

## Some Birds of Molokai.

BY WM. ALANSON BRYAN.

WITH a view to securing suitable material for the series of Hawaiian bird groups being assembled in the Bishop Museum, the writer spent two months (April 15 to June 15, 1907) collecting in the mountains of Molokai. The collecting of the skins and the necessary material required in the Museum's work afforded a favorable opportunity for making some detailed field observations on the nests and habits of many of the birds found on this seldom visited island. In addition to a general report of the expedition, the Molokai Olomao (*Phæornis rutha*) is herein described as new and shown to be a species closely allied to *P. lanaiensis* with which it has formerly been united.

The popular and, in a large degree, the scientific interest in the expedition centers about the securing of specimens of the Hoa or Black Mamo (*Drepanorhamphus funereus*) which is one of the rarest of living birds. The search of the forests was made with a view to securing specimens of this species if possible. As a consequence the collecting of other mountain birds was in a sense incidental to this main endeavor. Locating the present haunts of the few remaining examples of the Hoa, made frequent change of station necessary, and, as a result, practically the whole forest area of the island was visited before the coveted locality was finally found. The most extended stay, however, was made at Kamoku camp, and it was at this place that most of the material here reported was obtained.

Kamoku camp is a shelter cabin belonging to the Molokai ranch. It is located on the southwest side of Hanakalilolilo mountain, near the head of Waikolu valley, and it is well suited to the requirements of the collector. It is about 4000 feet elevation and on the edge of the great bog forest at the head of Waikolu and Pelekunu valleys. In this vicinity have been secured most of the specimens of birds of the island, now in museums. The region is also important as the type locality for the Hoa and certain other birds peculiar to Molokai.

The second camp was at the eastern end of the island near the mountain Kaunapahu and beside one of the many streams which unite to pour their waters into the head of Halawa valley. From this station trails were cut through to Wailau valley and then extended to the left to reach the centre of the Halawa headwater country—a region which had never been thoroughly explored.

The third, and in many ways the most successful camp, was made back of Moanui ranch, near the head waters of the Waialua stream. The fourth and last station was directly back of Mapulehu, within a short distance of the pali of Wailau valley. From all of these stations, as centres, excursions were made in various directions. By reference to the map it will be seen that the forested eastern half of the island, which is the portion of greatest interest to the ornithologist, was accessible from the stations mentioned. From the different camps referred to I was able at least to visit all of the favorable localities, while the more important collecting grounds were very thoroughly explored.

What has been said elsewhere<sup>1</sup> of the difficulties attending the collecting of birds in the mountains of the Hawaiian group is especially true of the mountains on Molokai. Indeed it is impossible in a brief description to give an idea of a region so varied and broken, representing, as it does, all the main features of a wild semi-tropical forest and a group of volcanic mountains combined.

For various reasons the wet bog forest at the head of Waikolu and Pelekunu valleys is conceded to be the most difficult collecting ground in the Hawaiian Islands. It is situated at a sufficient elevation to be drenched by almost continuous rains, and as a result the verdure is always most luxuriant. Under foot, at all times, is a perfect quagmire up to one's knees. Overhead the tangle of vines, aerial roots, ferns, bushes, and standing and fallen trees—all completely overgrown with moss and slime—are so woven together as to produce an almost impenetrable jungle. Great palis drop down perpendicularly for hundreds of feet. Narrow, fissure-like, forest-hidden valleys, running in all directions, add to the difficulty of getting about, while numerous vine-covered well-like holes, often a hundred or more feet deep, play no small part in furnishing

<sup>1</sup> Notes on the Birds of Kauai, Bryan and Seale, Occ. Papers B. P. B. Mus., vol. i. no. 3. p. 129. Notes on the Birds of Waianae Mountains, Bryan, *Ibid*, vol. ii, p. 235, etc.

an ever present source of real, though hidden, danger to one working in the region. Add to all these and a hundred other material things the discomforts of the cold drenching rains, the dripping forests, and the dense—oftimes bewildering—clouds of fog that envelope everything, and there would seem to have been little omitted that would add to the discomfort of the collector.

The Halawa district is even more discouraging to the naturalist. The country—an otherwise sloping plain—is cut into long sharp ridges by numerous, almost countless, streams and tributary ramifying valleys, all converging to pour their waters down Moaula and Hipuapua falls, into the beautiful Halawa valley. Throughout this headwater region Ieie (*Freycinelia*) vines run rampant. The trail must be cleared of them at every step. Splendid trees are so overgrown and completely hidden by them that when one looks over the forest from a point of vantage there is little else than ieie in sight. The difficulties and mishaps incident to carrying a gun and working one's way for days through such a snarl can be better imagined than described. It is not uncommon for one to be forced to abandon the ground entirely, and to climb for considerable distances over the bushes and low trees; often one is twenty feet or more from the ground, on top of the tangle of vines. To find the small and inconspicuously colored birds after they have dropped to the ground through such a maze is a task of no mean proportion: often hours of fruitless labor can be thus expended.

Though less boggy than Pelekunu, and less overgrown with vines than Halawa, the stations at Moanui and Mapulehu each presented physical obstacles to the collector that are, in their way, almost as difficult to surmount. Among them might be mentioned the long narrow ridges and impassable waterfalls at Moanui, and the precipitous palis of Wailau and Mapulehu.

In general it may be said that the forests of the island are characteristically timbered with the common native trees of the group, save for the striking exception of the Koa (*Acacia*) which is entirely wanting in the Molokai mountains. The Ohia (*Metrosideros*) is everywhere the most conspicuous, and, to the ornithologist, the most important tree. Wild banana (*Musa*), several kinds of the large lobelias, the Kopiko (*Straussia*), Olema (*Perrottetia*), and a number of other trees, are common in the higher ranges, while Kukui (*Aleurites*) is an abundant species in the valleys and

on the lower ridges, where, as in the valleys on the windward side, it grows to an immense size.

