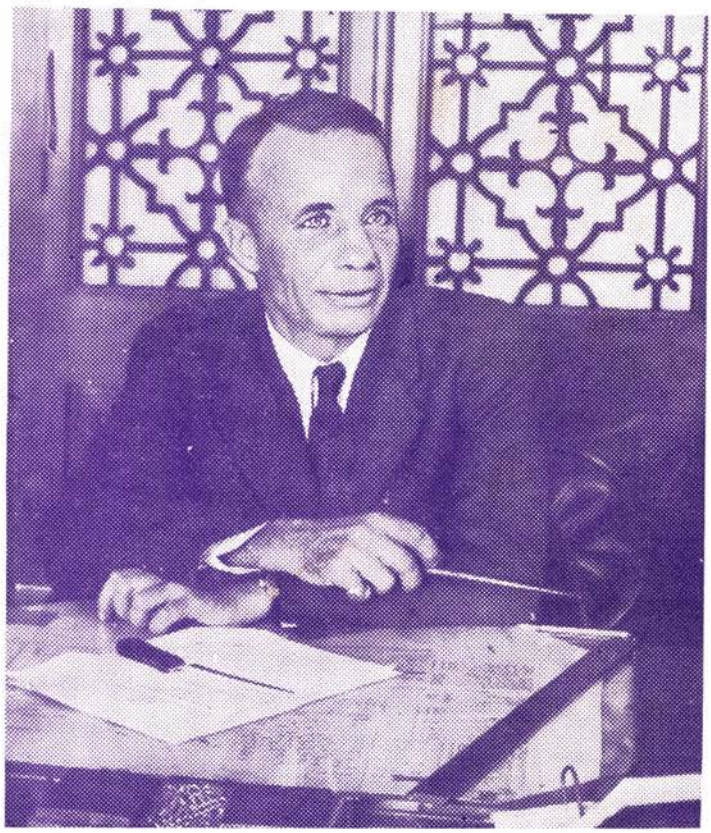
Vol. XLIV. No. 1 25 Cents July, 1932

MID-PACIFIC MAGAZINE



Hon. Theodore Roosevelt, Governor-General of the Philippine Islands, and an Honorary Vice-President of the Pan-Pacific Union.

The Mid-Pacific Magazine

CONDUCTED BY ALEXANDER HUME FORD

Volume XLIV **Number 1**

CONTENTS FOR JULY, 1932

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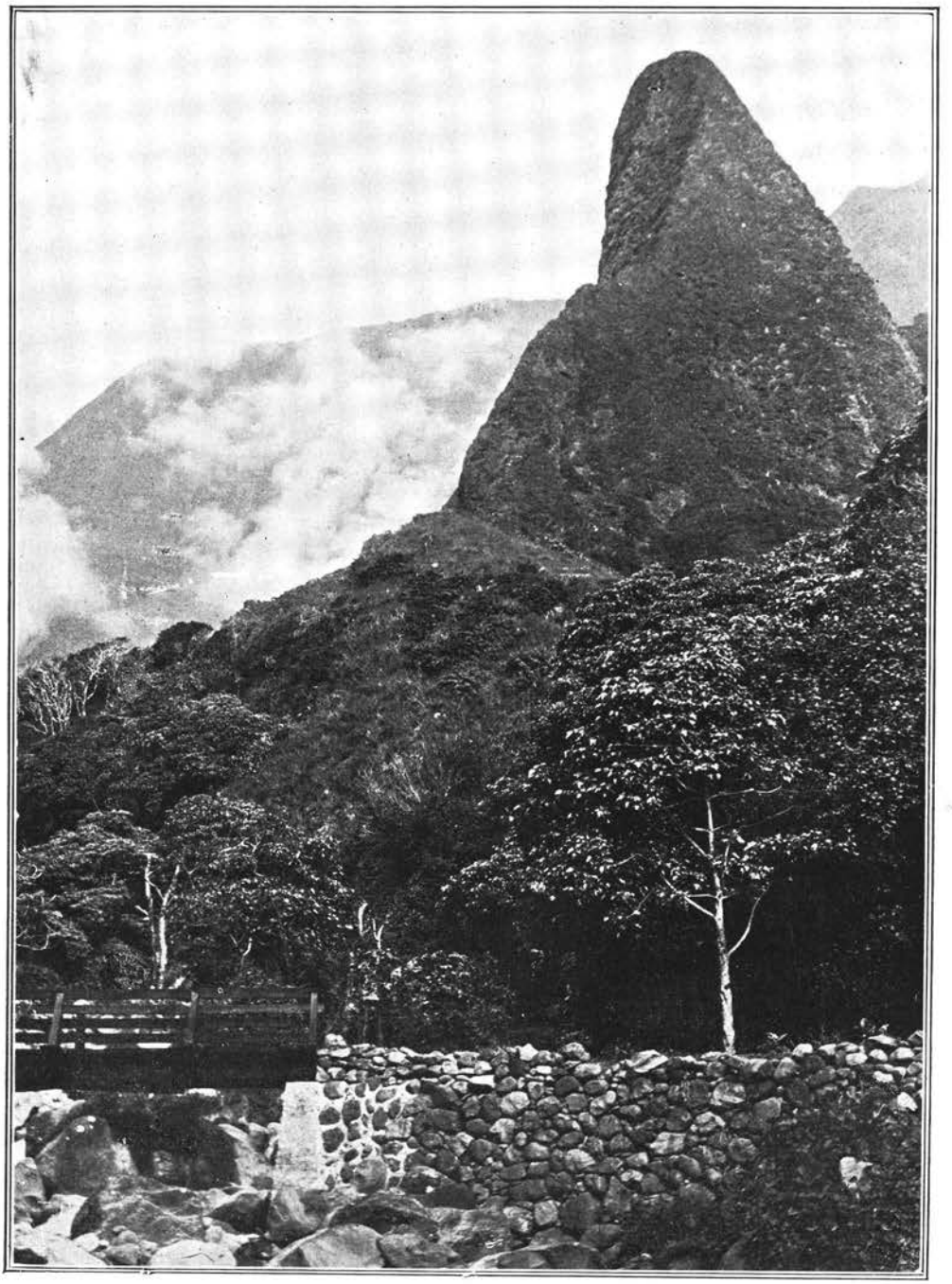
Published monthly by ALEXANDER HUME FORD, Pan-Pacific Club Building, Honolulu, T. H. Yearly subscription in the United States and possessions, $3.00 in advance. Canada and Mexico, $3.25. For all foreign countries, $3.50. Single Copies, 25c.
Entered as second-class matter at the Honolulu Postoffice.

Printed by the Honolulu Star-Bulletin, Ltd.



The famous needle that guards the entrance to Iao Valley on the Island of Maui, the Yosemite of the Hawaiian Islands; a striking example of the erosive powers of the elements. The silvery-green leaved kukui tree at the foot of the needle is found in all the volcanic islands of the South Pacific. From its bark the Hawaiians extracted a dark-brown dye with which they colored their fish nets.

The leaves of the pandanus have been used for years as thatch for native houses.

Early Plant Life of Hawaii

Together with a Partial List of Some Later Introductions

Compiled by GERRIT P. WILDER

Presented at a Meeting of the Hawaiian Civic Club

How did this group of islands called the Hawaiian Islands come to be here? The answer is generally conceded to be by volcanism.

Volcanoes are arranged along lines of weakness in the earth's crust. Molten lava from the earth's interior, escaping through cracks at sea bottom, piles itself up until the accumulations eventually arrive at sea level, and islands are formed; some large, some small, some high, and some low.

Once formed, destructive processes began and their shapes changed. When torrential rains descended, cracks in the earth were formed, growing larger through erosion; valleys resulted. Rocks disintegrated and their dust accumulated, forming pockets of loose material.

Seaweeds washed upon the shores, decayed and formed humus; then moss grew. After long periods of time had elapsed, there came to these islands plant seeds which took root in the soil that was ready and waiting for them.

From whence and by what means did these seeds reach these islands? In some instances the seeds were blown along in the track of the hurricanes which carried them great distances. Migratory birds, as well as other birds swept along before severe storms, doubtless brought some seeds on their feet and attached to their feathers. Driftwood might have brought certain seeds whose germinating qualities survived immersion in sea water.

An intermingling of ocean currents through feeders, at times when gales pre-

vailed, might, as Hillebrand has suggested, account for the presence in these islands of important Andine elements of American flora.

I am strongly of the opinion that there existed many years ago islands adjacent to the present Hawaiian group, as well as other islands within the Bird Reservation which have since disappeared; soundings have been taken lately and recorded by the Coast and Geodetic Survey, which show a number of submerged reefs of large areas, notably that which extends in a southwesterly direction from Necker Island.

The endemic fauna on Laysan, 850 miles from the Hawaiian group, could only have reached there by some land-bridge formation which has since disappeared; therefore it seems probable that some of the flora may also have come to these islands in the same manner from the continent of America.

It can readily be understood that, by such slow processes, comparatively few plants reached these islands; those that did, however, gradually developed into distinct species. Fornander, the historian, states that that branch of the Polynesian family from which the oldest ruling line of the Hawaiian Chiefs claim descent arrived at the Hawaiian group during the sixth century of the Christian Era. They, somewhat like the plants that had preceded them, had come by stages, voyaging daringly in unknown seas and sojourning in various islands of the South Pacific.

Long periods of time had elapsed since their progenitors migrated from the homeland in the Asiatic Achipelago, before our branch of the Polynesian family settled in these Hawaiian Islands where, it is reported, they remained isolated for from twelve to fourteen generations, a Hawaiian generation being about twenty-five years.

At this period the initial plant life of these islands had become well established and, due to the long isolation, a great number of endemic plants resulted. Endemic plants are those growing in a restricted locality. Indigenous plants may grow naturally in a number of regions.

Hillebrand estimated that about 80 per cent of the plant life found growing in Hawaii by the whites was endemic. One of the finest examples of these is the koa tree (*Acacia koa*), a true native of Hawaii. This species must have been established in very early times. The great tree moulds of the Kau district near Kilauea Volcano attest to the immense size attained by some of them, whose age has has been estimated at several thousand years.

Large forests of these splendid specimens, from which the Hawaiians made their great canoes, may still be seen growing in the principal islands of the group, and particularly fine are those on the island of Hawaii above Waiohinu, and at Kahuku in the Kau District.

During my years of voyaging among the islands of the South Pacific, I have never found the *Acacia koa*. Valuable additions to the already existing plant life of the Hawaiian Islands were made by the Polynesian voyagers themselves, who brought with them from islands south of the equator such food plants as:

Taro (*Colocasia antiquorum*, var. *esculenta*)
Coconuts (*Cocos nucifera*)
Breadfruit (*Artocarpus incisa*)
Sweet potatoes (*Ipomea batatas*)
Bananas (*Musa paradisiaca*)
Sugar cane (*Saccharum officinalis*)
Pia (Arrow Root) (*Tacca pinnatifida*)
Olena (tumeric) (*Curcuma longa*)
Ohia ai (mountain apple) (*Eugenia malaccensis*)
Ti plant (*Taetsia fruticosa*)
Uhi (yam) (*Dioscorea pentaphylla*)

They brought, also, the paper mulberry (*Broussonettia papyrifera*), from the inner bark of which they made a cloth called kapa; also *Piper methisticum*, from the macerated roots of which was extracted a juice for the making of a drink known as awa.

Listed as having been introduced by Polynesian voyagers of prehistoric times, we find such splendid trees as the kamani (*Calophyllum inophyllum*) and the *Terminalia catappa*, also called kamani by

the natives. The latter produces a small, edible kernel within the tough fibrous fruit, hence its name, "Tropical almond."

These splendid trees were held sacred by the Hawaiians, who made idols from their hard tough wood. The original trees of *Calophyllum inophyllum*, referred to in Vancouver's voyages, are still to be seen in the Halawa Valley, Molokai.

The kou (*Cordia subcordata*) was highly prized on account of its very beautifully grained wood from which were made fine calabashes for domestic use.

Various plants were held sacred by the ancient Polynesian people, and strict ceremonies accompanied their planting and setting out. The Hawaiians feel that the moon has a great influence upon growing plant life, and in consequence plantings were carefully planned for the proper lunar periods. Certain plants and flowers were held sacred to certain gods and goddesses and were always offered to them.

When the early Polynesians made their long voyages they took with them not only their foodstuffs but carried growing plants as well. In this wise the first breadfruit plant was brought to Oahu from either Samoa or Tahiti some four hundred years ago by a Hawaiian named Kahai, who had piloted his great canoe from Hawaii to the islands of the South Seas and back again. Landing at what is now Pearl Harbor, the breadfruit tree was carried overland across the Koolau mountains and presented to the King, then living at Kualoa. He commanded it be planted in the Hakepuu Valley, Oahu.

If we begin at the seashore and enumerate the plants with which we in Hawaii have all our lives been familiar, we shall realize what a large number of valuable plants were very early introductions to these islands. At sea level as well as further inland one sees the puhala (Pandanus), the leaves of which are used as thatch on native houses; mats and baskets are also plaited from the lauhala (puhala). There are several varieties of Pandanus in these islands, one bearing red fruits, another yellow fruits, still another whose fruits are yellow tipped with red. These brilliant tips are removed and the edges cut into scallops and strung into leis which when partially dry become very fragrant and are much esteemed by the Hawaiians.

The pilikai is a vine found commonly along our shores. The pohue kai is a trailing vine, bearing pale purple flowers used medicinally by the Hawaiians.

A trailing perennial herb called nohu (*Tribulus cistoides*), bearing small yellow flowers and hard sharp burrs, is always an annoyance to the barefoot pedestrian. One of the very common plants in the open flat country is the ilima, a small species related to the hibiscus. It covers waste places on the dry hillsides. When strung into leis, the ilima is much esteemed for personal adornment.

In swampy places grows the common rush called akaakai (*Scirpus lacustris*), and in the more salty places grows the succulent akulikuli, which is especially abundant along the Ala Moana as well as out near the fishponds of Koko Head. Another plant which resembles the akulikuli is the aeae (*Lyceum sandwicense*). Its mature fruit, a small berry, produces a red juice which was used as a dye.

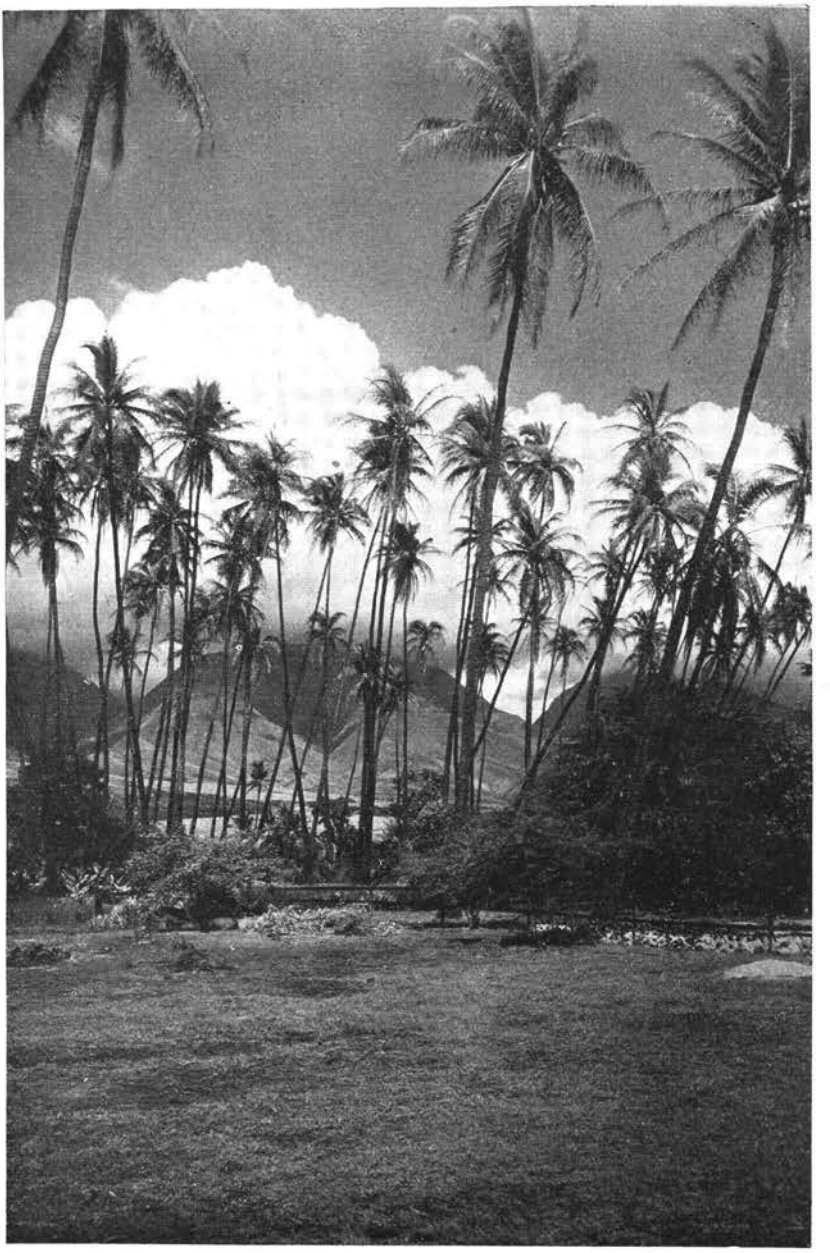
Kamole (*Jussiaea suffruticosa*) growing in the kalo patches is very common in Hawaii.

Kaluha (*Killingia monocephala*) one of the Cyperaceae, grows in sandy soil and moist places; its grasslike stems were used medicinally by the natives.

Kalioopu (*Cyperus auriculatus*) is a weed which also grows in swampy places; this was well known to the Hawaiians for its healing properties.

Perhaps one of the most useful plants was the ehuawa (*Cyperus laevigatus*) found growing near brackish water. This plant was cultivated by the Hawaiians; its bruised stems matted together form a mass of fibers used in straining liquids. Grated coconut was squeezed in it to express the milk or cream.

Another plant which is common along



No Polynesian scene is complete without the graceful and picturesque coconut palm. No copra is manufactured in Hawaii, however, as is done in other Polynesian islands.

the borders of fishponds is *Batis maritima,* known to the natives as akulikuli because of its resemblance to other plants of that name. This was probably introduced by accident, as it is found in many places in the Pacific area, even in Lower California—its seeds might have come in straw or hay.

In the low, wet lands of Kakaako, Oahu, the makaloa (*Scirpus maritima*) was plentiful in former days. It was this small rushlike plant that gave the natives a most wonderful material from which to make their beautiful mats; it has always grown to perfection on the island of Niihau, whose fine mats are justly famous. Nowhere else in the Pacific area have the Polynesians been able to produce such finely woven mats as are made from this species of makaloa, which is peculiar to Hawaii.

One of the noxious weeds which often appeared after the winter rains in early days, covering the plains near Honolulu, was a plant bearing a burr called kikania (*Xanthurium strumarium*). This unpleasant burr attached itself to the tails of horses and cattle, and in this way was carried from island to island when the stock was shipped.

The anapanapa, also known as kukuku (*Colubrina asiatica*), is a sprawling shrub or low bush generally found growing near the seashore; its leaves and green fruit when bruised in water produced a lather used in washing clothes.

On the land which is now the residential district about Thomas Square, Honolulu, and further out towards Punahou, was often found in olden days a vine bearing pretty flowers known to the natives as puahiiaka (*Jacquemontia sandwicense*). This flower was dedicated to the Goddess of the Volcano, Hiiaka. It is now very rare.

The pili grass (*Heteropogon contortus*), which supplied thatch for native houses, still grows on the slopes of Diamond Head, also in the dry sections of the Waianaes. The grass is also found on the other islands of the group, but stock-ranging keeps it greatly reduced. It is to be regretted, however, that today one seldom sees a thatched house.

The Hawaiians knew the medicinal qualities of many plants, among them nanea, or pulihilihi (*Vigna lutea*), a vine growing along the seashore and bearing small yellow flowers and a beanlike pod.

Roots and leaves of the makou, a small herbaceous weed growing near the sea, were boiled and made into a tea used in stomach disorders.

Kowali awahia (*Ipomea insularis*), a vine delonging to the Convolvulaceae, is found commonly growing in the lower woods. Its roots contain a very powerful cathartic, which must be used with discretion. Its leaves and stems, when bruised, are applied to bruises and sprains.

Kamanamana (*Adenostema viscosum*), a small plant common to all these islands, was of very early introduction. A tea made from its leaves and flowers was used as a remedy for sore throats.

The puakala (*Agemone mexicanum*) was an introduced plant, bearing large white flowers resembling the poppy. When its thorny stems and leaves were cut or broken there issued a yellow acrid juice which the Hawaiians used as a remedy for toothache. This shrub was very common on the plains about Honolulu fifty years ago; today an occasional specimen is seen in dry sections of the Kaimuki district, Oahu.

Another plant used medicinally was auhuhu or hola (*Tephrosia piscatoria*), a small shrub whose white flowers, together with its leaves and green beans or fruit, had toxic properties and when bruised and placed in shallow pools of salt water the small fish became stupefied and were easily caught. This mild, so-called fish poison did not affect the fish as human food. This plant was probably introduced to Hawaii from islands south of the equator, as it is common throughout the Pacific area and is used in the same way by other Polynesians.

Among the useful plants were wauke (*Broussonetia papyrifera*) and mamake

(*Pipturus albidus*) both of which furnished fiber which was beaten into kapa. A few plants are met with nowadays in the woods. It is, however, no longer cultivated to any extent in Hawaii, as the making of kapa may now be considered among the lost arts in these islands.

The olona (*Touchardia latifolia*), a shrub much cultivated in olden days by the natives, who made from its inner bark a very strong and durable twine with which fishlines and fish nets were made; this plant is no longer cultivated.

Probably one of the outstanding trees in Hawaii is the hau (*Hibiscus tiliaceus*), which grows equally well at the seashore as in the mountains. Its wood is very light, strong and tough; its curved branches served the Hawaiians as amas to support the outriggers on their giant canoes. The inner bark furnished a strong cordage, and the wood, though soft, was, when dry, useful as the base on which to create fire by friction. Along the beaches the hau trees furnished welcome shade for the natives; today one sees it beautifully trained over pergolas in formal gardens. Dense jungles of hau may be seen in upper Nuuanu Valley near the Pali and in many other places in the woods. The flower has five large sulphur-yellow petals, usually having a dark center, there being some varieties all yellow; when faded, the flowers turn reddish brown—thus the name hauula, or red hibiscus. A decoction made from the young buds, which was used in various ailments, was one of the best-known remedies to the Hawaiians.

A tree rarely seen today is the papala kepau (*Pisonia inermis*). It grows in open spaces on the edges of the forests about 2,000 feet elevation; found on all the larger islands of the group. The wood is very soft and, when well dried, was used as torches, burning very freely. The sticky substance adhering to its fruits was, in the olden days, collected and used to snare such birds of bright plumage as the oo, mamo, and iiwi, whose feathers were made into the royal cloaks and capes, and the beautiful feather leis which today are rare and priceless.

At just what period the beautiful silvery- green-leaved kukui (*Aleurites moluccana*) came to these islands is not known. It may be found in all the volcanic islands of the South Pacific. Its large protected seeds can float and it may have been washed up on our shores, taking root there and gradually working inland and up into the mountains, and even on to the highest cliffs. From its bark the Hawaiians extracted a dark-brown dye with which they colored their fish nets. The roasted nuts, mixed with chili peppers and salt, supplied an appetizing condiment known as "inamona." The extracted oil of the kukui nut was burned in stone lamps, many years before the foreign introduction of either whale oil or kerosene. Torches were made of kukui nuts strung on the midrib of the coconut-palm leaflets.

Aiea (*Nothocestrum longifolium*), often seen as a shrub rather than a tree, is common on Oahu. Its wood is of little value except as fuel. Another species of this tree, sometimes attaining a height of 30 feet, is found on the aa lava flows of North Kona; its wood is soft and its trunk easily damaged and often destroyed by stock.

Under the same name aiea or kawau (*Ilex sandwicensis*) is a tree about 30 feet high, common on all the islands of the group. Its habitat is in the swampy rain belt, though it also grows in drier places. The wood is whitish and soft, yet the Hawaiians made use of it in the frames of their Spanish saddles.

Another tree is the heau (*Excarpus brachystachys*), found on Oahu and Molokai at the high elevations; it now has become very rare and is seldom seen by collectors.

The wood of the maua (*Xylosma hawaiiense*), generally growing in the same forest belt, was durable though crooked and knotty.

Kauwila (*Alphitonia ponderosa*), a large tree growing in dry sections of

The banyan thrives in Hawaii, and there are many notable specimens in Honolulu, including the one under which Robert Louis Stevenson spent many happy hours.

Kauai and Hawaii. Its wood was fine-grained, hard, heavy, and was used by the early Hawaiians for spears, mallets for beating kapa cloth, and for other wooden tools.

On the lava fields of North Kona, Hawaii, one finds the uhiuhi. It is known by the same name on Kauai. On Maui, however, it is known as kea (*Mezoneurum kauaiense*). Its blossoms are red, the seeds flat, 2 to 4 in compressed pods; its hard wood was used for spears and agricultural implements long before the advent of iron tools. So far as is known, this tree is not found in any other part of the world.

Growing on the high slopes of Konahuanui, Oahu, is a most interesting shrub called kioele (*Kadua menziesiana*). Few people nowadays see this plant because of the difficulty in ascending the high ridges where it may be found.

Ohe is a small spreading tree found in the high forest belts of all the islands of this group. On Oahu it is known as the ohe mauka (*Tetraplasandra oahuensis*). In this genus there are a number of species; the wood is soft and of little value. The Hawaiians on the different islands of our group knew the ohe by such individual names as oheohe, ohemakai, ohe kikoola, and ohe kukuluaeo. Another plant called ohe was the bamboo (*Bambusa vulgaris*). This was undoubtedly introduced from the other Pacific Islands. Very large clumps of it may be found in the deep valleys of Hawaii, Oahu, Kauai, and Molokai. It was useful in house building, furnished poles for fishing rods, and from the young shoots a fibrous material was obtained which was woven into hats and fans.

Several species of small shrubs (*Coprosma longifolia*), (*Cymosa*), and (*Foliosa*), known as pilo, are found on Oahu. They are, however, of little value. The same name, pilo, is also given to another insignificant shrub named *Kadua laxifolia*.

Pukeawe (*Styphelia tameiameia*) is a small tree or shrub. This species is found on all the islands up to an elevation of 10,000 feet. The fruit or berry was used by the kahunas and high priests. This plant was also known as maieli, or kawau.

Ilieo (*Plumbago* species), a shrub common in the lower dry section of the lava fields of Hawaii, is found growing also in Koko Head crater, Oahu. Its flowers are small and white. The acrid juice of the stems was used for tattooing black.

Honohono (*Haplostachys grayana*) is a fleshy herb found growing in damp shady places; its leaves were used medicinally by the natives. Another plant, also called honohono, is a grass (*Oplismenus compositus*) common in the open country at the edges of the forests. The name honohono is also given to the creeping succulent herb (*Commelina nudiflora*) which grows along the borders of streams and in damp valleys. It is a useful fodder plant.

Ihimakole (*Portulaca sclerocarpa*), a succulent herb found in open pastures of the lowlands, resembles the common pigweed. The Hawaiians knew of its curing properties for throat affection. They chewed the leaves to extract the juices.

The flowers and the fruit of the ohia ai, the scarlet lehua blossoms, the orange-colored fruit of the halapepe (*Dracaena aurea*), the fragrant maile (*Alyxia olivaeformis*), and the ieie (*Freycinetia arnotti*) were all deemed acceptable to Laka, Goddess of the Hula.

The Hawaiians have always been interested in ferns, some of which were edible, others used medicinally, and many were used for personal adornment. Such names as pala, palapalai, palaa, peahi, pololei, laulii, akupukupu, and waimakanui are common.

Today, high up on the mountains, one finds the pamoho, maua, hapuu, ekaha, and the wawaeiole. All of these ferns existed in olden days, as well as many other rare varieties which have since disappeared.

A very rare endemic tree is the kokio (*Kokia rockii*), growing at 2,000 feet elevation in North Kona, Hawaii. This plant has dark-red blossoms and is related

to the hibiscus. Other endemic plants are the hibiscadelphus, of which there are few examples remaining. One species, found on Maui by Dr. Joseph Rock, botanist, and named by him *Hibiscadelphus wilderianus,* is now extinct. *Hibiscadelphus hualalaiensis,* growing in Kona, Hawaii, is another species of this rare tree. In the bird forest near Kilauea Volcano is but one remaining tree of the *Hibiscadelphus giffardianus.* The flowers of these three rare species are peculiarly shaped, grayish-green outside, the petals magenta, the capsules containing the seeds are yellowish and covered with tomentum.

Among the flowering vines there are a number whose blossoms much resemble the maunaloa (*Dioclea violacea*). In the mountains of Oahu, and especially in Waianae, grows the nukuwi (*Strongylodon Lucidum*). This vine bears beautiful clusters of deep-scarlet flowers. Its brown seeds are often found along the beaches of windward Oahu. The nukuwi occurs in Tahiti and Fiji and possibly may have reached Hawaii by means of ocean currents.

The kaee (*Mucuna gigantea*), a vigorous climber, bearing large bean-shaped pods, containing generally but one seed. These are washed down the valleys by freshets, float about the ocean and have been found on the sand islands of the Bird Reservation 1,000 miles from Honolulu.

Another flowering vine called anunu (*Sicyos* species), of which there are a number. One is found in the dry valleys near Ewa Plantation. It was used medicinally by the Hawaiians.

On the dry slopes of leeward Oahu we find the vine kakalaioa (*Caesalpinia bonduc*), bearing thorns along its stems and branches, making tramping very difficult where the kakalaioa grows. Its large flat pods are also covered with spines. Its round gray seeds, generally two, were much prized by Hawaiian boys, who in olden days used them as marbles.

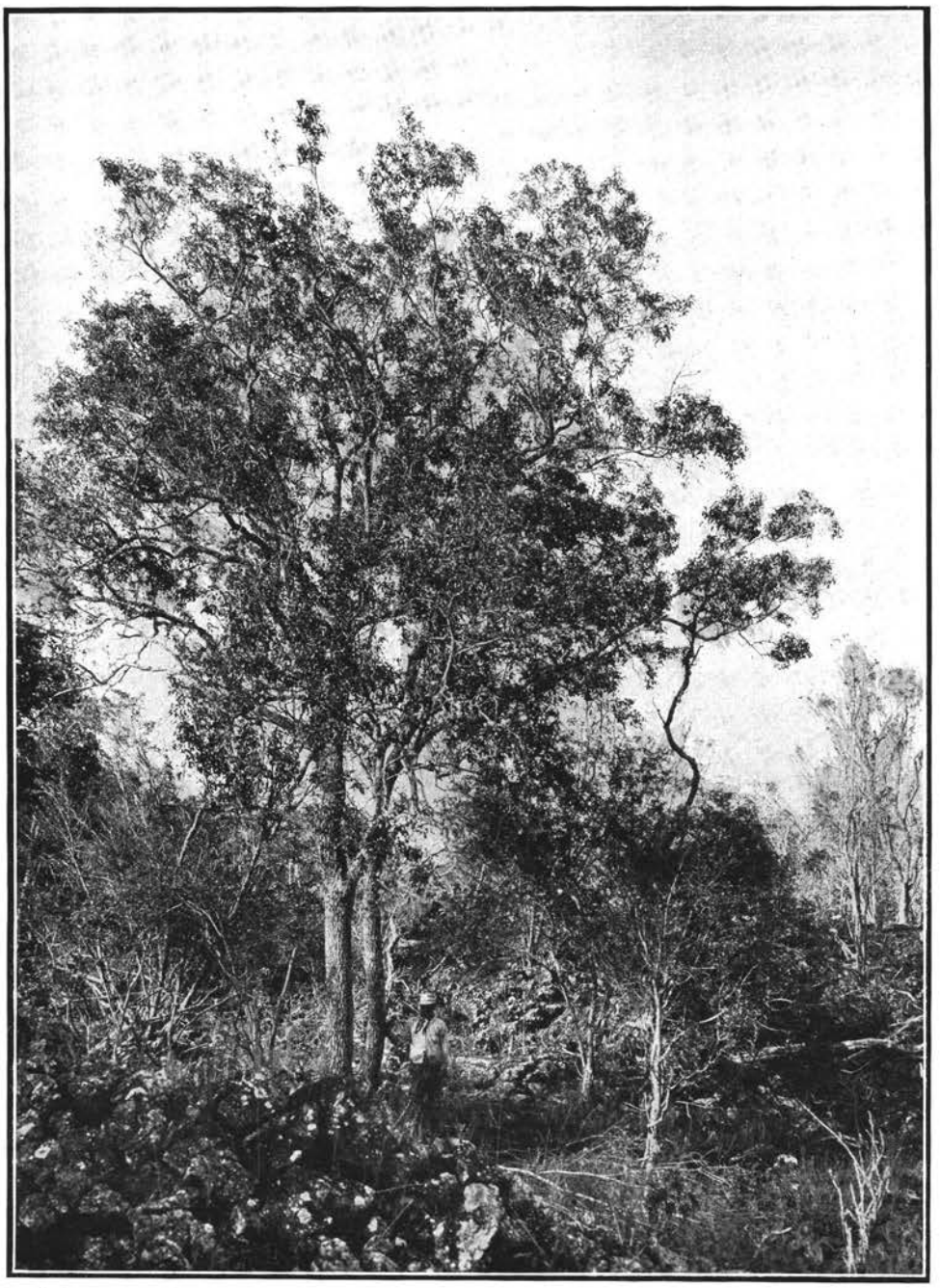
One of the trees whose light wood was useful to the Hawaiians for making floats for their fish nets was the wiliwili (*Erthrina monosperma*), its brilliant red flowers appearing after the trees had shed their leaves. The fruit is a large bean containing bright-red seeds. The Hawaiians claim that the sharks are more likely to bite when this tree is in flower.

Sugar cane (*Saccharum officinarum*) played an important part in the economic life of the Hawaiians. They sweetened their food with the extracted juice and also used it in admixtures of native herb medicines. Before the introduction from Tahiti of a variety of cane now known as lahaina, the Hawaiians cultivated about their homes for their own use some of the following-named sugar-cane varieties: ainakea, akilolo, lahi, lele, lehua, ko kea, kenikeni, honuaula, manu lele, pilimai, palani, papaa, pua ole, and ulaula. Only a few of these varieties exist today, although the Hawaiian Sugar Planters' Association has tried to preserve some of them for breeding purposes.

The loulu palm (*Pritchardia* species), are indigenous to Hawaii. These interesting palms will grow equally as well on the mountains as at sea level. Their large, broad leaves were used for interior lining of the native grass houses. Their young, tender fronds were split into narrow strips and woven into beautiful hats.

This species comprises many varieties which are found on all the larger islands of the group, some bearing small fruit, others having fruit at least two inches in diameter. These palms are fast disappearing from their native habitat; rats are in a measure responsible for this, as they eat the seeds.

The mahoe (*Alectryon macrococcus*), a medium-sized tree endemic to the Hawaiian Islands, inhabits the dry leeward sections of these islands. The flowers are small and the fruits are edible. It is now a rare tree on Oahu; on Molokai it is extinct; on Kauai it is found but rarely; on Maui it is common in the forest belt of Auahi, a few miles from Ulupalakua. The wood is hard and tough; owing however



Sandalwood was in early days one of the chief exports of the Hawaiian Islands. Comparatively few trees now remain, the best specimens being found in the North Kona district of Hawaii.

to its scarcity, many of the older natives were not acquainted with it.

