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NOTES ON THE MAMMALS OF KIPAHULU VALLEY MAUI, HAWAII

By Winston E. Banko and Nixon Wilson

All of the mammals living wild today in Kipahu Valley are descendants of stocks accidentally or intentionally introduced into Hawaii by man. Neither the Hawaiian form of the hoary bat (Lasiurus cinereus semotus) nor the Hawaiian monk seal (Monachus schauinslandi), the only Hawaiian mammals to arrive without the aid of man, has been recorded from the Kipahulu Valley area.

The following account is based on information and impressions gathered by the authors who participated in The Nature Conservancy's expedition into Kipahulu Valley in August, 1967. Observations and trapping of mammals were carried out incidental to the pursuit of other objectives; hence conclusions are preliminary.

Goat, Capra hircus. The history of goats on the island of Maui is unknown, but they have been a management problem in Haleakala National Park adjacent to Kipahulu Valley at least since 1950 when 2,309 were destroyed (Yocom, C.F., Ecology of Feral Goats in Haleakala National Park, Maui, Hawaii. Amer. Midl. Natur., 77(2):418-451, 1967).

A small herd of goats was observed by Expedition members along headwall ridges of Kipahulu Valley and several goats were collected for their ectoparasites. Well-worn trails along rocky ridges and deeply eroded gullies in Deschampsia grasslands in the higher elevations of Kipahulu Valley suggest a significant history of goats in the area. There were no indications that a resident herd was established in the Valley nor were there recent signs that goats had penetrated into the forest zone. Goats in Kipahulu Valley apparently confine their activity largely to the rocky headwall ridges above 7,500 feet in elevation where they are possibly the dominant disturbing ecological factor.

Pig, Sus scrofa. It is not known when Polynesian voyagers first brought pigs to the Hawaiian Islands. Certainly it was a long time ago - long enough for the pig to become well established in Hawaiian religion and culture before the arrival of Caucasian man. Thus it seems likely that pigs have inhabited Kipahulu Valley for many centuries.

Pigs are hunted today along the edge of the remnant native woodlands and in the pastures of lower Kipahulu Valley by local residents who value them for food. However, hunters do not usually penetrate far into the virgin forest of Kipahulu Valley in quest of pigs because of difficulty in finding their kill and transporting it back to their homes in the lowlands.

In the middle and upper sections of Kipahulu Valley we noticed evidence of wild

pigs throughout our range of exploration. On the valley floor signs of pigs were rather commonly and uniformly observed, and Expedition trail crew members were successful in capturing several suckling pigs during the course of their travels. Evidence of rooting by wild pigs was most noticeable in forest glades and, especially, in grassy meadows above the upper limit of tree growth in the grass-forb-shrub zone. Pigs appeared to be less abundant in dense forest and signs were limited largely to those associated with traveling, foraging, and bedding activities. Pig signs were more frequently observed in terrain having little gradient. Steep slopes appeared little used by pigs, probably because of harder substrates and lessened opportunities to root for food.

Pigs undoubtedly altered the status and distribution of the native biological elements when they were originally introduced to virgin Hawaii centuries ago. But the magnificent forest of koa (Acacia koa) and 'ohi'a (Metrosideros collina) in Kipahulu Valley, with their interesting and complex understory of plants bear witness to the compatibility of wild pigs and a wide variety of endemic plant species. Only in the open forest edge and grassland communities does the pig appear to be a significant factor in altering the natural succession of the dominant trees.

Rats, Rattus sp. According to a Hawaii State Division of Fish and Game listing, three species of rats occur on the island of Maui. The Polynesian rat (Rattus exulans) was brought to Hawaii by ancient colonizers. The Norway rat (Rattus norvegicus) and the black or roof rat (Rattus rattus) were inadvertently carried to Hawaii by Caucasians.