As elsewhere in the group, the timbered area is now more limited in extent than formerly. That this reduction in area has worked a hardship on the avifauna throughout the islands is well known. However, on Molokai more than anywhere else, has the change in the forest and its inhabitants been allowed to come about naturally, through causes inherent in the fauna and its habitat. For this reason, fairly reliable testimony, even of a meagre nature, concerning the existence and subsequent disappearance of certain birds, before the introduction and spread of foreign plants, animals, or conditions, is of great interest. It may be regarded as suggesting what would probably have occurred in time from innate causes existing in the fauna or its environment, even though the introduced causes with which we are familiar, had never become active. As a matter of fact, the impending extermination of certain Molokai birds cannot, in any just way, be attributed to introduced disturbing conditions. In certain other cases, however, it would seem to be entirely due to conditions brought about since the coming of the white race.

The weather throughout the trip was, I am told, unusually wet and cold. Heavy rains were of almost daily occurrence, while cloudy, gloomy weather was almost continuous. This not only interfered with collecting, but caused many birds to abandon their nests—often after they had been completed, and I had marked them for study.

For much of the success of the trip the writer's, as well as the Museum's, thanks are due to the directors of the Molokai ranch for many special courtesies and privileges. I wish personally, to make especial acknowledgment of the kindness and hospitality extended by Messrs. James Munro, C. C. Conradt, O. Tollefson and C. E. King.

## LIST OF BIRDS.

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### **Micranous hawaiiensis** (Roths.).

A few examples were seen at sea off the Wailau side of the island. There is a cave on the coast between Pelekunu and Wai-kolu, through which it is possible to row a canoe at low tide, that is used by this species as a nesting and roosting place. Although I did not visit the cave, I am reliably informed that the thousands of little Hawaiian Tern or Noio make this their home.

### **Æstrelata sandwichensis** Ridgw.

*Æstrelata sandwichensis* Ridgway, Water B. N. Am., ii, p. 395 (1884).

Although the Uau is to be seen at the proper seasons on the channels between the various islands of the group, and has for generations been hunted by the Hawaiians for food, not to mention its having long ago been made to figure in a very popular legend of the natives, it has continued to remain one of the rarest of the Hawaiian birds in museum collections.

Up to the present, save for an immature specimen in the Bishop Museum that was collected by Mr. Henshaw on the beach at Hilo, in 1900, the species has been known only from a skin "from the Sandwich Islands" in the U. S. National Museum (No. 61,259), collected by Mr. V. Knudsen, and a second specimen taken by him on Kauai, now in the British Museum. It is, therefore, with considerable satisfaction that I report on a fine series of adult skins which I secured on Molokai during the month of June.

On April 26, while at the residence of Mr. John Walker, in Pelekunu valley, I was shown, in a cabinet of curiosities, a roughly mounted specimen of the Uau. The bird had been collected by Mrs. Walker three or four years before the time of my visit, one morning, asleep in the long grass on the hills back of the village, and not far from Mrs. Walker's house. The specimen was kindly given to me for examination. The following morning, at an early hour, I heard a solitary bird calling from high up on the cliffs near the village where I had spent the night. I at once made an effort among the natives to organize an Uau hunt. They all agreed

that it was not the proper season for securing birds, saying that it would be useless to make the severe climb up the mountain to where the birds' nests were. Some weeks later, they assured me, Uau would be much more plentiful. As it is impossible to find the birds' burrows without specially trained dogs, which only the natives have, I was forced to give up the project for the time being.

My next meeting with the Uau was on May 9. I was on a two day camping trip on the Kaunuohua trail, which leads down the pali into Pelekunu valley. The object of the trip was to spend a late evening and early morning in that locality, in the hope of hearing the call, and, if possible, secure specimens of the Oo, since the bird, in former times, frequented that section. On the way down, at about a 3500 foot level, I found the bill, wings, feet and some loose feathers of an Uau that had been killed and eaten by some animal, presumably a mongoose, not more than the day before. That night I went into camp beside the trail in a drenching rain. The camp was not an elaborate affair, simply a few ieie vines and ferns piled on a narrow shelf on the pali, the ledge being scarcely wide enough to lie on. The face of the pali was almost perpendicular for hundreds of feet above and below me. In fact, it was so steep that it was necessary, as a precaution, to drive stakes along the lower side of my bed to prevent the possibility of its slipping off the edge and my rolling off during the night.

Shortly after dark I began to hear the strange, weird cry of these petrels, as they sailed about the cliffs, evidently attracted by, and much exercised over, my campfire. All night long—long after the fires had died out—they could be heard calling here and there about my "swallow nest" camp. A long drawn out U-a-u, suggesting the wail of a lonesome cat, would be answered by Uau-ka-ka-ka-ka-ka, a note just petrel enough to be recognized as such, yet combining such a number of other suggestive sounds, as to render it both indescribable and unforgettable. Though they frequently flew close to me, there was so much heavy fog that it was useless to shoot in the dark, besides it would have been almost impossible to have secured a bird from the precipice below me if it had been killed by a chance shot. The experiences of the night, however, were enough to assure me that the petrels were about in sufficient numbers to warrant an effort to secure specimens, when I could manage the undertaking.

For the next few days following my Pelekunu experience with the birds, I was camped at Halawa and Moanui. At the former place, although far from any habitation and in a rugged country, I did not hear nor see a single Uau. At Moanui, on the other hand, they were seen each evening at dusk flying over the headlands close down beside the sea. Three specimens were taken June 5 and 6. It is rather curious that all the birds seen flew along the coast toward the east, against the wind, while later on, on the windward side of the island, the birds were seen to return to their rookeries from all directions. A possible explanation would be that the birds prefer to follow along coast line to their nesting places on the opposite side of the island, rather than to take the more direct route over the mountains through the fog.

A favorable opportunity for visiting the nesting colonies of the Uau did not come until June 14, when I made a trip down into Wailau—the valley lying next east of Pelekunu—for that especial purpose. On the way over the pali from Mapulehu, about half way down the Wailau trail, a half-eaten carcass of one of these birds was found, under similar conditions to the one noted from Pelekunu valley.

At Wailau village I rallied a party of these experienced native bird catchers, with their Uau dogs, for a day's hunt on the almost vertical cliffs of Olokui. For there, well down towards the sea end of this great pyramid-shaped mountain, at an elevation between 3500 and 4000 feet, a colony of these birds have reared their young each season for generations. Each year, during the summer months, the natives of the valley have formed hunting parties and have preyed upon the colony in search of the young Uau, which are regarded as an especial delicacy by all Hawaiians.