Alaa or aulu (*Sideroxylon sandwicense*), kaulu, according to Hillebrand, is a genus represented by a number of species in Hawaii, and is common on Oahu, Maui, Molokai. It is not found on either Kahoolawe or Niihau and is entirely wanting in the forests of Hawaii. Its fruits vary in size according to the species. Hawaiian bird-catchers used its milky sap to snare certain birds of rare plumage.

Iliahi (*Santalum freycinetianum*), the sandalwood of commerce, was in early days one of the chief articles of export from these islands to the Orient. There are four species in this genus represented here in Hawaii, ranging from small shrubs to trees 50 feet high, and the best specimens are to be found in the North Kona district at about 4,000 feet elevation. Sandalwod is difficult to grow under cultivation; the plant being hemiparasitic, requires proximity to species of especial plants as hosts, from the roots of which it obtains nutriment.

Naio (*Myoporum sandwicense*), the so-called false sandalwood, is very common on the principal islands of the group. It is a very brittle tree when green; although the dry wood emits a fragrant odor when cut or burned, it has not the lasting qualities of the true sandalwood.

The mamani (*Sophora chrysophylla*), is a species of hard wood growing on the high elevations of Hawaii, Maui and Kauai. It does not now exist on Oahu; this wonderful tree with its durable wood is fast disappearing, a fact much to be regretted, as it is the most durable wood of all the native trees of these islands. Fence posts were made from it and there are authentic records of examples having remained more than fifty years in the ground, and which upon examination were found to be still in an excellent state of preservation.

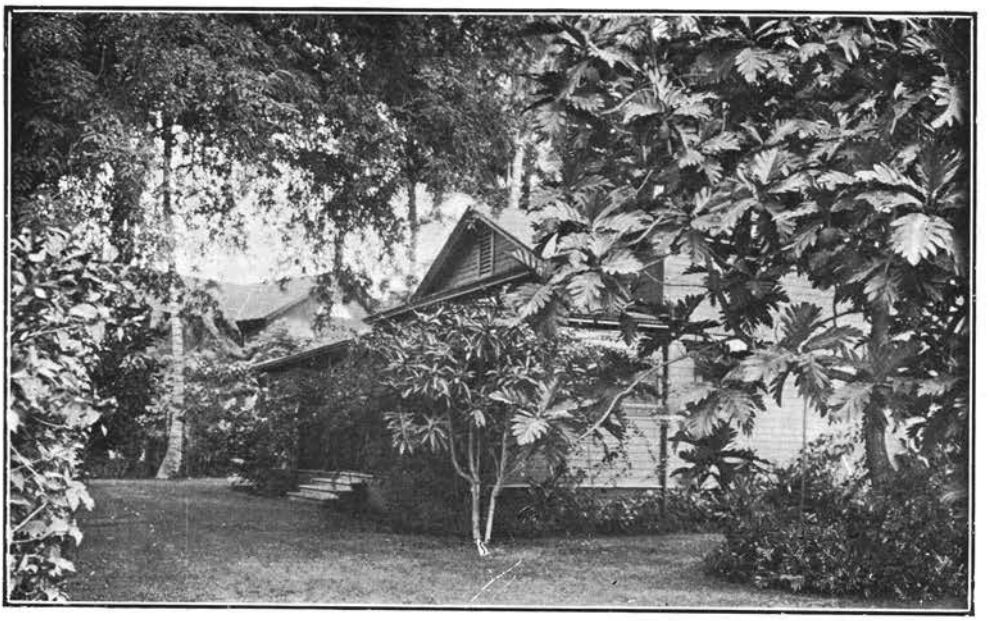
One of the favorite trees of the Hawaiians was the lehua (*Metrosideros polymorpha*), so often referred to in songs and legends. Its scarlet blossoms attracted the iiwi bird of red plumage, and the oo, whose yellow feathers were taken by the bird hunters. The progress of civilization and the consequent cutting of the forests have changed conditions to such an extent that these beautiful birds are rarely seen today.

In this genus Metrosideros, there are five species in the Hawaiian Islands, known by such names are lehua ahihi, lehua makanoe, lehua papa, ohia lehua, lehua mamo, lehua laulii, lehua puakea, lehua kumakua. The flowers are in axillary cymes composed of many stamens of a bright crimson color. Occasionally is seen a lehua tree bearing orange-colored blossoms. These and the red ones are often made into wreaths, much sought after by the Hawaiians.

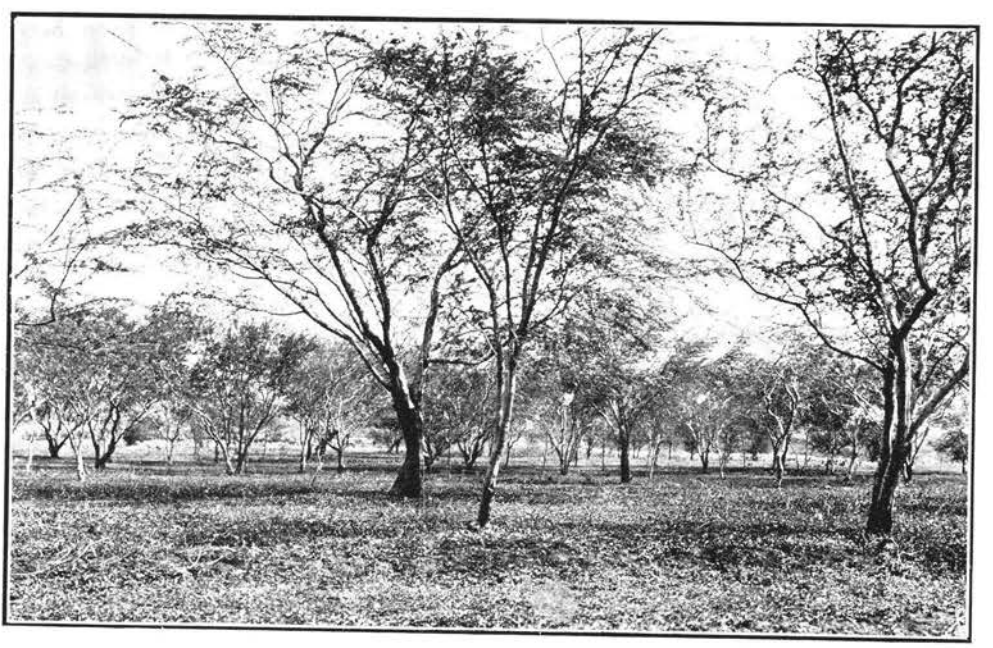
Another native tree bearing flowers closely resembling those of the lehua is the ohia or mountain-apple (*Eugenia malaccensis*). Gregarious forests of them may be found in the deep shady valleys on the principal islands of the group. Its juicy scarlet fruits, which ripen during the summer months, are very refreshing to the tramper in the woods. It is not claimed by the writer that all of the native trees are contained in the foregoing list, because many more names of Hawaiian species could be added.

Coming now to comparatively modern times, we note that Captain Vancouver brought to these islands the first orange trees and planted them in the Hanalei Valley, Kauai, where they thrived. From these original trees introductions were made to all the other islands of the group, those sent to Kona, Hawaii, gaining a very high reputation for their excellent quality and sweetness. Those luscious fruits which were very plentiful thirty years ago are not so easily obtained today. Fungus diseases, scale insects and a fruit fly, together with root rot and a gum disease, have decimated the groves of former days.

Following Vancouver, generous credit must be given to one Don Francisco de



The first breadfruit tree was brought to Oahu some four hundred years ago.



The parent of all Hawaiian algarobas was raised from a seed from the Royal Gardens in Paris, brought by Father Bachelot. The tree comes originally from tropical America.

Paula Marin, familiarly known as "Manini," for the introduction of many valuable trees to Hawaii. He introduced and grew the first grapes and made wine from them. His home was called "Ka pa waina," The Vineyard. In later years when an extension of the street westward from Nuuanu was made it was called Vineyard Street. Manini also brought the first date, fig, guavas, mulberry, tamarind, Brazilian cherry, and the cherimoyer (*Annona cherimolier*). The higher altitudes seemed to be more favorable for the successful growing of the cherimoyer and in the Kau district near Waiohinu there are fine stands of these wonderful Central American fruit trees. Manini also brought the first mango; the original venerable tree still stands today, towering above all other trees in that locality. Its fruits are small and the seeds large. It is very regrettable that Manini's diary or any other record of his work is not to be found, for he did a great and lasting service to Hawaii.

In 1828, Father Bachelot, a Roman Catholic priest, brought seeds of the "kiawe," algaroba (*Prosopis juliflora*). He planted the first tree in the grounds of the Catholic Mission in Fort Street, Honolulu, where the present Knights of Columbus building now stands. The kiawe tree has indeed been useful to Hawaii. The flowers produce nectar for honey; its beans or pods are a boon to stock raisers as food for their animals; and its wood is used as fuel.

The first tamarind tree (*Tamarindus indica*) was planted in the garden of a Hawaiian chief in Alakea Street, mauka side of the present location of the Mutual Telephone Company.

Mr. William Wond, who was at one time sheriff of Oahu, planted the first samang tree (*Samanea samang*), sometimes called the monkey-pod tree. Four magnificent specimens may still be seen in the grounds of the old S. M. Damon home on Nuuanu Avenue.

Dr. F. W. Hutchison planted a fine garden of fruit trees and ornamentals at his home bordering lower Nuuanu stream; later this garden became the property of Saint Louis College. Here grew such rare trees as the nutmeg, alspice, cinnamon, sapota, mamee apple, and a number of flowering trees including the jacaranda (*Jacaranda mimosaefolia*), and the *Saraca indica*, whose orange-colored flowers grow directly from the trunk of the tree.

In the year 1851 there were received from Australia two Wardian cases containing a number of plants from the Botanical Gardens of Sydney. These came as a gift to the King of the Sandwich Islands, then Kamehameha Fifth. Among the plants contained therein were *Grevillea robusta, Araucaria excelsa* (Norfolk Island pine), and *Araucaria cunninghamii*. These were all planted in the grounds of the Queen's Hospital. The last-named tree was cut down to make room for the nurses' quarters.

The Royal palm (*Oreodoxa regia*), was introduced by Dr. Gerrit P. Judd, who brought a single seed from Havana, Cuba, and planted it at the corner of Bates Street and Nuuanu Avenue.

Araucaria excelsa was widely distributed among the ranches and plantations on several of the islands of this group. Today many specimens of the Norfolk Island pine may be seen in Honolulu, especially fine ones growing in the Oahu Cemetery. These were planted by Dr. Gerrit P. Judd.

In this same shipment of plants came a species of Casuarina, or ironwood. These trees have been distributed all over the islands and are useful near the sea as a windbreak and shelter. Many flowering shrubs and vines also came in this same shipment; among them the Bougainvillea, and as far as I have been able to learn this was the first introduction to Hawaii of this ornamental flowering climber.

The Roman Catholic Brothers at Ahuimanu, on windward Oahu, introduced the cocoa tree (*Theobroma cacao*) from which chocolate and cocoa are derived.

Mrs. G. F. Wundenberg introduced the first Tahitian chestnut (*Inocarpus edu-*

lis), the wi apple (*Spondias dulcis*), and the papaia (*Carica papaya*). The seeds of these plants were sent to her from Tahiti about 1848 and she planted them in the Hanalei Valley, Kauai.

The late Mr. C. Afong brought the first lichee (*Nephelium litchi*) to Hawaii from China and planted it in his garden at the corner of Nuuanu Avenue and School Street, Honolulu, the premises now occupied by Chun Hoon. Today, although somewhat obscured by large buildings, this patriarch of the species in Hawaii still bears a crop annually.

There is still some question as to who should be given the credit for bringing to Hawaii the first avocado tree (*Persea Americana*). Although Manini did not have it growing in his own garden, "The Vineyard," I was told by the late Judge Sanford Dole that he had as a boy seen mature avocado trees growing in Pauoa Valley, Oahu, in a garden belonging to some member of the Don Marin family.

Residents of Hilo claim that in the early '50's a variety of avocado was brought there by an officer of the U. S. warship *Saint Marys*. However, it was not until 1895, when Admiral Beardsley of the U. S. Navy brought three of the so-called hard-shelled or thick-skinned type avocado, now locally known as the Guatemala, that our avocado seedlings began to improve in quality of their fruit. Other varieties produced from seed as well as by grafting and budding have since then been introduced from California, Mexico and from Florida, but they have added little to the fine quality of the fruit already growing here.

To the late Mr. S. M. Damon we owe the famous Pirie mango, as well as the highly prized Alphonse, both of which he imported from India. Mr. Joseph Marsden brought from Jamaica in 1882 some fine varieties of mangoes, notably the so-called number nine. Henry Davis planted the famous number eleven, which came from British West Indies. Mr. E. W. Jordan imported the first Mulgoba mangoes. He also imported and grew seeds of a fine variety of Macadamia nut (*Macadamia ternifolia*) from Queensland, Australia. Some fine specimens of this nut-bearing tree may be seen at his old home in Wyllie Street, Honolulu. Ten years previous to this time the late Mr. Herbert Purvis of Kukuihaele, Hawaii, had two trees of this species growing in his garden. They were, however, of inferior quality, the kernel of the nut having a bitter flavor. Therefore few seedlings were propagated from the fruit, and this variety soon passed into obscurity.

Captain Benjamin Pitman, who came from Boston and located in Hilo, planted the first *Ficus elastica*, Indian rubber plant. The gigantic tree now adorns the premises of the Hilo Hotel, Hawaii, and remains a magnificent monument to him who planted it.

In the Kohala district, Hawaii, in the garden of the Hawaiian Girls' Seminary there, grow some of the rare trees planted by Dr. Elias Bond, among them a large number of rose-apple trees (*Eugenia jambosa*), which line both sides of the driveway leading to the school.

Mrs. James Wight, also of Kohala, had in her garden at Halawa a splendid collection of rare trees, including the cinnamon (*Cinnamomum zeylanicum*). She also imported from England a species of red-flowering Amaryllis which is locally called the "Kohala lily."

In the early '60's Captain and Mrs. James Makee of Rose Ranch, Ulupalakua, Maui, imported the first camphor trees (*Cinnamomum camphora*), also a species of pine called the monkey-puzzle (*Araucaria bidwilli*). These tall trees now stand out conspicuously and can be seen from points on West Maui. Captain Makee also brought the first species of Eucalyptus, planting the trees along the roadway.

Especially fine also were the beautiful flowering Pride of India trees (*Melia azedarach*), planted on the hills and bordering the pastures, many of them still standing today. Up in the pastures above the old home is a group of trees (*Cinchona*

officinalis), from the bark of which quinine is extracted. Mrs. Makee was very proud of her magnolia trees (*Magnolia magnifica*), said to be the first trees of this species introduced in Hawaii. Her garden had in it many other flowering plants, both rare and beautiful.

On the slopes of Haleakala, Maui, are clumps of forest trees, including several species of conifers, eucalyptus and acacias (Wattles from Australia), and a few native trees planted by the late Louis von Tempsky. One hundred and fifty thousand trees are standing today as a monument to his untiring efforts.

Mr. Albert Jaeger introduced to Hawaii and planted in his garden, corner of King and Punahou Streets, a splendid collection of rare trees. It is a matter of sincere regret to horticulturists that this fine garden has been almost entrely obliterated in order to make room for the street improvements and business block. Mr. Jaeger planted the two large banyan trees (*Ficus bengalensis*), on Beretania Street, corner of Punahou Street. He also was instrumental in collecting trees for planting the grounds of the Board of Agriculture and Forestry, King Street. A number of these rare species are the only ones of their kind growing in Hawaii today.

The first mangosteen (*Garcinia mangostana*) was planted and grown by Mr. Francis Gay at his home, "Kekopua," Makaweli, Kauai.

To Mr. George Wilcox of Lihue, Kauai, belongs the distinction of growing and possessing the only durion (*Durio zebethinus*) in these Islands; it occasionally bears fruit.

Dr. Joseph Rock brought to Hawaii many rare and useful trees, some of which were planted on the campus of the University of Hawaii. He introduced from Burma seeds of the valuable chaulmoogra (*Hydnocarpus curtzii*) from which is expressed an oil used as a remedy for leprosy.

In the grounds of the Queen's Hospital, Honolulu, may be found many rare trees presented by Dr. William Hillebrand, Dr. F. W. Hutchison, and Governor A. S. Cleghorn.

It was Dr. Hillebrand who brought and planted in the Queen's Hospital grounds the rare *Bombax ellipticum*, which produces showy pink blossoms; it is the only specimen of this tree in the Territory.

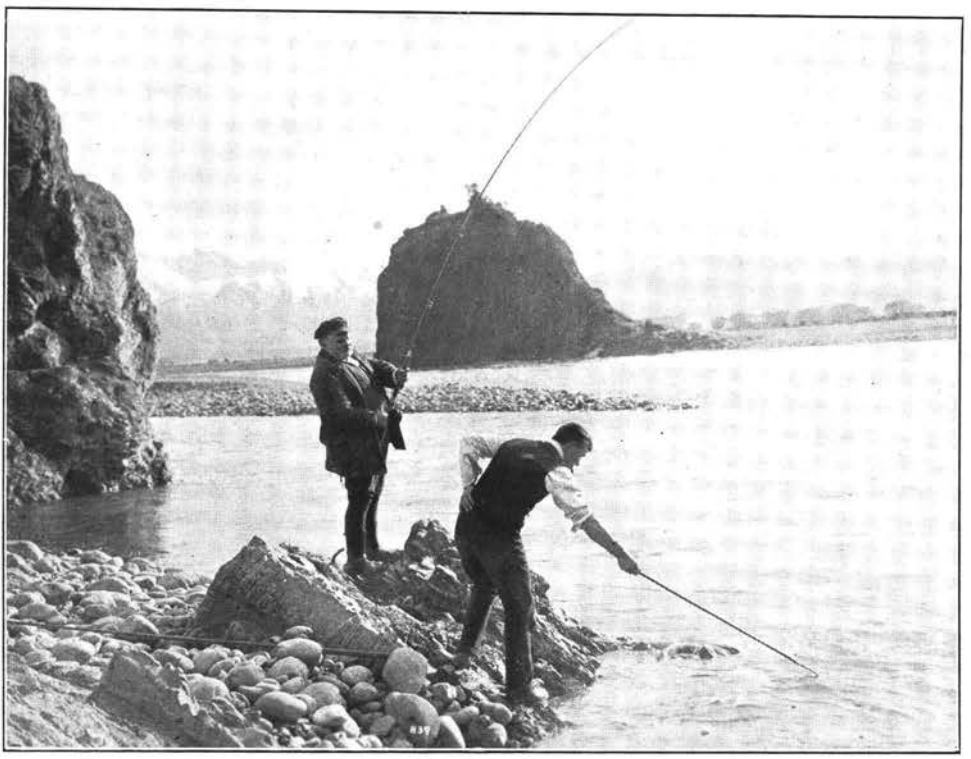
Dr. Hillebrand made valuable contributions to the flora of Hawaii; in his own garden in Nuuanu is a wealth of beautiful and rare trees. It is a matter of sincere thankfulness that, through the generosity of the late Mrs. Mary Foster, this garden is to be preserved to the City of Honolulu.

The Hawaiian Sugar Planters' Association, through the efforts of Dr. Harold Lyon, has been able to bring to Hawaii many rare and useful trees and plants, among them some fine forest trees which have been set out to take the place of some of the native trees that have now all but entirely disappeared.

The United States Agricultural Experiment Station, in Makiki district, continues its good work in the introduction and disseminating of choice varieties of fruit trees. From their Makiki Station these trees are distributed to localities best suited to their growth.

Thus we see that the regularly organized agencies as well as the enthusiastic efforts of a number of amateur plant collectors are all contributing their share toward making Hawaii a real "Paradise" for those who love the beautiful in nature.

Beautiful specimens of red deer are found among the high Alps of New Zealand, and are pursued by the hunters to the regions of perpetual snow.



About 250 varieties of fish have been found in New Zealand waters.

The Fauna of New Zealand

By JAMES DRUMMOND, F.L.S., F.Z.S.

New Zealand's native fauna has attracted the attention of investigators in nearly all parts of the world. Its special interest lies in its manifold peculiarities, in the incongruous characters possessed by some of its members, and in the ancient types found in different classes of its animals.

Beginning with the mammalia, the Dominion is surprisingly inadequately represented. Its only land-mammals, except seals, are two bats. One of these, the long-tailed bat, belongs to a genus (*Chalinolobus*) which is found in the Australian and Ethiopian zoological regions, and to a species (*morio*) found in the southeast of Australia as well as in New Zealand; but the other, the short-tailed bat (*Mystacops tuberculatus*), belongs to a genus peculiar to this Dominion. At one time it was believed that the Maori dog (*Canis familiaris*, variety *maorium*, the "kuri" of the Maoris) and the Maori rat (*Mus exulans*, the Maoris' "kiore") were indigenous to New Zealand, but it is now generally believed that these two animals were introduced by the Maoris when they made their notable migrations from their lengendary Hawaiki. The dog was highly prized as a

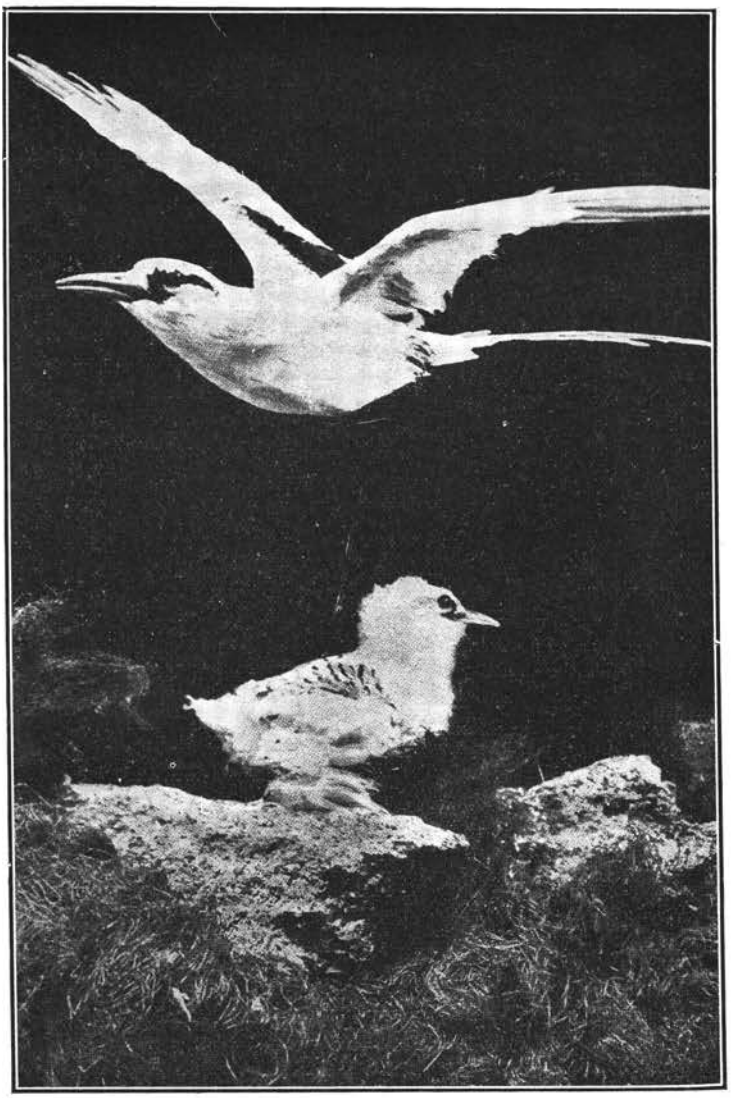
domestic pet, and the rat as an article of diet. Both could easily be taken across the sea in the large canoes used in those days. The dog, without doubt, is extinct. Statements by Captain Cook, J. R. and G. Forster, Sydney Parkinson (the artist), the Rev. W. Colenso, and early visitors to New Zealand show that the Maori dog was a very ordinary animal. It was small, with a pointed nose, pricked ears, and very small eyes. In color it was white, black, brown, or parti-colored, and it had long hair, short legs, a short bushy tail, and no loud bark, but only a whine. The Maoris lavished upon it an abundance of affection. When dead its flesh was used for food, its skin for clothing, and its hair for ornaments. Opinions differ in regard to the approximate date of its extinction, and investigations in this respect are made somewhat difficult by the fact that for some years "wild dogs," as they were called—probably a cross between the Maori dog and dogs brought by Europeans—infested several districts in both the North Island and the South Island, and were confused with the Maori dog. It is probable that the pure Maori dog became extinct about 1885. The Maori rat, a forest-dweller, is not as plentiful as it was when Europeans first came to New Zealand, but it still lives in the forests.

The long-tailed species of bat was once fairly plentiful, especially in the forests, where it makes its home in hollow trees. Large numbers also at one time were found under old bridges across streams, notably at the River Avon, in Christchurch. It is not very rare now, and specimens sometimes are found in the forests and in caves. The short-tailed species is not extinct, but rare. Most bats are exceptionally well adapted for life in the air, feeding on flying insects, and even drinking on the wing. But the short-tailed species of New Zealand possesses peculiarities of structure which enable it to creep and crawl with ease on the branches and leaves of trees, and probably it seeks its food there as well as in the air. Few naturalists, however, have had opportunities to observe it, and little is known of its habits.

The sea-lion, the sea-elephant, the sea-leopard, and the fur-seal are found on islands within the Dominion's boundaries. In the early days of colonization sealing was a great industry, and yielded large profits to some of the adventurous men who took part in it.

Amongst the sea-mammals whales are the most important. For some years New Zealand held the record for the largest known mammal in the world, living or extinct. This was the Okarito whale, whose skeleton is in the Canterbury Museum. It was found dead on the sea-beach near Okarito, a small village in South Westland, in February, 1908. A very careful and conscientious measurement showed that its length, in the flesh, was 87 feet, or 99 feet measured over the curves of its back. It held the record until September, 1918, when a whale was found stranded at Corvisart Bay, near Streaky Bay, at the eastern extremity of the Australian Bight, South Australia, which measured in a straight line 87 feet 4 inches. Both competitors for the record were females, and both were blue whales, which usually are known as *Balaenoptera sibbaldi*, but which now bear the name *Balaenoptera musculus*. (A blue whale (90 feet in length) larger than either of these, was stranded at Orewa, near Auckland in September, 1925, but all records were broken when a blue whale 110 feet in length and weighing 115 tons was caught by the "N. T. Neilsen-Alonzo" in the Antarctic early in 1927.)

At one time extensive whaling was carried on in New Zealand waters, three hundred vessels, chiefly from America, sometimes visiting the country in one year. The industry began about 1795, reached the height of its prosperity between 1830 and 1840, and then began to dwindle. In recent years there has been an effort to revive the industry, but it will never attain the position it held in former years. Porpoises are plentiful,



Many types of sea birds are included in the avifauna of New Zealand.

and the dolphin (*Delphinus delphis*) also is found in these waters. Mention should be made here of "Pelorus Jack," a solitary whale which for some years met vessels near Pelorus Sound, and which was protected by an Order in Council under the name of Risso's dolphin (*Grampus griseus*). He was the only member of the species reported from New Zealand waters.

In contrast with the species of land-mammals, the members of the next class, Aves, were remarkably plentiful when settlement began. Bush and grass fires, cats, stoats, and weasels, and the ruthless use of the gun have reduced their numbers, but they still stand as probably the most interesting avifauna in the world. They include a comparatively large number of absolutely flightless birds. No living birds in New Zealand are wingless, but the kiwi (*Apteryx*), the weka (*Gallirallus*), the kakapo parrot (*Strigops*), and the takahe (*Notornis hochstetteri*)*

cannot use their wings for flight, while a duck belonging to the Auckland Islands (*Nesonetts*) is practically in the same plight. There are also several species of birds whose wings are so weak that they can make only short flights. Other notable birds are the kea (*Nestor notabilis*), which is accused of killing sheep on stations in the South Island; the tui (*Prosthemadera novae-zealandiae*), which affords one of the most beautiful sights in the New Zealand forests, and charms visitors with its silvery notes; the huia (*Heteralocha acutirostris*), the only species known in which there is a wide divergence in the shape of the bills in the two sexes, the male's being short and straight, while the female's is curved, pliant, and long; and the wry-billed plover (*Anarhynchus frontalis*), the only bird known to possess a bill turned to one side.) Cormorants or shags (*Phalacrocordax*) and penguins (*Impennes*) are exceptionally well represented in the avifauna. New Zealand, indeed, may be regarded as the headquarters of the penguins, as all the genera except one are found within the boundaries of this Dominion. The oldest fossil penguin known is from the Eocene and Oligocene rocks of New Zealand. New Zealand probably was the center from which penguins were dispersed to other countries.

Several species of birds make notable migrations to New Zealand. The godwit (*Vetola lapponica baueri*) breeds in the tundras of Eastern Siberia and in Kamchatka and Western Australia, and spends the summer months in New Zealand, arriving about October, and leaving in March or April. The knot (*Canutus canutus*) breeds in circumpolar regions and migrates to New Zealand; and two cuckoos—the shining cuckoo (*Lamprococcyx lucidus*) and the long-tailed cuckoo (*Urodynamis taitensis*)—come from Pacific islands in the spring, and leave for their northern homes about April. Both, like most members of the Cuculidae family, are parasitical, and impose upon small native birds the duty of hatching and rearing young cuckoos. The kiwi, already mentioned, belongs to the same subclass as the ostrich, the emu, and the cassowary, all struthious birds, and has several peculiarities besides its flightlessness. One of these is the position of its nostrils at the tip of its bill, instead of at the base as in all other birds. Its plumage is peculiarly hair-like in appearance. It possesses a very generalized structure; as Sir Richard Owen once suggested, it seems to have borrowed its head from one group of birds, its legs from another, and its wings from a third. It was once believed to be almost extinct, but in recent years has been shown to be fairly plentiful in some districts where there is little settlement.

The takahe (*Notornis*) is one of the world's very rare birds. Only four specimens have been found. Two of the skins are in the British Museum, one is in the Dresden Museum, and one in the Otago Museum, in Dunedin. The fourth specimen was caught by two guides (Messrs. D. and J. Ross) at Notornis Bay, Lake Te Anau, in 1898. There is reason to believe that the takahe still exists in the wild districts of the southern sounds.

The interest of the living avifauna is surpassed by the interest of the extinct birds. These include the great flightless moa (*Dinornis*), a goose (*Cnemiornis minor*), a gigantic rail (*Aptornis otidiformis*), and an eagle (*Harpagornis moorei*).

Reptilian life is restricted to about fifteen species of lizards, and to the tuatara (*Sphenodon punctatus*). This is a lizard-like creature, the only surviving representative of the order Rhynchoce-

* This bird is better known as *Notornis mantelli*. That name was first given by Sir Richard Owen to an extinct bird, represented by a fossil found at Waingongoro, in the North Island, by W. Mantell in 1847. When the first living specimen of the takahe was found in 1849 scientists concluded that it was identical with the fossil, and it was accordingly given the same name of *Notornis mantelli;* but when Dr. Meyer, of Dresden, examined the skeleton of the third specimen he found that it was different from the fossil, and he changed the specific name from Mantelli to Hochstetteri, this honoring Dr. Hochstetter, a naturalist who visited New Zealand in the early days. Messrs. G. M. Matthews and T. Iredale, in their "Reference List" of 1913, give *Mantellornis hochstetteri* as the name of this interesting rail.

phalia, otherwise extinct. The tuatara is found in no other country. Its nearest ally is Homoeosaurus, whose remains have been found in Jurassic rocks in Germany. It has been destroyed to a large extent by wild pigs, cats, and dogs, and is now seldom found except on a few islands off the coast of the mainland.

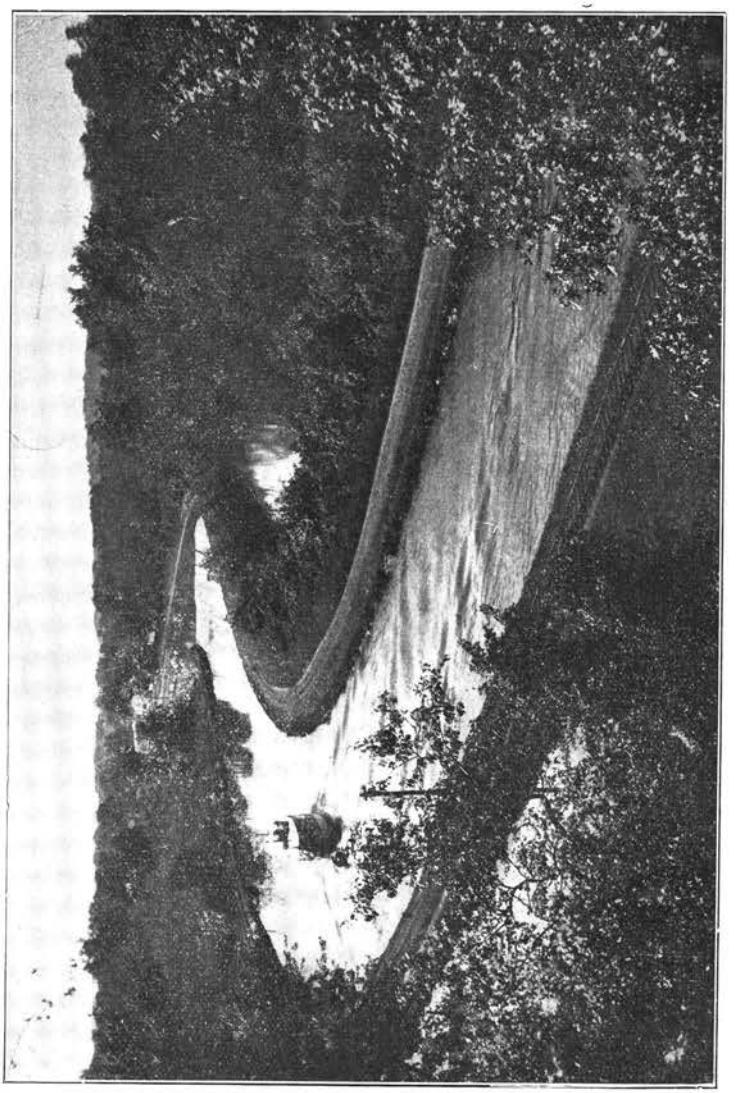
The amphibians are represented by two species of frogs. One, *Liopelma hochstetteri,* has been recorded from only a few districts in the Auckland Province. The other, *Liopelma hamiltoni,* has been recorded from only Stephen Island, a small island in Cook Strait, notable as one of the refuges of the tuatara.

About 250 species of fish have been found in New Zealand waters. Many of these are used for food. Several species, notably the mudfish (*Neochanna apoda*), which is sometimes discovered buried 4 feet deep in clay in places where rivers have overflowed in flood, and in swampy places, are interesting. Some of the genera are peculiar to New Zealand, but some also occur in Australian and South American waters.