Trapping of rats in the middle and upper elevations of Kipahulu Valley was carried out to learn what we could regarding the status of these animals and their associated ectoparasites in an undisturbed rain forest environment. Coconut and Swiss cheese baits were used in ordinary rat snap-traps, with the following results:

Camp 1 (3,100 feet)	96 trap nights;	7 <u>R. rattus</u>	5 <u>R. exulans</u>
Camp 2 (4,100 feet)	190 trap nights;	7 <u>R. rattus</u>	2 <u>R. exulans</u>
Camp 3 (6,560 feet)	24 trap nights;	3 <u>R. rattus</u>	
(7,500 feet)	12 trap nights;	no rats caught	

While trapping results between stations are not strictly comparable because of possible variability in attraction of rats to baits used, variable expenditure of effort and other unknown factors, several relationships seem clear. Populations of R. exulans appear to be more numerous in mid-Valley habitats than in higher elevation habitats, if indeed they occur much above 4,000 feet at all. Populations of R. rattus appear to be fairly abundant and uniformly distributed through middle and upper elevation forests. Two color phenotypes of R. rattus were obtained with the black mutant (black back and belly) more abundant than the original wild-type (agouti back and white belly) (Tomich, P.Q. and H.T. Kami, Coat Color Inheritance of the Roof Rat in Hawaii. J. Mammal. 47(3):423-431, 1966).

Specimens of R. norvegicus were not obtained. Presumably populations of this third species occur on Maui in the Valley, but in pastures and around human habitations at lower elevations than those trapped.

Seven species of ectoparasites (4 mites, 2 lice, 1 flea) were collected from the rats; all were forms commonly reported for rats in other parts of Hawaii.

House mouse, Mus musculus. The house mouse occurs on Maui according to the State Division of Fish and Game listing, but its history of establishment is unknown. With 38 trap-nights of effort for house mice at Camp 2, 12 at Camp 3, and 12 at 7,500 feet, one mouse was caught at Camp 3 (6,560 feet) and one at 7,500 feet - the approximate upper limit of tree growth. Mouse snap-traps baited with Swiss cheese were used.

House mice are almost certainly found also at lower elevations, in fields and around human habitations, although no trapping for mice was done below Camp 2 (4,100 feet) and confirmation is lacking. Thus it appears that house mice found in higher portions of the Valley form populations continuous with those established in summit grasslands and may be rather isolated from those which presumably occupy lower portions of the Valley. The intervening dense forest may serve as a route for occasional vagrants that pass from one population to another, and perhaps it does not support a resident population.

Small Indian Mongoose, Herpestes auropunctatus. The mongoose is widespread on the islands it occupies in Hawaii, but the densest populations seem to occur in habitats at lower elevations. The mongoose on Maui is thought to be descended from those introduced to the island of Hawaii in 1883, but details of their introduction to Maui are not available. None was caught in 20 trap-nights at Camp 2, 9 trap-nights at Camp 3, and 12 trap-nights at 7,500 feet. Steel traps baited with Swiss cheese and fresh meat were used. Local residents say that mongooses are common in lower elevations of Kipahulu Valley, in fields, remnant woodlands, and around human habitations. While the negative trapping results of central and upper Kipahulu Valley should not be considered conclusive, it is apparent that mongooses are not abundant in the zones trapped and the question may be raised as to whether they occur there at all.

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The authors are indebted to P. Quentin Tomich, Ph.D., Animal Ecologist II, Hawaii State Department of Health for his comments and helpful suggestions which are reflected herein.

The following news article, Mainlanders Back "Save Kipahulu" Drive, by Helen Altonn on page A-11 of 5 August 1968 Honolulu Star-Bulletin is of interest to all of us:

The Nature Conservancy hopes to acquire lush Kipahulu Valley on Maui for a conservation park by early next year, an official of the national group said today.

Keith Artz, field representative for the group's western regional office, told the Star-Bulletin...that fund-raising campaigns are going well on the Mainland.

"We hope we can get this cleared up late this year or early next year," he said.

"We have had a number of donors who have given well over \$5,000 from the Mainland."...Artz said the group must raise at least \$1.5 million to purchase the 9,000-acre valley--home of many rare and endangered species of birds--"plus money to cover our expenses too."

The valley's upper portion is one of the most important remaining wilderness areas in the world and the coastal area, containing the seven Sacred Pools, is of major scenic and ecological significance.

Laurance Rockefeller purchased a 58-acre oceanside tract with part of the Seven Sacred Pools last year and asked Nature Conservancy to obtain the other property.

