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LEAHI NATIVE GARDEN

By George C. Munro

In Elepaio of January this year I told of the start of Leahi Native Garden. This is now well on its way. Many young trees of wiliwili (Erythrina sandwicensis) are growing finely. About 6000 seeds of this spectacular native tree have been planted on outside ridges of Diamond Head crater (or Mount Leahi as one might be excused from sometimes calling it) since April 1950. Seeds of fifty other native species of dryland plants have been planted in the garden and elsewhere on the outside ridges of the mountain. It remains to be seen to what extent Erythrina and other native trees will withstand the dry seasons and become permanently established on these slopes, and the smaller native plants successfully compete with the more aggressive exotics already established there. Few of the other species planted have so far been seen growing and will not be reported on at present. But much has been learned of the best locations where at least some of the seeds planted will be likely to succeed.

Leahi native garden is on the lower slopes, above the Army Trail, of ridges 13, 14, 15 and 16, numbering them from Diamond Head Reservoir on the north, at Campbell Avenue, along the west side to the main ridge No. 16 running down from the highest point of the mountain between Makalei and Diamond Head Terrace. Ridges 13, 14 and 15 run into this main ridge and do not raach the rim of the crater. Being under the highest point of the mountain the trade wind brings light showers along the west side to this section which do not reach to the town below. This is considerable help in carrying plants through the dry season. On the lower slopes of ridges 13 and 14 there are accumulations of rich soil which during the heavy rains hold moisture well and some of the native plants grow luxuriantly there. The garden will be used as a trial situation and if native trees become established there, seed will be available for spreading on other locations to establish a forest.

An effort is under way, as an extension of the garden, to lay a foundation for a Hawaiian xerophytic forest on the west side of the mountain. The trail on the north is at about 200 feet elevation, and 100 feet at the south end. Groves of 50 erythrinas are being planted along the upper side of the trail and seed of other plants are set on up the slopes. This will be continued as long as the trail remains passable. Access to this trail is near my home where it connects the ridges of Leahi native garden. Even without care the trail here will not greatly deteriorate, so I anticipate being able to conduct the trail garden for a considerable time even if the trail is not kept in repair.

The tree covering of the west side of Diamond Head is largely the foreign kiawe (Prosopis juliflora) (SW) DC and koahaoli (Leucaena glauca) (L) Benth. The kiawe will eventually die of old age and so long as no grazing animals are allowed there to prepare and spread the seed no more of this tree will grow there. Native species can then take its place and compete with the koahaoli. The taller trees will do this successfully but the lower plants may require help.

Diamond Head, this peculiar accumulation and mixture of volcanic and coral material that is so prominent a landmark at the entrance of Honolulu Harbor, is worthy of being designated a mountain and I shall use this term when writing of it. It should as far as possible be kept sacred from further building up its slopes especially on the side facing the city of Honolulu. The process of native grasses preparing the rocky surface for shrubs and trees is well exemplified on its ridges and by this the scenery will be continuously improved. I feel I am privileged in being able to make an effort to also contribute to this.

In this attempt to re-establish a Hawaiian xerophytic forest I owe much to many others as I am unable myself to do much in collecting seed and without seed the scheme is hopeless. To keep aware of the amount of assistance given I name the erythrina groves for those assisting and already have 37 of these. Perhaps garden is hardly the term for simply sticking seeds in the ground and letting the resulting plants care for themselves but I think it suits the case. Rare plants are started in the home nursery to be planted when in suitable condition and at suitable times.

For lack of facilities and inability to traverse the steep ridges and gulches the botanical research has been in abeyance and no more native plants have been found so far this year. Later I hope to continue this to some extent and also planting wiliwili seeds on the ridges of the north, south and east of the mountain.

The following are fifteen native plants so far found. I do not know at this writing if all are strictly native and few if any are endemic to Hawaii.

Portulaca oleracea L. The common pigweed, akulikuli kula, grows on all the open spaces in the wet season.

Sida fallax Walp. Ilima grows everywhere, small plants on the rocky slopes and up to five feet three inches high and others with stems half an inch in diameter two inches from the ground on the rich and moister soil where the prevailing mass of this plant is about three or four feet high with a nice open seed bed below it. The measurements given are from exceptionally large and old plants.

Abutilon incanum (Link) Sweet. Native Mao. Fairly common but affected by a leaf disease which soon disfigures this handsome plant.

Waltheria americana. The native hialoa, formerly used medicially grows scattered with the ilima.

Dodonea viscosa. Of the alii which probably covered large spaces originally till destroyed by the animals I have so far located only two specimens. A spray was brought me by a friend from near the top of ridge 7 and I found a plant about a foot high on the steep hillside at about 300 feet elevation amongst koahaoli on ridge 14.