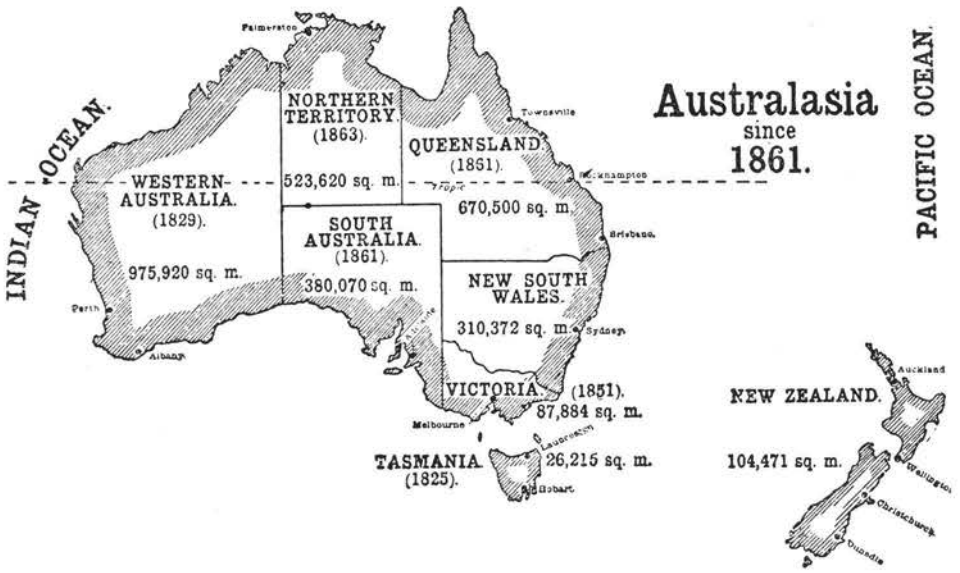
Amongst the invertebrates one of the peculiarities is the fact that the Dominion has few butterflies, although it is well supplied with moths. It has a red admiral butterfly (*Vanessa*), named after the European species, which it resembles, and a copper butterfly (*Chrysophanus*), which is very plentiful. In the forests there is that strange growth the "vegetable caterpillar." The Dominion has native bees and ants, dragon-flies, sober-colored beetles, and representatives of other orders of insects. The katipo spider (*Latrodectes katipo*), which lives mostly on or near the sea-beach, is well known locally. Amongst the mollusca there is a large and handsome land-snail (*Paryphanta*), and *Amphibola,* an air-breathing snail, peculiar to the Dominion, which lives in brackish water, mainly in estuaries. There are about twenty species of univalves and twelve of bivalves in the fresh-water shells, and about four hundred species in the marine shells, including the paper nautilus (*Argonauta*). Perhaps the most interesting of all the invertebrates is the *Peripatus,* an ancient type of creature which survives in New Zealand and in parts of Australia, Africa, South America, the West Indies, New Britain, the Malay Peninsula, and Sumatra. Zoologically, it belongs to the air-breathing division of the phylum Arthropoda, and has been placed in a special class, Prototracheata or Onychophora. It is about 3 inches long, has many feet, loves moisture, shuns light, and moves slowly. Two genera have been found in New Zealand. One genus, *Peripatoides,* contains two species, *novaezealandiae* and *suteri,* and the other, *Oöperipatus,* contains only one species, *viridimaculatus.* The *Peripatus* is viviparous. It is claimed that one New Zealand genus, *Oöperipatus* is oviparous, but that has not been fully proved.* Professor A. Dendy, F.R.S., has made special investigations in regard to the New Zealand species.

With the arrival of Europeans the whole face of the fauna was changed. The first European animal introduced was the pig, liberated by Captain Cook in Queen Charlotte Sound in 1773. With settlement, sheep, cattle, horses, and other domestic animals were brought, some for utility, some for pleasure, such as song-birds, and some for sport, such as deer, trout, pheasants, and quail. In the work of acclimatization several great and irretrievable blunders were made. The worst of these was the introduction of rabbits, stoats, and weasels.

* Professor Adam Sedgwick, F.R.S., late Professor of Zoology at the Imperial College of Science and Technology, London, in the new Encyclopedia Britannica.



The influence of drought in the drier portions of the virgin area can be lessened by water conservation, and especially by the spread of irrigation. No great perennial rivers run through this area except the Murray in the southern portion, and heavy rain in the tropical zone falls only during a few months of the year.



The Virgin Area lies, roughly speaking, between the western boundaries of Queensland and New South Wales, and what would be shown on this map by a line about one-quarter of an inch from the eastern shore, and practically parallel to it.

A Virgin Area in Australia

By SYDNEY UPTON
A.M.I.C.E., F.R.G.S., F.R.E.S.

In his address printed in the January issue of *United Empire*, Sir Edward Grigg called attention to the need for transferring overseas some of the surplus population of this country He hopes that a positive policy will be ready for application when migration again becomes a practical proposition. He believes we should do well both in the Dominions and here to see whether we cannot entrust the settlement of large areas to Chartered Companies.

For overcrowded England today, a policy to increase migration is no less essential than a measure of protection against unequal and unfair trading; and those who desire the change of fiscal policy, now being made, to be successful, would do well to bear in mind Sir Edward's statement that the two subjects are inseparably linked; without the former the latter will fail to relieve the country of its heavy and increasing burden. There are some 1,600 persons to the square mile in each of the great areas where live the workers of London, Manchester and Birmingham; the 14 southeastern counties of England have over 1,200 persons to the square mile; and even in England as a whole the population density is 742—nearly as many persons to the acre as there are to the square mile in Canada or Australia. One-quarter of England contains nearly 23,000,000 people.

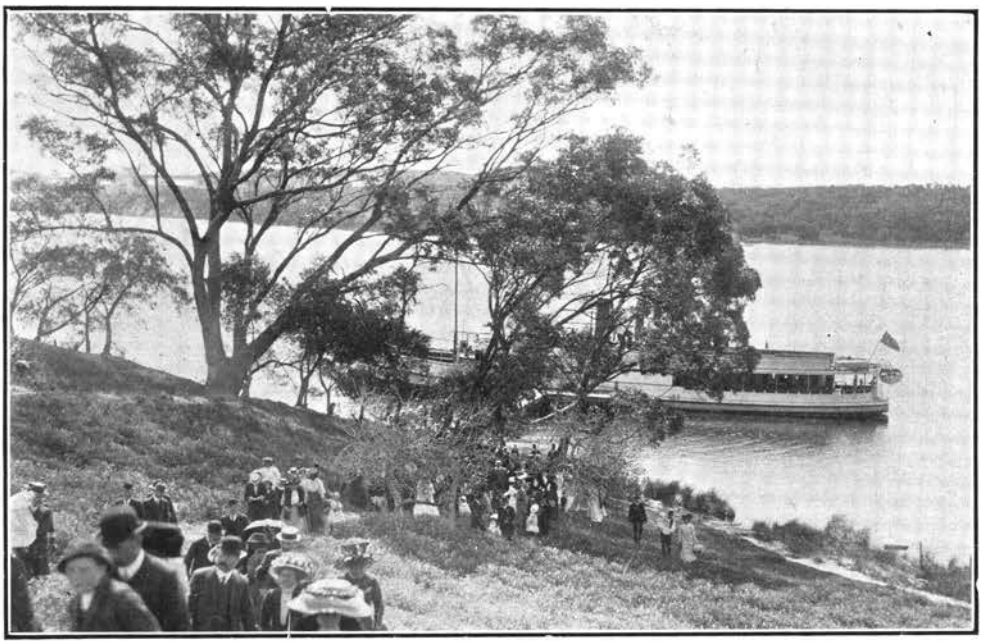
But, before Sir Edward's suggestion as to Chartered Companies can be considered, the large areas for settlement have first to be found. Vacant spaces there are overseas, but—where is the virgin area suitable and ready for migration on a

grand scale? In Africa all the land available will be needed by the teeming millions of natives when they have been taught how to make use of it. The tropical and semi-tropical islands and protectorates are unsuitable. New Zealand is in need of settlers, but what can it offer for such a purpose? Or Canada, with its long, cold winter and other handicaps, unless Vancouver Island be taken over? There remains Tasmania, also suitable, and Australia.

One cannot travel in the Commonwealth without realizing that Australia is a big country; the farther one travels the better one can visualize the vast undeveloped resources of the continent. *White* Australia's undeveloped resources include rubber, cotton, tobacco, palm and tung oil, quinine, tea, coffee, rice and spices, and other similar commodities, also its at present useless mineral wealth. This does not mean, however, that Australia is an inexhaustibly rich country; on the contrary, it is not a land of unrivalled richness but one very heavily handicapped, naturally and artificially. Few realize the significance of the lack of inland lakes and rivers, and of river-systems for cheap transport, or that the country has been ruthlessly exploited in the earliest stages of its development. Only by carefully organized scientific development can Australia continue to yield riches and compete with countries whose development is a comparatively straightforward task entailing one tithe the trouble and expense.

In its internal physiography Australia is divided into four topographical regions. *The elevated Great Western Plateau* occupies one-half of the whole continent, but only the fringes of it are or can be of much use to man or beast until man can precipitate rain from the clouds. The rainfall of its huge hot interior is considerably less than that of the driest part of cooler England, and no great perennial rivers run through it as is the case with similar arid areas in other parts of the earth's surface. Even where, as in the tropical zone, there is a heavy rainfall, it falls only during a few months of the year, the others being dry. *The South Australian Highlands* are of no great extent, and they are fairly well occupied. *The Eastern Highlands* account for one-fifth of the island and contain fully five-sixths of the total population of the Commonwealth, three-quarters of them living on the coastal fringe. The fourth region is that of *The Central Lowlands* which cleave the island longitudinally from shore to shore, separating the highland areas one from another, yet receiving the drainage from their inland slopes. This region covers a part of Queensland and New South Wales, a little of Victoria and southeast South Australia; at the ridge which turns its waters to north and south (by Lat. S. 21½ and Long. E. 143) the land reaches no greater elevation than 675 feet above the level of the sea. Its northern third is tropical and drains to the great Gulf; the southern two-thirds are semi-tropical and warm temperate, draining or capable of being drained to the southern sea via the mouth of the Murray River.

The Central Lowlands of Australia include the greater part of the basin of the River Murray; they lie handy to the markets of the Commonwealth, within easy reach of China, the East Indies and India, and not very far from southern Africa; they have a gateway on the north facing Canada, and one on the south on the direct and open route to England. Blest with a perfect climate in which white men can work the whole year round, the Lowlands receive from 8 to 28 inches of rainfall yearly and have a fair supply of water both on and below the surface of the ground—with more available from the Eastern Highlands when man will take the trouble to get it. Yet, from the Gulf of Carpentaria to Encounter Bay (1,250 miles), although all the land has been appropriated, this vast region of over 500,000 square miles—equal to the whole of the British Isles, France and Germany together—is to all intents and purposes empty and unoccupied; a comparable area of equal size in the United States of



The River Murray, the basin of which is included in the southern portion of the Virgin Area.

America carried nearly 4,000,000 more people ten years ago. There is one block of land 700 by 400 miles (three times as large as Great Britain) which does not contain a single mile of railway, or even a road worth mention. In another part of the region, on the Murray, development has actually outstripped population, though there is not a single port to which produce can be sent economically.

It is true that immense fertile plains in western Queensland and New South Wales can only be irrigated by hitherto untried methods, and that a part of the block above mentioned suffers severely from drought at times, but millions of tons of fresh water are running to waste yearly to the south, the east and the interior, whilst the incidence of drought can be lessened by human agency—by railways and roads, by water conservation, and especially by the spread of irrigation. (An improvement in the rainfall of several areas in Australia is already taking place through increased evaporation to windward, and from more vigorous convection.) The limitations of the Central Lowlands should not be minimized; since their development, however, must take place from the three sides where the good land and water lies, the fact that the middle west is at present only good for grazing is of minor importance. It is well within the bounds of possibility that El Dorados like those of Australia's past may lie hidden beneath the wide untrodden wastes of this region. Today, access to it is to be gained only by crossing one or other of the highland areas of Australia: after all these years its two natural gateways remain unopened, and the great highways which should carry traffic to and from them are either unused or not in existence.

Here, then, is a virgin area suitable and ready for migration on a grand scale—*with a density of population less than one-thousandth that of England.* It can be developed from many points simultaneously, by tens of thousands preferably. Here a dozen or more of Britain's finest firms of contractors could be made use of—and only so can the masses and the problems which will have to be dealt with success-

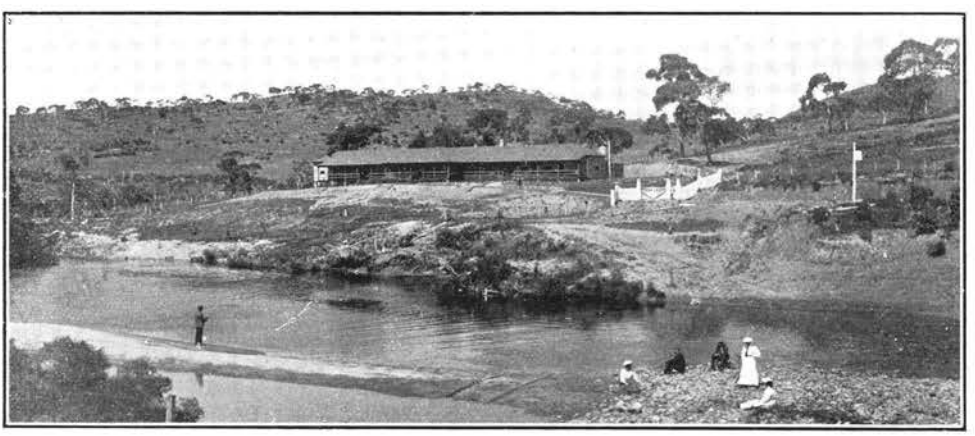
fully handled. The task will call for the best of Britain's business and organizing ability; it will find work for all emigration and similar societies; it could provide stimulus for British industry, ready today to respond to the slightest help.

Without ports, people and pence, the master keys to any territory are missing. Is it not unreasonable to expect the produce and goods of a region so valuable to be carried to and over the ranges for far-away ports, when easier and more economical routes are available across the lowlands to the River Murray and the coast? Is it surprising that nine-tenths of the population of the Commonwealth is to be found in that narrow margin of the island which overlooks the sea, and that one of the richest regions of the continent, (whether on, above, or below the surface) remains empty?

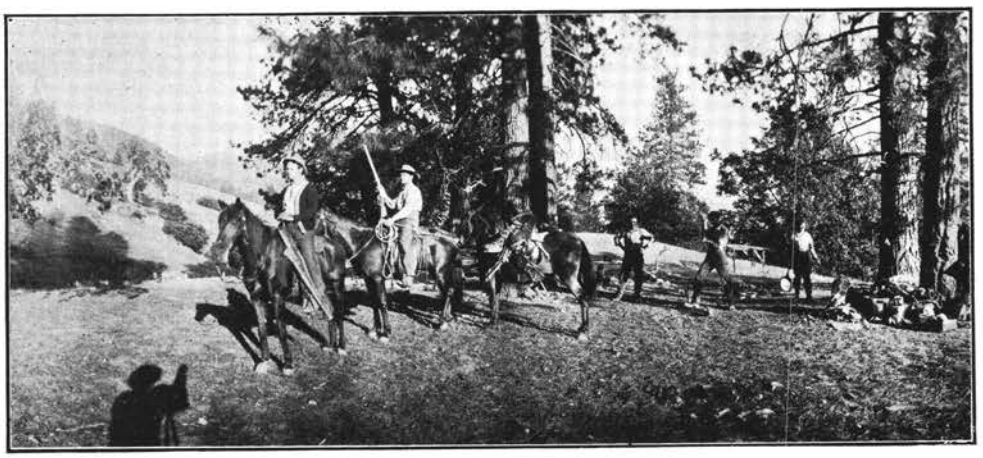
By the building of a single barrage to replace those tiny weirs, steamers could ply the whole year round on the River Murray, and—through a high-level canal—ships could steam straight to the big cities of the Commonwealth and the ports of the world from a harbor which could be constructed at Victor, near its mouth. By the construction of a trunk line of railway from Victor up this virgin area all the existing unprofitable lines of eastern Australia could be connected, and made to pay. With a positive policy for the rapid growth and settlement of population, there could soon be people in the interior of Australia.

With the highest density of population of any country of which there is a record, England is overcrowded; it cannot find profitable employment for *all* its people. Australia has insufficient people to run it efficiently in its present state of development; it has big enough burden in the intensive development of the areas already occupied.

Can statesmen do nothing to bring some of England's idle hands to the empty lands of Australia's virgin area?



Hundreds of these station or ranch buildings would cover a now fertile but uninhabited region if the virgin area should be systematically opened up.



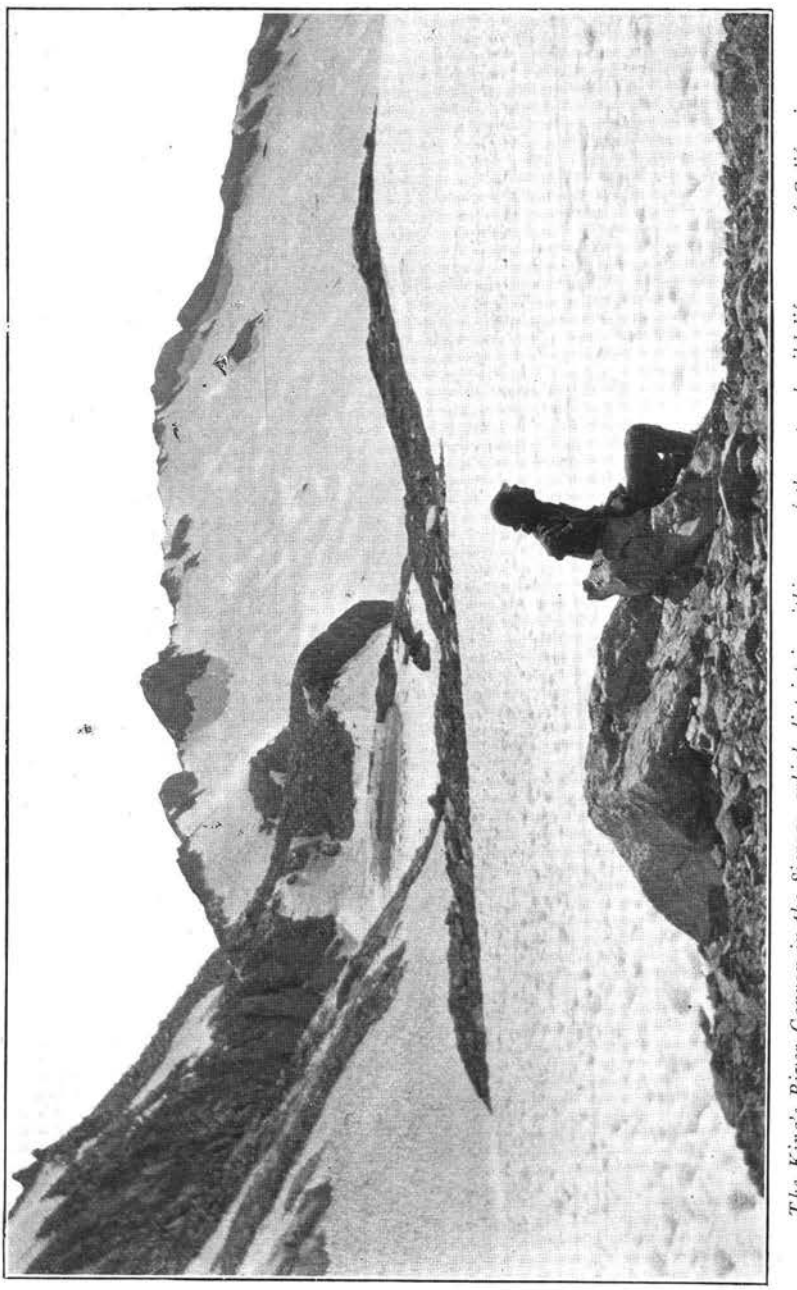
On the trail of a mountain lion.

California to Develop Wild Life Income

By RAYMOND S. SPEARS
On Staff of "ALL OUTDOORS"

The new natural history indicates that there is no such thing as waste land, speaking economically. The wild fastnesses of mountains, the far reaches of arid, so-called desert, the untillable stretches of soil-less Bad Lands, wash and recent fills, high land of monthly frost, depth of glittering sun and heat—in all these are wildcraft sources of financial income which to individuals on the outskirts of civilization, beyond even grazing areas, may obtain through application of nature lore, and which the state itself can foster to the end that tremendous incomes can be returned, comparable with many an intensely cultivated area. That cattle, sheep, homestead, and other occupations could put a loss in red into a profit in black on ledgers and increase annual incomes beyond hopes through wild skins and furs is now recognized as a matter of business, due to experimental and sentimental results which, in New York, added $1,500,000 to a state income of $300,000 and which in Pennsylvania increased an income of $200,000 to $2,500,000 by development of pasture, wild land, marsh, woodlot and other terrain to produce mink, skunk, raccoon, foxes, marten, fisher, muskrats, and other furbearers.

The California legislature is studying this problem in committee; the New York-Pennsylvania wild land income from fur and game (meat) is more than $70 a square mile over 92,000 square miles, compared to California's $4 a square mile. In Northern California is more than 50,000 square miles of territory, which is on the whole better wild life areas than in the Empire and Keystone states put together, since in those states more than 22,000,000 population scants the available wildlife terrain. California has, all told, 155,652 square miles, and the game law



The King's River Canyon in the Sierras, which district is within one of the natural wild life zones of California.

committee has been informed that its northern forest area could easily produce much more than $4,000,000 annually in wild furs under due conservation of fur and wild hide creatures. And this without damage to any domestic animal or agricultural interest, since in the regions which now produce fur, game and wild life in most abundance, the loss does not amount to one-tenth of one per cent in any direction.

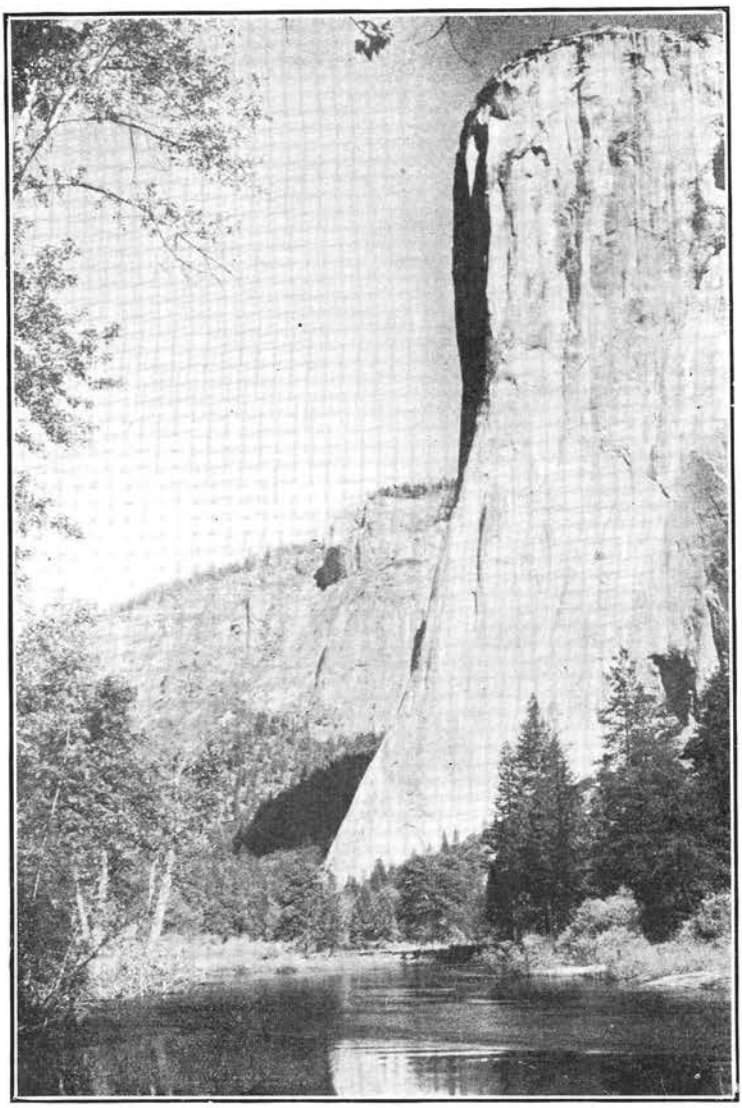
The undomesticated arid, mountain and other natural wild life districts include east and over the crest of the Sierras, the vast slope east to the Colorado and Death Valley basins, the Sierra Madre, Salton Sea and other districts now non-productive. Without too closely analyzing the territory, the desert country should produce at least $20 a square mile in furs and hides, and up to $50 a square mile in wild meat. In Pennsylvania, the game for the table has a fair value of more than $1,000,000 annually. California's wild meat production in deer, antelope, bear, wild fowl, upland game birds could easily be $20 a square mile for the whole state, or more than 3 cents an acre. This would allow three or four acres grazing, say, for each rabbit! The figures given are, of course, extremely conservative.

When the California legislature took up the game and fish laws in 1931 session they found the problem so complicated and with so many angles, due to new conceptions of the possibilities of wild life as a state asset and a potential development of financial profit that all phases had to be threshed out. The questions of replenishment by reintroduction, stocking, management of regions, called for the most scientific and commercially accurate considerations. The fact that conservation would add from $15,000,000 up to the California state income in mere land meat, fur and hide production is amazing, when one considers that, except for the fish, the income is probably not more than $500,000 a year, meat, fur and hides, all told.

The lack of adequate production is traced to many things which have been errors. Thus on one ranch the Biological Survey reports a rancher giving $2 bounty for killing of skunks. Those skunks, the rancher thought, were a detriment. As a matter of fact, in insect, rodent and other destruction, the individual skunk had an actual value, alive and at work, of about $15 because of its efficiency as a thinner of destructive creatures.

A government trapper states that hardly one coyote in ten is a potential destroyer of domestic stock. In Northern California, in one district, ninety-three coyotes were destroyed without checking the loss of sheep at a ranch. Then a local trapper caught one female coyote and all sheep destruction in the district ceased. The Biological Survey calls the domestic stock killers "outlaws," and these are wild animals which have abandoned their normal habits of eating roots, wild honey, berries, rodents, nuts and other common foods for the unnatural habit of eating domestic animals, birds and beasts. The "outlaw" is usually an animal that has been wounded, crippled, or driven by hunger to eat domestic meat. This same condition is found in India where the man-eating tigers and leopards are invariably decrepit animals of great age, or crippled creatures unable to catch wild game. Discovery of this fact has led to an entire revision of considerations regarding wild life.

The deserts, so-called, the open country not occupied by domestic animals because of lack of water, could be occupied by antelope and probably species from Australia, Africa and India, producing a wild food supply of priceless service to rural populations. The high mountain timber belts, the chaparral, the canyons and ridges, could readily be protected and developed into wild life production of 10 cents to $1 an acre, or $64 to $640 an acre, depending on character. The studies being made of this project indicate that mere protection would in the years return many species to full supply, and that in ten years the California wild life terrains could be producing more than $100 a square mile, or $15,000,000 annually.



The protected wild life in Yosemite Park possesses a high valuation as an added attraction for tourists.

Louisiana received a fur income of $144 a square mile.

The various organizations active in California in this project to develop the full resource of native and imported wild life income range from the humane societies to the American Trappers Association, from sportsmen's clubs to the American Mammalogists, and nature students and the fur interests. The revelation that under adequate development wild furs would enable every boy in the rural districts to catch enough value to put himself through High School and probably through college or university has given a new impulse to the farm, ranch, and other country interests in their consideration of such products.

Of the work done in California, Prof. Milton P. Skinner, of Long Beach, who is the Yellowstone Park Naturalist, has lectured on practical conservation to more than 73,000 school children in the Los Angeles district.

E. Raymond Hall, assistant professor of Vertebrate Zoology of the University of California, is conducting a campaign of adult and undergraduate education in wild life conservation.

Chief Redington of the Biological Survey investigated and learned that more than five tons of strychnine is distributed free of charge in Western States which is scattered promiscuously in the wild districts and to this enormous lethal distribution by untrained and haphazard indiscrimination is attributed the destruction of the Oregon fur trade, which normally would be more than $10,000,000 annually but is now less than $300,000. Scientists, upon investigation, have been amazed at the ruthless poison habit, for four grains of strychnine will kill a grey wolf; revelation of this wanton killing apparently without intelligence has led to humane and women's societies, especially, making examination into the strange obsession so cruel to nature's creatures and so ruthless to the profits and pleasures of humanity.

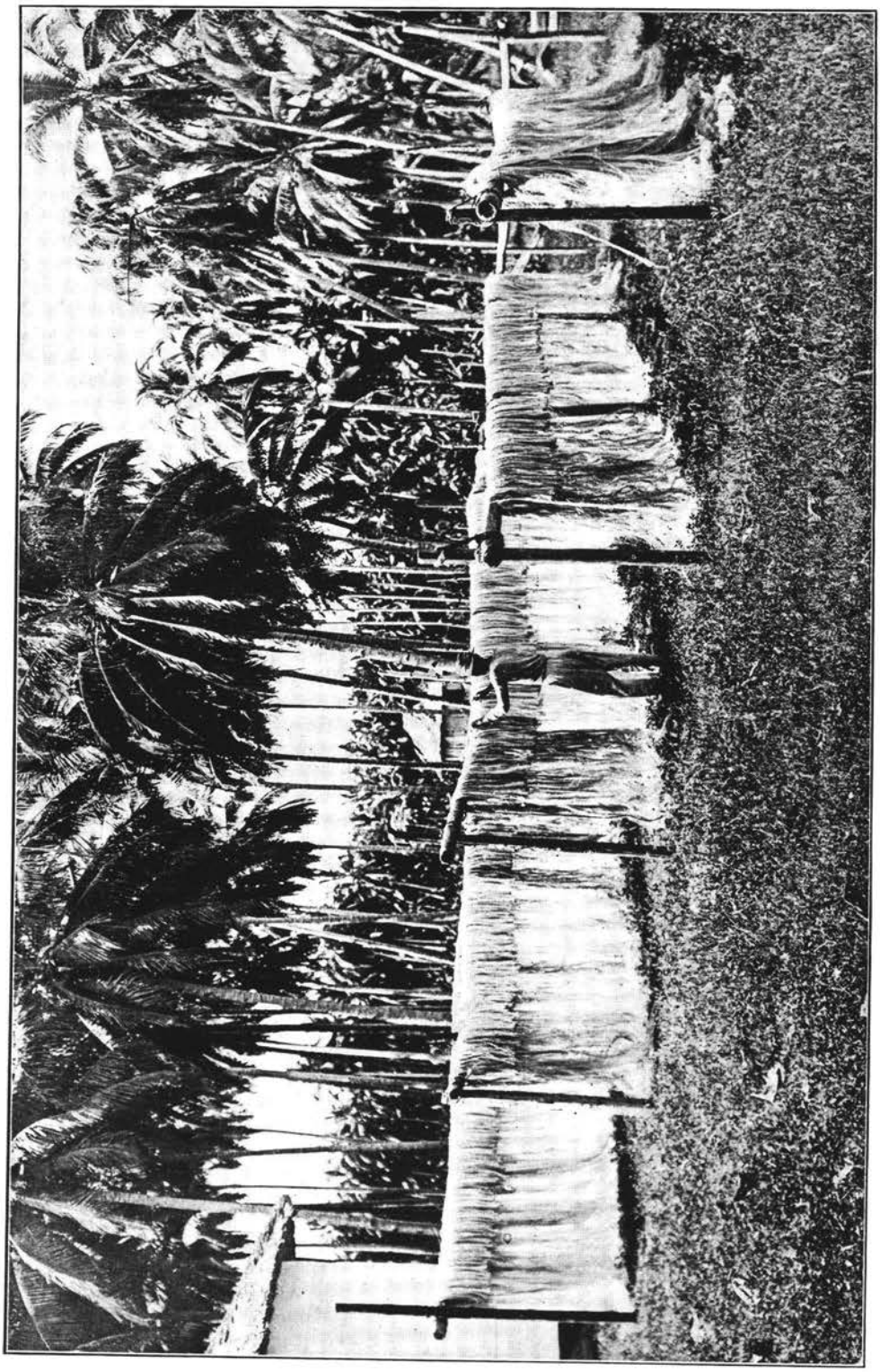
Mountains, deserts, valleys, chaparral, forests and other terrain alive with game, fur and beautiful creatures would bring tourists to California by the hundreds of thousands. In Nevada it is estimated that at the present time an antelope is worth $1,000, a deer $300, a sandhill crane $100, a coyote at a camp site $50; the Yellowstone Park grizzlies are valued at $10,000 each as tourist attractions and the buffaloes at $5,000 each.

So intimately related are Nevada's and California's interests that it is regarded as inevitable that these two states will bring their wild life laws into close relationship. The states of Washington, Oregon, California, Nevada, Idaho, Utah, Arizona and New Mexico in their common interests will eventually unite in definite interrelating plans in order to bring back wild life, by protection, reimportation, and other methods till the districts that now produce less than $10,000,000 will develop an annual gross of more than $100,000,000. State game law commissions are already associated in a society.

The great leaders of the movement, like Hall and Skinner, hardly dare estimate the possibilities of wild life when given in the wilderness, and the partly used districts, its full development.

R. S. Oakes, secretary-manager of the American Trappers' Association, believes that in the one department of fur and wild hide conservation, the Western Coast, Sierra and desert regions could yield upwards of $200,000,000 annually in wild food, fur, hide, skin, and other practical materials, coupled with the value to the human race of roadside and camp country, ranch and rural opportunities to study birds and beasts.

Texas is putting conservation into the schools. The work of Prof. Skinner of Long Beach has led many school authorities to discuss the problem of how best to introduce wild life conservation as a required subject in grade and high schools, since adequate understanding of the subject would be worth annually to California, all told, more than $25,000,000 at the very least, counting actual products and tourist attraction income.



After hemp fiber has been stripped clean of cellulose, it is washed and dried in the sun as the first step of manufacture. Manila hemp cables today divide honors with the finest steel.

Grading hemp preparatory to baling.

The Manila Hemp Industry's Growth

By a Correspondent for the American Chamber of Commerce Journal of Manila

Manila hemp, the world's prime cordage fiber, is indigenous to low mountain regions of the Philippines with an abundant rainfall distributed throughout the year, but not to Manila or indeed to this coast, where the dry season is distinct. It grows without replanting, or practically wild, in southeastern Luzon and the Bisayas, and is replanted in the Davao-gulf region about every 10 or 12 years. On Luzon, too, the fiber is commonly stripped from the petioles (it is a relative of the banana) by hand, one of the hardest labors man performs; but in Davao machines do this back-breaking, gut-rupturing work, and the industry is more advanced there, where the plantations date from the American occupation and later, than in regions where feudal farming still prevails and owners are indifferent about unit costs and production. Hemp goes loosely bundled in piculs of 137½ lbs. from the farms to the shipping ports, and from them to Manila or aboard ocean steamers in well-pressed bales of 275 lbs. A monthly average of 13,087 metric tons of this fiber is exported from the Philippines. A little is manufactured locally. The public's buying power is largely determinable by its price, because

about two persons in five in the Philippines live in the hemp regions and directly or indirectly support themselves from the hemp industry.

Filipinos have always used Manila hemp, abacá as they call it, for making cloth. They laboriously strip the fiber clean of cellulose, wash it and dry it in the sunlight, and tie the fibers into threads long enough for the loom. They macerate the fiber in a mortar, to soften it as much as possible. But, though it takes color well, it makes a harsh cloth at best. Hemp cloths, *pinokpok* and *sinamay*, are made in Albay and Marinduque, Samar and other provinces where easy means of transportation has not entirely supplanted the native fabrics with cotton cloth, which is of course much preferable.

Hemp cloth is a good sail cloth and still used as such on hundreds of little craft in Philippine inland waters. Hemp cord can also be made into seines, and hemp is very resistant to the action of salt water.