He proposes linking Haleakala National Park and the sea and preserving all the Seven Sacred Pools.

George I. Brown of Honolulu and Dr. Milton Howell of Hana are co-chairman of the fund-raising committee in Hawaii.

Artz noted that one of the largest individual contributions to the project was from George R. Carter on Maui. He first gave \$57,000 and then another 50,000, Artz said, adding: "We need more friends like him."

He said the campaign to purchase the valley is the largest project Nature Conservancy has now, "and the most thrilling, as a matter of fact."

SUGGESTIONS:

The following suggestions are from Laurence J. Taylor, 19 August 1968:

...If I may, although I have been a member for less than two years, make just a few suggestions to your Society:

1. I believe it is about time that you increased your out-of-state dues to \$3.00. I think it will better help you to meet your costs.
2. You should try to increase the membership in Hawaii, especially those on other islands.
3. Actively work with the Nature Conservancy representatives to help save more of Hawaii from development.
4. Strongly support the creation of a Kauai National Park.
5. Would it be possible to have Mr. W. Michael Ord write a column about birding on Guam every other month?
6. To speak out more forcefully against the introduction of axis deer to the island of Hawaii and of black-tailed deer to Kauai.

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Please send your comments and suggestions to Kojima, 725-A 8th Ave., Hon. 96816.

NOTES FROM KOKE'E AND THE 'I'IWI FEEDING ON THE BANANA PASSION FLOWER

By Diane Birindelli

In September 1967, I spent two weeks at Koke'e, Kauai, observing the birds and exotic plants of the area. Many bird species will not be mentioned, because I could not identify them definitely from brief glimpses or their songs.

The white-tailed tropicbird (Phaethon lepturus) was often seen soaring in Hanapepe, Waimea and Kalalau Canyons and along the Napali coast. Four to six birds were spotted each time, but none was ever seen to light on the cliffs. At Koke'e, the first golden plover (Pluvialis dominica) arrived on their fall migration from Alaska on August 30, according to Dr. Gladys Falshaw, curator of the Koke'e Museum. More birds continued to arrive during the first part of September, and there were approximately thirty to forty birds in the meadow by the museum or under the apple and pear trees near the ranger's cabin. During the previous year, Dr. Falshaw had taught two of the plovers to come within ten feet of her when she called "plover boy." In return, they were fed cracked corn or bread crumbs. Both birds returned in September and even after their summer in Alaska, responded to her call.

The two birds seen most frequently in the immediate Lodge area were the mynah (Acridotheres tristis) and the moa (Gallus gallus). The resident flock of mynahs, at least seventy-five, often shared the meadow with the plovers, and in the evening they roosted in the Monterey cypress trees (Cupressus macrocarpa) around the meadow. The moa were most common near the Lodge and cabin area. Dr. Falshaw lives in one of the cabins and feeds quite a flock of moa which stay in the bushes surrounding the cabin. Three hens were seen with from two to five chicks. One hen had made a nest in a tree behind the Museum and had laid five eggs. The mejiro (Zosterops japonica), although not as common as the mynahs and moa, is also common in the Lodge and cabin area. Several mejiro were also seen in the 'ohi'a (Metrosideros collina) trees around the northern part of the Alaka'i swamp.

Daily hikes were taken along some of the many trails at Koke'e: Nualolo, Honopu, Awaawapuhi, Alaka'i, Halemanu, Kumuwela and Highway 50 to Kalalau. As