Teprosia purpurea (L) Pres. Hawaiian Ahuole or ahuhu. This plant which the natives used for poisoning fish is very common as small plants on the rocky open ground and flourishing on the better soils. Its seed is being spread around.

Cassia gaudichaudii. Heuhiuhi of the Hawaiians (according to Hillibrand). I prefer this name to uhiuhi or kolomana as they are used on other trees. It is present on the most favorable locations. The largest yet seen is nine feet high and two and one-third inches in diameter three inches from the ground. It seeds well and seed is being scattered as it ripens.

Lipochaeta lobata. The Hawaiians call the smaller plants of the genus, nehe, so we will apply this name to this one. It also is to be found on the best soils and some on the more forbidding locations. It branches from the ground to about four feet high and with a branch spread of about three feet. It seems worthy of cultivation for its attractive yellow flowers.

Cuscuta sandwichiana Choisy. Pololo. This parasite may not be in the garden but I found a strong plant on a ridge near it in 1950.

Boerhavia diffusa L, var. tetrandra (Forst) Heimell. Alena is very common everywhere there is not too much shade for it.

Santalum ellipticum Gaud. Iliahi. There is no specimen of this sandlewood in the garden so far as known but a robust grove of it is on a ridge on the east side and further north a small tree was seen in 1950. They flowered heavily but no visit was made when carrying seed. When opportunity offers seed of this will be planted and spread on the west side.

Euphorbia degeneri. Sherff. This is on most of the ridges at about 300 feet elevation. The largest plant seen is 32½ inches high. A plant of it is near the alii on ridge 14. It likely is on ridges 15 and 16 higher than I have gone.

Heteropogan contortus. Pili grass is on all the open ridges and helps to prepare the rocky ridges for woody plants.

Panicum torridum Gaud. The annual kakonakona of the Hawaiians is scatteringly on all ridges during the wet months. On the outside ridges it does not attain its maximum size. I have seen this grass on Molokai covering many miles of country about three feet high, like an immense field of wheat.

Erogrostis variabilis (Gaud). Stead. Variable love-grass. This very robust bunch grass is perhaps more tolerant of shade than pili but succumbs like most grasses when the shade becomes too dense. It with pili is reclaiming the rocky ridges for higher growth.

Doryopteris decora. This is the only fern so far seen on the mountain. Where the ilima and hialoa grow strongly with heuhiuhi and nehe it is to be found sparingly. It dries very quickly with the approach of the dry season but responds with astonishing rapidity to rainfall.

Two species of plants were found which Miss Marie Neal, Botanist at the Bishop Museum, informed me were not recorded in the Territory before. One is a small snapdragon (Antirrhinum orontium L) on ridge three and Jatropha gossypifolia above Makalei and in the valley between 13 and 14. This remarkable plant may do a great deal in the way of breaking up the rocky surface as it seems to grow in the almost solid rock. There is quite a patch of it under kiawe on a rockface above Makalei. Doves feed on the seeds so it may be spread by them, though they will likely digest most seeds they eat. It may help the scenery as it keeps green through the dry season. As I am working with native plants I shall leave it to the birds to spread it.

The planting of native things will increase the bird food on the mountain and so contribute to the well being of the city birds when it is eventually declared an inviolable bird sanctuary. But the story of the birds must wait till that of the Kapiolani Park is taken up again.

May 29, 1951.

REVIEW:

THE AVIFAUNA OF MICRONESIA, ITS ORIGIN, EVOLUTION, AND DISTRIBUTION, by Rollin H. Baker. (University of Kansas Publications, Museum of Natural History, Vol. 3(1):1-359, 16 text-figs., 1951)

Under this title Rollin H. Baker presents a most extensive and up-to-date discussion and bibliographic check-list of the birds of the Marshall, Caroline and Mariana Islands.

Dr. Baker, of the staff of the University of Kansas and its Museum, was a member of the scientific staff of the Laboratory of Mammalogy of the U.S. Naval Medical Research Unit No. 2, in the Micronesian area during the late war. The primary duty of the Unit was to learn about ectoparasites of vertebrate animals which might affect man. In the course of carrying out this objective, sizeable collections were made of birds and mammals, together with ecological data from several islands in Micronesia. Results are here presented, in addition to a thorough digest of all previous records, and thoughtful conclusions.

Following a brief description of Micronesia and a list of some of the place names, with sketch maps, Dr. Baker reviews the history of ornithological exploration in the area.