It was for such domestic purposes, cloth, seines, sails and rope, that hemp was used in the Philippines until Britain and the United States began trading at Canton and frequently running ships to Manila, a trade that grew rapidly after the Spanish monopolies of overseas trade were abolished in 1830 and smuggling was no longer necessary. Both the Yankees and the British soon discovered that Manila hemp made superior cordage; they liked to outfit their ships with it, and began buying homeward cargoes of it. The Yankees experimented with it for making paper, with success, too, because there was a free press in America, where popular education created more demand for newspapers and books than the scanty linen-rag supply could satisfy. England and Scotland had more linen and less public-schooling, and confined their use of hemp to the cordage trade.

Both Britain and America used Manila hemp liberally in equipping the big merchant fleets of sailing vessels they trafficked with on the seven seas, and Britain found it of equal value in her warships while she was defeating Napoleon, humbling France and making herself mistress of the seas. When steam replaced sail, there was still use for hemp in the massive cables steamships require; in this function hemp from Manila divides honors with the finest steel today.

After the Civil War in America, Britain gained the ascendancy in the Manila trade; America was practically off of the seas, though Germany was claiming her place fast enough, and America bought Manila hemp via England, c.i.f., landed in American ports by British ships. It is still thought necessary to have foreign ships in the carrying trade between the Philippines and the United States, but Manila hemp for the American market has been bought in the islands and shipped directly to America since the Philippines came under the sovereignty of the United States. The United States gives the Philippines a market for higher grades of hemp than England buys; whereas American and Philippine banking and insurance and steamship interests share the benefits of the direct trade, Filipino labor gets the grading and conditioning work that was formerly done in England on the hemp fiber destined for America.

Japan comes in of late as a third good customer for Manila hemp, taking both the ordinary cordage grades, even the lower ones, and very high fine grades that are made into hat braid. Japan also knows how to crack away the crust from the bundles of fiber, and what is left is a cotton of long staple and the finest strength and whiteness. Not much is known, however, of the practicability of this process when cotton is at normal prices; it may not pay excepting when cotton is high, but low cheap grades of hemp can be used for it.

The Philippine government takes an interest in grading hemp for export in order that the growers may obtain the prices pertaining to the grades they sell; there is a fiber-grading board doing this

work, formerly in the indifferent hands of a government bureau.

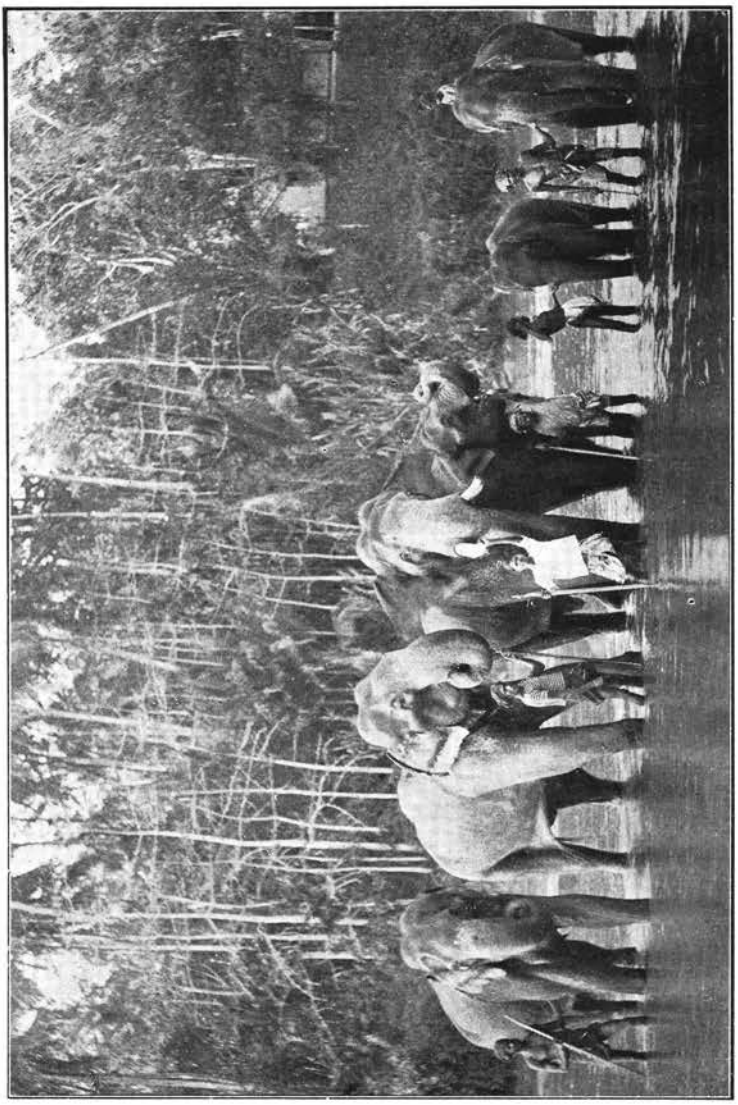
Manila hemp is on the American free list. Such a product, absorbing torrents of rain in its growth, can not be cultivated in the United States; yet for ships, for well drills, for rope and cordage generally, such a product is needed. England, of course, had it monopolized in '98; even the grades of the stripped fiber, of which there were few, were England's; it was a profitable commerce to buy hemp but half-classified, insure it with a British company, ship it on a British ship to Scotland or England, clean and properly classify it there, then, with charges, insurance and freight collected once more, reship and sell it wherever there might be demand. An export duty applied in Manila, which became a wedge to ease Britain out of this trade so far as it concerned America; the Taft commission decreed a rebate of the duty if the hemp was bought by American concerns and manufactured in the United States.

While this developed a direct American trade in Manila hemp quickly enough, it gave rise to abuses. A Philippine customs inspector sent to Europe found hemp there that had enjoyed the drawback and should have been manufactured in the United States instead of being sold and exported. When the tariff for the Philippines was enacted, export duties were prohibited. There have been lamentations at the University of the Philippines over steps taken to break the British monopoly of Manila hemp and give the Philippines a better market while benefiting American cordage interests and consumers, but the record is really not dishonorable; everything the Philippines produced at that time left Filipinos' hands in the rawest possible state; whereas now the tendency is to manufacture locally.

There are five cordage mills in Manila. A Filipino, Valenzuela, for whom *calle* Valenzuela in Santa Mesa is named, had established a ropewalk in that district prior to the revolutionary period and did a thriving business in making cordage for ships. Valenzuela was a victim of the revolution against Spain; the *Guardia Civil,* suspecting him of disloyalty, drumheaded him to face a firing squad. The incident is memorialized in a painting in President Rafael Palma's office at the University of the Philippines. As usual, the thrifty middle class bore the brunt of the disorders in the Philippines at the end of the century that led to the change of sovereignty. Valenzuela's career deserves a place in a textbook.

Manila hemp was not grown commercially outside the Philippines until the Dutch stole plantings and got fields of it growing in Sumatra—on plantations still prohibited, it is said, to foreign visitors. This hemp is now on the market and sells on a par with the Philippine product.

Hemp goes from the farms to central points, and then mostly to Manila. This is a scene on the Pasig river.



Elephants are used extensively in teak lumbering, and are indispensable in the industry. Other more up-to-date methods have been experimented with, but have proved unsuccessful. Elephants are slow, but sure, and this is very essential.

In the countries where teak grows it is considered the most important commercial wood.

Teakwood

By IVAN J. TOFFT

(A paper submitted to Professor John Richard Mez, University of Oregon, in the class in "International Trade Relations of the Pacific Area.")

Teakwood has a very romantic and long historical background. It is also of importance as a commodity of export by the Far East to the rest of the world. Its history dates back to ancient times when Europe was the playground of warring tribes and clans. The eastern part of the world was somewhat more settled, but was being explored by the roving island people.

It was during this period that a certain wood called "pijingoda" (ironwood tree) was discovered. The natives found that it was more useful than the other woods found in the Far East. It could be used for making "dugouts," or small boats, principally, but it also served other purposes. Early tribes fought over the ownership of the sources of this valuable wood. In this way the natural forests were divided up among the different peoples.

Teakwood, as this valuable wood is named today, has had very little subject matter written about it. Some world travelers have given the teakwood industry a prominent place in their travelogues. The industry itself is so small in comparison with the giant lumber industries of the world that it is relatively a mere infant.

During the first part of the twentieth century many explorers brought back to the New World stories concerning the unexplored regions of Asia and Africa. From these stories it is possible for the interested reader to get information. The present-day lumber industries of these eastern countries receives mention only now and then in trade magazines and government reports.

During the early ages tribes in Southern Asia and on the coast of Indo-China and Siam found it necessary to have means by which they could cross the numerous streams. Rafts were used first and later "dugouts" were made. Rafts were all right on small streams where the current was not too swift, but were not usable on fast-moving rivers. Through necessity rude canoes or boats were fashioned out of logs, to meet the requirements.

After the natives began making rude boats they discovered that certain woods were more adaptable to the making of boats. It was at this time that they found that pijingoda, or teakwood, was very valuable for this use. Teakwood has many qualities which are well suited to such uses. Natural teakwood is very hard, the grain is straight and will not warp or shrink. Most important is a natural oil that is always found in the wood, which resists water and preserves the wood almost indefinitely. The natives found that it resisted the attacks of the white ants, or termites. These qualities in the natural wood made it most valuable for building boats.

Their boats made of teakwood did not become water-soaked and could be handled roughly without fear of ruin. In Indo-China, Siam and Burma, where the bulk of the world's supply is found, one finds numerous swamps and a dense growth of underbrush. Because the rivers are not connected and are generally littered with floating and partly submerged fallen trees, the natives found it necessary to have very strong "dugouts." In many cases it was necessary to drag their "dugouts" from one stream to another through the dense underbrush and over rough ground.

Superstition played an important part in the lives of the early peoples of eastern Asia, as it did with other early tribes. In these far-eastern countries idols were used extensively for worship. It took the tribes many years to construct an exact image of one of their gods. The designs were very intricate and must be exact. In this respect it was found that teak was invaluable. Its straight grain and even texture made it very valuable for carving. Idols were made to fit the purpose and many large idols were constructed of teak that had been seasoned for many years. Representations of their gods were carved to place in their homes, and warriors found it beneficial to carry such idols to their combats. Idols made of teak are very beautiful because the wood turns a glossy jet black with age. Many of these carved idols can be found today in many modern homes, each with an origin and history that is very interesting.

Quite early it was found that teak was useful in many other respects and commanded a high price. The lumbering on a commercial basis was carried on at first by natives who were very wasteful. They did not consider the future supply, but recklessly cut and sold the valuable timber.

The devastating methods used by the natives and foreigners who came in to cut and ship the timber caused the governments of the various countries to put the supply under government supervision. At present the governments control all the teak forests, and lumber companies must first be granted a concession to work the sections. A rigid and strict surveillance is kept up by the governments to protect their rights. Each company that operates must have the consent of the government forestry official before a tree can be cut. The official goes into the concession and supervises the girdling of the trees, and they are then left for about two years before they are cut and hauled away.

Elephants drag the teakwood logs to the nearest stream deep enough to float them.

The natural supply is very limited. The future supply is somewhat guaranteed by the governments' replanting system. When a concession is granted a lumber company, it is usually for twenty or thirty years. The first ten or fifteen years a part of the concession is worked, and in the remainder of the term the rest is logged off. Replanting starts just as soon as the section is worked.

There are about twenty species of teak. The most common, as well as most abundant, is the *Tectona grandis*. So-called teak forests have about one tree to every three hundred other forest trees, but the growth is very rapid when once a beginning is made. The leaves are large and resemble elephant ears. The tree grows to an average height of eighty or ninety feet, and attains a girth of about twelve to sixteen feet. Maturity is reached in about eighty years. It is a deciduous tree and seeds at the end of the rainy season. The seeds are contained in a hard shell and, due to the lateness of the season, they may lie dormant for a considerable period.

The wood is a light yellowish-brown when cut, but turns darker with age. Among its valuable qualities it contains a resinous oil which not only protects it against the action of water and insects, but acts also as a preservation against rust. Because of this one quality it is considered most valuable in ship building, because, as backing for armor plates in ships, it prevents rust.

In Siam teak is considered the most important commercial wood. It yields the government approximately a revenue of 1,500,000 ticals per year, with the best qualities found on the low hills of northern Siam. The Siamese government controls the supply and grants concessions to companies, whose operations are carried on in the vicinity of Chiengmai, an old city located near the headwaters of the Menam River. Chiengmai has been the center of European civilization in Siam for the last fifty years. The gov-

ernment forestry department headquarters are at Pakonanpoh, the junction of the main branches of the Menam River. At this point all the logs must float past the government checking station.

The pride of Burma is its teak forests located near Tenasserim and in upper Burma, with the control resting in the hands of the government, well protected. Licenses are granted to companies who are concerned entirely with the extraction of teak, and "zones" are allotted to them under supervision of the government. Replacement of the forests is taken care of by the government, and trees are felled with proper regard and consideration. The Irawadi River plays an important part in the logging activities and a bitter war was fought by the country over the quarrels of the Bombay-Burma Company and King Theebaw, which led to the conquest of the Irawadi River by the English.

Indo-China boasts a small supply of natural teak, but it is not found so abundantly as in Siam and Burma. The control rests with the government and concessions are granted to foreign companies.

The teak lumbering industry, because of its peculiarities and situation, must use what may seem like old-fashioned methods in operating. Elephants are used extensively and, together with bullocks and water buffaloes, are indispensable in the industry. Other more up-to-date methods have been experimented with, but have proven unsuccessful, and for this reason elephants are still used. They are slow, but sure, and this is very essential. The price of elephants varies considerably. A good elephant sells for about £1,000, although it is possible to buy one for as little as £50. The expensive animals are usually well trained and experienced in the lumbering business, where they are used to drag the felled logs to the nearest stream that is large enough to float them. The work is slow and exacting, but under the adept handling of a native "Oogie" the animals behave well and do the work required. Each animal is able to handle from fifty to sixty logs a season. This may seem to the average person questionable, but when we consider the length of the lumbering season we can readily understand. The season lasts only a few months out of the year, generally from June first to the last of February. When the winter rainy season comes on the work is at its height.

All logs must be floated out of the forest to the larger streams and on down to the mill. There are many log jams and it is necessary to constantly watch the streams, as many logs are floated out of the main stream and in this manner become stranded and lost. Many small lumber mills, hidden away in the jungle, are able to thrive simply through the negligence of a native stream patrol man. Snipers are always on the lookout for logs that they can float away to their hidden sawmills.

Five to six years are sometimes consumed from the time the log is cut until it finally reaches the sawmill. When the logs finally arrive at the large rivers they are gathered together in large rafts, generally with 150 to 175 logs lashed together to make one raft. As the logs pass the government station they are checked to the company whose stamp is on the logs. Native swimmers go out into the stream and bring the logs to shore, whence they start through the mill.

During the idle season of the year the owners of the competing sawmills watch with jealous eyes every move made by other companies. They are afraid that some competitor will steal state secrets. Very little log stealing goes on, with the exception of the small operations of the "log snipers."

Elephants are an important factor in piling of lumber at the mills after it has been cut. Heavy timbers that are unmanageable by human hands are cleverly handled by these animals. Under the guidance of an "oogie" the animals pile the timber. They become so adept at this work that stacks of timber above the

elephant's head can be made. The elephant uses the tusk to handle the timber. A story is told about an elephant that always closed one eye, after placing a timber, to sight down the pile to see if it was in line.

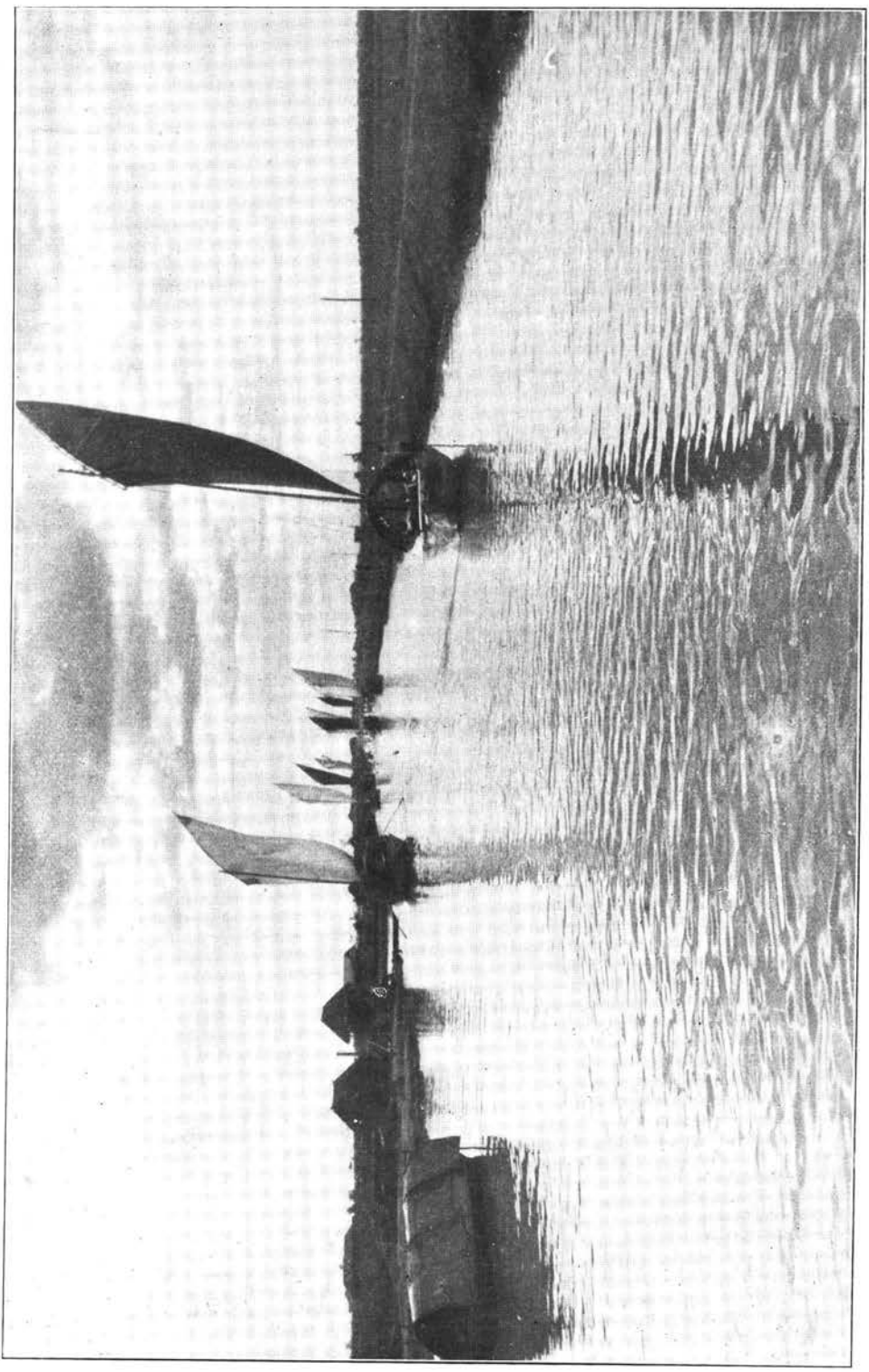
The industry is handled largely by foreigners. The British have many holdings or grants in each country, while the French concerns are situated in Indo-China, with the center of the industry at Saigon. There are also a number of Chinese and Japanese firms now operating, but the English seem to have the strongest foothold in the industry. Relatively few native concerns are able to exist. They do not seem to be able to compete, and those who do usually do the logging and then sell the logs to the foreign mills. This, perhaps, is true because the foreigners have the most efficient facilities to handle the raw material.

Exports of teak are sent to many parts of the world, but the bulk of the produce is used in China and Japan. The cost of the wood makes it practically out of the question for common use in foreign countries. Western countries have used it for ship building and furniture making, but most of the articles we find in homes today are made in factories near the supply. Many valuable teakwood articles are placed on the market by foreign producers.

In ship building, teak can not be surpassed. Many firms in the United States use a considerable amount of teak regardless of the price. A certain wealthy man in Los Angeles, California, had an expensive airplane constructed with teak for the fuselage. A thin covering of teak was used in place of the common composition silk covering. It was said to be more durable and much stronger as a resistant to the elements. It was christened *Tioga Eagle* and was reputed to have cost nearly sixty thousand dollars.

Another instance of the use of teak can be recalled. A day cruiser forty-five feet long was built by a ship-building concern in Wilmington, California. It was constructed of teakwood, and sold for sixty thousand dollars. A Los Angeles capitalist purchased the cruiser and claims that it is the most expensive craft on the Pacific Coast. The *Blue Moon,* as it has been named, has made numerous voyages on the coast and has been in many exhibitions.

Many people today own pieces of teakwood furniture, and with pride relate the history of the article. Furniture made of teak will last many lifetimes and seems to keep its original state of perfection. This is one of the reasons for its great value. Pieces of art are frequently found in present-day homes, made of teak, and it is not a rare piece of wood or a rare article, even though it is extremely expensive. Its usability, lasting quality, and beauty create a great demand for articles fashioned from this wood.



Thousands of boats are used to transport rice on the 10,000 miles of canals and navigable waterways in Indo-China to the export centers, and it finally finds its way to the mills at Chalon, the manufacturing suburb of Saigon.

French Indo-China Rice Trade

By GEORGE H. STOCKER

(A paper submitted to Professor John Richard Mez, University of Oregon, in the class in "International Trade Policies of the Pacific Area.")

Much information has been printed, in late years, on the rice trade of the Far East. In this paper I will endeavor to give some specific details on the methods of raising rice, and the production and marketing methods in French Indo-China. Besides being a large rice-producing country, French Indo-China is one of the principal exporters of this commodity, the shipments of the product constituting about 70 per cent of the total exports from that country. About 90 per cent of these exports pass through the port of Saigon, located on the southernmost part of Indo-China on the Mekong River. Saigon ranks with Rangoon in Burma, and Bangkok in Siam, among the principal rice ports of the world.

French Indo-China has an area about equal to that of the State of Texas, 274,384 square miles. It has a population of approximately 20,000,000 people. It is one of the two important rice-growing countries of the world, Siam being the other important grower, which are not compelled to have recourse to foreign rice. While India exports over twice as much rice as does French Indo-China, the latter country buys practically no rice from foreign countries. This fact is due to the large difference of rice varieties that can be grown in French Indo-China. This country is the third country in importance in the amount of land devoted to rice production, being exceeded in this respect by only two other producers, India and China.

There are five provinces in French Indo-China: Cochin-China, Tonkin, Annam, Laos, and Cambodia. The acreage in each one of these districts is largely devoted to rice production. In Tonkin and North Annam, two crops annually are obtained. Central Annam sometimes harvests a second crop. It is somewhat difficult to obtain accurate statistics concerning the actual acreage and production in French Indo-China, but from the most reliable official sources, the pre-war acreage averaged 8,550,000 acres. It has increased somewhat during recent years to approximately 13,000,000 acres. There are about as many acres sown to rice in this country as in Japan, Chosen, and Taiwan combined.

The two great rice-growing areas of Indo-China are located in the deltas of the Mekong and Red Rivers, in Cochin-China and Tonkin Provinces, respectively. Both rivers have large annual floods due to the torrential rains that fall in the Himalaya Mountains, and every year a proportion of the crop is washed out. The headwaters of these two rivers are located in the vicinity of the Himalaya Mountains, which causes the rapid rise of the water volume in the rainy seasons. They drain a very mountainous region in the uplands, with many small tributaries adding to the volume of water flow. Some years the damage is so great as to reduce the total production of the country materially. On the other hand, if the dry season starts too soon the crop suffers from a lack of moisture and great damage ensues. Water is kept around the rice by dikes, and the late rains are depended upon to replenish the water as it evaporates. An early dry season is more dangerous to the rice crops than the floods, as it affects the entire country, while floods are only local. To insure a good crop of rice in this area, the rains must continue into November.

The planting of rice in Indo-China,

which is at the rate of one and one-half bushels per acre, is regulated by the advent of the rainy season. This season is necessary to render the ground soft enough to work and usually comes in the months of May and June. The early rice is harvested during November and December. Seasonal rice is gathered during January, February and March, and the late rice is gathered during April and May. The early rice is planted in poor districts, where two crops are necessary to fulfill the needs of the population for food, and in the low districts that are subject to the annual floods of the Mekong River, which come in November and December. The seasonal rice is the grain that enters into the country's commerce, both domestic and foreign, the other two kinds being retained for local consumption. The late rice is an emergency crop like the early rice and is used to recoup losses occasioned by floods, or to be employed as a second crop. The seasonal rice, the only crop of interest in the world markets, is subject to the two dangers, floods and droughts.

Rice is grown under very different conditions to those prevailing in America. In the Province of Cochin-China there is no irrigation, the rice being planted at the beginning of the rainy season, and all the necessary water is furnished by the rains that fall continuously during the growing period. Use of seeders and drills is impossible at seeding time, and only a water buffalo can work the land. The rice is planted in small patches, and then transplanted at the proper stage, to the rice field proper. In Tonkin and Annam modern methods will some time be possible, as large tracts of land are being prepared for the use of irrigation.

The rice cultivated locally belongs to the family of *Oryza sativa*, and is supposed to have come originally from India. While there are over five hundred varieties of this rice raised in the colony, they may be divided into three important types, viz: lowlands rice, highlands rice, and floating rice. The lowlands rice is the only variety that is exported, the other two being grown on a restricted scale and usually consumed locally.

The quality of rice produced in certain parts of Indo-China is variable. This is supposed to be due primarily to faulty planting and cultivation. For example, the Annamites are much harder and more efficient workers than the Cambodians, and the result is that the crops of the latter are inferior to those of the former and are often quoted at one piaster (fifty-one cents) per hundred kilos less than the Annamite rice. The local government is attempting to interest the growers in seed selection, as the average amount of rice produced in Indo-China per acre is considerably less than is the rule in Siam or India. For various reasons the quality of rice produced is considered inferior to that grown in Siam and India, and Saigon rice is generally quoted lower in world markets than rice from either of the aforementioned countries.

Most of the land under cultivation in French Indo-China belongs to large property owners. The proprietor, almost without exception, rents the land out for a certain proportion of the crop, which varies according to the richness of the land. It is usually not less than 30 per cent of the crop, together with a certain quantity of ducks and geese, chickens, eggs, and other products of the Annamite farmer. The money necessary for financing the crops, and purchasing implements, is generally furnished by Chinese or East Indians, not at stated interest rates, but for certain proportions of the anticipated crops. One of the greatest drawbacks in the development of this industry in French Indo-China, is the lack of adequate financial institutions, organized primarily to assist the farmer in planting, growing, harvesting and marketing his crops. At the present time an agricultural bank has been formed, which extends credits to farmers at rates low enough to better the status of the industry as a whole.

The Chinese practically have a monopoly on the rice merchandising, marketing,

and milling in Indo-China. The important Chinese mills have buying organizations that extend into every village of every rice-growing community. Long before the rice is ripe, the small Annamite grower has usually sold the proportion of the crop that is his, to one of the agents that continually circulate through the country. The rice is usually delivered to the Chinese purchaser in a neighboring village, or is frequently called for by the Chinese miller's local representative, if the paddy happens to be on a canal. The landholder to whom the Annamite has paid rice as rent, eventually sells to a local representative of one of the Chinese mills. Only in rare cases does the actual grower take his crop to the mills; this only when he is located near one of the manufacturing centers.

After the rice is in the hands of the Chinese purchasers, it is concentrated in one of the local centers, and is eventually shipped on junks to the mills at Chalon, the manufacturing Chinese suburb of Saigon. There are approximately 10,000 miles of canals and navigable waterways in Indo-China. These are used by thousands of junks to transport the rice and produce of the country to the export centers. This transportation service is also monopolized by the Chinese mills.

The paddy, after reaching the mills, remains in the warehouses until it is sold, before it is turned into cleaned rice. Very seldom is the rice cleaned, sacked, and placed in stock in anticipation of orders, the usual custom being to wait until the carrying vessel is signalled at the mouth of the river. At this time, the mill having the contract to furnish the rice begins work on the paddy. As the average mill can turn out 750 tons of rice a day, it is finished as quickly as the vessel can handle it. This system is practical when a mill is working for only one or two small vessels. If several vessels happen to arrive at once, as is frequently the case, the mill is unable to supply all at the same time. The result is a delay for the ships and a great loss of money.

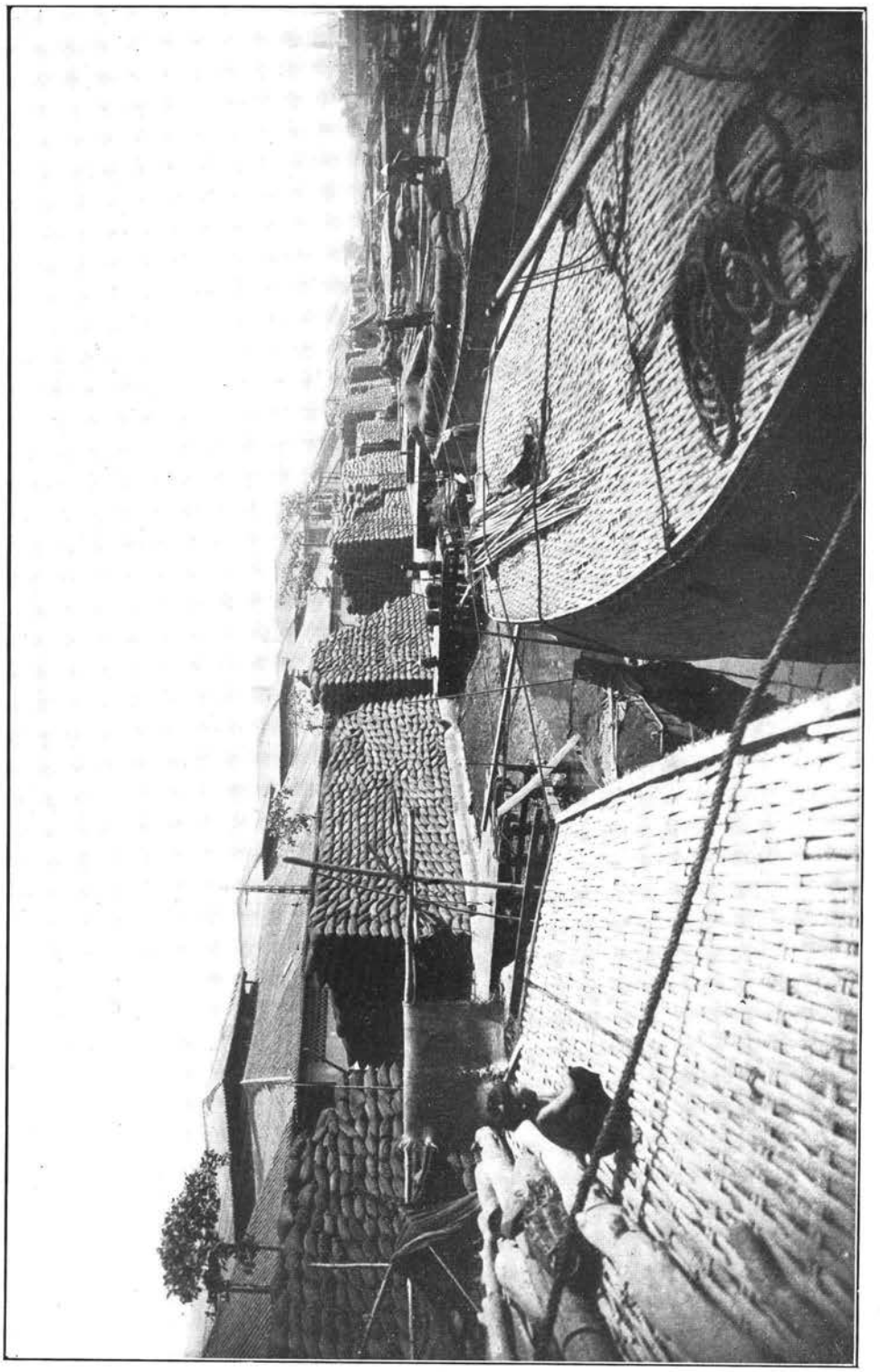
Efforts have been made to persuade the Chinese to abandon this practice, or at least to commence the manufacture of rice upon the receipt of advices concerning the sailing of vessels from Hongkong or Singapore, but without success. Efforts to form export and standardization organizations have not met with success and owing to this fact a comparatively small percentage, not over 25%, of the French Indo-China rice is sold direct to the importing countries. The largest percentage is shipped to Hongkong, where it is regraded and mixed with Siam and Indian rice. The result is that French Indo-China rice suffers greatly in the world markets, as the importer has no standard grades to choose from and there is no certainty as to the quality he will receive, no two shipments being alike.

An additional factor that is causing the lower quotation of Saigon rice on world markets is the lack of grading and classification in French Indo-China. The kinds of rice exported are white rice, cargo rice, paddy, brokens, and flour. The following are the only grades that are quoted:

Number 1. European rice, 25 per cent brokens.
Number 2. Japan rice, 40 per cent brokens.
Number 3. Java rice, 50 per cent brokens.
Number 4. Brokens.
Number 5. Flour.

Europe takes the best rice, which contains 25% brokens; Japan usually accepts 40% brokens; Java, 50%; Cuba and the Philippines take the best local rice; while France, Hongkong, and Singapore take broken rice in addition to white whole rice.

Rice containing a smaller percentage of brokens is milled, but only on special orders, the mills preferring to manufacture according to the above-mentioned grades. High prices are demanded for special grading, which results in Hongkong getting most of the trade. The purchaser simply receives a certificate issued by the Saigon Chamber of Commerce, stating the percentage of brokens, no reference being made to the quality of the rice, and



A river port where is accumulated the rice crop of the surrounding region. Here are stacked immense quantities of sacked grain ready to be sent to the mills.

the Chamber of Commerce assuming no responsibility for the certificate.

The Chinese mills at Hongkong operate largely in rice coming from French Indo-China, and the Chinese mills in Cholon are largely controlled by Hongkong interests, thus the incentive to raise the standard of Saigon rice is not seen, as standardized French Indo-China rices would lessen the importance of Hongkong as a distributor.

About 70% of the export business is done by the Chinese, who control the Hongkong, Singapore, and Manila markets. The European export houses obtain a very small part of this trade, their business being done principally with France and other European countries, Cuba, Java, United States and Japan. This business is done on a firm-offer basis. The Saigon exporter obtains a two or three days' option from a Chinese mill, the latter promising to furnish a certain quantity of rice, at a certain time, for a certain price. The exporter, after arranging with the freight brokers for space, and his bank for exchange, then cables his offer to his prospective customers; upon the acceptance of an order, the exporter usually deposits one-half of the purchase price with the Chinese miller, even if the transaction is not to be consummated for several months. The foreign purchaser pays for the rice against documents, a credit having been opened in a Saigon bank. Shrinkage of not more than two per cent is guaranteed by the Saigon shippers, and the certificate of quality, furnished by the local Chamber of Commerce, is attached to the papers.

The Saigon exporters do not take possession of the rice until the arrival of the ship. Upon payment of the second half of the purchase price, the Chinese mills begin deliveries as fast as the rice is manufactured. All weighing and verification between the miller and exporter is done at the mills. The responsibility of the Chinese ceases as soon as the junk is loaded and started on the three to five-day trip to shipside at Saigon.

All insurance losses from theft, damage, etc., must be borne by the exporter. The Chinese mills furnish the junks, but accept no responsibility of any kind, except damage resulting from unseaworthy junks. This is rather an expensive custom for the exporters, as thefts are frequent during the trip from Cholon to Saigon. The exporter must account to the purchaser for the tonnage actually loaded upon the ships, and all discrepancies between the Saigon weights, after the trip from the mills, and the Cholon weights, must be borne by the exporter.