expected, the 'elepaio (Chasiempis sandwichensis sclateri) was the Hawaiian species most to be seen or heard. They frequently follow one along the trails, fluttering from one blackberry (Rubus penetrans) bush to the next, or just hopping along the ground. The 'i'iwi (Vestiaria coccinea) and 'apapane (Himatione sanguinea) were often seen and heard in the koa (Acacia koa) and 'ohi'a (Metrosideros collina) forest. A feeding habit of the 'i'iwi was observed, which, so far as my investigations have shown, has not been previously recorded from Koke'e. The banana-passion-flower vine (Passiflora mollissima) has grown at Koke'e at least since the 1940's (Pearsall, 1946), probably even earlier. Now it is a major component of the koa forest, clambering up the trunks and hanging down from branches in addition to sprawling through the forest in a shrubby form. The plant blossoms and fruits at the same time and the ground is liberally scattered with fallen fruit which is a food of the wild pigs. While watching an 'i'iwi in a koa tree from which this passion flower was hanging, I saw the bird lean over almost upside down and peck at the base of a flower. Unlike the purple passion flower or liliko'i (P. edulis), the banana passion flower hangs downward from the vine and has a long corolla. Thus any bird after the nectar would have to hover around the flower opening like a hummingbird, be able to reach the flower from a lower branch, or lean over and peck a hole at the base of the corolla as the 'i'iwi does. Since the corolla is straight and about two inches long, the 'i'iwi would still be unable to reach the nectar with its curved bill even if it could reach the flower opening. This habit was observed several times and upon examining numerous passion flowers, I found that almost all had a small hole near the base of the corolla. Henshaw (1902) and Baldwin (1953) recorded the 'i'iwi piercing the corollas of the banana passion flower and nasturtiums on the Big Island, but I have not yet uncovered any observations of the same action from Kauai. A recent article by Spieth (1966) describes and illustrates the 'i'iwi on Maui hanging upside down and inserting its bill and most of its body into the curved lobeliad flower. The lobeliads were not blooming on Kauai so there was no opportunity to see this other feeding method. It would be interesting to find out when the 'i'iwi acquired its habit of obtaining nectar from the passion flower, and how much it depends on this source for nectar.

Blackberry (Rubus penetrans) and thimbleberry (R. rosaefolius) are still overrunning the trails, but the State Department of Agriculture has released two foliage feeding lepidoptera (Schreckensteinia festaliella and Apotoforma sp.) on Kauai to combat this problem. The raspberry crown borer (Bembecia marginata) was also released on Kauai, so both the blackberry and thimbleberry may soon be controlled and eventually eradicated. (C.J. Davis, Department of Agriculture, personal communication). Other exotic species found along the trails at Koke'e include Tritonia sp., Paspalum spp., Tibouchina semidecandra (Brazilian glorybush), Hedychium flavescens (yellow ginger) and H. coronarium (white ginger). Of the latter two, the yellow ginger is much commoner and can be seen blooming in large masses near the camping area at Koke'e, along the road below the recreational residence area, along the Halemanu trail and at Waipoo Falls. The Brazilian glorybush, with its purple flowers and velvety leaves grows in scattered clumps along Highway 50 from the cabin area almost to Kalalau Lookout. Pearsall reported this plant growing along the highway across from the ranger's cabin in 1946. It hopefully will not become a pest as it did on the Big Island.

LITERATURE CITED:

- Baldwin, P.H., 1953, "Annual cycle, environment and evolution in Hawaiian honeycreepers," UNIV. CALIF. PUB. ZOOL. 52:285-398.
 Henshaw, H.W., 1902, BIRDS OF THE HAWAIIAN ISLANDS, Thos. G. Thrum, Honolulu, 146 pp.
 Pearsall, G., 1946, "Notes on some birds of Kauai," ELEPAIO 7:32-41.
 Spieth, H.T., 1966, "Hawaiian honeycreeper feeding on lobeliad flowers," AMER. NAT. 100:470-72

If you have seen the 'i'iwi extracting nectar in the same way or other interesting experiences, please share with other members by writing to Kojima, 725-A 8Ave, Hon. 96816.

Field Note from Henry Yuen, 11 August 1968: Fairy Tern at Koko Head

Here's something that should be exciting. On July 21 one juvenile fairy tern was found. It was about five inches long and was covered with sandy colored down. It sat motionless, lying as flat as possible on a thick, horizontal kiawe branch about 60 feet above the ground or 60 feet down to the valley bottom. His parents fed him fish which they brought in crosswise in their beaks. Timing the adult, I found that it took him 45 minutes to catch one fish, which the chick swallowed whole in two seconds (the time it takes me to take one picture of the parent walking up to the chick and to recock my camera). Unfortunately by the time the camera was recocked --two seconds--the fish was swallowed.