A check list is then given of the 206 kinds of birds - 150 full species, belonging to 91 genera, 37 families, and 13 orders - known from Micronesia. This serves as an index guide to the valuable discussions which follow:

There is a summary of the birds by habitat: 30 sea birds, 29 migratory shore birds, and 147 land and fresh-water birds, including faunal components, home lands of migrants, routes of migration, and derivation of the land and fresh-water birds. Included is a discussion of speciation and numerical tabulation of endemism by families. Time of colonization, factors causing dispersal, and an analysis of speciation are discussed in turn. A plea is made for the conservation of the avifauna of Micronesia.

The bulk of the book is taken up by a detailed discussion of each species or subspecies of bird. The bibliography is extensive. Dr. Baker presents results of an immense amount of research, as well as valuable new field observations. Reference is made to each name used in what would appear to be every account which has been published of birds in this area. The geographic range is given, not only within Micronesia, but also outside the area. There are no keys to, or technical descriptions or illustrations of species, but concerning each are given the distinguishing characters, measurements, weights, nesting and food habits, even an account of the parasites, and "remarks" contain other extensive and valuable information. Several sketch maps suggest the manner in which forms were derived.

The following are some of Dr. Baker's conclusions, taken from his summary:

(1) The islands of Micronesia are oceanic and were seemingly formed independently of any present day continental land mass. Terrestrial organisms have reached these islands by "over-water dispersal." The avifauna of Micronesia has been received from Polynesia, Melanesia, the Moluccas, Celebes, Philippines and Palearctica.

(2) Oceanic birds are among the oldest forms of bird life inhabiting Micronesia. Most of the species are circumtropical; no residents are known derived from Palearctica or the North Pacific. Micronesia has no endemic oceanic birds.

(3) On the migratory flights, shore birds reach Micronesia along three distinct flyways, here named the Asiatic-Palauan Flyway, the Japanese-Marianan Flyway, and the Nearctic-Hawaiian Flyway.

(4) More than half (52 per cent) of the land birds and fresh-water birds in Micronesia are derived from ancestral stocks in Melanesia; 21 per cent

from the Moluccas and Celebes; 10 per cent from the Philippines; 9 per cent from Polynesia; and 8 per cent from Palearctica. There may have been only 46 actual colonizations of Micronesian birds from other areas.

(5) Endemism in land and fresh-water birds of Micronesia is extreme. Of 104 native, resident birds, 97 (93.5 per cent) have become differentiated and can be separated taxonomically from related forms. In Micronesia there are 5 endemic genera, 31 endemic species, and 76 endemic subspecies.

(6) Some of the more important factors controlling the dispersal of bird life to Micronesia are the direction and intensity of the winds, the small size of the islands, their isolation, and the insular climates, which appear to favor colonists from tropical homes.

(7) Factors most important in the process of differentiation of birds in the islands of Micronesia are isolation, paucity in numbers of individuals, freedom from predation, absence (or presence) of interspecific and intra-specific strife, and nutrition.

Dr. Baker is to be congratulated upon having made an outstanding contribution to knowledge of the birds of Micronesia.

E. H. Bryan, Jr.

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JOURNAL OF ORNITHOLOGICAL WORK
during the summer of 1937
By Walter R. Donaghho
(continued)

August 4 (continued):

The trail wound its way down over a glistening pahoehoe flow towards a group of cones in the distance towards the ocean. In the early afternoon, I came near the southernmost cone, long and low, with two peaks. I climbed up to a bench mark on one of the peaks. To the southwest was a stretch of scattered forest which extended to the east, further down towards the ocean. The coast, near Punaluu, appeared seemingly not far away to the south; also, seemingly, not far distant were the cane fields of Pahala.

Descending the cone, I crossed the lava flow to the forest, grassy and park like. Ohia was the only tree, scattered about in groves. Birds were scarce; the forest seemed silent and peaceful. In a solitary tree nearby, the call of an iiwi was loud and clear, coming across to me like a silver bell. Upon going over, I sighted the bird, sitting in the tree's midst, preening. I walked on towards the road through clumps of trees and again out into open meadows. Pukeawe covered the ground under the groves. A few birds, mostly linnets, were there; now and then an apapane chirped. After a bit, I came to a new fence line recently put up by the CCC. I followed it, going diagonally towards the road. The meadows disappeared and the country was rocky - a pahoehoe flow sprinkled with scrub. More forest was skirted and soon I hit the road, a bit later a ride in a Kau-Hilo bus, free too!

August 7: Received our pay checks today!...

August 9: Went with the truck-load of men down to the lower end of the Peter Lee road, where I jumped off and started up toward the mountain.