The internal transportation facilities of the country are excellently organized, all important rice-growing sections being served by a network of canals. The external situation is well served by French, English, Dutch, Japanese, Chinese, and Philippine steamship lines, that make business possible with European and Oriental countries, at all times. The United States and Cuba, which absorb considerable rice from Saigon, lack regular shipping connections. It is said that vessels of American lines in the Orient come to Saigon only when freight cannot be had elsewhere, and that during the sugar season in the Philippines, especially, vessels that had been announced as coming to Saigon, have been suddenly, and without warning diverted to that trade. This has caused considerable loss to the Saigon exporters, and has made business with American countries difficult.

There are no exchanges dealing in futures in French Indo-China, and no preference is shown in regard to exporting rice to the various countries. Only export rice enters commercial channels, as the rice consumed locally remains in the district in which it is grown.

The shipments of rice flour in recent years have averaged about the same as in previous years. There have been noticeable shifts in the countries of destination, however. Both England and Germany have been taking less than one-sixth of the consumption they had just after the war. On the other hand, the exports to

The proprietor, almost without exception, rents his rice land for a certain proportion of the crop.

Hongkong have more than doubled. An analysis of the export data, however, indicates that as a rule, a lesser quantity of these goods is being shipped "direct" to Europe and America. Also that Hongkong and Singapore are being used more than formerly as transshipping points.

The consumption of rice in Indo-China averaged, in the years just following the war, about 300 pounds per capita, an amount somewhat less than that of Ceylon, Japan, Taiwan, and Siam, but greater than that of the other Far East countries. In later years, especially 1924 to 1926, from which specific data are available, the per capita consumption was about 260 pounds.

There are sixteen large rice mills in Indo-China, modern in every respect, and equipped with English or German machinery. The mills have foreign engineers in charge, who are largely British, and naturally secure a considerable amount of the replacement and improvement work for British firms. The average milling capacity is 750 metric tons a day. Two mills have a daily capacity of 1200 tons each. Fourteen of the principal mills are at Cholon, where the bulk of the manufacturing is done, and there are two modern mills at Haiphong. Another new and modern mill has been constructed of late at Pnompenh, Cambodia, financed with Indian capital. A vessel of approximately 1500 tons can navigate up the Mekong River to this city. Under the present plan, Cambodian rice is exported from this point, instead of shipping the paddy to Cholon, as has heretofore been the custom.

There is practically no market for the by-products of rice in Indo-China. This is one of the reasons for the large and increasing exportation of paddy to Hongkong, as at that city the products can be utilized. Flour is the only by-product of any importance that enters export commerce. Locally, the hulls of the rice are either used by the mills for fuel, or sold for a small price to natives, who burn them and then use the ashes for fertilizer. At present, the development of new by-products, and the use of all parts of the so-called waste products, make the industry one of great importance.

Tea Culture in Formosa

By EDWARD THURSTON

(A paper submitted to Professor John Richard Mez, University of Oregon, in the class in "International Trade Relations of the Pacific Area.")

Somewhere about 1860 the practical commercial growing of tea was introduced in Formosa.

Bohea tea is one of the principal teas of commerce and is the main variety grown in Formosa. It is of the genus *Camellia* and was originally imported from China in about the ninth century.

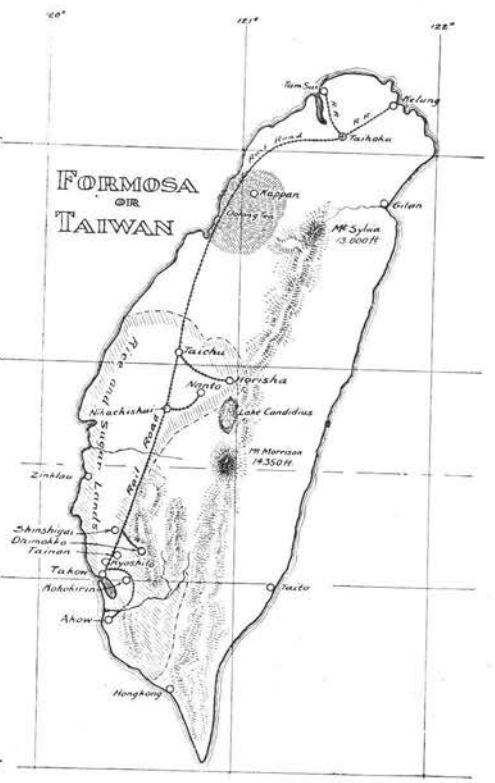
Where the tree is allowed to grow under natural conditions it attains a height of from 30 to 40 feet; the leaves are about 4½ inches long and 1¾ inches wide.

The original home of the tea is unknown, but it is considered indigenous to the whole monsoon region of Eastern Asia. It requires a warm subtropical climate and a moist, steaming atmosphere resulting from frequent, copious rains. It thrives best on rich, light, fertile soil containing stores of humus, well drained, and of good depth. In Japan the best tea regions are from 30 degrees north to the 35th parallel and 40 degrees is the extreme northern limit. The finest teas are found at high elevations.

The main tea plantations in Formosa are in the northwest, especially in the area between Shirchiku and Taihoku.

Propagation is obtained from seed of special plants set apart for seed purposes. Young plants are raised in nurseries, and when about six or eight inches high they are set out in the plantation at a distance of from four to six feet apart. They require much weeding and cultivation, and manures are considered a great aid.

Pruning is an important operation for the purpose of producing a bush of convenient size for plucking and to increase the leaf production. The plant, when two years old, is cut down to within less than a foot of the ground and this operation is carried on biennially.



The Island of Formosa.

A small crop is obtained the year after planting. In the third year, about 150 pounds of finished tea per acre per annum is obtained. In 6 to 8 years the bushes are in full bearing, yielding from 400 to 1,000 pounds of finished tea per acre annually. Plucking is carried on every 7 or 10 days with 20 or 30 pluckings during a season.

The quality of the tea depends very

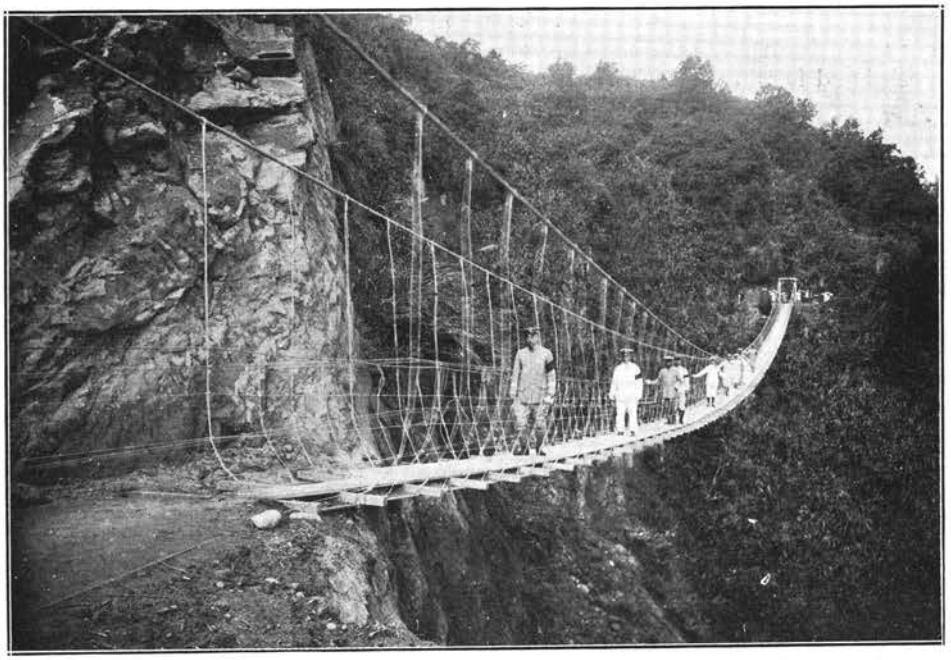
Picking tea on a Formosan plantation where twenty or thirty pickings are made during the season.

much upon the character of the plant, the circumstances of its growth and cultivation. But manufacturing is also very essential. Machinery is used for nearly every operation in manufacturing. The most important feature in tea manufacturing is the regulation of the fermentation (oxidation) process. The fermentation is the cardinal feature in the making of black tea, and black tea is the most important in commerce. In preparing green tea fermentation is prevented.

Plucked leaves are usually thinly spread on the clean floor of a shady withering house, or in sterilized shallow trays arranged on racks. Withering is completed when the leaf has become soft and flaccid. This process usually takes from 18 to 20 hours. The withering process not only prepares the leaf for the subsequent process of rolling, but also brings about important changes in the later fermentation process.

A rolling machine passes the withered leaf between two adjustable metal rollers, and requires from 15 to 60 minutes; the rolled leaf is then sifted and the older leaves treated again. The rolling imparts to the tea its characteristic twist. This operation is subservient to the fermentation process, which is the oxidation of the cell contents of the leaf. The rolling rupures the leaf cells and the juice is pressed out on the surface of the tissue where, under the influence of oxidation, fermentation commences.

Fermentation encourages chemical action commenced during rolling. From the rolling machines the tea leaf is transferred to the darkened fermentation rooms; spread in layers 2 inches thick to give full access to the air. The atmosphere is kept moist and the odor and flavor of the teas is thus developed. The manufacturer must not let the tea oxidation continue too long or it ruins the



A novel suspension bridge in Formosa spanning a deep gorge.

quality. A number of yeast cells improves the tea and cultures of yeast are used.

The action of oxidation or fermentation is stopped at the desired moment by means of heat. The process requires about half an hour. The fermented leaf is conveyed over a series of moving tables in the drying chamber through which hot air is passed. The process kills fermentation and also dries the tea.

The leaves are then sifted into grades. The four chief grades of black tea in descending order of quality are: orange pekoe, pekoe, pekoe Sanching and Sanching orange pekoe, this being the youngest leaf. The tea is stored in air-tight receptacles until required for packing. It is dried before packing.

The kinds of tea produced are: black leaf tea, green leaf tea, oolong tea, black brick tea, green brick tea, tablet tea, tea dust, unfired tea leaf, tea stalks.

Japan trees are not so well suited for making black tea, but are the chief producers of green and Oolong tea. North America is the main consumer of this type of tea and imports 80 per cent of the tea grown in Japan.

Oolong tea is the favorite in the East and New England and is used in England to add flavor to the black tea. Oolong tea is admittedly superior in quality to black tea. The Oolong teas are black and green leaf teas, and although they look like black teas, their taste is very similar to that of the green. These teas are the result of a special method of curing. The tea is usually twisted in threads. The decoctions of Oolong teas in the higher grades are a pure straw color, and in the lower grades a brown and red color. As a general rule Oolong teas have a grayish color. They are prepared with water and are manufactured in two types, scented and unscented. The Oolongs are known under the following names: Oolong, Poochong (special style of packing), Silver Oolong (specially picked Oolong prepared from delicate whitish leaves of the first picking).

Peculiarities in the preparation of Oolongs place them in a separate class between green and black teas. They are

manufactured in special factories. The tea is made from fresh opened leaves of the third and fourth pickings. In the factory the leaves are steamed in special-built boilers and immediately cooled in kettles with cold water. No fermentation is allowed, so that the Oolong is similar to green tea in respect of the oils remaining in the leaf. Cooling takes place when the leaf turns a bluish color.

Black and green teas differ only in method of manufacture. Entire localities specialize in one kind of tea not because of climatic conditions but from tradition and acquired habit, and also from the character of the demands of the nearest market.

Skill is required in hand rolling and as it is very unhealthful and disagreeable work skilled help will not stay. So Japan has developed machinery to do the work. Electric heat is now used, which overcomes the troubles of uneven heating. The electrical process started in Japan in the Shidzuoka district. It has now developed past the experimental stage, and is rapidly being adopted by the manufacturers of tea. In 1924 the greatest movement from the old process to electrification of the industry was made.

In the old process of steaming or withering, leaves were placed in withering houses on shelves or in baskets placed in an oven full of boiling water. The electric steam heaters which have lately been introduced are fitted with endless belts revolved by electric motors which convey the tea leaves through the withering machine, after which they are blown off the other end of the belt by fans to other conveyors to the rough-rolling machines which are heated and revolved by electric power. The rollers hitherto were heated by charcoal and the tea leaves were in danger of having their flavor spoiled by the gas generated by such fuel, besides which the unevenness of the heat deteriorated the leaves. Electrically heated ovens are now employed. The re-rolling machines are also electrically heated and propelled.

The electric heating drier is used in two ways: first at the end of the fermentation, and secondly when the manufactured tea leaves are to be dried again for packing.

The special feature of electric heat adapted to tea manufacture is that the heat is changeless and it can be adjusted according to the requirement.

The United States consumes about one pound per person annually, and is second in the tea-consuming countries. There are some 900,000,000 pounds of tea consumed in the world annually.

The culture is very greatly encouraged by the government of Formosa by providing classes of instruction in tea cultivation and the construction of model tea gardens. The government inspects all teas before they are exported, so that no inferior grade will be shipped, so as to maintain their good name for quality tea.

Plant Life of Santa Catalina Island

By M. B. DUNKLE
Of The Santa Catalina Islander

Any island appeals to the imagination of a naturalist, a historian, or a poet, and Catalina offers as much of this exotic allure as does any island lying so close to the mainland.

The life of an island offers three main questions or problems. First: What does its life show about the past history of the island? Second: What does it show about the present orogenic forces at work? and Third: What does the life of an island show about the evolutionary development of that life itself? The purpose here is to present a few of the facts bearing upon each of these three problems and to suggest at least one answer to each of the questions.

For the sake of brevity and because plant life is more familiar to us than are the more mobile and inaccessible birds, insects, or animals, we will limit our observations to plant life.

The plant life of Catalina is of interest because of the presence of unique forms not found elsewhere. There are from thirty to fifty plant endemics on our island, that is, plants which are sufficiently differentiated to rank as species or varieties not to be found on the mainland. We say from thirty to fifty because authorities do not agree in classification and because new facts about plant distribution are being continually discovered.

The large number of plants common to the Channel Islands as a group and unknown on the mainland might seem to indicate phases in the migrations or trade routes of the prehistoric peoples or might be merely indicative of the natural means of seed dispersal.

Among the interesting endemics are the following:

The ironwood (*Lyonothamnus floribundus*), which is a tall, upright tree with simple or compound leaves, and great spreading clusters of white flowers. It is found only on the larger of the Channel Islands.

Our island blue oak (*Quercus dumosa McDonaldii*), is a handsome spreading tree found only on Catalina and Santa Cruz Islands. Our other island oak (*Quercus tormentella*), is a large upright tree with thick, downy, elliptical leaves, and is found on all the larger islands from Santa Rosa to Guadaloupe.

Some of our most unusual endemics are so rare as to be known by only a few people. Among these are the weeping dogwood, Trask's mahogany, and one of the most beautiful of our flowers—*Antirrhinum speciosum*. Our tree poppy (*Dendromecon arborea*), is also relatively rare. On the other hand our tree lilac (*Ceanothus arboreus*), with its large leaves and great clusters of light-blue flowers is common on many sheltered hillsides. It is found also on Santa Cruz Island.

Continuing a study of our island endemics and their distribution one can scarcely help but conclude not only that the separation of Catalina from the mainland is relatively remote, but that the interconnection of all the Channel Islands was a more recent geologic occurrence than their separation from the mainland. Yet one wonders whether the fact that several of our Island plants are also found in Lower California and on Guadaloupe

Island, indicates that these regions were once connected, or whether it more strongly indicates ocean currents bearing plant debris and seeds.

Island shrubs and trees, as a rule, grow larger than corresponding forms on the mainland. The California holly, or toyon, the wild cherry, the tree lilac, the mountain mahogany, the elder, and the lemonade berry (*Rhus integrifolia*), all make sizable trees with trunks from one to two feet in diameter, when growing in favorable locations. Many island shrubs and herbaceous plants, both native and introduced, grow more sprawled or straggly than the usual habit elsewhere. Both of these facts indicate that some ecological factors differ from those of the mainland.

Probably, too, climate or soil were different in the past from present conditions. Thus there never has been a seedling of the ironwood found and that interesting and rare tree is doomed to extinction unless artificial propagation is resorted to. No seedlings of the tree poppy were found until recently, when they have been growing near mining or road building operations in the vicinity of old plants. The seeds seem to succeed where the humus is scraped off and barren, rocky soil stirred up. The rarity of many plants on the island is due both to grazing by sheep or goats, and to the present lack of climatic conditions suitable for the growth of the particular plant.

A heavy chaparral grows on most of the northern and northeastern slopes, where neither sun nor wind strike so directly and dry the soil quickly. The southwestern slopes of the island, on the contrary, are nearly devoid of noticeable shrubbery or trees except in the deeper and more sheltered canyons.

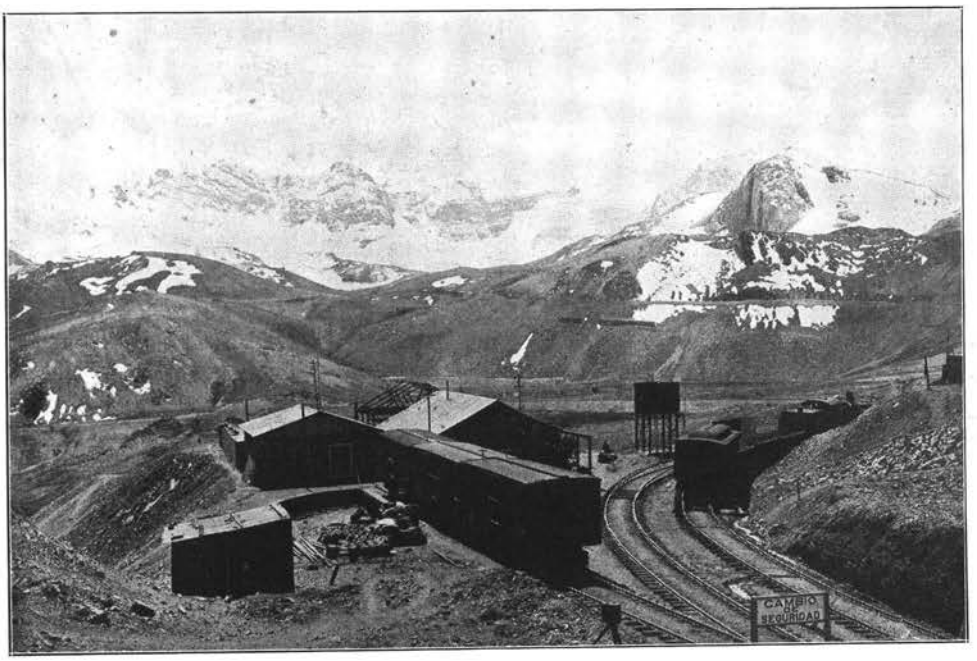
The high rolling slopes of the Island plateau are relatively barren most of the year, but are veritable fields of bloom in the spring after a winter of good rains. On some slopes facing the windward side of the island, as the palisades, the erosion of the ocean is more rapid than the weathering of the atmosphere and there is an almost complete absence of plant life for miles.

In these and many other ways do plants write an account of geologic processes and the interplay of present physical forces. But what do our island plants tell of the development of life itself? Only one hypothesis will be developed here to show how this may be done.

There are thirteen or fourteen species or varieties of large trees on the island, and six of these differ in more or less well-marked characters from any found on the mainland. Of the ten dwarf trees three are not found elsewhere. This percentage of endemic forms decreases steadily as we approach the shorter-lived forms. In fact, nearly all of our island endemics are either long-lived perennials or shrubs or trees.

This leads to one of two conclusions: Either the seeds of annuals and short-lived perennials are more easily carried and there has been a great exchange of these plants brought about by the centuries of Indian intercourse and the later years of modern commerce. Either this or the rate of evolutionary change is much greater among the long-lived plants. It is obvious that there have been, since any given time, many more generations in annuals than among perennials. Then the chance of any new variation or mutation must be in proportion to the average age of a plant of any given species, that is, the longer the life span, the greater the chance of variation.

This article has tried to give you, not a mere description of island plant life, but some idea of the philosophy that even plants may indicate and some illustrations of the quasi-historical data that patient study may give.



The country around many of the copper mines has a distinctly Alpine appearance.

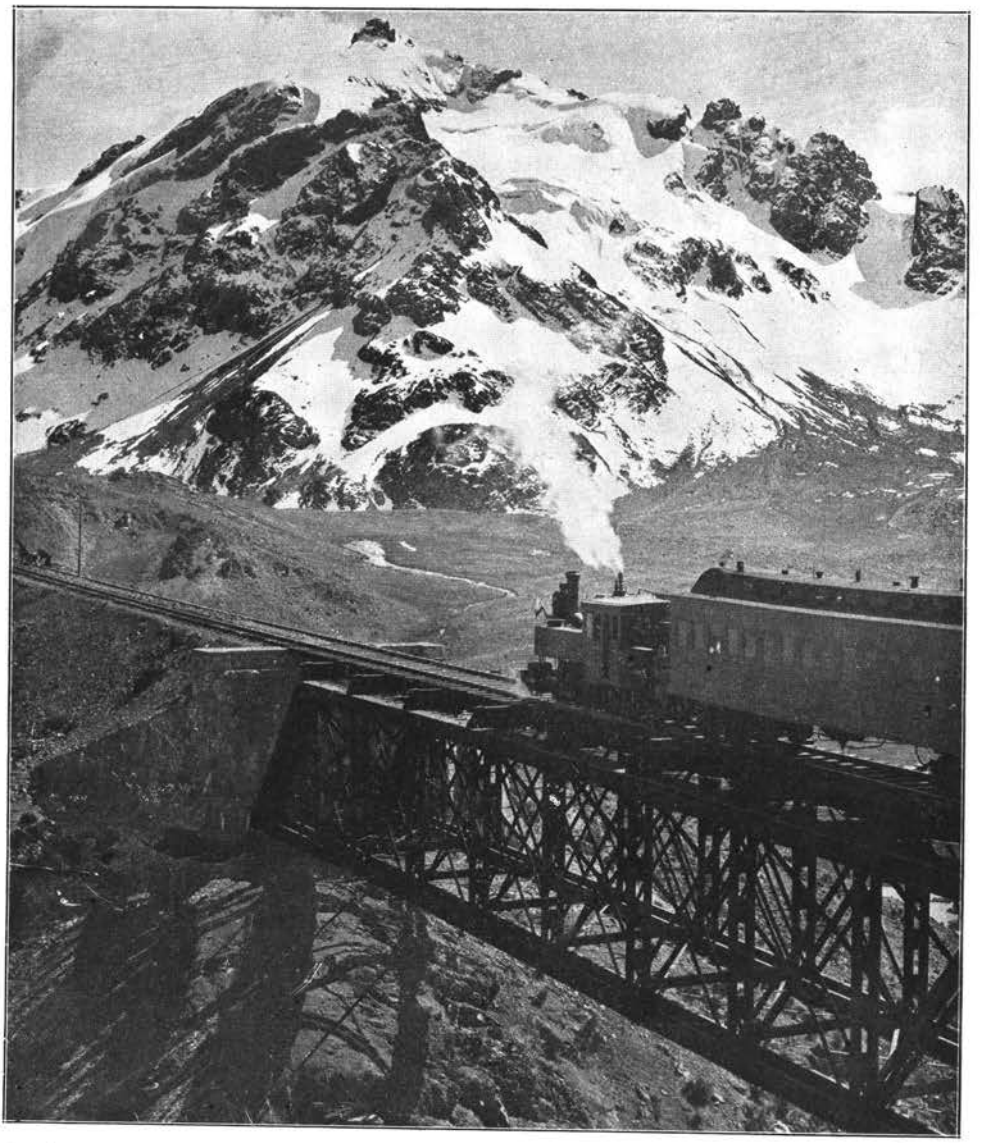
The Copper Mining Industry in Chile

By W. A. EDWARDS
On staff of the Du Pont Magazine

Chile is veritably a land of copper. The republic now ranks second among the world's producers of this ore, and is surpassed only by the United States. There are numberless copper properties in Chile, but since the vast bulk of the present-day output comes from three huge American-owned and operated mines, a description of these will give the reader a good idea of this industrial development.

Mining for copper in Chile was undoubtedly practised by the original Indian inhabitants prior to the coming of the Spanish conquerors, and as these latter were seeking only gold and silver, copper mining received very little more attention than in pre-colonial times. After the declaration of Chilean independence in 1810, a decided advance was made. Many British companies and others began to exploit the mineral wealth of the country, and from Great Britain, about the sixties and seventies of the last century, came scores of Cornish miners to seek their fortunes in the districts of Copiapó and Vallenar. Beginning with the twentieth century, production increased rapidly, reaching a high peak with the advent of the big American companies.

The Chuquicamata Mine is owned by the Chile Exploration Company, a subsidiary of the Anaconda Copper Mining



In close proximity to some of these copper mining properties are mountains of the Andes range rising to a height of from 14,000 to 15,000 feet.

Company. Here is found the largest known single deposit of copper ore in the world. It may be described as occupying an intensely fractured zone in a belt of coarse-grained granite porphyry. When one learns that in this deposit there are probably over 1,000,000,000 tons of ore containing on an average two to three per cent of copper, and that the capacity production of this mine is in the neighborhood of 400,000,000 pounds of metallic copper per annum, one becomes duly impressed.

Although the latitude of Chuquicamata is twenty-two degrees south of the Equator and the property therefore lies in the tropical zone, the climate is by no means tropical. The days are warm and the nights cool. This temperate climate is due to the fact that the altitude is about 9,500 feet above sea level. The surrounding country is hilly and is in reality a desert, for there are neither flora nor fauna to be found for many miles, with the exception of a small area in the vicinity of Calama, to which reference will be made later on.

From Chuquicamata one looks out over a huge expanse of sandy waste, beyond which can be seen the snow-clad peaks of the great Andes range. This district around Chuquicamata, a part of the desert of Atacama, is said to possess the driest climate in the world, even more so than the Sahara Desert of northern Africa. Rainfall is an extremely rare occurrence. This mine is situated inland near the "oasis" town of Calama, 160 miles from Antofagasta, and the journey to Chuquicamata from that port is made on the line of the Antofagasta and Bolivia Railway Company, a British-owned and operated enterprise, which runs through the heart of the "pampa."

Chuquicamata is said to derive its name from a tribe of "Chuqui" Indians who inhabited the country some time prior to the coming of the Spanish conquistadores. Primitive tools, including stone hammers and wooden shovels, have been discovered in the old mine workings, which goes to prove that the deposit was known and worked previous to the arrival of Almagro and his men in, or near, the year 1533. In the graves of these Indians have been unearthed ornaments made of the beautiful green-colored brochantite and atacamite—minerals similar to those found at Chuquicamata today.

Between 1880 and 1912, Chilean and English companies carried on mining operations chiefly on the richer-grade ore in the veins and also on surface ore. In 1912 the firm of Guggenheim became impressed with the enormous possibilities of this tremendous deposit, and with the object of exploiting it, formed the Chile Exploration Company. This company started construction in April, 1913, and operations in May, 1915. In 1923 control passed to the Anaconda Copper Mining Company.

Electricity, the motive power used at the mine, is generated at the port of Tocopilla, eighty-five miles distant, and is transmitted to Chuquicamata by overhead line at a voltage of 110,000. The Tocopilla power plant consists of twenty-four oil-fired Babcock & Wilcox boilers, the oil being brought to the port in the company's own fleet of oil tankers. From two sources in the Andes, thirty-seven and sixty miles distant, water is brought to Chuquicamata in practically unlimited quantities.

The company provides adequate housing accommodations for the employes and their families. A main hospital, with a staff of six doctors and forty trained nurses, is maintained at Chuquicamata, and there is also a special maternity hospital in the workmen's village. Schools, social clubs, theaters, stores, playing fields and other amenities of modern social life are provided by the company for the benefit of the community. It is amazing when one realizes that an industrial center of some 15,000 souls, complete with every convenience of present-day civilization, exists in the center of a desert region which is scarcely capable of supporting a blade of grass. It is truly a wonderful tribute to the organizing ability of the of-

ficials of the Chile Exploration Company.

The mining village of Placilla, the ruins of which still stand, could doubtless tell wild tales of stabbings, killings and every form of vice. Old-timers say that of all those buried in Placilla's cemetery, not one died a natural death. Those days, alas for the romantic novelist, are gone forever, for Placilla is no more, having been purchased and cleared out by the company soon after its inception.

At Rio Loa, eighteen miles from Chuquicamata and 7,500 feet high, is situated the explosives works of the Compañia Sud-Americana de Explosivos, an associate of E. I. du Pont de Nemours & Company. The river Loa, the only stream for many miles, passes close to the factory, and the country for a few square miles around is a veritable oasis in the desert.

The Potrerillos Mine belongs to the Andes Copper Mining Company, another subsidiary of the Anaconda Copper Mining Company. It is situated in the central part of Chile, about 300 miles to the south of Chuquicamata and 500 miles north of the Braden Mine. Barquito, a port belonging to the company, lying about two miles south of the port of Chañaral, is connected with Potrerillos by a railway ninety-four miles long, of which fifty-eight miles is owned by the company and the remainder by the Chilean government railways. At Barquito is the main power plant, with a capacity of 30,000 kilowatts, from which the current is transmitted to the mine and plant at 88,000 voltage. At Potrerillos itself are the main camp, the main offices, the reduction plant and the smelter, while the actual mine workings are about six miles to the southeast at an average elevation of 10,500 feet. In close proximity to this property are mountains which rise to heights of from 14,000 to 16,000 feet.

The earliest record of mining in this district takes us back to the year 1894. In 1896 a group of Chilean mining promoters formed the "Compañia Minera de Potrerillos" to work the property which was acquired in 1913 by Mr. William Braden. In 1916 he sold his interest to the Andes Copper Mining Company. During the period from 1916 to 1923 work was largely confined to the exploration and development of the ore deposit and to the construction of the plant, actual production of copper beginning in 1928.

The ore body consists of an intrusion of quartz-diorite porphyry which has been thrust upward through sedimentary rocks. It is estimated that the deposit contains some 140,000,000 tons of ore with an average metallic copper content of 1.5 per cent.

Potrerillos has been aptly described as an "upside down mine" because the elevation and contour of the deposit are such that no hoisting is required to bring the ore to the surface. The method of mining employed is termed the "undercut-caving system." The ore is "undercut" by drilling and blasting and "caved" at certain levels, then passed down small internal shafts or "raises" and by gravity finally finds itself in underground storage bins, from which it is loaded into railway cars and taken to the treatment plant.

Water for the reduction plant is piped from La Ola River. It contains a high proportion of salt, but a supply of fresh water for household purposes is obtained from small streams in the neighborhood of Potrerillos. In addition to comfortable dwellings for the workers and staff, the company has provided an up-to-date hospital, schools and a church. There are also athletic fields and a movie theater. It will be interesting to readers living in the United States to learn that "dry" laws prevail over the area controlled by the company.

The Braden or El Teniente Mine of the Kennecott Copper Company is located in the province of O'Higgins about thirty miles northeast of the town of Rancagua, which is approximately two hours' train ride from Santiago, the capital of Chile. "El Teniente" is Spanish for "the lieutenant," and tradition has it that the mine was first discovered during the Chilean

war of independence by a fugitive Spanish army officer who was fleeing across the Andes to the Argentine.

A railway from Rancagua to Sewell, the company's main camp, follows the torrential rivers of the Coya and Teniente for forty miles until the mine is reached at an altitude of about 8,000 feet above sea level. From a scenic point of view the approach to the mine is very different than that of Chuquicamata or Potrerillos. Around Rancagua there is an abundance of green pasture land and for several miles, until almost within sight of Sewell, the ground is covered with brush and small trees. The country in the immediate vicinity of Sewell has a distinctly Alpine appearance; the contrast between the jagged peaks and rugged mountains here and the well-rounded types prevalent at Chuquicamata and Potrerillos is very striking. Here we have the strong action of weathering, caused by a copious rainfall in addition to snow and ice, constantly at work to aid in the erosion. At Chuquicamata and Potrerillos there is practically no rainfall and very little of any other atmospheric agency to disturb the smooth contours of the hills.

The mineral deposits of El Teniente, which were known and worked in colonial times, occur around the circumference of a volcanic crater which is roughly cylindrical in shape and about nine-tenths of a mile in diameter. The electrical power used at Braden is derived from two hydroelectric plants at Coya and Pangal, both belonging to the company. The main water supply comes from the Cachapoal River and its tributaries, while for domestic use there is a pipe line which brings fresh water from the Andes Mountains. The company provides housing accommodations for employes and, as at Chuquicamata and Potrerillos, there are a hospital, school, club and other adjuncts to modern life. Like Potrerillos, Braden is a "dry" camp.

Braden Mine has progressed so rapidly that it is now one of the three important copper mining centers in Chile. What was previously a desolate place has been transformed into an active and prosperous community of about 12,000 people.

An ore-shipping port on the Chile coast.

The Salmon Industry of Alaska

By TREVE JONES

(A paper submitted to Professor John Richard Mez, University of Oregon, in the class in "International Trade Relations of the Pacific Area.")

Few people realize that Alaska from east to west is as wide as our own United States, also that it extends as far west of San Francisco as that city is far west of New York. Nevertheless these are the facts. Alaska has some 26,000 miles of coast line, and it has been said that it is bounded on one side by Canada and the other by fish. This is very nearly correct, because of all the resources of Alaska, fishing is one of the most productive.

As early as 1889, thirty-six canneries were in operation, with a capital investment of about $4,000,000. Since that time they have increased immensely. Prior to 1888, the islands of Kodiak and Afognak contained only one or two establishments. In 1889, the number of canneries at Karluk was increased to five and three additional firms came to that place to seine fish for canneries located at other points. Products of the fisheries are consigned to the agents of the companies in San Francisco, Astoria, and Portland, who dispose of them in foreign markets, principally in England. Most of the work in the canneries is done by Chinese, whose services are obtained by contract with their agents in San Francisco. The number of native fishermen is very small, whites being preferred, as the natives have generally been found inefficient. The seining gangs are composed principally of Americans, Norwegians, Swedes, Germans, Sicilians and Negroes.

The principal methods of catching the salmon are through the use of seines, fish traps, gill-nets, and trolling. Most of the fish used in the canneries are caught in seines varying from 150 to 250 fathoms in length and from 16 to 20 feet in depth. The usual size of the mesh is about 3¼ inches. There are two methods of seining; one is called purse-seining and the other beach seining. Beach seining is the most common way and therefore is the most important. The seine is drawn out from the shore into the water by boat, one end of the seine being held in at the shore. The other end is taken out into the water as far as it will go, then drawn in toward the shore farther down the beach, thus making a U formation, which is then drawn in from both ends, the fish being caught in the pocket thus formed. Gill-netting is somewhat similar, in that a net is used. This method is done entirely from boats, however, and a silk or some light-weight net is used. The net is played out of the boat into the water, and the ends are secured by buoys. The mesh of the net is larger than that of the seine, so that a fair-sized fish can almost get through it. That is just what the salmon attempts to do, and when he sees that he cannot get through, he attempts to back out, but this, too, is impossible, because his gills are so formed that he can't get them past the mesh, and the salmon is caught.

Fish traps are quite different. They are composed of netting stretched on piling driven into the ground under water. This netting is made in box formation with a funnel-shaped inlet on one side. The salmon swims through the funnel into the box and is trapped, then the bottom of the box is lifted up and the fish are removed.

Trolling is merely fishing with hook and line from a boat. Usually several trolling lines are put out from one boat.