While sitting alone waiting for his parent to return with more food, the chick moves around and shifts his position frequently. However, the minute the chick sees me, he will freeze. One day he didn't eat. I don't know if it was I or something else that was bothering him, but the parent was really patient. He would sit there and just wait. Sometimes he would try to nudge the chick into eating, but still not hungry. For fifteen minutes the parent just sat there with the fish and his chick. After waiting so long, he suddenly flew away. When he was out of sight, I left as fast as I could, thinking about how I must have spoiled the little birds appetite by frightening him in some way. That was July 30.

By August 1, everything was all right and the little chick was eating again. By now you could see his wing and tail feathers sprouting. By August 9, he began to have feathers on his head. And by now the chick must be able to recognize me, or I like to think he does. Before, whenever he saw me he would simply freeze. Nowadays, though he sits motionless, he will quietly turn his head and watch me as I go climbing all over the cliffs, tripping over the vines and falling out of the trees. Sometimes I really wonder if he can follow me with his eyes, so I would climb and crawl to the otherside of the cliff. I look at him through the binoculars. He's looking straight at me, so I climb and crawl all the way back. I look at him again. Sure enough, he's still looking straight at me. A line drawn from my nose to his nose with intersect at right angles with a line drawn across his head, so we're looking straight at each other!

I may have found an unhatched egg on August 9. I'm not sure, since all I saw was an adult sitting on a thick branch. He could be incubating an egg. Anyway I'll know for sure later this week.

One thing I've noticed about the birds is that, if I disturb one bird, I automatically disturb the entire colony. Sometimes when I'm climbing around, a tern flies up and startles me, just as much as I startled him, and we'll both look at each other. In no time two other birds will join in, and later a fourth will be seen. Sometimes a bird will return with his mate, then other birds would join them. Normally, they will sound the alarm notes of a low bark and a high note, but occasionally they will scream at each other when they are farther away from me. Anyway, always the first time they see me in a new place, they will come in real closely to look at me--some more courageous than others about three feet away--and slowly they will fly away, leaving one hovering high above me (from 70 to more than 100 feet high) until I finally leave. But after awhile, when they see me again, they don't even bother to come in for a close look. A glance 20 feet away is enough.

Field Notes from Peggy Hodge, 12 August 1968: Cattle Egret

Seen in mid-July and now a flock of 20 Cattle Egrets in meadow by Kawainui Stream opposite back of Food City in Kailua. Also same number in meadow by Maunawili turn-off near Kawainui Swamp.

Also seen in late July a school of 40 porpoises frolicking, spinning, and surfing in waves half-mile offshore at Mokuleia.

Field Notes by John I. Kjargaard, 2080 Mauna Place, Honolulu, 10 August 1968: Red-eared Bulbul

At our home in lower Makiki Heights our first sighting of a Red-eared Bulbul was in the fall of 1965. At that time we saw a pair flitting in and out of a mock orange hedge. In 1966 we saw a number of birds, and in the fall of 1967 we counted as many as 24 at one time. For a while the birds would congregate in a large tamarix tree late every afternoon. By about five o'clock they would take off and apparently settle down for thenight in a large banyan nearby.

After reading of their destructive feeding habits we watched to see what they would eat. They liked the fruit of the mock orange which they swallowed, pit and all, probably also the fruits of the banyan.

Like the cardinals, they occasionally fly underneath the eaves of the house looking for insects, mostly moths. On several occasions one or two birds have come around when we fed the Kentucky cardinals, and once one of them entered the feeding cage. It kept watching the cardinal but did not attempt to crack any of the sunflower seeds. Strange enough, we have yet to see them touch any fruit.

On one occasion one sat in a papaya tree watching a white-eye pecking a hole in the papaya. It showed great curiosity, cocking its head from side to side, yet it never tried to peck at it.

We have seen them mostly during the cooler months of the year.