Our start was an early and auspicious one. My men were each provided with a bag which was held on the back, suspended from the shoulders, in approved native fashion. Save for my collecting gun, we were without firearms and unencumbered. The day was bright, with occasional showers—just sufficient to keep every leaf in the moss-grown forest soaked and dripping. Only the most hardy and venturesome natives ever attempt this climb. For four hours we struggled up the steep ascent, cutting the trail through the tangled undergrowth, helping each other up the cliffs

where footholds were wanting, pulling ourselves up by our hands here, slipping back there, passing the dogs over the dangerous places, encouraging them over the hard ones, panting, wringing wet, and all but exhausted, we at last reached the top where the crest of the ridge slopes down a few hundred feet before it pitches off for a perpendicular drop to the floor of the beautiful balloon-shaped valley two or three thousand feet below. The crest of the ridge, here as elsewhere, is overgrown with the usual jungle of vines, ferns and trees which hide the steep, broken—often dangerous—irregularities of the rocks which it covers.

For the next six hours we ranged over the mountain side, each of us following as best he could, some one of the dogs. Over the cliffs and down the valleys they ran in every direction, sniffing here, digging there, until finally on locating a bird they would bark for help.

Digging out an Uau is not the easy and pleasant task one might imagine. As a rule they make their burrows under the spreading surface roots of trees—sometimes going back under them several feet from the mouth of the burrow. Occasionally they select a crevice in the broken rock or underneath a boulder that is overgrown with roots and vines, so as to resemble, in its essential features, the site just described. Rarely—almost never—are they found nesting on the surface of the ground, even though it be covered with vines and undergrowth. Having located the burrow and opened it up for a distance, it is often then difficult to find the bird, for the holes are usually natural ones that follow the roots in various directions, and at most are only appropriated by the bird and modified to its use. But once the hand touches the bird there is no further doubt concerning its whereabouts, for on being disturbed they bite with their hooked, pincer-like bills, and kick and scratch with their feet most savagely. Once the bird is in hand it is easily despatched by the native hunter in a neat and efficient manner. The forefinger is violently forced down the bird's throat. It is then slightly bent at the first joint so as to catch the heart and lungs, which are given a slight twist and sharp pull, with the result that the bird dies instantly, with scarcely a struggle.

One can with practice, imitate the Uau's call very closely. This ruse was continually resorted to by the natives. Their efforts



would occasionally be answered by some unwary bird, thus disclosing its whereabouts, but as a rule they failed to respond. Earlier in the season, during the actual mating, the call is more generally given and answered by the birds throughout the day, but by the time of our visit the birds were mated and sitting together in the burrows. On several occasions two birds were pulled from the same burrow. Later on, I was informed, when the single glossy white egg is laid, it is a common occurrence to find one or the other parent birds sleeping outside the burrow, while its mate sits on the nest within.

July is given as the time when the egg is laid. The young in the downy stage, are always taken in late September and October. October 10 is the day usually selected by the natives as the most favorable time for collecting the downy young. These are commonly pulled from the holes by means of a stick which is split at one end. The split end is twisted into the down of the bird and in this manner it is easily pulled forth. But the adults must be captured and dragged out by the hand. As has been said, the young birds are especially prized as food. In former times they were reserved for the chiefs alone, being tabu to the common people.

As a result of the day's expedition, twenty-one Uau were taken, eighteen of which were made into skins. Compared with former years, this was a very unsatisfactory bag. In June, 1906, the same men, with the same dogs, and with much less effort, secured sixty-three birds. The cause in the decrease in numbers was not far to seek. Along the trail, as we ascended Olokui, we found the remains of three birds that had been killed and eaten by mongoose. It was a common thing when following the dogs, to have them lead us to deserted burrows, the occupants of which had been devoured but a few feet from their homes. In one hole we found a female mongoose with a flourishing family of five little ones, that had taken possession of an Uau burrow after its occupant had been killed. From the foregoing data, when taken in connection with the wide distribution of the mongoose in the group, it seems certain that the Uau is doomed to rapid extermination.

Turning to the series of eight males and twelve females, all in the full adult plumage, I am impressed by the remarkable

uniformity of color and size exhibited by it. A table showing the maximum, minimum and average measurements of the series is given, the measurements being in inches. The culminicorn is measured from the anterior end of the nostril to the tip of the bill.

## EIGHT MALES.

	Wing	Tail	Tarsus	Toe	Culmen	D. of B.	Culminicorn
Minimum . . . . .	10.85	5.20	1.30	1.80	1.17	.55	.90
Average . . . . .	11.04	5.33	1.34	1.85	1.21	.55	.90
Maximum . . . . .	11.15	5.40	1.40	1.90	1.25	.58	.90

## TWELVE FEMALES.

	Wing	Tail	Tarsus	Toe	Culmen	D. of B.	Culminicorn
Minimum . . . . .	11.00	5.25	1.30	1.70	1.17	.53	.85
Average . . . . .	11.15	5.33	1.34	1.82	1.21	.55	.91
Maximum . . . . .	11.40	5.40	1.40	1.85	1.25	.57	.95

The average length of both sexes is about 15.50. A June female of its nearest relative, *Æstrelata phaopygia* Salvin, from the Galapagos Ids., in the Museum's collection, measures: wing 11.85, tail 5.50, tarsus 1.45, toe 2.00, culmen 1.35, depth of bill .62, culminicorn .96. The measurements of a series of birds from the Galapagos, as given by Rothschild (*Avifauna of Laysan*, etc., p. 290), is "wing from 11.6 to 12.50, averaging from 11.8 to 12 inches, tail 5.8 to 6.3 and 6.4, metatarsus about 1.4 to 1.5."

It will be noted that the Museum's specimens from the Galapagos, with the exception of the tail, falls well within the average, as quoted from Rothschild. The specimen may, therefore, be taken as a representative of that series. Since it is a June specimen, it is specially useful in comparison with the Molokai series.