The fish that is preferred is the king

A catch to strain the capacity of the strongest net.

salmon—giants of the salmon tribe, ranging up to eighty pounds in weight. Canneries that buy their fish from individual fishermen usually furnish the boats, gill-nets, and other gear and pay from three to five cents a fish, and the salmon so purchased will average close to five pounds. In case of the king salmon, however, the canneries purchase them by the pound from the trollers. The prices range from twelve to fourteen cents per pound. Thus a troller may realize more from the landing of a single king salmon of good size for his sole catch of the day, than the sum reaped by a gill netter who makes a catch of half a hundred red salmon or humpbacks. This apparent discrepancy, the difference between five cents a fish and a price per pound that may net the troller as high as five dollars for a single fish, is occasioned by the fact that some canneries slice their cross sections from the king salmon, packing a single steak in a flat, oval can. This product brings a very high price on the markets. A certain amount of king salmon is kippered, a delicious food that retails in the outside market at prices that range upward to a dollar a pound. Part of the king salmon catch is shipped fresh or frozen.

It is necessary to place certain restrictions upon the fishing near the salmon streams, otherwise the entire run of salmon would, in a short time, be reduced to nothing. Salmon are protected a certain distance out from the mouth of the streams, as they congregate there before going up the river to spawn.

The Bureau of Fisheries, after an exhaustive series of experiments, has definitely determined that the salmon, returning in great shoals from their span of years in the mysterious depths of the ocean, separate, each returning to spawn and die in the same fresh-water stream that gave it birth. Young salmon marked before leaving fresh water for the salt seas, have never returned to spawn in water other than the one from which they departed in infancy. Therefore, though traps, seines, gill-nets and other gear exact enormous toll from the returning hordes, that toll is a general one, while fishing at the mouth of one particular stream would result in a catch of fish that were specifically destined to spawn along its course and thereby tend to exterminate the entire salmon run in its waters, leaving it salmonless for all time to come, if

such fishing continued for only the few years that constitute the life cycle of a salmon.

Canneries of Uyak Bay and Larsens Bay secure their fish off the mouth of Karluk River, which, though a relatively small and shallow stream, has long been noted as one of the best fishing streams in the world. The Bureau of Fsheries placed certain restrictions on fishing there. In 1922 a rack was built across the river and salmon were counted that passed through an aperture left for that purpose. Red Salmon to the number of 384,683 ascended to the spawning beds during that season, also 9752 king salmon. The companies fishing off the Karluk caught 700,000 red salmon during the season.

A series of such counts compared with the number of fish caught by the packers, and the subsequent size of the run of that species in the year when the bulk of the fish resulting from the spawning of the salmon so counted should return, will eventually enable the experts to determine just what percentage of escapement in relation to the permitted take for packing is necessary to maintain the salmon runs at safe levels. The Karluk count in 1922 demonstrated that only 35% of the fish escape to spawn and it was apparent that such a low percentage of escapement would not suffice to maintain a large and assured salmon run, as it was already far less than in the early days of Karluk fisheries. Subsequent counts were made and are still made annually, and the Bureau of Fisheries now requests that 1,000,000 fish be permitted to ascend the streams and a 50% escapement of the rest of the run.

This is one illustration of the magnitude of the industry. There are many such streams on the coast of Alaska, each yielding thousands and hundreds of thousands of pounds of salmon yearly.

The plant of a canning company usually includes, besides a cannery building proper, a fish house and wharf, a salting house, lodging houses and mess rooms, storerooms and warehouses.

The method of handling salmon after they are caught—the fish are thrown from boats into large bins in the splitting house, where they are prepared for the cannery by cutting off the heads and fins and removing the viscera. The different steps of this process are performed by different groups of men, one set cutting off the heads, another removing the fins, while still another scrapes off the scales or viscera. The fish are then washed and thrown into hand-cars to be hauled into the cannery, where they pass through various processes, almost all of which are carried on by machinery. The red salmon is first cut into lengths suitable for the size of the can. These pieces are fed along into the cans, inequalities in the filling being supplied by hand work. The cans are then topped in the topping machine, from which they pass to the soldering machine and then are subjected to processes of venting, cooking, steaming, testing, cooling, japanning, and labeling.

The major portion of the salmon pack is shipped from Alaska to the United States, where it is then shipped to almost every country in the world. United States exports of salmon maintained the market leadership in the United Kingdom, Philippine Islands, Australia, Mexico, British South Africa, Argentina, Cuba, Dutch East Indies, Peru, Germany, British India, and many other countries of less importance.

The United Kingdom is the most important market for canned salmon in the world, absorbing from one-third to one-half of the total exports of both the United States and Canada, about nine-tenths of Japan's, and practically all of the salmon packed in Siberia not shipped to Japan.

Despite the geographical proximity of the Philippine Islands to the Siberian salmon canning industry, the United States enjoys a practical monopoly of the Philippine trade in this commodity.

VOLUME VII JULY-SEPTEMBER, 1932 No. 3

JOURNAL

OF THE

Pan-Pacific Research Institution

A Periodical Record of Investigations Bearing on Problems of Food Production, Distribution, Conservation and Consumption, as well as on Public Health, and Race and Population Problems as Related to the Countries Bordering on the Pacific.

INDEX

AT PRESENT PUBLISHED QUARTERLY AT HONOLULU, HAWAII
BY THE
PAN-PACIFIC UNION
More frequent publication as acceptable material is contributed.

The Story of Dehydration

By B. F. Hulse
(Before the Pan-Pacific Research Institution.)

"Dehydration" is a very dry subject (it being a drying process), and drying is as old as the hills. It is recorded that King David of Israel accepted raisins in payment of taxes. In 430 B.C., a Babylonian mortgage, the earliest known document of its kind, called for the return of principal and interest in dried fruit. I have a suspicion that the apple of temptation was an old-fashioned dried apple, for it seems to have stuck in Adam's throat. Scientists in late years have tried to qualify the word "dehydration" to mean "the removal of the excess moisture from fruits and vegetables without any loss of food value," but this definition has not yet reached our dictionary.

Dehydration is one form of conservation, and is therefore not popular just at present. This year in California alone, many thousand tons of fruit and vegetables went to waste, but their conservation would have but increased the problem of marketing the rest of the crops at a profit. To the growers, therefore, dehydration is not popular at the present time, so you see that I am assigned a very old, unpopular, dry subject. Therefore I trust you will make due allowances.

I have written several exhaustive theses on this subject, but they are too long and technical for this occasion. I believe that you would not be particularly interested in tracing the evolution of modern dehydration, for the history is replete with failures of practically all of these machines as well as of the companies which were organized to promote them. I shall therefore confine my remarks mainly to the system which is in general use, at least in some modified form, and to the products of this system which gives promise of a partial balance in rations for both man and the beast upon which man is more or less dependent.

I have been especially requested, however, to preface my remarks by a short résumé of the origin and evolution of this system. This necessarily involves the personal equation, which I fain would omit. However, they seem to think that you would like to know just how any mind could conceive such a crazy idea, and one so at variance with the accepted theories prevailing at that time. The idea was not only pronounced crazy, but absolutely impossible, and the originator crazy as well. This curiosity is probably something like the quest to know what prompted Columbus to conceive that the earth was round, when everyone else believed it to be flat.

In 1913 our commercial attaché in Berlin reported great activity all through Germany in the dehydration of fruits and vegetables. Our Agricultural Department, always anxious to keep abreast of the times and believing that the Germans had probably discovered some new method, were trying to extend their research into the plants. The secrecy maintained about the process made it most difficult for the recognized agents of our government to make this research.

I was therefore asked to make the investigation while posing as a disinterested tourist. I was provided with credentials for research in biology and sanitation, and took pains to have these credentials certified by Emperor William himself, for which I am very thankful, as the possession of these papers, signed by the Kaiser, undoubtedly saved my life when I extended my research into a Zeppelin just prior to the opening of hostilities. On arrival in Germany I soon learned that there were over 2500 dehydrators working night and day, and that

about 1900 of these were operating on Irish potatoes alone. The Germans had certainly dried more potatoes that season than we had raised in the U. S. A. Great warehouses were filled with thousands of tons of this potato flour and dried fruits and vegetables. I found the general system of dehydration no different from ours except perhaps that they did not attempt to dry in the natural state, but macerated or cut the products into very small particles for rapid drying, and that they blanched the product (practically cooking it with live steam) before drying to avoid oxidation. Of course, I could only report as above and that it was clearly evident that Germany was preparing for war. I rushed to France and England with this news, and found them wholly unprepared; so deceived were they by the honied words of the Kaiser that they laughed at my concern, although I had seen trainloads of war material going to the front in Germany and troops being secretly moved at night. The credulity of the French was especially pitiful, for the declaration of war followed within a few days.

Later, in discussing matters with Lord Haldane (the war lord of England), I found that his greatest concern was the problem of getting proper foods for the soldiers at the front. I was offered a commission in the Engineers Corps, but he thought that I could be of more service by returning to California, there to mobilize all possible equipment for the concentration of fruits and vegetables so necessary for the soldiers' rations.

We were able to furnish an enormous quantity of these goods, but being so hastily prepared the quality left much to be desired, and it is not strange that the soldiers have sworn off for life on so-called dehydrated foods. Nearly all of these foods were dehydrated in accordance with the English practice and according to their instructions, which left little room for initiative, but when we entered the war I was asked to make extensive research in this work with the hope of improving the quality of the food. It was perfectly natural that we should use hot dry air as a means of drying, but I found that this system tended to dry the outside first, thus closing up the pores so that the inner moisture could not escape until the outer cells were shriveled and broken down. This permitted the nutritive portion within the cells to become oxydized in the air. This oxydized surface made an active field for the germination of bacteria and the larvae of insects with which the product was soon infested. Thus I realized that oxygen which was so essential in life and growth was the real menace to open air drying, and immediately began experiments in atmosphere devoid of free oxygen. My first experiment was with carbonic acid gas (CO_2), but this being heavier than air and so readily diffused, was very hard to hold in a dehydrator, so I built a box on the ceiling of a tight basement and placed a circulating belt therein, feeding the product onto this belt through an opening in the floor of the store above. A fan was used to circulate the heated CO_2 in opposite direction to belt travel. The only opening in this basement was through a stair well at the opposite end of the basement, with a window to the outside at the ceiling of this stair well. I then began circulating CO_2 by feeding it into inlet of fan. As the gas was fed into the fan the air in the basement was expelled through the stair well. The discharge from dehydrating box being into the basement at opposite end from stair well, assisted in the process of expelling the air without great loss of gas by diffusion, and this loss was minimized by covering the outlet to atmosphere with miners' gauze through which the unstable gases do not readily pass, while allowing both air and vapor to pass freely. Thus was evolved the first submerged dehydrator in which it was possible to retain the valuable heavier-than-air gases for reheating and recirculation. These gases of greater specific gravity settled to the floor line, from where they were drawn

through a fan, reheated and recirculated while the vapor and air in its passage through basement stratified and rose to the ceiling to be expelled through gauze-covered opening. This experiment proved that we could dehydrate by recirculation without the introduction of any outside air or gas except that which had passed through the burner and therefore was without free oxygen. In fact, we soon discovered that these products of combustion were fully equal to the CO^2. In a case where secondary combustion was used in connection with kerosene fuel, results seemed to imply their superiority in that they seemed to possess some quality which congealed the juices of the fruits instead of drying them, thus shortening the time required and leaving a heavier, more succulent product. Gases of combustion, when properly rectified, are a clear, odorless and tasteless product, devoid of the quality of smoke—(free carbon), and undoubtedly possess a highly sterilizing quality similar to that disclosed in the process of smoking meat.

Submergence in this gas devoid of free oxygen seemed to kill the harmful bacteria and all larvae of insects. Having no oxydized surface, the dried product is no longer a host for insect larvae and has been kept for years without insect infestation or deterioration in quality.

It was but natural that people condemned this system as based on an impossible hypothesis and dubbed it the smoke system. We had long been taught that it required a certain volume of air to carry off the vapor from a certain quantity of water, and that this air became saturated and would not thereafter absorb more moisture without added heat. This new theory of separating vapor from air was not recognized, and people generally accepted the theory that moisture-laden air was heavier than dry air because it contained water, which we all know is heavier.

My patent attorney refused at first to draw the claim, which stated "that the steam, or vapor, after stratification, passed off at the top," and the patent office disallowed this claim as an untenable theory until assured that this was an actual accomplishment. They lost sight of the fact that it is not weight, but specific gravity, of the two gases which we were dealing with. That water when transformed to the gas (vapor) expands over 1700 atmospheres and thus its specific gravity becomes less than that of air and will rise, as any one knows who has watched the discharge from the spout of the teakettle. If vapor was of greater specific gravity than air, the clouds would fall on us at once, while they only fall when the vapor is again reduced to the liquid form—water.

The capacity of the gas to retain moisture increases or decreases with the rise and fall of its temperature. Therefore when the greater portion of the vapor is separated by stratification and the gas drawn back from the floor line, reheated and recirculated over the traveling belt laden with the food to be dried, its capacity has been increased, and, therefore, it dried the product. In its passage over the product from the dry to the fresh, it soon becomes saturate, and meeting the cold, fresh product actually condenses a portion of the moisture, thus transferring the latent heat to the product, which is then covered with the moisture of condensation. This tends to open the pores and sweat the inner moisture to the outside, just as a person will become moist and perspire freely in a hot, moist climate; thus this becomes a sweating process, except just at the finishing end, when the reheated gas dries off this moisture which has been sweated to the surface.

You would naturally expect this to be a much slower process, but in one plant which I changed over from an open hot-air drier to this system, the company wrote me a letter stating that "it increased the output of the plant about fourfold, while reducing the fuel cost by two-thirds, and produced a superior quality product, with about one-fifth less bulk reduction," which meant that they had one-fifth more

and a better product from the same weight of fresh material.

The development of this system was accomplished while I was working for the government, during the war, but not one cent of government aid was received or used in the experiment. I did not desire to monopolize the principle under a patent, but without this protection I was unable to get any one to quickly commercialize the process so that the improved products might be available for our soldiers at the front. We therefore made application for letters patent, and I assigned all my right and title to an incorporation, which agreed to begin operations at once. The control of this company fell into the hands of a German who did not seem overanxious to help our soldiers. Therefore, I managed to keep the patent from being issued, although notified that the claims were allowed and patent would be issued on payment of the required fee. The system is, therefore, as free as the air for the use of any and all.

At the opening of the first commercial plant, a celebration was planned and most of the notables on the coast were invited. Although having no financial interest in the plant (as its co-inventor), I was asked to address the gathering and explain the theory of the process. After this ceremony a friend of mine overheard a conversation which probably reflected the general reaction of this theory.

As I remember, the parties mentioned were Hon. Clement Horst addressing the late Luther Burbank, asking what he thought of the theory. Mr. Burbank, pointing to his head with an expression of great sympathy, said: "Just another good man gone wrong—the inventor, like the miner, thinks of one subject until his mind travels in a circle. He fools himself and actually believes the most impossible things." Later in the day, when an excellent quality of raisins began to be delivered from one tunnel and dehydrated sweet potatoes from another, neither product showing any oxidation, the howl went up that there was "hocus-pocus" somewhere, because although no air was being admitted except the small amount to supply combustion, there was a great draught passing out at the top of the box. One "learned professor" proceeded to measure this discharge and, subtracting that supplied by the burner, was able to tell the assembled multitude just what size fan we must have delivering this air through some concealed duct. When I explained the weight of water being removed per minute and computed its expansion into vapor, it tallied almost exactly with his computation, and the knowing professor faded out.

Having recounted the evolution of this successful system, no doubt you are wondering why there are not more of these plants in operation. In the first place, the initial cost of a dehydrator is considerable, and although this is a most efficient system, yet it requires heat, power and labor for its operation, while in open-air drying the sun does the work, so it is not a case of "let George do it," but, instead, "let old Sol do it." In a very hot, dry climate it is surprising how good the sun-dried product is, but an unseasonable rain may spoil the entire product. A bulletin of our California Agricultural College contends that the added quantity and quality of most dehydrated fruits over that produced by sun drying will pay for the processing. However, that does not supply the machine to the grower, who is already bankrupt. I will recount an incident, or rather two incidents, which present the real difficulty in this country. Some years ago the growers of central California were faced with the loss of a large portion of their grape crop owing to early rains, so the Chamber of Commerce asked me if I would not start a number of dehydrators which were idle and explain the method of operation. On arriving at the plant, I found the walking delegate there to see that we employed only union labor. I was informed that the unit of labor for an operator would be $5.00 for the first eight hours and $10.00 for each of the other two shifts, or $25.00

for the 24 hours, which is necessary in dehydrating. He also wanted $8.00 and $16.00, respectively, for an engineer to operate the burner, but I finally induced him to allow the regular attendant to watch the burner, which was automatic in action.

Shortly afterward, my wife and I were attending a fair in Milan, Italy, and noticing samples of beautifully dehydrated fruit and vegetables, we remarked at once that they must have been dehydrated by this process. These proved to be from a plant operating near Turin, the old capital of Italy, so I went down to see the plant and found that it was installed by a man to whom I had furnished plans for an installation at Fresno, Cal. On inquiry I learned that he was paying 16 lire per shift (about equal to $2.40 per unit of labor per day). Comparing this with $25.00 in the United States, it is clearly apparent why he chose Italy instead of the United States for his field of operation.

This also illustrates our struggle to maintain in this country a standard of wage and living estimated to be six and one-half times the average of the world. It has thus far been maintained by our tariff wall, but let that fail and we would be submerged as surely as would the people of the Nuuanu Valley had the Nuuanu dam failed at the height of your recent flood.

About the only plants which can operate in the United States are those where the hand labor can be practically eliminated by the use of automatic machinery or where a waste product is being salvaged. You have a concrete instance of the latter in your pineapple industry, in which more than half of the pineapple was formerly a waste. I was informed that it cost the Hawaiian Pineapple Corporation over $50,000 to dispose of this waste in 1913 and in comparison with their present output this cost would probably have reached at least $300,000,000 had they not installed a dehydrator, which has successfully transformed this waste into pineapple bran, a most valuable stock food. This proved a boon to these islands, which were importing the bulk of their stock food. The Islands' total output of bran for the season will reach the enormous quantity of 8,750 tons.

The cost of this process is very small owing to the use of automatic machinery, which makes it possible to deliver this waste by automatic conveyor into one end of a revolving drum, from the other end of which the finished product is again delivered by conveyor to the sacking chute. The average sale price has been about $20.00 per ton, but is slightly lower this season as the saturation point of the market seems to have been reached —price and quality considered. It would be preposterous for me to criticize the general practice of these companies, which are recognized as the most highly specialized and successful enterprises in the world, but this particular branch is but a side issue and one which must not fail to function in exact synchronism with their basic operation. Therefore they are not to be criticized for playing the game safely in the installation of this salvage plant, and installing only that which had been proved, even though it might not be of the highest efficiency or reach the limit of perfection in quality of production. Although I assured them of the success of this newer system, they were too far from any of these plants to see the operation, and it was impossible to convince them except that they be shown. Possibly the fear of complication as to royalty may have been a deterrent factor in their not adopting the new system in its entirety at that time. Their ability to operate at temperatures far in excess of that permissible in foods for human consumption greatly reduced the time required, and, therefore, limited their great necessity for the new system for speed of operation. However, as the time seems to have arrived when the food value must be increased or the price reduced to find a further market, no doubt more thought will be given to increasing the quality and

decreasing the cost of production. The principal cost is for fuel for redrying. A dryer in the plant of the Hawaiian Pine used approximately 45,000 cubic feet of air per minute, which is heated to about 1800° F. After passing through the dehydrator it was discharged to atmosphere at approximately 220°, thus the heat required to raise 45,000 cubic feet of air from average temperature of 70 to 220° was wasted during each minute of operation, besides much radiated heat was lost through radiation from the drum of this dehydrator. This loss extended over many years, although I called attention to it on my last visit. The principle of recirculation was then sufficiently established that a duct was installed and the discharge connected to the inlet, thus recirculating and saving this enormous heat loss. The lighter color of the bran is very noticeable, which indicates less oxidation owing to recirculation of the burned gases in place of fresh air. However, as these gases return at high velocity, leaving no chance for stratification except in the separator, full benefit of this principle is not obtained.

In the plant of the Libby Co., the drums being shorter, necessitated discharging the air at approximately 250°, thus entailing a still greater loss.

Spurred by the necessity for greater economy, I prophesy that these plants which are the ultimate of efficiency in most of their operations, will soon house in these machines with insulated walls and draw the return air back through the space surrounding the drum, thus preserving their radiator heat as well as that now being wasted in the air. The slow movement of the return air through the large space will permit of stratification, allowing the vapor air to separate and be discharged at ceiling, while the gases are drawn from the floor line, reheated by mixing with the products from burner, and be recirculated. In this manner the circulating medium would soon become only the burned gases, which have been denuded of free oxygen in burning. Therefore oxidation of the product would be precluded.

The projection of any organic substance into very hot air causes a sudden expansion of moisture within the cells, which bursts the cell wall and leaves the nutriment and mineral salts open for oxidization and dissipation by the heated air, thus robbing the finished product of considerable weight and its most nutritious portion.

Though very rich in some elements, pineapple bran being made from one portion of the fruit is not a perfectly balanced ration and may not be as readily assimilated as if it contained the entire fruit.

I came to the islands this time with great hopes of establishing a new industry which would provide quantities of valuable food very rich in proteins and mineral salts, which would serve to balance the ration and thus increase the use of pineapple bran.

A great industry has been built up on the mainland in the harvesting and drying of kelp, or seaweed, as a food for both man and beast.

I had done some research in your waters and knew that they were rich in brown algae, which is of the same family as the giant kelp of the Pacific known as *Mascrocystis pyrifera.* I assumed that the deeper benches adjoining these islands would naturally be forested with this plant, which should thrive and grow most rapidly in these warm waters under a tropical sun. I was doomed to disappointment, for research fails to reveal a single trace of this plant—your scientists of whom I have made inquiry even discourage the idea of transplanting this species to this area—claiming that if it would grow here it would be here, as the tides would surely have transported it. Still I am not wholly discouraged and cannot fully subscribe to this theory. I know that it is true that the kelp stipes are carried a long distance by the tides, and that any portion, no matter how small, will continue to grow so long as it is in the sea water, but I also know that none

of these floating portions are capable of reproduction. The organs of reproduction are very near the root, and the fact that it spreads but a few feet from its source is evidence of the difficulty of tide transportation of the reproducing organisms for great distances.

The United States Department of Agriculture has made extensive research on this plant and made attempts at transplanting to the Atlantic coast. I have these bulletins on the coast, but was unable to get them here in time to be of use. My memory is that the experiment was a failure in the North Atlantic, but was successful in the warm waters of the Gulf Stream. Elaborate surveys and maps of the kelp beds were made during the war, and show an area of nearly 500 square miles on the Pacific Coast. This research was carried on primarily to locate a new supply of potash, source of which was shut off during the late war. Millions of dollars were spent in experimental work and much potash produced at a time when it was marketable at $400 to $500 per ton for war purposes, but these plants soon closed down under competitive prices. Potash from Germany formerly cost about $40.00 per ton.

Our attention naturally turned to kelp as a valuable food supply, and we soon found that live stock was, after all, our best means of turning it into fertilizer. We had long known that kelp was rich in the mineral elements which are required for both man and beast, and that they were in a very assiminable form and readily furnished those deficiencies found in much of our diet. The great erosion of the land has undoubtedly dissolved the soluble mineral elements and deposited them in the sea, so we naturally turn to sea food for that which is lacking in food produced from the soil. Plants cannot be expected to extract from the soil that which is not present, nor the animal to extract that which is not present in its food. Likewise, we cannot extract from our food that which it does not contain.

In my close study of anatomy and medicine, I was greatly impressed with that wonderful handiwork of God—the human body. After a most intensive study I came to the conclusion that it was the only perfect mechanism, which, if given proper care and the proper food, could rebuild and perpetuate itself. I was impressed that it was evidently the intent of our Maker that we should be well and happy without recourse to stimulants and poisonous drugs. Sickness and pain could nearly always be traced to some deficiency in our diet or improper care of the body, and I find this theory gaining ground.

Dr. J. W. Turrentine, of the Department of Agrciulture, Washington, D. C., has made some valuable research in deficiencies of our foods, and consequently of our bodies. His report on *"Kelp as an Agency for the Control of Goiter,"* reprinted in the January, 1925, number of the *Scientific American,* is most interesting, and while it applies particularly to goiter, the principle is equally applicable to other deficiency diseases, so I am taking the liberty of quoting him at some length and would refer you to his digest for further detail. He says (page 31):

"Apparently man's metabolic welfare depends in part on the maintenance of this seemingly insignificant yet actually indispensable store of iodine."

The function of the thyroid gland may best be described in the words of McCarrison, who lists the principal duties of that gland as four in number:

"(1) It governs the growth of all cells, and sustains their functional activity. (2) It controls calcium metabolism. (3) It is a profound katabolic stimulant, facilitating the breaking down of exhausted cells and governing the elimination of the waste products of their disintegration. (4) It exercises a protective antitoxic and immunizing action, defending the body, not only against the toxic products of its own metabolism, but against invasion by disease-producing microörganisms and injury by their products. . . .

"The thyroid gland is to the human

body what the draught is to the fire; nay, more; its iodine, by its chemical interaction with certain unknown constituents of the cells, is the match which kindles it. . . . The thyroid gland is specifically associated in the exercise of its functions with the generative organs. . . . By stimulating the development and growth of the sex organs the thyroid secures through them the progress of mental and physical growth."

LACK OF IODINE IN NORMAL DIET

The modern diet is made up largely of highly refined materials, seeds constituting most of it. These, in their natural state, in addition to materials of great value as sources of energy, contain many of the mineral elements and compounds essential to animal life and growth. But in most cases they are refined to the point where the latter are eliminated. As a result, when used alone, they are not able to sustain life; it has been shown that animals fed on certain of them exclusively perish more quickly than do those entirely without food. The excessive use of refined foods leads to deficiency diseases. Overrefinement in food manufacture deprives us of essential elements which under less artificial conditions would be a natural part of our diet. No automatic method is provided for supplying these materials, of great importance in every case, but of the greatest importance in feeding the young. The diseases of the bones in growing children as a result of deficiencies are well recognized. Less attention is paid to the frailty and inadequacy of the teeth as a result of similar causes.

Together with deficiencies of the many commoner elements, there occurs, of course an even more marked deficiency of iodine. The slight occurrence of iodine in food materials is shown by the elaborate research of Forbes and Beegle as illustrated by the following summary:

The various groups of food materials analyzed, in the order of the increasing frequency of iodine occurrence, are as follows: (1) Nuts; (2) spices, condiments and stimulants; (3) fruits; (4) cereals; (5) hogs, silage and forage crops; (6) garden vegetables and root crops; (7) leguminous seeds; (8) animal products, and (9) manufactured foods and milling and manufacturing by-products. "Among the cereals iodine was found as an uncommon constituent, usually in traces only."

METHOD OF SUPPLYING IODINE TO THE DIET

As a source of iodine for human metabolism it is obvious one must look to the sea, the great storehouse of that essential element, and choose that method of securing the requisite quantity in the manner which most readily coincides with one's already-established dietary habits. Sea foods might well become a more common article of diet, but at the present cost for preservation and transportation do not reach the majority of people. Sea salt is not a commodity at present cheaply obtainable; its wide introduction as a condiment would be of great benefit to the human race. A logical and from many points of view an ideal conveyor of all these essential elements are the kelps, the larger seaweeds of the brown algae group.

COMPOSITION OF KELP

Chemical literature is replete with references to investigations of the composition of kelp. They have been studied from the point of view of their utilization as foods, and as carriers of inorganic salts and iodine. The different species vary in chemical composition, quantatively rather than qualitatively. Most of the work in America has been devoted to the giant kelp of the Pacific, *Macrocystis pyrifera,* made the basis of the extensive investigations of the United States Department of Agriculture. Its composition is more thoroughly understood perhaps than that of any other sea plant.

The composition of this kelp has been studied to determine its water, organic, inorganic, nitrogen, protein, sugar and fat content. It is tremendously complex, being made up of a great variety of or-

ganic and inorganic compounds, and of organic compounds containing and combined with mineral elements. In organic combination are parts at least of the iodine, the phosphorus and the sulfur. In the plant, all of them are held in varying degrees in colloidal suspension.

The many analyses of *Macrocystis pyrifera,* made in state and federal laboratories, show on the average: Potassium chloride, 22 per cent.; sodium chloride, 10 per cent, and water-insoluble ingredients, 7 per cent. (on the dry basis). Entering into this total of 37 per cent. inorganic material are: Calcium, 4.96 per cent.; magnesium, 2.24 per cent.; sodium, 10.52 per cent.; potassium, 29.46 per cent.; iron and aluminum oxides, 0.43 per cent.; chlorine, 34.93 per cent.; sulfur (calculated to SO_3), 4.44 per cent.; phosphorus (calculated to PO_4), 2.30 per cent. While all the kelps contain iodine, the iodine content of this species is phenomenal. Of 29 samples analyzed for that element, an average content of 0.26 per cent. was shown, with a maximum of 0.41 per cent. and a minimum of 0.17 per cent.

From the foregoing it is evident that this kelp contains the principal ingredients of sea water, and has stored them up within itself in even greater concentration than most of them exist in sea water. This is particularly true of potassium and iodine. It appears, therefore, to be an ideal concentration of the desirable elements of sea water with the relatively marked elimination of the most common and least valuable—common salt.

ADAPTABILITY OF KELP AS A DIET AMENDMENT

As a conveyor to the diet of the essential mineral elements, kelp possesses many ideal characteristics. It is a carrier of iodine of remarkable properties—a high content of iodine, together with a great assortment of other useful elements. The source of raw material is abundant. Methods have now been perfected whereby it may be so processed that its colloidal constituents remain unimpaired and its mineral content unreduced. When so processed it is a carrier of these elements and compounds in a natural, vegetable colloidal suspension, from which or through which they may be taken up by slow, digestive processes just as they would be if they were made available as natural constituents of usual articles of diet. Being highly concentrated in these, preparations may be made in condensed forms so that the convenience wherewith they may take a variety of forms, suitable for addition to the diets of people of varying ages and dietary habits. It is important that kelp to be used for the control of goiter be employed as a preventive as well as a cure, particularly that it be added to the diet of the young and to all those approaching or experiencing life crises. It is contended by some that its addition to the diet should be made a part of a culinary or dietary routine and not left to chance or the caprices of the memory. On the other hand, the disciplinary and educative advantage to be had from consciously taking as a diet amendment a concentrate of essential elements must not be overlooked. Being abundant, cheap and conveniently acquired, transported and stored, it should be made available for all peoples of all lands. Through its instrumentality, as a carrier of iodine, and other desirable elements, not only goiter, but other diseases depending on related deficiencies may be eradicated.

The present methods of combating goiter by the administration of metallic iodides or thyroxin, leave much to be desired. The administering of iodides, as, for example, dissolved in the drinking water of a school, results in uneven dosage, though rarely in such an excess as to cause symptoms of oidine poisoning. Yet Bircher describes the practice as causing harm and is supported by others in this contention.

What the situation requires is iodine in a form as closely as possible approximating the natural form in which that element is normally taken into the body, in

organic combination, preferably as a constituent of food materials. Salts of iodine radically fail to meet this requirement. Those employed are very soluble and therefore are able to overcome the natural metabolic balance of the body solutions and thus rapidly to force their way into the circulation and out. The situation calls for a food, not a drug.

With a natural food material at hand, the wisdom of resorting to drugs for feeding is open to question. It must be remembered that iodine is administered in goiter, not on account of any physiological action it may have as such. On the contrary, its physiological action--as exhibited by iodism, for example—is exactly what one desires to avoid. It is given merely to furnish raw material to the thyroid wherewith to manufacture essential secretions. The situation demands physiologically inactive iodine, in so far as such is attainable.

Soluble iodine is not necessarily assimilable iodine. And in this connection it may be remarked that while the interconnection between iodine and goiter has been known for a hundred years, no appreciable impression on the progress of the disease has been accomplished by the use of iodides. On the contrary, it appears that goiter is on the increase, a fact attributable to the increased use of refined foods and of surface water for drinking purposes and demands for nervous energy occasioned by our modern social régime.

CURATIVE POWERS OF KELP

This suggested use of kelp, based on a priori considerations, has within recent months been subjected to a rigid clinical demonstration with results so uniformly favorable as to exceed expectation. Under the supervision of skilled endocrinologists, victims of goiter of a variety of involvements have been treated with standardized kelp extracts and with very few, if any, exceptions have responded favorably. Under this treatment heart action and metabolism have been restored to normal, the swelling of the thryoid glands reduced, nervous disorders have disappeared, and in every case where frequent periods of violent insanity formerly occurred—requiring the confinement of the patient in an institution—these have entirely ceased to appear.

THE ERADICATION OF GOITER

The importance of maintaining the proper functional activity of a gland as vital to our physical well-being as is the thryoid, cannot be overestimated. The ease with which that may be done makes its neglect inexcusable. The time has now arrived when goiter must be eradicated. Our knowledge of the cause of the disease, its prevention and cure has reached the stage where we can proceed with confidence to that end. Those responsible to the public for the state of the public health, those interested in the betterment of public health are now in a position where, with coöperation, through moderate educational propaganda, they can persuade the public to take for itself the simple step which will insure an adequate oidine supply in the diet to prevent the development of goiter, to arrest the course of the disease where developed, and in the majority of cases to effect cures. By concerted action within a brief period this dread disease may be eradicated—and further honors thus be made to accrue to those who are devoting their lives to disease eradication through preventive medicine.

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For those who wish to read further on this subject, I would refer you to an article on page 23 of September 29th, 1917, Literary Digest, by C. G. Hopkins, entitled "The Ocean's Gift to the Land." Another in September 2nd, 1916, Scientific American, page 215, by Monroe Woolley, entitled "Industrial Preparedness for Peace" — "Obtaining Potash from Kelp." Another in September 21st, 1918, Scientific American, page 231, by Edward Crossman, entitled "Seaweed for War." Still another in May 15, 1915, Scientific American, page 457, entitled "The Pacific Kelp Beds." The Philip R.

Park Company, of Wilmington, California, has probably done more research work on kelp as a food than any other one agency. They have developed a very successful industry and was successfully dehydrating and marketing over 200 tons of kelp per day when I left California. They evolved a very valuable stock food which, in combination with fish meal, was marketed under the trade name of Manimar, and met with pronounced success. The rapid cure of big jaw, goiter and other diseases by this feed attracted wide attention. Tubercular cattle on even a light ration soon showed positive reaction. These results were so conspicuous that this company started research on the use of dried kelp as a human food or natural medicine. Dr. Cavanaugh, the world-renowned chemist from Columbia College, was induced to come to California to assist in this research, the result of which was the development of a concentrated dry kelp in a powder form which is on the market under the trade name of Parkelp, and receiving the endorsement of many of the best medical authorities. Results seem almost unaccountable both as a food and a medicine, and I am almost convinced that kelp serves as a catalectic agency or solvent which increases the assimilability of other foods. Possibly the substance extracted from kelp during the war—"ascetone"—which served as a catalectic agency or solvent to unite the cotton and nitrogen in making explosives, is the miracle agency in making food more available for assimilation.