Field Trip to Manana, 8 September 1968:

The annual trip to Manana Island finally came off on September 8, following a disappointing postponement of the regularly scheduled August trip. Twenty-four members and guests made the excursion by boat from the small beach Waimanalo-side of Sea Life Park to the island and were able to spend about three hours on the island itself observing the sooty terns and common noddies. The numbers of birds on the island were, of course, appreciably less than the almost fantastic totals during the height of the breeding season, but the sooties could still be numbered in the hundreds and the noddies in the thousands and to those who had never before visited a tern colony, the total effect was quite satisfactory and perhaps even spectacular. The greater proportion of the sooty terns were young birds who had just learned to fly or were on the verge of learning, but a considerable number of adults were also in evidence. The common noddy seen were also primarily the just-flying or beginning-to-fly young, but a small number of chicks still in their down were still present. There were a number of wedge-tailed shearwater chicks still in the burrows of the colony at the northern edge of the island and a few Bulwer's petrel chicks in the small colony at the southern edge. Some members reported adult shearwaters flying near the island, and Mrs. Pyle and others saw a fairy tern flying into and out of the crater. Another group observed at least one red-tailed tropicbird which came under attack from the noddies. Mr. Burckhalter, the speaker at the August meeting, had reported and showed a color slide of a nesting red-tailed tropicbird on Manana, but the bird was not on the nest on Sunday. There was, however, a note from Mr. Burckhalter stating that he had checked the nest again on August 20, the day after he spoke to the Society, and found both the adult and the chick gone. Three great frigatebirds were seen; one of which received the same treatment from the noddies as did the red-tailed tropicbird. And, quite naturally, a number of golden plover were observed while we were en route from the library to the landing beach, and one wandering tattler met some of the group, as they arrived at the beach to await the boat. Red-footed boobies flying by Manana Island were also seen by several of the members.

Charles G. Kaigler

Excerpts from the minutes of the general meeting, Hawaii Audubon Society, July 16, 1968:

...Ian Atkinson gave a report on the Audubon field trip of July 14, 1968 to Peacock Flats trail where White-eyes, Leiothrix, 'Elepaio and 'Amakihi were seen.

Several people saw a White-tailed tropicbird in Makua Valley.

The President announced that Margaret L. Nott would represent the Society at the Action for Beautification Council.

There was a general discussion on what to do with the Society's collection of books which are housed in the Waikiki Aquarium but rarely used. Following suggestions were made: 1) Donate them to Bishop Museum, 2) List them and circulate the list to book dealers with the members having the option of buying them first, and 3) Keep them if at all possible.

Our illustrious, well-known lecturer for the evening was Jack Throp who gave a very entertaining talk with color slides entitled "My Favorite Animals."

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Excerpts from the minutes of August 19, 1968:

...A letter from The Nature Conservancy was read. Co-chairman Milton M. Howells, M.D., wrote thanking us for the \$50.00 we sent for the Seven Sacred Pools Project.

The question of the books belonging to the Audubon Society and stored here was left pending.

...Bill Hodge of the Sierra Club reported that a club was being formed here, and that they desired copies of our minutes. No action was taken. He had passed out and later collected an inventory of scenic areas in our state desired by the State Cultural Arts.

Dave Burckhalter, a graduate student from the University of Arizona, gave a talk on his study of the sooty tern on Manana Island. After several months' study of the breeding habits and nesting problems of various birds on the island, and some experiments, he reached interesting conclusions.

Following his talk, and the showing of a few well-taken shots of birds in various stages of growth, there was a lively question and answer period. It was especially pertinent that the proposed trip to Manana was close at hand.

Harriet E. Linn
Acting Secretary

ALOHA to our new life member:

Mrs. Frank Gerbode, 2560 Divisadero St., San Francisco, Calif. 94115.

OCTOBER ACTIVITIES:

- October 13 - Field trip to study shorebirds. Bring lunch, water, and if possible your car. Transportation cost (\$1.00) to be paid to the drivers. Meet at the Library of Hawaii at 8:00 a.m.
Leader: Charles G. Kaigler, telephone 988-3195.
- October 14 - Board meeting at the Zoo entrance building at 7:30 p.m.
Members are always welcome.
- October 21 - General meeting at the Waikiki Aquarium Auditorium at 7:30 p.m.
Program for the night:
Speaker: Rex R. Elliott, Industrial Engineer, Ewa Sugar Company, Inc.
Topic: Shorebirds of Hawaii (Color slides)

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