In comparison, it will be seen that in all maximum dimensions, the Hawaiian birds fall safely below the minimum given for the Galapagos series, but nowhere is this difference more noticeable than in the size and form of the beak. This difference, though marked, is difficult to describe, but it may be stated definitely that in *sandwichensis* the bill is much more slender, the nail more strongly deflected at the tip, and the nostrils thinner and less prominent. These differences are constant throughout the Molokai series. The color characters are even more obscure. However, the slaty black terminal bands on three or four of the shorter

auxiliaries forming a patch on the side of the body under the wings in Galapagos specimens are entirely wanting in all Hawaiian specimens in the Museum; even the immature bird from Hilo beach. In *sandwichensis* the white frontal band is wider and the black bases to the white feathers composing it do not reach to the base of the beak, as in *phaeopygia*. The whole back and wings are blackish slate, with the feathers of the mantle inconspicuously, if at all, marked, with paler tips (not slate black with conspicuous whitish terminals as in *phaeopygia*). The outer pair of tail feathers, viewed from above, vary somewhat, but they are always in both adult and immature birds, strongly mottled with white on their inner, and to some extent, on their outer webs.

I regard *phaeopygia* and *sandwichensis* as distinct, though closely allied species with the latter possessing characters of color, measurement and habitat sufficiently marked to distinguish it from the former in all ages and both sexes. I, therefore, adopt Ridgway's name as published in the text of the Water Birds of North America (vol. ii, p. 395, 1884) as the proper designation for the Uau (not Uuau as sometimes erroneously given), or Hawaiian Dark-rumped Petrel.

### ***Puffinus newelli* Henshaw.**

Unfortunately, I did not secure a specimen of this rare bird, though I had the pleasure of examining one that had been preserved by Mrs. Wilson. It had been collected some years before, from one of the steep cliffs toward the summit of the mountain between Pelekunu and Waikolu valleys. The description taken from it accords exactly with a specimen in the Museum collection from Kauai. The bird is known on Molokai as Ao—the name being an imitation of its nocturnal cry. Pelekunu natives informed me that during the "bird season", early in October, the adults and young can be collected in considerable numbers from the cliffs. They were quite clear as to the distinguishing characters between the Uau and the Ao; giving differences which an unobservant person would have passed over. Therefore, I have every reason to have confidence in what they told me concerning their habits. They assured me that some birds were seen, or rather heard, throughout the year (?), but that they became plenti-

ful about the first of May. From that date on all through the summer months, they would hear them each night call out "A-o", as they left their burrows to fly out to sea. They were commonly found colonized in the steepest parts of the pali, 500 or 1000 feet or more from the floor of the valley. The Uau as a rule, have their colonies higher up, seldom less than 1500 feet above the sea. Occasionally, however, both birds are found in the same colony—on rare occasions in the same hole. The Wailau natives who accompanied me on the Uau hunt just described, verified these statements. They were at some loss to account for the absence of Ao from among our catch of Uau, since last year, in June, they got both species. I heard the call of the Ao in the two valleys mentioned several times, but am convinced that it is much the rarer of the two birds.

#### **Phaëthon lepturus** Lacep. & Daun.

From the cliffs at the heads of the principal valleys, in fine weather, we can always see one, sometimes five or six, of the White-tailed Tropic Bird or Koaë, gracefully floating about the cliffs far below. While no specimens were secured, I had no difficulty in satisfying myself that only the white-tailed species frequent the precipices there. As yet the bird is fairly common, being noted on a number of occasions, at different places about the island. However, it has already begun to suffer from the depredations of the mongoose, which is known to be on the increase everywhere on the island, especially in such localities as the Koaë favors for breeding places.

#### **Fregata aquila** Linn.

The Iwa was seen on two occasions a considerable distance out at sea. Specimens are shot from time to time when they fly in close to the beach.

#### **Anas wyvilliana** Sclater.

No specimens of the Hawaiian duck were seen, and I doubt very much if there any now living in the island. Several persons informed me that some years ago it was always to be seen in the streams—frequenting the pools high up in the mountains. Lately

they have disappeared. Doubtless the few pairs that in the past have found a congenial habitat along the streams at the Halawa end of the island have been preyed upon by the mongoose.

***Nycticorax nycticorax nævius* (Bodd).**

On May 30 I shot an adult male Auku Kohili from a tree beside the Honouliwai stream well up into the mountains. The bird is not common at the higher elevations—only two or three being seen there. But towards dusk, on the beach, especially at Moanui and Mapulehu, they were common flying from the valleys to fish from the walls of the mullet ponds along the coast.

Mr. O. Tollefson's son relates that while he was returning from the mountains one day along the Honouliwai stream, he saw at some distance ahead of him an Auku sitting on a rock in the stream, evidently still-hunting for fish. As he was watching the bird a mongoose came out of the shrubbery along the stream and pounced on the solitary fisherman. The bird and the animal engaged in a desperate struggle, resulting in the death of the Auku before the boy could interfere. Although he gave immediate chase, the mongoose succeeded in dragging its prey from boulder to boulder out of the stream and into a crevice in the rocky bank, from which it was impossible to dislodge the animal.

***Gallinula sandvicensis* Streets.**

This species is common on the island, being seen in the taro ponds in Wailau, Pelekunu and Halawa valleys.

***Fulica alai* Peale.**

I did not find the Alae keokeo, but am told that it is to be seen on the mud flat at Palaau, a locality I was not able to visit.

***Himantopus knudseni* Stejn.**

The Kukuluaeo or Hawaiian Stilt is a resident species at Palaau where the young have been taken in June.

**Lophortyx californica** (Shaw).

The California Quail is common, though not abundant, on Molokai, frequenting the open country on the western end of the island. The mother birds were being followed by their half-grown young in May.

**Phasianus torquatus** Gmel.

The Ring-necked Pheasant is a well established introduced species on Molokai.

**Phasianus versicolor** Vieill.

Like the last, the Japanese Pheasant is common on the island. Both species keep to the open country or the edge of the forests, seldom, if ever, entering the deeper woods.

**Spilopelia chinensis** Scop.

The Chinese Turtle Dove is occasionally seen in the deepest native forests, though it is more commonly found nesting in the introduced Algaroba (*Prosopis*) along the coast about Kaunakakai. There is but little rice or grain of any kind raised in Molokai, hence the dove does not find as congenial a habitat there as on Oahu for example.