Another very interesting study is of the preparation of the leafy vegetables so essential for our diet by this improved method of dehydration which removes the water between the cells without breaking the cell wall or oxydizing the product, thus leaving the food value and vitamin content available in a condensed form. The bulk reduction is generally from 15 to 25 to 1—so that they are in most convenient form for storage and shipment and therefore available for convenient use at all seasons and in all parts of the world. When cooked they are fully equal to the fresh article. Being grown in a highly mineralized section by scientific methods, harvested at exactly the right time and dehydrated the same day, they become one of our most valuable foods. Formerly these vegetables dried in the old-fashioned way were dark and tasteless, with little or no food value available—the valuable mineral content having been consumed by the oxygen of the hot air, leaving a partially decayed surface which set up over-fermentation in the stomach, thereby causing an acid reaction to an otherwise valuable alkaline reactant food. Even fresh vegetables lose their freshness and available food value very soon, even when kept in an ice box. A close microscopic examination will often show oxidization and germs of ferment.

We often put too much confidence in the old-fashioned ice box, which is not infrequently an incubator of disease germs if not carefully guarded. This reminds me of an experience when I was connected with the Good Samaritan Hospital at Los Angeles. One of our most exclusive girls' boarding schools had sent a girl with slight throat trouble for examination and diagnosis of the apparently slight indisposition. We recognized symptoms of diphtheria, so notified our city health office at once and he asked me to accompany him on a trip of inspection to the school. On arrival he proceeded at once to examine the ice box and found the drain choked up with slime; the water leaking through the box had run under the linoleum on the floor, so when stepped on the water oozed up between the cracks. Milk in an open receptacle was examined and germs were found on spinach and lettuce stored in the ice box. On inquiry of why his investigation began with the ice box, Dr. Powers stated that "his years of experience in the health department had shown this to be the most prolific source of trouble." With this in mind, I was one of the first to abandon the ice box in favor of electrical refrigeration in my home.

The Bulletin, "Dental Diseases in Hawaii," by Martha R. Jones, Ph.D., Nils P. Larsen, M.D., and G. P. Pritchard, D.D.S. of Honolulu, is a most valuable record of the careful research work being carried on at the Queen's Hospital in cooperation with the Palama Settlement and the University of Hawaii. The findings are most interesting and clearly show that deficiency of mineral element does exist in the body and traces these through deficiency in the teeth, especially in children of preschool age. The wonderful teeth and physical strength of the Hawaiian when subsisting principally on vegetables and sea food (including some kelp), as compared with his present condition, after adopting our diet of the highly refined foods, is perfectly apparent. Also the wonderfully perfect teeth of the Japanese when subsisting on their natural diet, which also consisted largely of natural rice, fruit and vegetables, together with sea food in which kelp was a part, as compared with the great deficiency after adopting our highly refined diet—at least in a very large degree. This naturally points to a deficiency in calcium, yet children supplied with milk and food of a high calcium content still showed defective teeth in a marked degree, while the teeth of children whose diet included much fruit and vegetables were uniformly less defective.

Vegetables are so perishable that it is not always possible to procure them in a fresh and perfect state of preservation, and it is also a well-known fact that vegetables grown especially in the tropics are tasteless and do not seem to contain the valuable mineral elements in an assimilable form, therefore there has been an effort made to concentrate vegetables (which are known to contain these valuable elements) into a therapeutic remedy which can be administered as an amendment to our regular diet, and thereby gain the necessary mineral balance in our bodies. I have watched these experiments with growing interest and surprise, for the reaction has ofttimes been entirely out of proportion. Having obtained an undisputed result, we are now researching to find the cause. Many theories have been advanced and laboratories established to prove or disprove these theories. Mr. L. P. Sims, president of California Vegetable Concentrates, Inc., of Los Angeles, has probably spent more time and money in this research than have all others combined. I have known this man intimately for many years. His high standing and reputation for truth and integrity leads me to quote direct from his personal letter describing this product and explaining his theory, which may or may not solve the mystery of this known phenomenon:

"For the past two years, we have devoted our attention quite exclusively to the production of vegetable concentrates for their therapeutic value. We have learned many things. We have taken every precaution to avoid bacterial infection. We are using only the very best of raw material. As a result of our rather extensive contact with various educational institutions and experimental stations and the personnel thereof, we have learned many things with particular reference to ways and means of avoiding vitamin destruction, particularly the water soluble vitamins. The underlying and basic principle, however, runs directly back to you in your designing of the system of dehydration, which virtually eliminates or avoids oxidation.

"As you know, we have been supplying our products to a number of pharmaceutical manufacturers and to a number of organizations. The use of these products by the pharmaceutical manufacturer with the exception of a few cases, is unknown to us. They are not particularly communicative, relative to their use of our products. On the other hand, the other organizations distributing our products have welcomed the cooperation which we have been in a position to extend, and have been most frank and full in their correspondence. We are therefore familiar in a general way with the veritable

mass of what they termed clinical cases, but which can be more properly described as their 'general practice.' One of the largest distributors of our products, or rather one of the distributors who dispenses the greater volume of vegetable concentrates, dispenses these products in various combinations in a dosage of 10 grains in a capsule. We were advised by these people of the favorable results they secured from this 10-grain dosage. While we knew these gentlemen intimately and well, we have confirmed the reported favorable results through a number of other sources by discussing the subject with various physicians, dispensing these products. Frankly, the therapeutic reactions which they secured are indeed favorable and in many instances quite spectacular. You know just as we do that 10 grains of vegetable concentrates is the residuum of only 150 grains (on the average) of the fresh vegetable. We were satisfied, but confirmed our impression by experiments that 150 grains and even five and ten times 150 grains of the fresh vegetable would produce no apparent physiological reaction whatever. To explain these seemingly paradoxical phenomena, we established a laboratory in conjunction with a clinic which we had previously established under the guidance of our good friend, Dr. D. G. Ragland. The result of this work was what is now being referred to as the 'Sims Theory of Nutrition.' This work, with primary relationship to leafy vegetables, led us to the following conclusions: First, that all of the nutrient values, especially the vitamin potencies and the essential mineral salts, are *within* the cell of the vegetable; second, that the cell walls are of cellulose; third, that cellulose is not broken down by any of the dilute acids or enzymes of the alimentary tract (cellulose is destroyed to some extent by bacterial action in the colon, but of course this is too late for metabolism); fourth, that unless the cellulose cell coverings are broken, cracked or fractured, the nutritional values therein are unavailable for assimilation and metabolism; fifth, that the nutrient values received from the ingestion of vegetables are in direct ratio to the proportion of cellular fracture caused by mastication or other previous preparation; sixth, that the proportion of cellular fracture caused by ordinary mastication is doubtless a very small fraction of 1 per cent; seventh, that complete dehydration renders the vegetable structure extremely brittle and friable and the finest comminution by mechanical impact or other grinding, fractures, cracks and breaks an infinitely greater proportion of cells than is possible by the most prolonged mastication and thus renders available for assimilation and metabolism a vastly increased quantity of auxiliary food factors and essential mineral elements in colloidal form. You will note that this proposition involves quite exclusively the question of comparative cellular fracture.

"As yet we have not reached intelligent conclusions as to the proportion of cellular fracture caused by mastication. Neither have we reached definite conclusions as to the proportions of cellular fracture caused by the finest comminution of the very brittle vegetable structure. Our estimate and present opinion is that the cellular fracture caused by ordinary mastication is an extremely small fraction of 1 per cent. Our estimate of the cellular fracture in the concentrates is approximately 90 per cent. The following statement may appear to you to be rather startling. Granting that the cellular fracture in the concentrate is only 100 times greater than that caused by mastication, it then becomes evident that a level teaspoonful of the vegetable concentrates, weighing approximately 50 grains, is not only equivalent to 750 grains of the fresh vegetable of which it is the residuum, but from the standpoint of availability for assimilation and metabolism, it is equivalent to 100 times 750 grains or 75,000 grains or approximately 10 pounds of the fresh vegetable.

"This theory has been submitted to a score or more of the world's recognized

authorities on nutrition without unfavorable criticism in any instance, but with the urgent suggestion frequently made that metabolism experiments be conducted to conclusively demonstrate the truth of the theory. These metabolism experiments are now being arranged for by a number of recognized authorities, and are already in progress in two or three instances.

"You will note that our work in some degree has been an effort to explain phenomena which already exist.

"Regarding our clinical work, will advise that through the coöperation of a number of physician friends we have completed five formulae, which for the want of better terminology we have temporarily designated as follows:

"CVC—Vegetable Anti-Anemia Food.

"CVC—Vegetable Anti-Constipation Food.

"CVC—Vegetable Anti-Diabetic Food.

"CVC—Vegetable Blood Food.

"CVC—Vegetable Nerve Food.

"We can describe these formulas and the basic reason for them briefly as follows: Anti-Anemia Food is composed of beet leaves, endive, lettuce, spinach, turnip leaves and watercress; all prolific sources of chlorophyl as a foundation-building material for hemoglobin formation. The proportions used were determined to give an optimum balance and calcium, phosphorus and iron. It is noted that spinach, turnip leaves and watercress are outstanding sources of Vitamin A potency. In all secondary and alimentary anemias the blood picture shows a low hemoglobin and low calcium, phosphorus and iron. This food simply supplies in an assimilable form the mineral elements evidently deficient and chlorophyl in abundance. The relationship and necessity of Vitamin A to blood platelet formation is now recognized by all authorities. The use of this formula in the treatment of alimentary and secondary anemias has been uniformly and quite startlingly favorable. It may be of interest to you to have before you what properly might be termed more authoritative information on this subject, and we respectfully refer you to the work of Dr. Wm. Weston, of the South Carolina Food Research Laboratory, as reported by him in his article, 'A Newer Conception of Nutrition,' as appears on pages 834 to 837 of the September 20th, 1930, issue of the Journal of the American Medical Association. In this article he discusses the use of spinach concentrate, lettuce concentrate, and carrot top concentrate in the treatment of alimentary anemia in nursing infants and lactating mothers. We quote from this article (page 836) as follows: 'In every case of alimentary anemia in which this spinach concentrate has been used, there has been a steady improvement, and in a large number of cases the increase in hemoglobin has been spectacular. This material has also been fed to anemic lactating mothers, whose babies were anemic and the milk insufficient to supply the baby's requirements. In such cases the hemoglobin of the mother and of the baby rapidly improved and the milk supply was increased.' He further states: 'From a limited experience, I believe that carrot top concentrate and lettuce concentrate possess an equal and under certain circumstances a superior food value to spinach concentrate.' In his summary, item 4, Dr. Weston uses rather forceful language. He states, 'the mineral content of the milk should be improved by adding spinach concentrate, lettuce concentrate or carrot top concentrate in suitable proportions to all milk, regardless of the baby's age, if the hemoglobin is below 75 per cent.'

"Anti-Constipation Food consists entirely of asparagus, parsley, okra, the stalk of rhubarb, Irish moss and mint. This food is compounded with respect to the demulcent properties of okra and Irish moss, the Vitamin B potency of asparagus, rhubarb and parsley and the fact that our clinical work has quite conclusively demonstrated that parsley and asparagus apparently perform the function of so altering the colonic flora as to greatly diminish the B. Coli count, reduce the

toxic or inflamed condition of the colon, as well as induce normal peristalsis.

"The Blood Food consists of beet leaves, kale, stalk of rhubarb, turnip leaves, parsley and watercress. The calcium and magnesium contents of this formula are particularly high, with an optimum balance of phosphorus and iron. These vegetables are highly potent in Vitamins A, B (F and G) and C. Beet leaves and parsley, with the other ingredients in smaller proportions has uniformly effected remarkable increases in the leucocyte count from the subnormal, and apparently has increased the phagocytic activity as evidenced by an increased ability of the polymorphonuclear cells to ingest bacteria. While we are not positive, we believe that this is an original discovery of a food which apparently increases the white blood count.

"The Anti-Diabetic Food consists of asparagus, beet leaves, cauliflower, lettuce, spinach, tomato and watercress, all of low carbohydrate content, but forming a prolific source of mineral elements. These vegetables are prolific sources of Vitamins A and B, and we quote Dr. Sherman, of Columbia, in saying 'there is considerable evidence of the relation of Vitamin B to the proper functions of the digestive tract.' In every clinical case under our observation and a number of cases reported to us from cooperating physicians, the use of these vegetables has resulted in a lowering of the sugar and apparently increasing the sugar tolerance. In this food the phosphorus content was, of course, given primary consideration.

"The Nerve Food consists of lettuce, endive, pumpkin, celery, and sea lettuce. Sea lettuce is used as a source of iodine. The other vegetables are of high Vitamins A and B potency, and we believe it is generally recognized that Vitamin B plays an important part in the treatment of those conditions characterized by nerve cell depletion. This is evidenced by the peripheral neuritic forms of beri-beri, when the diet is restrained to those foods deficient in Vitamin B. You will probably recall that lactucarium is an active principle of both lettuce and endive, and is regarded as a soporific sleep inducement and so used extensively in France at this time.

"In a general way, we call your attention to the fact with which you have doubtless been long familiar, that the human race has subsisted from the beginning of time exclusively on vegetables, either directly or indirectly, through the meat of herbivorous animals or through fish, which in the last analysis live on vegetation. Vegetable concentrates of maximum cellular fracture simply provide these essentials in greater volume by virtue of their greater cellular fracture.

"There is much evidence, Dr. Hulse, to sustain each one of the above numbered statements in our theory above quoted, and likewise there is much evidence to prove that the cooking of vegetables not only destroys or diminishes the vitamin potency, but distinctly diminishes, and, what is more important, alters the mineral salt content of vegetables. From a therapeutic standpoint it therefore appears essential or at least advantageous that the vegetables should be raw. The extremely fine particle size presents an enormously increased surface area for the action of the digestive juices.

"In our theory we have not overlooked the probability of osmotic action or hydrolysis, but our experiments indicate that in the time available in the passage of food through the body, this action is extremely limited. We are pleased to say that a new sales corporation has just been formed here in Los Angeles, under the name of Protective Foods, Inc., for the distribution of the five formulae which we have mentioned above, and subsequently two additional formulae, which are now in process of clinical demonstration, one of which we have temporarily designated as a ration for the expectant and nursing mother and the second as an anti-rheumatic food."

BULLETIN
OF THE
PAN-PACIFIC UNION

An unofficial organization, the agent of no government, but with the good will of all in bringing the peoples of the Pacific together into better understanding and cooperative effort for the advancement of the interests common to the Pacific area.

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New Series, No. 149, July, 1932

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HONOLULU
Published monthly by the Pan-Pacific Union
1932

AIMS OF THE PAN-PACIFIC UNION

From year to year the scope of the work before the Pan-Pacific Union has broadened, until today it assumes some of the aspects of a friendly unofficial Pan-Pacific League of Nations, a destiny that both the late Franklin K. Lane and Henry Cabot Lodge predicted for it.

The Pan-Pacific Union has conducted a number of successful conferences; scientific, educational, journalistic, commercial, fisheries, and, most vital of all, that on the conservation of food and food products in the Pacific area, for the Pacific regions from now on must insure the world against the horrors of food shortage and its inevitable conclusion.

The real serious human action of the Pan-Pacific Union begins. It is following up the work of the Pan-Pacific Food Conservation Conference by the establishment of a Pan-Pacific Research Institution where primarily the study and work will be along the lines necessary in solving the problems of food production and conservation in the Pacific Area—land and sea. Added to this, will be the study of race and population problems that so vitally affect our vast area of the Pacific, the home of more than half of the peoples who inhabit this planet. The thoughts and actions of these peoples and races toward each other as they are today, and as they should be, for the welfare of all, will be a most important problem before the Union, as well as the problem of feeding in the future those teeming swarms of races, that must be well fed to preserve a peaceful attitude toward each other.

The Pan-Pacific Union is an organization in no way the agency of any Pacific Government, yet having the good will of all, with the Presidents and Premiers of Pacific lands as its honorary heads. Affiliated and working with the Pan-Pacific Union are Chambers of Commerce, educational, scientific and other bodies. It is supported in part by government and private appropriations and subscriptions. Its central office is in Honolulu, because of its location at the ocean's crossroads. Its management is under an international board.

The following are the chief aims and objects of the Pan-Pacific Union:

1. To bring together from time to time, in friendly conference, leaders in all lines of thought and action in the Pacific area, that they may become better acquainted; to assist in pointing them toward coöperative effort for the advancement of those interests that are common to all the peoples.

2. To bring together ethical leaders from every Pacific land who will meet for the study of problems of fair dealings and ways to advance international justice in the Pacific area, that misunderstanding may be cleared.

3. To bring together from time to time scientific and other leaders from Pacific lands who will present the great vital Pan-Pacific scientific problems, including those of race and population, that must be confronted, and, if possible, solved by the present generation of Pacific peoples and those to follow.

4. To follow out the recommendations of the scientific and other leaders in the encouragement of all scientific research work of value to Pacific peoples; in the establishment of a Research Institution where such need seems to exist, or in aiding in the establishment of such institutions.

5. To secure and collate accurate information concerning the material resources of Pacific lands; to study the ideas and opinions that mould public opinion among the peoples of the several Pacific races, and to bring men together who can understandingly discuss these in a spirit of fairness that they may point out a true course of justice in dealing with them internationally.

6. To bring together in round table discussion in every Pacific land those of all races resident therein who desire to bring about better understanding and coöperative effort among the peoples and races of the Pacific for their common advancement, material and spiritual.

7. To bring all nations and peoples about the Pacific Ocean into closer friendly commercial contact and relationship. To aid and assist those in all Pacific communities to better understand each other, and, through them, spread abroad about the Pacific the friendly spirit of interracial coöperation.

Appreciation of Pan-Pacific Work in Japan

At the inaugural banquet of the English-Speaking University Club of Tokyo, in April, Prince Iyesato Tokugawa, president of the House of Peers, and president of the Pan-Pacific Association of Japan, praised the work of Alexander Hume Ford, Director of the Pan-Pacific Union, as follows:

It is a truism to say that the world is daily getting smaller and smaller. Nevertheless, it is a truth the full significance of which is not rightly understood by everybody.

This is, I am sorry to say, particularly true in Japan and the other Far Eastern countries which are behind the rest of the civilized world in the practical application of recent inventions.

Take, for instance, aërial locomotion or the telephone. In Europe or America, you find most of the principal centers connected by daily services of well-appointed airplanes. And you can talk through the telephone between, say, New York and London or Paris or Berlin as easily as between Tokyo and Yokohama.

You, therefore, actually feel in Europe or America how small the world now is, and how close you are, at least physically, to your friends across the border.

This sense of nearness to each other and the increasing chance of getting together, can not fail to strengthen the bonds of common humanity and universal brotherhood.

In countries less fortunately situated, we have to make up for what we miss in the matter of humanizing appliances by trying to make the most of such means as come our way in order to promote the cause of international understanding.

One of the most useful methods in this respect, is to afford opportunities to the different races and nationals living in one city or locality to mix together so as to get acquainted with each other and understand each other better.

And that is what our friend Mr. Alexander Hume Ford means in creating an organization like the one whose inaugural meeting we are now attending. I am, indeed, proud to take a part in the initiation of a movement so praiseworthy in its purpose and so pregnant with far-reaching consequences.

It has, indeed, been fortunate for us that circumstances have made it possible for Mr. Ford to spare so much of his time and energy in the interests of international fellowship in this part of the world.

The institution which he first started here, namely, the Pan-Pacific Club, has been a great success; it is doing good work in most of our centers of intelligence and culture.

Let us hope that equally successful will be this latest creation of his inventive genius and untiring energy.

Honolulu and Conventions

Editorial in Honolulu Star-Bulletin, June 24, 1932.

Honolulu has entertained two conventions this year and is about to entertain a third.

This is not only good for the conventions but very good business for Honolulu.

This city—this setting in Hawaii—provides an excellent meeting place for conventions and conferences, particularly those with an international membership. They find the trip here feasible from any part of the "Pacific area." They find the atmosphere one of friendly good will. They find a stimulus in the harmonious

race and economic and social relationships of the "melting pot."

Honolulu needs and should have more conventions and congresses. But work on such future meetings here is evidently at a standstill.

It took more than five years of effort and planning to get the National Foreign Trade Council to vote its 1932 meeting in Honolulu.

The fourth Pacific Rotary conference, just concluded, was the fruit of Rotary endeavor for several years past. The first Rotary conference—held in Honolulu, too—required more than a year of preliminary work.

Experience with the Press Congress of the World, the science congresses, and various educational and commerce conferences called under the sponsorship of the Pan-Pacific Union, abundantly prove that the campaign to get any sizable, important convention here must extend over several years.

Next month the Pacific regional conference of the World Federation of Education Associations will meet here. It has taken years of hard work to bring that important group to the Mid-Pacific Paradise.

It is perfectly obvious that Honolulu should be working now on conventions for 1934, 1935, 1936 and beyond. It may not be too late to do something about 1933. One wonders whether the loss of the 1933 Institute of Pacific Relations meeting was not the result of inaction of the community.

There is little being done on future conventions, and that little is unorganized.

Two or three times the Chamber of Commerce has gotten almost to the point of developing convention work as part of its accepted civic job—but never quite reached that point. The Tourist Bureau some years ago definitely put itself on record as feeling that the getting of conventions for Honolulu is not its function.

Both the chamber and the Tourist Bureau help other organizations that are sponsoring conventions, but neither has made regular, continued convention work a part of its program. The chamber has directly handled two big business conferences but has no permanent facilities for such an important phase of modern civic enterprise.

There are many reasons for this situation, but perhaps the chief reason is that among the downtown business community considerable opposition exists to "making Honolulu a convention city."

A good many of Honolulu's well-known and substantial citizens sincerely dislike the idea of conventions here. They visualize a city overrun with raucous-voiced delegates waving banners and flaunting badges of heroic size and loud color. When you mention "conventions," they have an immediate picture of noise, tumult, intrusion into the peace of the Mid-Pacific Paradise.

Yet when these conventions do come, the picture is quite otherwise. There was no boisterous tumult at the foreign trade meeting. It was of tremendous value in relation to the local situation at that time. No overenthusiastic hordes of delegates stampeded through the quiet halls and corridors of the Royal Hawaiian hotel. No raucous Rotarians threw furniture out of the second-story windows of the Moana, or pajama-paraded through the lobbies.

Honolulu has been notably fortunate in the character, the prestige and the excellent results of its conventions. And Honolulu always will be. This island of Oahu is too far from the mainland for the conventions of unwieldy size, or for the meetings of the bibulous and boisterous clans that sometimes shock the naïve natives of Chicago, St. Louis, Cleveland, Buffalo and San Francisco.

The three conventions which come to Honolulu this year bring in a substantial amount of "new money," which is liberally spent. Their delegates are here for a week or more. Nearly all of these delegates bring members of the family. In hotel, café, store, curio shop and other

expenditures and purchases, they spend an estimated average of $15 a day each.

In these days, viewed solely from the money value, conventions are blessings to Honolulu business.

But we won't get many future convention sunless there is more realization of the need for preliminary work.

Invitations for conventions to meet here should be extended at least five years before we really expect to get those meetings.

Organized campaigning must be done, year after year, putting Honoluls's attractions and advantages before managers, boards, officers, members. Honolulu as a convention city must be "sold" —and sold skilfully, enthusiastically, patiently and faithfully.

All the essential elements of success in this are here, except one. We have the speedy ocean transportation, the fine hotels, the convention accommodations, reasonable rates. We have a friendly atmosphere and people in which conventions can do effective work.

The essential element lacking is the will to organize and carry out a broad-gauge program. The engine is built and standing ready on the tracks. But the steam is missing.

Honolulu—the Geneva of the Pacific

"Geneva of the Pacific" is the designation that has been given Honolulu by guest professors from mainland United States who have arrived here to join the faculty for the School of Pacific and Oriental Affairs being featured at the University of Hawaii summer session, June 29 to August 9.

Honolulu is headquarters for several great movements for international understanding and study, they point out, the leading organizations in this work being the Pan-Pacific Union and the Institute of Pacific Relations. The work of these two groups is comparable in their unofficial fields to the League of Nations, it has been suggested.

Under the aggressive leadership of Alexander Hume Ford, the Pan-Pacific Union received its charter of incorporation in 1917, and since 1920 it has held twelve major international conferences in scientific, educational, journalistic, commercial and social fields, bringing together delegates of the United States, Australia, New Zealand, Fiji, Samoa, China, Japan, Canada, Siam, Indo-China, Mexico, Chile and other Pacific countries.

The other organization that maintains headquarters in this "Geneva of the Pacific—the Institute of Pacific Relations—has been operating since 1925. The success of this group in studying and interpreting through non-official channels the thought, culture and institutions of the Pacific countries has attracted the interest of European countries having territorial interest in the Pacific—thus the scope of the institute's influence has gone beyond Pacific horizons.

Today the central secretariat functions continuously in Honolulu and there are Institute councils in Australia, Britain, China, Canada, Japan, New Zealand, the Philippines, continental U. S., and U. S. S. R. The Institute's program embraces research, discussion, and information; and biennial conferences are held.

Institute of Pacific Relations Fifth Meeting in Canada

The Institute of Pacific Relations will start a new precedent with its fifth biennial conference, going for the first time to the eastern shore of the Pacific for its meeting place.

Banff, in the Canadian Rockies, has been chosen as the spot on the North American mainland best suited to the purposes of the conference scheduled for August 30, 1933, according to a statement issued by Charles F. Loomis, acting general secretary, from the international headquarters of the Institute at 1641 South Beretania Street, Honolulu.

Word as to the choice of location has just been received by cable from the chairman of the Pacific Council of the Institute, Jerome D. Greene of New York, after the nine members of this international governing body had voted on the matter. Three invitations were under consideration, the Philippines, Honolulu and Canada.

The first and second conferences having been held in Honolulu, where the interracial atmosphere was thought to lend both comprehension and disinterestedness, and the third and fourth in the Orient, for a close-up view of oriental problems, it was felt that a new perspective on Pacific affairs might perhaps be gained from the vantage point of the eastern continental rim.

The fourth conference was held in Shanghai in October, 1931, under conditions most discouraging to international coöperation. The bringing together of Chinese and Japanese around one discussion table at such a time was regarded as a distinct achievement, and one that bore fruit in the form of solid coöperative study into the fundamental problems lying far below the surface of the current clash between China and Japan.

Nine member countries will participate in the next conference, Australia, Canada, China, Great Britain, Japan, New Zealand, the Philippines, the United States and the U. S. S. R. In addition official observers are expected from France or its Pacific colonial possessions, from Holland or the Netherlands East Indies, and from the League of Nations and International Labor Office at Geneva.

Institute leaders in all these countries are convinced, Mr. Loomis says, that there never was a time when the far-sighted coöperation of liberal groups throughout the Pacific area was so vitally important to the solution of vexing problems, and no time when the activities of an organization concerned with disinterested study and research rather than with politics and diplomacy were so necessary. The disentangling of the present Far Eastern muddle, for instance, will have to be left to the league and the diplomats, but objective study, on the part of an unofficial body such as the Institute, may do much toward uncovering the basic causes of this present conflict and of preventing others like it in future.

It is with this in view that the national institute groups all around the Pacific are already at work at outlining a preliminary study program and tentative discussion agenda for the fifth biennial conference at Banff.

America in the Pacific: a Century of Expansion

By FOSTER RHEA DULLES

Published by Houghton, Mifflin Co., Boston, Mass., June 1, 1932, pp. 299, with bibliography—$3.50. Reviewed by Kilmer O. Moe, Honolulu.

In his new book, "America in the Pacific," Foster Rhea Dulles presents a striking picture of the American drama, of a people moving westward in a century of struggle to subdue a continent. The challenge of the unknown found a welcome response in the hearts and minds of the founders of the nation, but the westward movement did not gather momentum until well into the nineteenth century. The "Roaring Forties" witnessed the American pioneer reaching out to get possession of a whole continent. During that decade the expression, "Manifest Destiny," was coined, two words that convey the sincere belief of many Americans, not alone of that day but of later decades as well.

Back of our country's expansion are the forceful men who wrote their impress upon the nation. Passing in review we get a close-up of the men who had a hand in winning for us the Oregon country, of Texas and of California. We get better acquainted with William H. Seward, who was responsible for the purchase of Alaska and of Commodore Perry, who opened up Japan to the western world. We get the inside story of the entangling venture to Samoa while the developments in Hawaii which led to final annexation are given a prominent place in the picture.

For a few decades the Civil War and the consequent reconstruction together with the task of settling up the country west of the Mississippi River absorbed the energies of the country, but by the end of the century this phase of the country's development had passed on into history. During the Spanish-American War and immediately thereafter "Manifest Destiny" was again in the saddle. The parts played by McKinley, Roosevelt, Dewey, Lodge and others clearly indicate that the country had embarked upon a new departure in policy with regard to expansion, the fulfillment of the dreams of Seward and Perry, the final triumph of the policy that had brought us Alaska, Samoa, and Hawaii as progressive steps toward the mastery of the Western Ocean and was now to give us an island empire at the very door of Asia.

Nevertheless, the author points out, there have been voices raised to question this interpretation of "manifest destiny." Senator Hoar is quoted in answer to the eloquent plea of Senator Beveridge for greater expansion in the waters of Asia.

> I listened in vain for those words which the American people have been wont to take upon their lips in every solemn crisis of their history. I heard much calculated to excite the imagination of the youth seeking wealth or the youth charmed by the dreams of empire. But the words Right, Justice, Duty, Freedom, were absent from that eloquent speech.

This is the other side of the picture but it was largely forgotten in 1900.

The book is written to furnish background for the problems that now confront America in the Pacific. A brief introduction gives a résumé of events during the present century. Japan has issued a direct challenge to our Open Door policy in China. The Filipinos are clamoring for independence. Will the American modify a policy that has behind it a long record of expansion in the Pacific? Read Mr. Dulles book and you will be in a better position to express an opinion in regard to this question.

Fishing to be Aided in Hawaii Schools

Steps to encourage pupils to enter the fishing industry here will be taken by Hawaii's schools next year.

The Board of Education today voted to ask the Fish and Game Commission and leading fishermen to give a series of talks at schools this year. Will C. Crawford, superintendent, told the board courses on the fishing industry will be given at McKinley High School next term.

Today's action was prompted by a letter from F. D. Lowrey, former speaker of the house of representatives. The letter follows:

In connection with the policy of dignifying labor in the school world, Mr. Miki discussed with me, a day or two ago, the fishing industry.

Mr. Miki tells me that at the present time there are some 200 men who are retiring from the industry each year due to age or disability. This figure seems to me a little high, but of course a great majority of the men in the industry are of the older generation and are pretty well along in years. Miki feels that ten years will see the retirement of most of his men. Therefore, if the industry is to go on, as we expect, there are a good many places to be filled.

The other side of the picture is one which is not peculiar to this industry, but holds, I am told, in many other lines, sugar particularly; that is, the older generation are now willing to see their children educated along lines which involve the use of the hands in something other than pushing a pen or selling merchandise across a counter. Mr. Miki feels that many parents would welcome the opportunity to place their boys in this industry, even admitting that the work is hard and has a certain measure of danger.

Mr. Miki's suggestion is that beginning early next year talks be given in the different schools in regard to the industry and its possibilities. This might be handled in the same manner as the talks that are given on agriculture and other vocational subjects. Mr. Miki feels that Mr. Kelly of the Board of Agriculture and Forestry, and Charles Chillingworth could be secured, without cost to the Territory, to talk to the pupils, and that they would arouse an interest in regard to the industry which might lead a substantial number to take advantage of the openings which will exist.

Barstow Foundation Committee Visits Samoa

A committee of the Barstow Foundation, which is endowed for the education of Samoan youth, will leave Honolulu July 7 on the *Mariposa* to visit Samoa and lay plans for an educational program.

The committee includes Albert F. Judd, chairman; Frank E. Midkiff, president of Kamehameha Schools, and Walter F. Frear, president of the Bishop Trust Co.

They will be accompanied by Edwin R. Embree, president of the Julius Rosenwald Fund, Mrs. Frear, Mrs. Midkiff, Albert Judd, Jr., and John T. Waterhouse. Mr. Embree will arrive in Honolulu June 30 on the *Malolo*. He was formerly secretary of the Rockefeller Foundation and has taken a deep interest in the Barstow Foundation plans. The main viewpoint of the foundation is to educate the Samoans in their own culture.

The group will be away 35 days, spending 23 days in Samoa consulting chiefs and officials.

Except for Mr. Judd, none of the group has visited Samoa before. He has been there three times. Albert Judd, Jr., is a student at Williams College, Mass. John Waterhouse is a recent graduate of Princeton.

The Barstow Foundation was created last September and endowed with $200,000. Those on the board who will not make the trip are Oscar F. Shepard, president of Punahou Schools, and Dr. Peter Buck of Bishop Museum.

Hawaii as Center of Science

By CHARLES E. HOGUE
of Honolulu Advertiser Staff

Hawaii is destined to be the cultural as well as the trade center of the Pacific area.

James A. Farrell, retired head of the United States Steel corporation, and his colleagues at the recent sessions of the National and Pacific Foreign Trade Convention were unhesitating in their predictions for the Islands' future in commerce.

Now comes Dr. Edwin R. Embree, president of the thirty-million-dollar Julius Rosenwald Foundation and former secretary of the Rockefeller Foundation, with equal confidence in the early coming of the day when this territory shall be the Pacific's cultural melting pot.

This can best be brought about, he believes, by the coördination of the activities of Hawaii's educational and scientific institutions, which are already of much greater world importance than is realized by most folk here, and are destined to be of continually increasing importance as time passes.

The institutions whose activities Dr. Embree has most strongly in mind are:

University of Hawaii.
Bishop Museum.
Honolulu Academy of Arts.
Sugar Planters' Experiment Station.
Pineapple Growers' Experiment Station.

Although, quite naturally, he cannot speak authoritatively in advance, Dr. Embree believes there would be little difficulty in obtaining ample financial aid for a project to correlate and extend the activities of these institutions through a central unit that would in no way interfere with their independent status. He feels confident that such an object would be met sympathetically not only by the Rosenwald and Rockefeller foundations, but by many wealthy individuals as well.

The proposal already has been discussed with officials of the institutions that would be affected and has met with an encouraging interest. Before Dr. Embree departs from Hawaii for the mainland it may be that the plan will have assumed proportions definite enough to warrant its presentation for consideration by institutions and individuals whose financial support would insure its success.

Dr. Embree came on from Chicago last week at the invitation of officers of the Barstow Foundation to accompany them to Samoa this month for an educational survey. A deep student of the races, with an understanding interest in the Polynesian peoples, Dr. Embree welcomed the opportunity to join the Barstow party as a volunteer technical adviser.

Trustees of the Barstow Foundation are committed to a policy of education for Samoans within their own culture. It is Dr. Embree's thought that the forthcoming survey should be devoted to learning what the Samoan chiefs feel would be the most advantageous objects to be sought under the Barstow fund activities. His recommendations will be of immense value to the Barstow Foundation trustees, based as they are on ten years' experience in the Rockefeller Foundation, for which he made four separate studies of the Pacific area, and his advantages as head of the Rosenwald Foundation.

His biological studies here and his activities in connection with the Rockefeller medical institution in China have had a direct bearing on his enthusiasm for the creation of a cultural center in Hawaii.

"Our trip to Samoa," he explained, "will be for the purpose of looking over the ground to see what things, if any, an outside foundation can do for the Samoans. We will try to find out what the chiefs want, to help in the development of their own culture. The trustees

of the Barstow Foundation are already committed to that policy.

"The approach to the problem will not be missionary in the sense of trying to give the Samoans outside influence, but will be an attempt to help them in their own ways of life. There will be no thought of displacing a culture that is possibly more beautiful than any they could get from outside.

"I do not undertake to speak for the Barstow trustees, but it is my own thought that there should be a school for the sons of chiefs. The Samoans must have leadership, and it must come from their own chiefs. Possibly it may not be regarded as an American principle, but I feel that a purely aristocratic effort is what is required. Development of health and culture, together with a knowledge of outside world conditions and their own historical background brought to the people through the education of their chiefs and their training for competent leadership, are the prime objects of the foundation's work as I see it.

