko	**(Makawao)**
Makawao	Maui Agricultural Co. (Paia)
Pauwela	
Huelo	
Keanae	**(Hana)**
Hana	Kipahulu Sugar Co.
Kipahulu	Kaeleku Plantation Co.
Kaupo	
Ulupalakua	
Kihei	

KAUAI

CAPES	BAYS
Haena Point	Hanalei Bay
	Hanamaulu Bay
	Nawiliwili Bay

MOUNTAINS	HEIGHT
Waialeale	5250 feet
Hoary Head (Haupu)	2030 feet
Kilohana Crater	1100 feet

LANDINGS	
Nawiliwili	Wainiha
Ahukini	Koloa
Kapaa	Port Allen
Anahola	Lawai
Kilauea	Makaweli
Hanalei	Waimea

PLACES	PLANTATIONS
Lihue	Kilauea Sugar Plantation Co.
Kapaia	Makee Sugar Co. (Kealia)
Hanamaulu	Lihue Plantation Co.
Kapaa	Grove Farm Plantation (Planters only)
Kealia	Koloa Sugar Co.
Anahola	McBryde Sugar Co.
Kilauea	Hawaiian Sugar Co. (Makaweli)
Kalihiwai	Gay and Robinson (Planters only)
Hanalei	Waimea Sugar Mill Co.
Wainiha	Kekaha Sugar Co.
Haena	
Koloa	
Lawai	
Eleele	
Hanapepe	
Makaweli	
Waimea	
Kekaha	
Mana	

MOLOKAI

MOUNTAINS	HEIGHT
Kamakou	4958 feet
Olokui	4600 feet

LANDINGS
Kaunakakai
Kamalo
Pukoo

OTHER ISLANDS

	HEIGHT
Lanai	3400 feet
Kahoolawe	1472 feet
Molokini	160 feet
Niihau	1300 feet

APPENDIX B

DISTANCES

Honolulu to	MILES
Kalaupapa	52
Lahaina	72
Kahului	90
Hana	128
Maalaea	86
Makena	96
Mahukona	134
Kawaihae	144
Kailua on Hawaii	157
South Point (Ka Lae)	233
Honuapo	244
Hilo (direct)	192
Hilo (via Kawaihae)	230
Nawiliwili	98
Koloa	102
Waimea	120
Hanalei	125

APPENDIX C

	MILES WIDE
Oahu Channel (Kaiwi)	23
Molokai Channel (Pailolo)	8
Maui Channel (Auau)	7
Hawaii Channel (Alenuihaha)	26
Kauai Channel (Kaieie Waho)	63

APPENDIX D

	Area in Square Miles	Length in Miles	Width in Miles	Population 1920
Hawaii . . .	4015	90	74	64,895
Maui	728	46	30	36,080
Molokai . . .	261	40	9	1,784
Lanai	139	21	8	185
Kahoolawe . . .	69	14	7	3
Oahu	598	46	25	123,496
Kauai . . .	547	25	22	29,247
Niihau . . .	97	18	7	191
Midway . . .				31
Total	6454			255,912

APPENDIX E

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APPENDIX F

PRONUNCIATION OF HAWAIIAN WORDS

A is sounded as in f*a*ther, *e* as in th*ey*, *i* as in mar*i*ne, *o* as in n*o*te, *u* as in r*u*le or as *oo* in m*oo*n.

Ai when sounded as a diphthong resembles the English *ay* in the word *aye* (yes), or the English *i* in b*i*te; and *au* resembles the English *ou* in l*ou*d.

The accent of most of the words in the Hawaiian language is on the penult (the syllable next to the last). A few of the proper names are accented on the final syllable, as Hanapepe′, Kamalo′, Waikiki′, etc. *W* is sometimes sounded as *v*.

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