**Asio accipitrinus sandwichensis** (Blox.).

In the Director's Report for 1904 (Oc. P. B. P. B. Mus., vol. ii, p. 241) I published a note on the nesting habits of the Pueo. To the data there given I am now able to add a third date for the nesting period of the Hawaiian Owl. While moving my camp into the Halawa headwater region, well back of Hipuapua falls, on May 24, I found a nest of the Pueo, in a swale which had formerly been a large wild banana patch, three or four acres in extent. My guide was in advance and stepped directly over the mother-bird without noticing her. Fortunately, the bird did not take flight, and I was able to catch her in my hand as she crouched on the nest. The nest contained one recently hatched young, and five lustreless white eggs, all of which were well advanced in incubation.

The young bird was not more than a day old. It was covered with very short, fine, creamy buff down, and looked very helpless and comical. The nest itself was unpretentious in the extreme, being simply a few dry spears of grass and a dozen feathers from the parent's breast, not enough, all told, to keep the eggs off the wet boggy ground. Beside the nest was a half-eaten rat.

The adult, young and eggs were taken and left that night at the camp. The following day, during my absence, a mongoose found the eggs on top of a wood-pile shelter, where I had left them temporarily, and destroyed them all. The parent-bird was in very worn plumage, and measured: wing 11.90, tail 4.50, culmen 1.10, tarsus 1.40. The young birds have now been taken from the nest on November 20, 1901, March 6, 1905, and May 24, 1907. These widely separated dates indicate that the Pueo nests at any time that suits its convenience. It is more abundant in Molokai than any other island of the group I have visited. In favorable localities it is to be seen each evening, sometimes as many as half a dozen at a time, flying about in search of food.

### ***Alauda arvensis* Linn.**

The Skylark is now common on the grass lands of the island. Frequently as many as six or eight birds are in sight at a time as one rides or walks through the most favorable localities. The mongoose seems not to have interfered seriously with the nidification of this introduced songster, owing, no doubt, to the fact that it nests in the open field far away from any cover that would harbor this avowed enemy of all ground nesting birds.

### ***Acridotheres tristis* (Linn.).**

The Mina is thought to be less numerous than in former years. If true, it may be due to the dying out of the lantana on the islands, since it is known to feed voraciously on the berries of this plant. Birds were seen about our camp at Kamoku, always keeping to the open fringing woods. At Halawa, however, they were seen further into the interior, but at no great elevation. Nowhere were they observed in conflict with the native birds. They are indeed so

seldom seen in any numbers in the regions frequented by our native birds, that they can hardly be said to seriously affect the decrease or disappearance of the Hawaiian avifauna.

### ***Carpodacus mexicanus obscurus* McCall.**

The House Finch or "Rice Bird" is common on Molokai. A nest—one of a number seen—was taken from an Ohia tree growing near Kamoku cabin at about 4000 feet elevation. It had been deserted, owing to the heavy late rains. The seeds in the grass, of which it was composed, had sprouted, some of the sprouts being two inches long, giving the structure the appearance of a ball of pale green moss.

### ***Munia nitoria* (Temm.).**

The "Chinese Sparrow" was occasionally met with in small flocks on the lower levels about the island.

### ***Drepanorhamphus funereus* (Newton).**

The Hoa, or "Oo-nuku-umu" as Perkins calls it, is exceedingly rare, so rare, indeed, that seven weeks of continuous field work in the forests of Molokai, its only habitat, were necessary before seeing or hearing, let alone securing a single specimen. The species was brought to our knowledge by Mr. Perkins, who first secured specimens in the forests at the head of Pelekunu valley in 1893. Judging by the number of specimens in the Bishop Museum, which received one-third of all the specimens he collected, not more than six birds were secured by him. The following year Mr. Theodore Meyer, a resident of Molokai, secured six specimens from the same locality, in six months of more or less continuous collecting. He believed the species to be extinct, as neither he nor any of his friends from then until now had been able to find the bird in any locality.

In March and April of the present year, Mr. George Munro spent four weeks in the type locality, with especial information as to its habits and calls, furnished him by Mr. Perkins. As Mr. Munro has had considerable experience in collecting Hawaiian



birds, having accompanied Mr. Palmer on his expedition through the group, the fact that he did not find the Hoa added great weight to Mr. Meyer's opinion that since 1894 the bird had become extinct.

After spending three weeks in the woods about Pelekunu, having had the advantage of Mr. Perkins' notes, and Mr. Munro's experience, I left the Kamoku camp satisfied that there was scarcely a hope of finding even a chance specimen in that section. It seemed certain too, that unless the birds could be found in some one of two or three similar localities on the island, there could be but little doubt but that it had vanished from the Hawaiian forests forever. During the next ten days especially devoted to a search for the Hoa and the Oo, in the Halawa mountains—in a section probably never before hunted over, or perhaps never even visited by white men—under forest and climatic conditions suited to both species, I was unable to locate either of them, and quit the region thoroughly discouraged and disheartened.

The next attempt was made at Moanui ranch. Since it was here, and here only, that I secured specimens, a fuller account of the experiences of this part of the expedition will be of interest, as showing some of the difficulties attending the work in these mountains, as well as the character of the country in which a few Hoa still survive. After settling my camp at the Moanui mountain house on the morning of May 30, I set off alone up Honouluwai valley, that being regarded by Mr. Tollefson and his men at the ranch, as probably the most feasible way of getting back into the mountains. No one, to their knowledge, had reached the head of the stream; in fact, the mountainous part of the ranch was *terra incognita* to the owner of the ranch, and everyone else, for its back boundaries had never been surveyed, or even visited. By picking my way over the boulders in the bed of the stream and working around the small waterfalls, I made fairly rapid progress until late in the afternoon, when I came on a small waterfall where the stream poured over a steep ledge, twenty-five feet or more in height. On either side of the stream the solid rock ran up almost perpendicularly for three or four hundred feet. The only way to proceed seemed either to turn back and leave the stream entirely, or to scale the falls itself. Judging by the character of the country and similar experiences elsewhere, it seemed probable that the stream

from this point on would be a series of more or less impassable waterfalls. Desiring to satisfy myself on this important point before returning for the day, I stripped off all my wearing apparel, save a stiff-brimmed rain hat, swam across the pool at the foot of the falls, and started to pick my way up the slippery rock over which the water poured. When three-fourths of the way up, my hands and feet suddenly slipped from under me. Coming down violently on my arm and side, and falling in such a way as to strike my head a stunning blow on a projecting rock, I rolled back into the pool of cold mountain water in an almost helpless condition. Fortunately, I was not completely stunned by the blow on my head, owing to the protection afforded by the stiff brim of my hat. I was severely bruised as it was, but the shock of dropping backward into the pool revived me sufficiently to enable me to escape drowning. However, it took some time after I had pulled myself out of the water, to regain my strength. The mishap was a sufficient adventure for the day, and an experience that will never be forgotten.