"As to the coördination of the activities of Hawaii's educational and scientific institutions, it must be realized that in the University of Hawaii, the Bishop Museum, the Honolulu Academy of Arts and the sugar and pineapple experiment stations there is represented an immense amount of brains.

"These institutions are rooted in the local soil; they have gone far in ethnology, Hawaiian and Oriental art, and the development of resources. They are already representative of the whole Pacific area, in racial understanding, Chinese and Japanese art, Australian and New Zealand agriculture and American resources. They are destined to higher research for all the peoples and countries of the Pacific.

"This will be the cultural center—the cultural melting pot, if you will, of the Pacific Basin.

"What I hope to see is some organic or informal union of these five institutions; a single great scientific and educational center worthy to attract the best brains of the whole Pacific, with the general idea of research on a higher level.

"It is not my thought that any of the institutions should be robbed of its individuality, but that there be provided some central nucleus, perhaps analogous to the University of London, which is the holding company for 17 colleges and research institutions there. The University of London has some money of its own, so that it is not dominated by any particular one of the units it represents, but serves as a clearing house for all of them."

Although Dr. Embree was not in a position to say what financial assistance might be expected were his plan undertaken here, he called attention to the attitude of the Rockefeller Foundation, which has heretofore made gifts to the University of Hawaii and to the Bishop Museum to aid research in anthropology and racial relations.

Dr. Embree is not a scientist who expresses a theory that he is unwilling to put into practical application in his own affairs. His belief that Hawaii's institutions are of outstanding importance had practical demonstration in the fact that his son, John F. Embree, now in anthropological work in Japan, came to the University of Hawaii for his undergraduate degree, when the doors of every college on the mainland were open to him. Likewise, his daughter, Miss Edwina, a Punahou student and more recently of Swarthmore, Pa., has returned to take her degree at the university here.

"Hawaii as a playground is all very well," Dr. Embree concluded. "But that does not do full justice to the Islands. This is the natural focal point for the brains of the Pacific, and I foresee the day when the tide of travel here will be stimulated by much more than the mere thought of recreation."

Fijians and Football

The Fiji Times and Herald, April 9, 1932

The granting of affiliation to two new Fijian clubs at the annual meeting of the Fiji Rugby Union on Thursday evening is a pleasing indication of the enthusiastic manner in which the Fijians are taking the game up. It is essential that young natives, particularly those living in the larger centers such as Suva, should be provided with every opportunity for indulging in clean healthy sport, not only for the sake of physical fitness but also for the interest it affords them. Another very excellent reason is to be found in the fact that the public enjoys seeing the Fijians play the game, and there is no doubt that assistance in fostering the game among this race will always be forthcoming.

It has been found that the Fijian youth takes naturally to rugby. It is a game which calls for strength, activity and powers of endurance—qualifications which the Fijians possess to an unusual degree. As yet they are comparatively new to the game, but as time goes on and they assimilate more of the finer points the Fijian race should be able to turn out footballers of a high class. In this connection it is also pleasing to note that several local players who have had experience in other countries are giving up some of their time to the coaching of native teams. Such service, particularly if directed toward reducing the tendency to kick instead of running with the ball, will bring good results. It is characteristic of the British race that wherever they colonize they always endeavor to interest the natives of the country in their games and sports. The good results of this policy are to be seen in New Zealand, where the Maori race has taken an almost keener interest in this typically British game than the Colonials themselves. The Maori finds rugby very much to his liking and in the New Zealand teams that have made football history have been included many famous Maori players. It would appear that it is the aim of the Fiji Rugby Union to encourage the game among the Fijians as much as possible, and we hope that the time will not be far distant when new grounds will have to be sought to accommodate the number of teams offering. It is also to be hoped that this season a visit from a Tongan team will be possible.

Tenth Olympiad Athletes Visit Hawaii

The rich possibilities of Hawaii as a center in which to hold a Pan-Pacific Olympiad, an object toward which the Pan-Pacific Union has been centering efforts for several years, were demonstrated in the last two weeks when over two hundred athletes passed through Honolulu en route to Los Angeles for the Tenth Olympic Games. The first to arrive was the Australian party of 15, swimmers, track stars, wrestler, and cyclists; the second, a group of athletes from the Orient: Japanese, led by Dr. S. Kishi, president of the Japanese Amateur Athletic Union, swimmers, track and field men, and rowers; also the Waseda University baseball team, which stopped over in Hawaii; a hockey team from India, led by A. M. Hayman, president of the India Hockey Federation, 18 in the party; 9 Filipinos, including swimmers, boxers and jumpers, Professor Candido Bartolome, manager.

A third group of 105, chiefly from Japan, comprised water polo and field hockey teams, rowing crews, boxers, wrestlers, and the women's track and swimming teams.

Olympic Games Will Use Metric System

San Francisco, Cal., June 14, 1932.
Mr. Alexander Hume Ford, Director,
Pan-Pacific Union,
Honolulu, T. H.
Dear Mr. Ford:

Newspapers throughout the United States are directing attention to the use of metric units in the Olympic Games and the trials preceding them. The enclosed editorial from the Oakland *Tribune* of May 29th is typical. Our news items and leaflets have gone to this influential newspaper, as to virtually all others in the United States.

Not only on sports pages are Olympic metric items appearing, but on general news and editorial pages. You may be sure that we shall seek to make the most of this splendid opportunity for the metric cause. Sincerely,

AUBREY DRURY, *Director.*

One hundred and eleven years ago John Quincy Adams asked that an international conference be held to study the metric system and work for its universal adoption. Since then there have been many individuals and organizations to repeat the suggestion. We continue to weigh and measure in the old ways which are admittedly haphazard and unrelated.

There is every chance that the coming of the Olympic Games to the United States will draw a new and larger attention to the metric system, for all of the events are to be arranged in terms of meters. The readers will be put to a little mental exertion translating meters into yards, if those readers happen to be American or British. Other countries have adopted the system.

A hundred yard dash is not to be run and the hundred meter dash carries a record and comparisons which are strange in our track meet books. A meter (39.37 inches) has been popularly described as one-ten-millionth of the distance from the equator to the pole. More accurately, it is the distance between two lines on a specially prepared platinum rod preserved in the archives of the International Metric Commission at Paris. Upon this one unit is built up the entire system of measuring in decimals. Thus the kilometer is a thousand meters and the millimeter is one-thousandth of a meter. In capacity, the unit is the liter, and in weight, it is the gram, and liters and grams are likewise graduated up and down in the scale of tens, hundreds and thousands.

A writer in an encyclopedia gives an illuminating example when he says:

"There is only one system of weights and measures in the world by means of which, if a voyager were wrecked on a desert island with only one measure, and that so small that it could be put in a lady's thimble, he could reconstruct all the measures for distance, for weight and for capacity, could map out the island, weigh up to tons and know the capacity of any receptacles he might construct. That system is the metric system, and that measure is the cubic centimter, made hollow, and graduated on the edge in millimeters."

Whether or not the metric system is on its way be adopted in this country, it is recognized as a fact that impetus in that direction was given with the return of the soldiers from France, and it is predicted another will be supplied with the Olympic games.

* * * * *

The meter (often called the "world yard") is about 10 per cent more than the old yard. Thus the 200 meters dash is about the same as the 220 yards; the 400 meters steeplechase will be proportionately meters represents the 880 yards run or half mile. Instead of a mile run, there will be the 1,500 meters run—short of a mile by about 110 meters. The 3,000 meters steeplechase will be proportionalely less than two miles.

Another feature will be the 5,000

meters run—about three and one-tenth miles. The 10,000 meters run, therefore, is approximately six and two-tenths miles in length. Running and hurdle races, walks, jumps, weight events, swimming contests and yacht races will be regulated by the world metric measurements in the Olympic games and tryouts. If an athlete high-jumps two meters, he is exceeding six and a half feet. If he broad-jumps seven meters, he is almost at 23 feet. And if he throws the javelin 70 meters, he is almost at 230 feet—it has been done.

Standardization of athletic records is urged by many athletic experts as a reason for even more general adoption of the world system, the pioneer in this having been the late James E. Sullivan of the Amateur Athletic Union.

Building on the public interest developed in metric measurements by the Olympic Games, a movement is under way to press legislation in Congress for adoption of these uniform decimal standards by the United States. All civilized peoples, except the Americans and British, have already adopted the metric units for everyday use and there is a strong movement in the United States and the British commonwealths to secure the advantages of the world standards. Athletic competition is serving to point out their utility.

Los Angeles Plans for the Olympiad

When the ancient Greeks pitched their tents on the plains of Elis in the dim centuries of the past and brought the young men of their land together in the first of all Olympic games, they raised high the banner of sportsmanship which has been followed by athletes of the ages.

Three thousand years and more have elapsed since the young bloods of ancient Hellas met in their first sportive combat but the Olympic games, as revived in modern cloak, will be celebrated in Los Angeles next July and August in a glamorous manner never surpassed even during the days of the old Grecian Empire.

Two thousand athletes, the choice men and women of 40 nations, will journey from the far corners of the earth to lay the best they have to offer in the way of physical prowess on the altar of clean sportsmanship, during the games of the Xth Olympiad from July 30 to August 14, inclusive.

During the sixteen day session more than 135 separate competitions will be held.

The mighty spectacle of 105,000 spectators filling the massive Olympic Stadium to the point of overflowing, an army of 2,000 picked athletes, with flags flying, as they pass in review during the impressive Parade of Nations, the Olympic torch as it first blazes forth atop the monster peristyle, will present a picture that will long remain in the memory of those privileged to attend the spectacular opening ceremony.

With every nation having signified its intentions of participating, the 1932 games will be the greatest international amateur sports event in world history.

The sports in which the greatest athletes of the day will compete will include track and field events, boxing, cycling, equestrian sports, fencing, field hockey, gymnastics, modern pentathlon, shooting, rowing, swimming, diving, water polo, weightlifting, wrestling and yachting. Fine arts exhibits will also be held during the entire period of the games.

Evidence of the international interest that is being displayed in the games is reflected in the fact that requests for

ticket reservations have been received from all of the 40 participating nations and from every state in the Union.

Official delegations and members of the nobility of continental Europe and Asiatic countries will be present in Olympic Stadium on the afternoon of July 30 when President Hoover proclaims the games open.

When preparations for the games were first started nearly ten years ago, one of the most serious problems confronting the Organizing Committee was that of furnishing transportation, housing and food for the athletes at a nominal cost.

Several European countries had expressed fear that the heavy cost involved would prevent them sending over representative teams. Some of them estimated it would be between $1,000 and $1,500 per athlete to send a team to Los Angeles.

A few months later, however, when William May Garland, president of the Organizing Committee, informed them that they would be able to send their men to the 1932 games at a total cost of approximately $500 per athlete they were highly enthusiastic.

The extremely low cost was made possible through the agreement of the railroads and steamship lines to furnish transportation to the athletes at a figure considerably lower than the usual tourist rates, and a new plan devised by the Organizing Committee for housing and feeding the teams during their stay in Los Angeles.

Since the revival of the games in 1896, it has been the custom of the host country to quarter the visiting athletes in hotels, rooming houses, in barracks and even aboard the steamships on which they crossed the ocean. Meals were taken at the hotels.

This plan has frequently proved to be both costly and unsatisfactory to the athletes, despite the best efforts of the host country to provide them with every comfort.

In an effort to provide the athletes with a greater degree of comfort and at the same time keep costs at the lowest possible figure, the Organizing Committee proposed that the teams live in a special Olympic Village which it would build for them near Olympic Stadium.

This plan met with eager acceptance on the part of the participating countries, especially when the Committee announced that a flat rate of only $2.00 per day would be charged for both room and board.

The Village, consisting of between 700 and 800 two-room houses, will be built at a cost of $500,000 and will be for the exclusive use of the teams and those having direct connections with the games.

The revival of the modern Olympic games was due almost entirely to the energy and enterprise of Baron Pierre de Coubertin of France, in whose mind, at the age of seventeen, arose a desire for international athletics. For a time he contemplated a political future, but within a few years he determined to devote his life and resources to the introduction of sports into French education. To this end he traveled widely in America and England, and became convinced that the organization of sports in these two countries was of real importance to the lives of the people.

Like the ancient games, the modern Olympics find their inspiration in the efforts of civilization to teach coördination between a healthy body and an active mind. As the thought was expressed by Baron de Coubertin:

"The main issue in life is not the victory, but the fight; the essential is not to have won but to have fought well. To spread these precepts is to pave the way for a more valiant humanity, stronger, and consequently more scrupulous and generous. These words extend across whole domains and form the basis of a healthy and happy philosophy.

"The Olympic movement gives the

world an ideal which reckons with the reality of life, and includes a possibility to guide this reality toward the great Olympic idea: 'Joie des muscles, culte de la beaute, travail pour le service de la famille et de la societe; ces trois elements unis en un faisceau indissoluble.

"May joy and good fellowship reign, and in this manner, may the Olympic torch pursue its way through the ages, increasing friendly understanding among nations, for the good of humanity always more enthusiastic, more courageous and more pure."

The new $60,000 overhead flood-lighting system will permit night football and other events. The Stadium will be the hub of activity during the games. Olympic Stadium with a reserved seating capacity of 105,000 and a general admission capacity of 125,000 is the most colossal structure of its kind ever built. In it will be held impressive opening and closing ceremonies, track and field athletics, gymnastics, final equestrian events, start and finish of the Marathon, the national demonstration of American football and the international demonstration of lacrosse. Construction of the Stadium was started in 1921 and it was first opened to the public in 1923. The original reserved seating capacity was 76,000 and the general admission capacity was 90,000. The cost, exclusive of the lands which were donated by the state, was $800,000. An additional $90,000 was spent recently enlarging the Stadium to its present capacity and in the installation of the new lighting system. The Stadium is situated in beautiful Olympic (Exposition) Park and is readily accessible over a network of street car lines and splendid boulevards. In Olympic Park is also situated the State Armory, where the fencing events will be held, and Los Angeles County Museum, where the fine arts exhibits will be on display. A $125,000 swimming stadium will be constructed adjacent to the south wall of Olympic Stadium for the aquatic events.

The Long Beach Marine Stadium at Alamitos Bay in Long Beach is where all rowing events of the games of the Xth Olympiad will be held. The course is 2,000 meters long, 130 wide and 2½ meters deep. Various members of the International Olympic Committee after viewing the course have described it as one of the best in the world. The events include four-oared shells with coxswain, pair oared boats with coxswain, double sculls without coxswain, and eight-oared shells. Contracts have been signed between officials of the City of Long Beach and heads of the Organizing Committee providing for the construction of officials' stands, landings, boathouses and other facilities. The finish line will be at the far end of the course. A huge grandstand will be constructed at this point. Standing-room for several hundred thousand spectators, however, will be provided along the banks of the course.

The yachting events will be held at Los Angeles Beach Harbor from August 5th to 12th, inclusive. Yachts of international eight-metre class, international six-metre class, international star class and the Olympic Monotype class. The monotype class will race over a three-mile course inside the breakwater; the other classes will race outside the breakwater.

Olympic Swimming Stadium is nearing completion in Olympic Exposition Park. The Stadium, which will be erected on a site adjacent to the main stadium, will be equipped with a pool 20x50 metres. The pool will be of concrete and will conform to all Olympic games requirements. Two one-metre diving boards, one three-metre board and two diving platforms, one a five-metre and the other a ten-metre, will be installed. Under water lights and a heating plant will permit night swimming. Aquatic events to be held in the pool during the games will include swimming, diving and water polo. Two grandstands will have a seating capacity of 10,000. There will be 65 dressing rooms.

The World Federation of Education Associations' Regional Conference

By DR. PAUL MONROE, President

July 25-30, 1932, at Honolulu, Hawaii, will occur the Regional Conference of the World Federation of Education Associations. The conference will relate to all countries in the Pacific and will deal with such subjects as the Dual Language Problem, Modern Educational Problems in the Oriental Setting, Vocational Education, Health Education and Adult Education.

The Pacific area at the present time is one of the most interesting and importtant sections of the world in economic, social and educational life. The United States is especially interested in the development of amicable, coöperative relations and of racial and international understanding with the groups this conference will represent. No area of the world is making more rapid cultural progress than the Asiatic-Pacific people. No place in all the world offers such an interesting and fascinating location for conferences of this nature as the Hawaiian Islands themselves. These islands represent a great human laboratory wherein is being worked out life problems of a complex social character, but on a limited scale. Here are found all of the oriental strains of blood, intermingled with the occidental. People living together in an enchanted land, working side by side without the prejudices and social distinctions which characterize such associations in other lands.

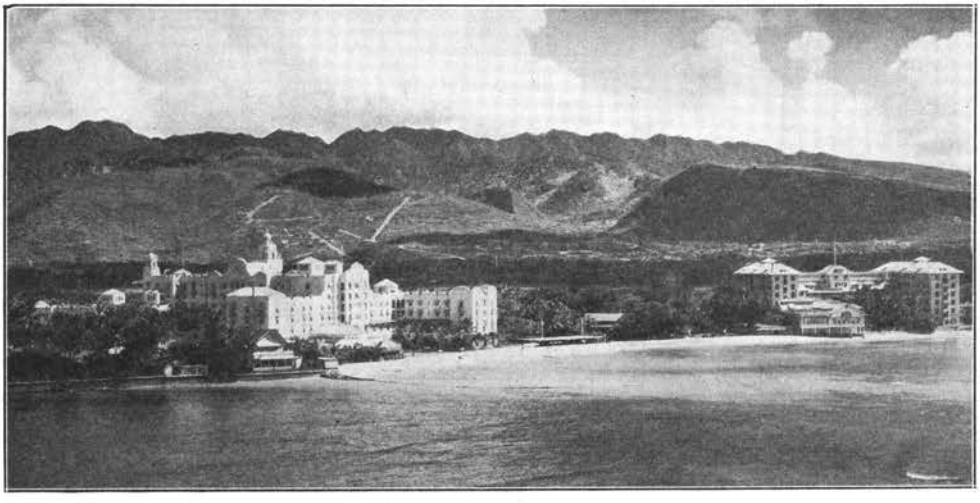
The group of islands with Honolulu as the capital, form a territory of the United States which eventually may apply for statehood. These islands are sometimes called "The Paradise of the Pacific," sometimes "The Crossroads of the Pacific," and other intriguing names. The islands lie in the midst of the Pacific, 2,200 miles southwest of San Francisco and Los Angeles, and between the Tropic of Cancer and the Equator, yet one is surprised to discover that he is not much nearer to Yokohama than to Seattle. The islands lie directly in the path of the trade winds, which modify the climate and produce an even temperature the year around. The golden sunshine, the hedges of tropical plants, some of which are always in bloom, the fine homes sequestered in tropical foliage, and the friendly and industrious people, make these islands a valuable and enchanting part of the United States.

The islands are volcanic and are really the peaks of volcanoes thrown up from the bed of the sea. Lying in the path of the trade winds produces on one side of a small island a heavy rainfall, with dense foliage, while on the other side, only a few miles away, is a semi-desert area. The islands are rich in agricultural products, the chief of which are sugar cane and pineapples.

The educational system is modern in its organization, instruction and material equipment. School health, industrial forms of education, visual instruction and progressive types of education characterize the system.

The conference represents the culmination of years of planning on the part of the teachers of Hawaii. There is every reason to believe that it will mark an important step forward in the social and educational development of the Pacific area.

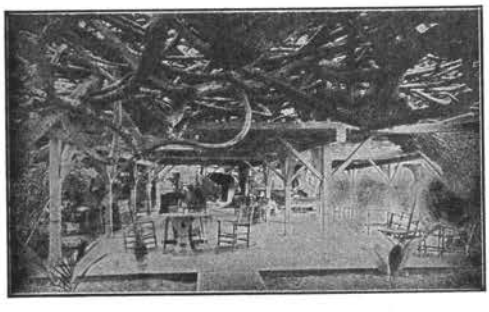
THE MID-PACIFIC



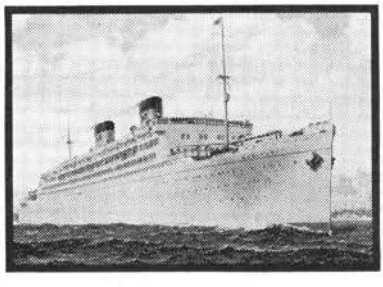
The Royal Hawaiian and the Moana Hotels at Waikiki

The Territorial Hotel Company, Ltd., own and operate the Royal Hawaiian Hotel, Moana Hotel, Seaside Hotel and Bungalows, and the Waialae Golf Club. The Royal Hawaiian has been voted the world's finest hotel by ten World Cruise Steamers. Rates upon application. Cable address Royalhotel.

The Matson-Lassco Steamship Company maintains a regular, fast, reliable passenger and freight service between Honolulu and San Francisco, Los Angeles, South Seas, Australia and Hilo. Castle & Cooke, Ltd. are local agents for the line, whose comfort, service and cuisine are noted among world travelers.



Famous Hau Tree Lanai



The Halekulani Hotel and Bungalows, 2199 Kalia Road, "on the Beach at Waikiki." Includes Jack London's Lanai and House Without a Key. Rates from $5.00 per day to $140.00 per month and up. American plan. Clifford Kimball, owner and manager.

The von Hamm-Young Co., Ltd., Importers, Machinery Merchants, and leading automobile dealers, have their offices and store in the Alexander Young Building, at the corner of King and Bishop streets, and their magnificent automobile salesroom and garage just in the rear, facing on Alakea Street. Here one may find almost anything. Phone No. 6141.

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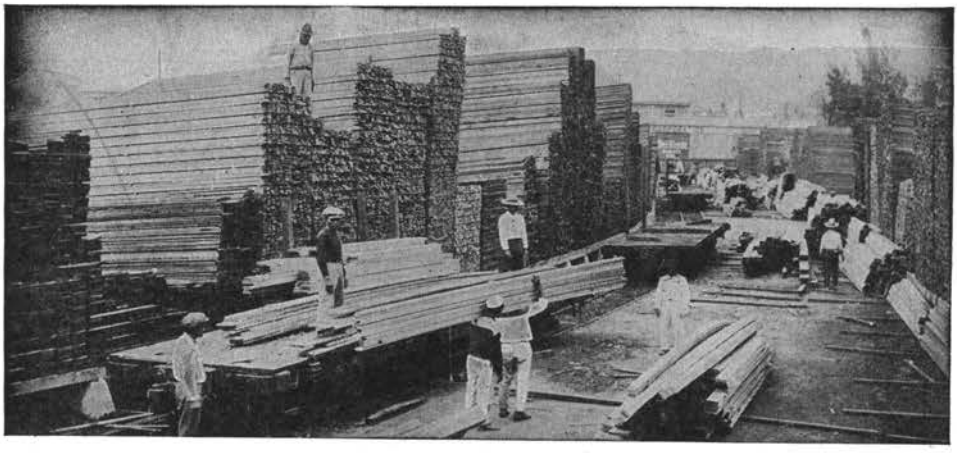

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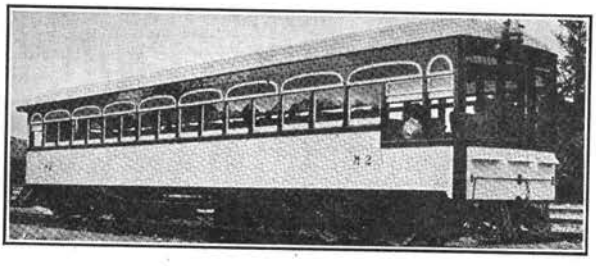
Lewers & Cooke, Ltd., have, since 1852, been headquarters for all varieties of building material, lumber, hollow tile, cement, brick, glass, hardwoods and oak flooring; as well as tools of the leading manufacturers, wall papers, Armstrong linoleums, domestic and oriental rugs, W. P. Fuller & Company's superior paints and Sargent Hardware.

They are also agents for Celotex cane-fibre products, Blue Diamond Stucco, cement colors, corrugated steel sheets, Lupton's metal windows, Gladding McBean's brick, roof and floor tile, and Pabco prepared roofings. A Home Building Department is maintained to help small home builders, and a Home Service Department to assist home owners in redecorating and modernizing.

OAHU RAILWAY AND LAND COMPANY



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The train leaves Haleiwa, returning to Honolulu at 2:52 P. M., after having given you three hours for luncheon and sightseeing at this most beautiful spot.

You arrive at Honolulu at 5:27 P. M.

No single trip could offer more, and the round trip fare is only $2.45.

SEE OAHU BY RAIL

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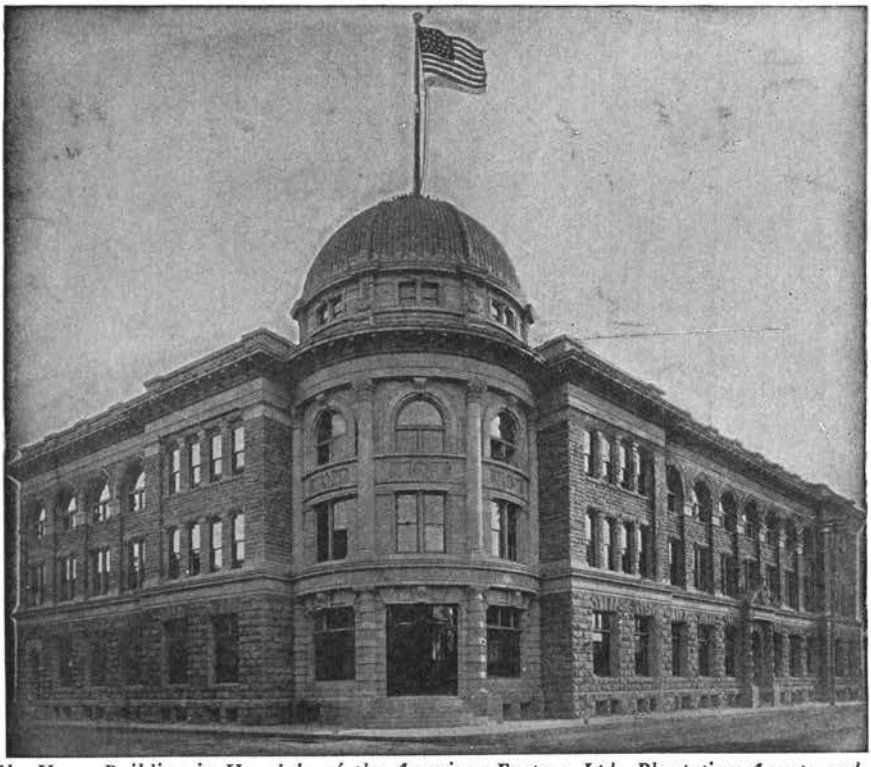

The Home Building in Honolulu of the American Factors, Ltd., Plantation Agents and Wholesale Merchants

Tasseled sugar cane almost ready for the cutting and crushing at the mills.

Home of Alexander & Baldwin, Ltd.

Anyone who has ever visited the Hawaiian Islands can testify to the usefulness of the "A & B Steamer Calendars" which are to be seen on the walls of practically every office and home in Hawaii. The issuing of and the free distribution of these calendars is a distinct public service rendered for some 30 years by Alexander & Baldwin, Ltd., who are staunch supporters of all movements that work for the good of Hawaii.

The beautiful new office building pictured above was erected recently as a monument to the memory of H. P. Baldwin and S. Alexander, the founders of the firm and pioneers in the sugar business.

Alexander & Baldwin, Ltd., are agents for some of the largest sugar plantations on the Islands; namely, Hawaiian Commercial & Sugar Co., Ltd.; Hawaiian Sugar Co.; Kahuku Plantation Company; Maui Agricultural Company, Ltd.; McBryde Sugar Company, Ltd.; Laie Plantation; and also Kauai Pineapple Co., Ltd.; Baldwin Packers, Ltd.; The Matson Navigation Co. at Port Allen, Kahului, Seattle and Portland; and the following-named and well-known insurance companies: Union Insurance Society of Canton, Ltd.; The Home Insurance Company, New York; Springfield Fire & Marine Insurance Co.; New Zealand Insurance Company, Limited; The Commonwealth Insurance Company; Newark Fire Insurance Company; American Alliance Insurance Association; Queensland Insurance Co., Ltd.; Globe Indemnity Company of New York; Switzerland General Insurance Co., Ltd.; St. Paul Fire and Marine Ins. Co.

The officers of Alexander & Baldwin, Ltd., are: W. M. Alexander, Chairman Board of Directors; J. Waterhouse, President; H. A. Baldwin, Vice-President; C. R. Hemenway, Vice-President; J. P. Cooke, Treasurer; D. L. Oleson, Secretary; J. F. Morgan, Asst. Treasurer; J. W. Speyer, Asst. Treasurer.

The Honolulu Construction & Draying Co., Ltd., Bishop and Halekauwila Sts., Phone 4981, dealers in crushed stone, cement, cement pipe, brick, stone tile, and explosives, have the largest and best equipped draying and storage company in the Islands, and are prepared to handle anything from the smallest package to pieces weighing up to forty tons.

The Hawaiian Electric Co., Ltd., with a power station generating capacity of 32,000 K.W., furnishes lighting and power service to Honolulu and to the entire island of Oahu. It also maintains its cold storage and ice-making plant, supplying the city with ice for home consumption. The firm acts as electrical contractors, cold storage, warehousemen and deals in all kinds of electrical supplies, completely wiring and equipping buildings and private residences. Its splendid new offices facing the civic center are now completed and form one of the architectural ornaments to the city.

The City Transfer Company, at Pier 11, has its motor trucks meet all incoming steamers and it gathers baggage from every part of the city for delivery to the outgoing steamers. This company receives, and puts in storage until needed, excess baggage of visitors to Honolulu and finds many ways to serve its patrons.

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The Pacific Engineering Company, Ltd., construction engineers and general contractors, is splendidly equipped to handle all types of building construction, and execute building projects in minimum time and to the utmost satisfaction of the owner. The main offices are in the Yokohama Specie Bank Building, with its mill and factory at South Street. Many of the leading business buildings in Honolulu have been constructed under the direction of the Pacific Engineering Company.

The Universal Motor Co., Ltd., with spacious new buildings at 444 S. Beretania street, Phone 2397, is agent for the Ford car. All spare parts are kept in stock and statements of cost of repairs and replacements are given in advance so that you know just what the amount will be. The Ford is in a class by itself. The most economical and least expensive motor car in the world.

Honolulu as Advertised

The Liberty House, Hawaii's pioneer dry goods store, established in 1850; it has grown apace with the times until today it is an institution of service rivaling the most progressive mainland establishments in the matter of its merchandising policies and business efficiency.

The Waterhouse Co., Ltd., in the Alexander Young Building, on Bishop street, make office equipment their specialty, being the sole distributor for the National Cash Register Co., the Burroughs Adding Machine, the Art Metal Construction Co., the York Safe and Lock Company and the Underwood Typewriter Co. They carry in stock all kinds of steel desks and other equipment for the office, so that one might at a day's notice furnish his office, safe against fire and all kinds of insects.

The Honolulu Star-Bulletin, 125 Merchant Street, prints in its job department the Mid-Pacific Magazine, and that speaks for itself. The Honolulu Star-Bulletin, Ltd., conducts a complete commercial printing plant, where all the details of printing manufacture are performed. It issues Hawaii's leading evening newspaper and publishes many elaborate editions of books.

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The Honolulu Dairymen's Association supplies the pure milk used for children and adults in Honolulu. It also supplies the city with ice cream for desserts. Its main office is in the Purity Inn at Beretania and Keeaumoku streets. The milk of the Honolulu Dairymen's Association is pure, it is rich, and it is pasteurized. The Association has had the experience of more than a generation, and it has called upon science in perfecting its plant and its methods of handling milk and delivering it in sealed bottles to its customers.

Stevedoring in Honolulu is attended to by the firm of **McCabe, Hamilton and Renny Co., Ltd.,** 20 South Queen Street. Men of almost every Pacific race are employed by this firm, and the men of each race seem fitted for some particular part of the work, so that quick and efficient is the loading and unloading of vessels in Honolulu.

Twice a week the **Inter-Island Steam Navigation Company** dispatches its palatial steamers, "Waialeale" and "Hualalai," to Hilo, leaving Honolulu at 4 P.M. on Tuesdays and Fridays, arriving at Hilo at 8 A.M. the next morning. From Honolulu, the Inter-Island Company dispatches almost daily excellent passenger vessels to the island of Maui and twice a week to the island of Kauai. There is no finer cruise in all the world than a visit to all of the Hawaiian Islands on the steamers of the Inter-Island Steam Navigation Company. The head offices in Honolulu are on Fort at Merchant Street, where every information is available, or books on the different islands are sent on request. Tours of all the islands are arranged.

Connected with the Inter-Island Steam Navigation Company is the world-famous Volcano House overlooking the everlasting house of fire, as the crater of Halemaumau is justly named. A night's ride from Honolulu and an hour by automobile, and you are at the Volcano House in the Hawaii National Park on the Island of Hawaii, the only truly historic caravansary of the Hawaiian Islands.

There are other excellent hotels on the Island of Hawaii, the largest of the group, including the recently constructed Kona Inn, located at Kailua on the Kona Coast—the most primitive and historic district in Hawaii.

The Bank of Hawaii, Limited, incorporated in 1897, has reflected the solid, substantial growth of the islands since the period of annexation to the United States. Over this period its resources have grown to be the largest of any financial institution in the islands. In 1899 a savings department was added to its other banking facilities. Its home business office is at the corner of Bishop and King streets, and it maintains branches on the islands of Hawaii, Kauai, Maui, and Oahu, enabling it to give to the public an extremely efficient Banking Service.

ADVT.

Interior View of Bishop Trust Co.

The Bishop Trust Co., Limited, largest Trust Company in Hawaii, is located at the corner of Bishop and King Streets. It offers Honolulu residents as well as mainland visitors the most complete trust service obtainable in the islands today. The Company owns the Guardian Trust Co., Pacific Trust, Waterhouse Trust, and the Bishop Insurance Agency, and is thus able to offer an all-inclusive service embracing the following: Trusts, Wills, Real Estate, Property Management, Home Rental Service, Stocks and Bonds and the Largest Safe Deposit Vaults in Hawaii.

Honolulu Paper Company, Honolulu's leading book and stationery store, is located on the ground floor of the Young Hotel Building in the heart of Honolulu's business district. The company has a complete stock of all the latest fiction, travel, biography and books relating to Hawaii. It is also distributor for Royal Typewriters, Adding Machines, Calculators and steel office furniture.

The Haleakala Ranch Company, with head offices at Makawao, on the Island of Maui, is as its name indicates, a cattle ranch on the slopes of the great mountain of Haleakala, rising 10,000 feet above the sea. This ranch breeds pure Hereford cattle and is looking to a future when it will supply fine bred cattle to the markets and breeders in Hawaii.

Help the Country Folk

By THEODORE ROOSEVELT

Governor-General of the Philippines

Agriculture is the foundation on which the Philippine Islands rest. Therefore they will prosper or fail to prosper in direct relation to the conditions governing the life of the farmer.

Roughly speaking, the matter divides itself into three principal heads. The first of these is the supplying of the legitimate governmental facilities necessary for the building up of an agricultural community.

The second is education—education of such a type as to acquaint all farmers with the methods by which they can avail themselves of modern discoveries, modern farm economics, and other scientific improvements, and make of their properties profitable enterprises.

The third deals with the social conditions in which they live. History shows that almost invariably city dwellers have open to them greater opportunities for health service, recreation, and the other amenities that go to make life pleasant. We should realize this, and plan where practical to minister to this need of the country folk as well.