I climbed several bluffs, open, covered only with brush consisting of a-alii and pukeawe, and then started across a long, gently sloping, rolling plain, interrupted once or twice by a steep incline. Clumps of koa began to appear, widely scattered. Birds were extremely scarce, apapane heard once or twice. In a half-dead koa tree were several linnets. I passed through a scattered clump of ohia which grew on an old pahoehoe flow.

A tangle of Coprosma, a-alii and pukeawe covered the ground, the only other vegetation was clumps of koa trees which began to appear after I had crossed a long plain and

started up a steeper slope (6000 ft. elevation). Save for linnets, I heard no birds here.

I came to an old stone wall running east across the slope and followed it. Hearing a loud snort close by, I looked up to see a black wild boar tearing down the mountain side, crashing through the brush. Coming to a low hill, I heard another pig squeal and saw several underneath a clump of koa a little way down the slope. I descended about half the distance toward them, then proceeded cautiously, hiding behind pukeawe bushes. The last protecting bush was about 12 yards from them and I settled down to watch. Right before me were two boars, a sow, and two little ones. The sow came toward me, stopped and started to root in the soil, grunting and blowing loudly, and then lay down. One boar was out in the sun, away from the group, and he walked over, grunting, and pestered the little pigs, pushing and shoving them, and in general disturbing their eating, whereupon they emitted loud squeals and moved away. He followed and met up with the other boar. The grunting stopped and they eyed each other like two fighting cocks. One of the little pigs came over towards me, followed later by the other. One of the boars wandered off over to another clump of trees about a hundred yards away. I could plainly see his cruel-appearing tusks as he raised his head and opened his jaws. He suddenly saw me and started with a "woof" and stopped again. When I came out into the open, however, he started off again. Startled by his cries, the small ones also fled, followed by the female, awakened out of a nap.

I went on in the direction of the Park. I heard an amakihi, answered by another. The koa disappeared; ohia scattered the slope here and there. I came to a clump of ohia and mamani. Several amakihi, a pair of elepaio and a brilliant red iiwi preening in a mamani were noted in the clump. The pukeawe trees were so dense that I had to skirt the kipuka.

Crossing the 1881 flow, I came to the Park fence. Now followed a parklike stretch with an open forest of koa, mamani, and ohia. I filled my shirt pockets with poha berries from the bushes that grew all about and sat down under a koa tree to rest. In a large tree opposite me honey bees were streaming in and out of a hole in its trunk. Birds, though not common, were flying about. Several elepaio called, once or twice apapane flew overhead. An amakihi probed around among the foliage of a mamani and another called nearby.

I came to another lava flow, and then another meadow. The forest grew in clumps of either koa or mamani, often both, the mamani forming the understory. Birds were very scarce, amakihi and elepaio heard now and then. I came upon a road and followed it into the Kipuka Kulalio. Vegetation here was similar to that of other kipuka just crossed. I approached a grove of koa, mamani and large a-alii trees growing underneath. Hill robins sang and called from within its depths, and quite a number of elepaio were whistling to each other. As I entered, I saw several birds, noticing particularly a flush of green on one unusually bright-colored amakihi. Much calling made me aware of the presence of many birds; the mamani seemed full of moving shapes. From under one tree I looked up and estimated at least 50 birds in the foliage, either feeding or looking at me, amakihi, several creepers, and akepiuie, distinguishable by the forked tail. Only females were noted. I was also surprised to note an akiapolaau just above my head, curious as an elepaio. It spent some time giving me a careful scrutiny, my imitation of its call causing it to be all the more curious. Going on, I passed through a grove of large koa, where I saw two creepers on the limbs. A flow was crossed and I soon came out into the open to find the Mauna Loa road just ahead.

August 10: Nasty weather. I noticed the scarcity of birds around the camp. Most of the apapane had deserted the forest, although the ohia still blossomed. The iiwi were still about, however.

This afternoon I drove with MacKensie to the Volcano House to meet Mr. Williams to go with him to Hilo, where I was to go on the air over Station KHBC with him. An hour

later we were in the studio where he started his bird lecture with my imitating the birds as he described them. Later, a guest at the dinner of the Hilo Lions Club, I gave a concert of imitations of bird calls.

August 12: Left with Mr. Rycroft for the Kaaha beach camp, where I was to make a study of the birds of the lower regions of the Park. One stop was made at the Kipuka Nene on the way down to the start of the trail at the brink of the Hilina Pali. While Mr. Rycroft was testing the phone here, I had a chance to notice what bird life there was. I found almost nothing. One or two apapane chirped now and then, but for the most part, the forest was silent. Five rock pigeons flew up from the side of the road a little farther down.