After a day or so of rest, I had sufficiently recovered from my injuries to resume the quest. On inquiry, a native boy was found, who felt sure he had been beyond the falls where my unpleasant mishap had occurred. He was accordingly engaged as guide. By nine in the morning, we had arrived at the place where I had fallen into the pool. Without further delay my boy went two or three hundred yards down the stream and began to pick his way with great caution up along the side of the cliff on the Moanui side of the valley. After great exertion, and with much difficulty, in the time of which my guide got a fall which lamed him considerably, we at last got above the falls, and down into the stream again. Within ten minutes of the first falls, we found a second one that had been completely hidden from sight and sound by the first one encountered. It was seventy-five feet high, and poured over the ledge at a place that completely blocked the way, making further progress along the watercourse quite impossible. We could now hear the roar of another and still larger falls, only a little way on. The only thing remaining for us to do was to turn back and work our way up the Moanui side of the valley. This was exceedingly difficult to do. After five hours of the most laborious climbing, we at last, by two o'clock, made the crest of the ridge

and could look down into the valley below. From where we stood one could have thrown a stone into the stream we had left, so nearly vertical was the rock wall we had scaled. From this point we kept on the ridge, cutting our trail a considerable distance into the mountains before night came on. On our return to camp late that night, we abandoned the stream entirely and opened a new trail down the main ridge.

Owing to the injuries resulting from his fall, my boy was unfit for duty the following day. In his stead an old, well informed mountain-going native was engaged. By an early hour we were at the farthest point reached the day before. For six hours, in the rain and fog, through a tangle of ieie and uhi (*Smilax*) vines, over, through, and under the moss-covered trees and roots, we forced our way still further up the ridge into the interior. It was the most uncomfortable sort of weather, and taken altogether it was exceedingly disagreeable, disheartening work. All day long we had not seen a single bird that could not have been collected in an hour's time by patiently waiting under any one of the flowering ohia trees we had passed by in the early morning on our way up the trail.

In the middle of the afternoon, I took the trail knife to give the old guide a chance to rest, for he had been chopping on the path since early morning. We were working in a particularly dense and unpromising jungle of ieie, when I heard a clear, gentle, even, inquiringly whistled "H-o-a" called by some bird not more than fifty yards away. It was a moment of intense excitement. There was little doubt in my mind but that the note was that of the bird I had so long sought. Making signs to the native to hurry to me with the gun, I began to imitate the whistle call as best I could. To my delight the curious black bird with the wonderfully curved bill, the object of my seeking, flew down and lit in a tree within ten feet of me! It was evident that curiosity aroused by my chopping had brought the bird to the spot to investigate.

Actively hopping and flitting from limb to limb, scarcely stopping a second, eyeing me sharply all the while, it persisted in keeping so close to me that I could not with safety fire even my auxiliary barrel. Yet the restlessness of the bird made it apparent that I must fire soon or lose my chance, for if the bird got fifty feet from me in the tangle of trees and vines on the side of the

ridge, it would, in all probability be gone from sight and forever. I pulled the trigger and, to my consternation my gun missed fire. It was after all little wonder that gun and ammunition failed me, for both had been soaking wet for three days. The next few seconds were moments of painful indecision. To break and reload my gun would surely frighten the bird; to use the heavy charge in the left barrel was almost criminal, but my only recourse. Without further delay I availed myself of the first opportunity when the bird was screened by limbs and fired. The feathers flew: my first Black Mamo had been shot. Shot, but not found. "A bird in the hand" in the Hawaiian forests, is worth several in the bush, especially the bush in Molokai. Though the bird was not more than twenty-five feet from me when I fired, and my man and I both saw it start to fall, we searched for it in vain for three-quarters of an hour. We looked carefully under the vines and ferns, among the undergrowth in the trees, in fact everywhere for it, even seining a pool of water that had collected in the rocks a little farther below, yet not a sign of the coveted Hoa could we find. I had almost given up all hope of finding it, and began to save the few scattered feathers lying about, feeling that my claim to having found the rare bird would have to rest on such evidence as they could furnish.

As the search grew more hopeless, my native, who had assured me in the morning that he had heard of the Hoa, but had never seen such a bird as I described it to be, now became more earnest, as he declared to me that the bird just shot was not the Oo—the only other black bird known to him. As he was able to give the points wherein it differed from that now almost equally rare species, I felt his remarks were valuable as a convincing commentary on the scarcity of this bird. Here was a native hunter, familiar with the teachings of his fathers, whose knowledge of the forest had been gained almost half a century before, who knew not only the native names and uses of almost every plant we saw, but the names and habits of all the native birds, save this one, declaring it to be unknown to him. Yet we who understand something of Nature's processes, know that the Hoa has been for ages inhabiting these mountains, not six miles distant from, and in sight of the place where this man was born, and where he had lived all his life.

But to return to the search. As a last resort, I climbed up into the tree intending to drop a stone from the place the shot struck the limb the bird had been sitting on, in the hope of locating more accurately the spot where it should have struck the ground. To my joy I found the mangled remains hanging in the tree in a thick bunch of leaves, six feet or more beyond where it had been sitting. It was, as I feared, badly mutilated. However, it was made into a very fair cabinet skin.

Feeling that where one bird had been found others were likely to be, and being elated at the success of the day, I altered my plans so as to extend my stay in the locality. Accordingly, on the third of June, with my guide I packed my range tent and outfit into the mountains and established a new camp in the jungle, at the head of Waialua valley. The country here was so steep and rugged that it was difficult to find a place seven feet square that would do to pitch a tent on. I need hardly add that it rained continuously. The trail was continued along the ridge between Waialua and Honouliwai streams. Early in the afternoon I dismissed my native and continued on the trail alone. I had covered no great distance when under circumstances similar to those already described, I heard the call note "Hoa" again, this time a hundred yards or so in front of me. My best efforts at imitating it seemed to have no effect. I whistled and called and hoped. At first the bird answered my calls, then it failed to respond. I continued whistling until it seemed certain that it must have gone off in some direction, when, without reason or warning, my second Hoa flew and lit in a Kopiko tree, not fifty feet away and began to preen and spread its wings. Catching sight of me it began to work off through the woods. I fired, and this time had no difficulty in picking up a perfect adult male specimen. Though I stayed in the vicinity for more than an hour nothing was seen or heard of its mate.

The following day found me early in the field. Though there was a steady downpour of cold rain I worked on until three o'clock. Not meeting with anything to encourage me, I climbed up into a tree preparatory to taking a last survey of the country, if there should come a rift in the dense fog clouds. Presently I caught a note entirely different from any I had yet heard. It was a rollicking

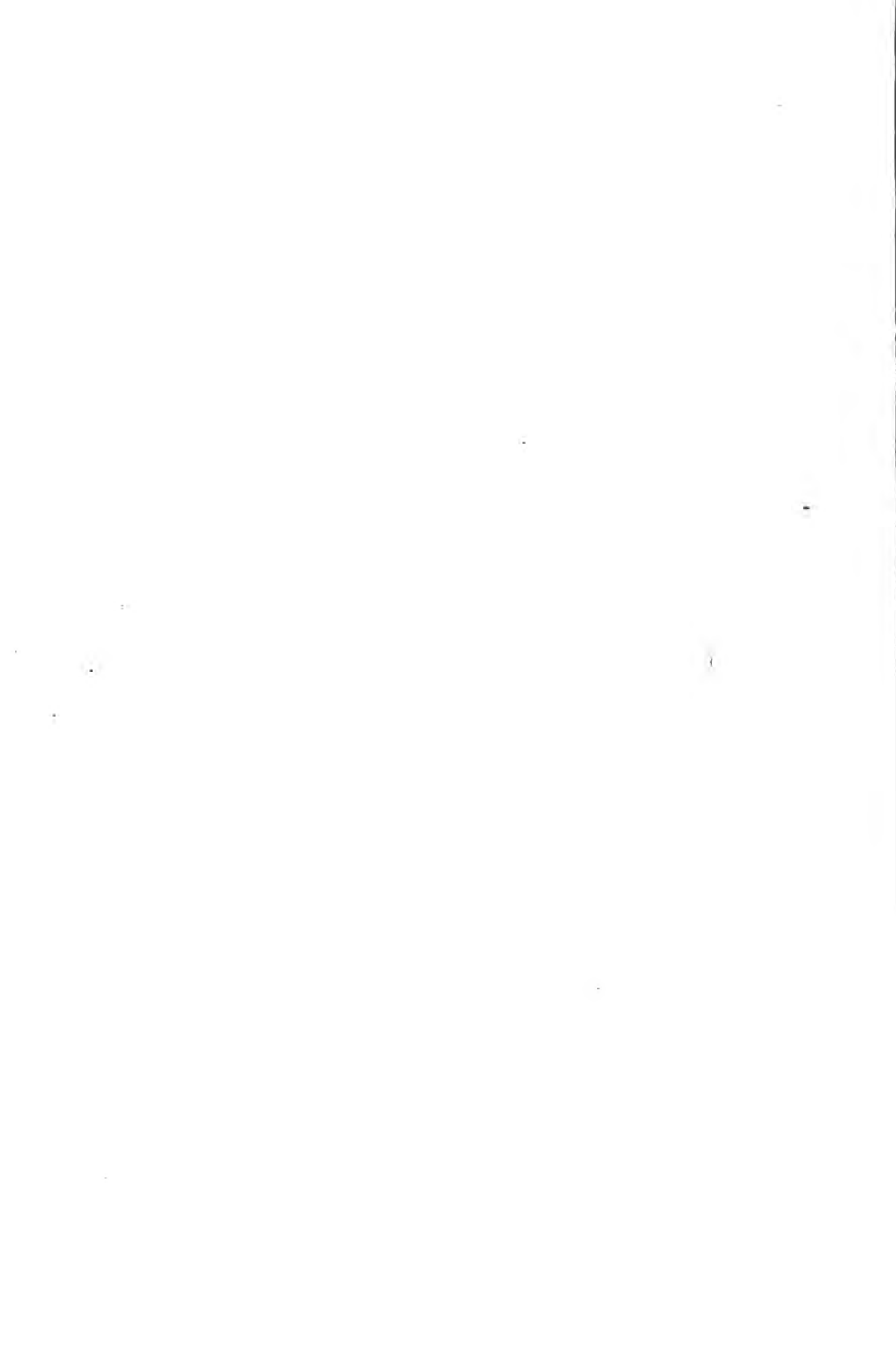
whistle of five or six clear notes, which I was only partially able to reproduce. The bird, however, came nearer and finally lit in the thick branches of a tree fifty feet or so below me. In my haste to get down out of the tree I was in, some small limbs gave way, and I came clattering down quite a distance before I was able to regain my footing. That the disturbance had frightened the Hoa I felt quite certain, and was therefore agreeably surprised to find that through it all it had not moved from the tree where it had first lit. It seemed to be willing to be studied, an opportunity for which I was exceedingly grateful.

This bird, as well as the two former specimens, confined its range to the undergrowth, several times coming down to within three or four feet of the ground. At no time did it make a long flight or alight on the top of the trees. As it was raining all the while the bird was especially active in preening and shaking its feathers. The trees and vines were everywhere covered with thick wet moss, and although the bird hopped about from branch to branch, carefully inspecting each limb, I did not see it catch any insects, or even probe into the moss. Hopping from tree to tree, it worked its way around the head of the little side valley, up which it had come in answer to my call, to where a large purple-flowered lobelia was in profuse blossom, and began to feed. The ease and grace with which the feat was accomplished was indeed interesting, and left no doubt in my mind as to one of the probable causes of the remarkable development of the tongue and bill. The tongue was inserted with great precision, up to the nostrils, in the flower, while the bird balanced itself on the branches, assuming almost every imaginable attitude in its operations. In all three of the birds secured, the crown was smeared with the sticky purplish white pollen of this lobelia. I had a preconceived idea that the bird would also feed on the flowers of the wild banana. This conjecture I was not able to prove or disprove by my observations, further than that in each case no bananas were to be seen in the valleys below or anywhere in the vicinity where the birds were secured.