Arriving at the rim of the pali, Mr. Rycroft mounted a horse and we started down. A small herd of goats was sighted on the cliff which was absolutely barren, except for an occasional tree of maba and ohia here and there. Long talus sloped composed of large grey boulders extended more than halfway up in many places. The flat, yet dome-shaped, plains at the foot were barren - a desolate pahoehoe wasteland which seemed to extend for miles. Only low grass grew, in patches here and there. Goats were the cause, I believe, for they were exceedingly common.

Craddock went down the trail while I finished eating lunch. Then I started cross country towards a high grassy prominence, which I had supposed to be the brink of the coastal cliffs. The only life noted on this lonely desert was the skylarks that flew twittering into the air now and then.

(To be continued)

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FIELD TRIP: Hawaii Audubon Society, Poamoho Trail Trip, Koolau Mts., Oahu, Hawaii
Sunday, July 9, 1951.

Eight Audubon birders today enjoyed a sun-bathed five hour walk on the ridges of the Poamoho Trail in the Koolau. They parked their two cars up beyond the pineapple fields at the first of the parking spots not too far from the forest entrance. Looking down on the gorges to the north among the patches of koa, sandalwood and kukui trees, they noted that the ohia-lehua had practically finished blooming. Also, the groups of jacarandas had diminished to a few spots of bright blue.

As usual, light-footed Unoyo Kojima acted as path finder and was ahead with a group of three, while Grenville Hatch and her five fellow watchers made slower progress. This was an advantage as two broad areas were covered and counts of bird numbers were made in each section. At the start of the hike, notes and songs of Liothrix, white-eye and amakihi were all heard. It was not long before careful glances into the valleys brought the sight of numerous apapane. However, the white-eyes proved to be the most abundant species of the trip.

It is gratifying to report that the Auduboners are by no means blind to the plant life they encounter. Along the trail there were many bushes of the fragrant naupaka and some of the hikers noted that a number of elepaio seemed to favor this plant. Two flowers which were new to some were the lavender variety of the naupaka and the purple brown blossoms of the sandalwood.

As the advanced party progressed, they saw small flocks of ricebirds and about half way to the start of the foot trail noticed the low flight of an owl which unfortunately did not favor them with a good view. This forward group spent some time at the look-out point to the south and east near where the auto road ends and christened it "Jeep Point" for a vehicle of this species which was parked there, having been left by some pig hunters. They observed that the stream far below them was quite out short of water with many large stones uncovered.

A descent was made on the foot trail to the banana patch where the almost dry soil (ordinarily wet) indicated again the extent of the drought. The hikers turned back at the point where there is an abundance of tree-ferns. On the return at "Jeep Point" they met a party of picnickers consisting of two Naval officers (one of them Lt. Comdr. .

A.A. Clark, III, aide to Rear Admiral Dennebrink), their wives and children. These people showed keen interest in the trail and asked the names of birds and flowers. It made one of the Audubon party reflect on how useful a week-end naturalist guide would be on the Poamoho and other Koolau trails. Perhaps, someday the Park Board of the Territory will make available a ranger-naturalist service for public use, and, perhaps, establish nature trails.

Half way back to the cars the advance party heard an unusaual bird call which proved to be that of a Chinese thrush, although it was doubtful at first whether or not it was that of the Garrulax. Later, Grenville Hatch's group reported that they had heard 2 different individuals of this species. The hike ended at 2:45 p.m. with a profitable day to remember.

LIST OF HIKERS

Catherine Delamere
Grenville Hatch
Unoyo Kojima
Blanche Pedley
Helen Peterson
Ruth Rockafellow
Euphie Shields
W. S. Thomas

LIST OF BIRDS

Amakihi	23	Owl	1
Apapane	35	Ricebird	30
Chinese thrush	1	Sparrow	2
Elepaio	6		
Garrulax	2		
Iiwi	1		
Linnet	2		
Liothrix	23		

W. Stephen Thomas, Lt.Comdr., USNR
Recorder

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AUGUST ACTIVITIES:

FIELD TRIP: Sunday, August 12, 1951, to Poamoho. Meet at the Library of Hawaii at 8:00 a.m. Bring lunch, water, and car (if possible). Fortunately, this summer is dry and we are able to go to Poamoho as scheduled, but this may be our last bird walk of the year to Poamoho, for the inclement weather is becoming more frequent.

MEETING: The regular Monday meeting will be omitted this month. Instead, we will meet at the entrance to the Honolulu Zoo at 8:00 a.m. on Sunday, August 19th, where we will be met by Paul Breese, Director of the Zoo, who will conduct us through the Zoo, and who promises to show us everything. Those who went on a similar trip two years ago know this will be a treat. Come and bring your friends.

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