The third specimen, like the two preceding it proved to be a male, in perfect plumage. The bodies of the last two and the stomach of the first one—its body being badly mangled—are pre-



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served in alcohol for anatomical study. The series of three, so far as coloration, curvature of the beak, etc., are concerned, are identical. Their measurements, carefully taken, are:

No.	Sex.	Length.	Wing.	Tail.	Tarsus.	Toe.	Culmen.	D. of B.
4712	♂	9.35(?)	3.80(?)	3.10	1.20	.90	2.20	-.37
4713	♂	9.50	3.90	3.10	1.25	.95	2.10	-.37
4714	♂	9.40	3.95	2.95	1.20	.90	2.15	-.37

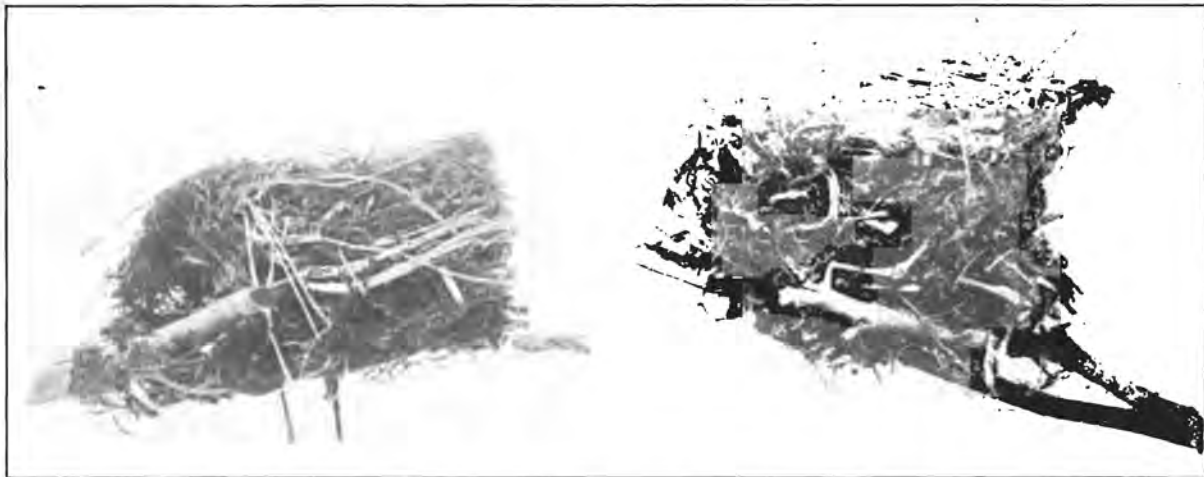
The chord of the largest of the curved tubular flowers of the lobelia on which the birds were feeding, is over two inches in length. After repeated inquiry among the oldest and best informed natives on the island, I was unable to find one who knew or had ever heard of the Black Mamo under the native name "Oo-nuku-umu." I did, however, find a few who knew of or identified the bird under the name Hoa.

### *Vestiaria coccinea* Forster.

A series of ten carefully selected birds and three nests of the Iiwi were secured, which in themselves form a valuable set. Taken in connection with the Museum's long series they assume especial interest, making it possible, in another connection, to discuss intelligently from specimens in hand, some of the interesting problems connected with the evolution and development of the species.

Next to the Apapane and Amakihi, the Iiwi is the species most commonly met with on Molokai. They generally frequent the Ohia forests, but occasionally they will extend their range down, in certain seasons and under favorable conditions, as in Wailau and Pelekunu valleys, so as to reach the seashore. They are strong flyers, often mounting high in the air. In small loose flocks they will thus fly from one valley to another. Their flight over the tallest forest trees can be heard and easily distinguished, owing to the whirring noise of their wings, which is supposed to be produced by the peculiar truncated form of the primaries. Other species of the family, as the *Himatione*, having the same shaped primaries produce a similar though less marked whirring sound.

On June 10, while collecting on Wailau pali, I saw a parent bird in the brilliant plumage of the adult, feeding an immature



(4699)

VESTIARIA COCCINEA.

(4700)

young (Mus. No. 4626). The young bird was sucking the nectar from the Ohia flowers when the parent bird lit beside it. At this the young bird opened its beak to receive the food brought by its parent. The old bird flew away, only to return shortly to repeat the feeding operation. During the time intervening between the attentions of the parent, both old and young birds flew about and fed together. On examining the young bird's crop, several green looper worms were found.

Of the three well identified nests secured, the best specimen was one taken on June 4 from fifteen feet up in a Kawau (*Byronia*) tree, growing on the crest of the ridge well toward the top of Puu Ohelo Mountain. Although it was unoccupied it had every appearance of having been used in rearing a brood. Scarlet feathers from the breast of the parent bird found in the nest left no doubt of its identity, while from the tree the nest was in I shot a very young Iiwi, that presumably had but recently left the nest near by.

The nest (Mus. No. 4699) is mounted on a horizontal fork, and externally is 4.50 inches across by 2.75 inches deep. The bowl is 2.50 inches in diameter by 1.50 deep. Externally the structure is composed of the moss so common on the trees in the higher altitudes. Into this has been worked a few sticks and some fibre from the dead leaves of the Ieie vine. The inner lining is made almost entirely of the black hair-like fibres of dead moss. Generally speaking it is a very neat and compact structure.

The second nest (Mus. No. 4701) does not differ much from the one just described. In size it is a trifle larger, and was located in a terminal vertical fork of an Ohia tree. The material, especially the moss, is coarser than in the nest described.

The third nest (Mus. No. 4700) was not quite completed when collected on May 25 from the thick forests at Halawa. Like the last, it was placed in an Ohia ten feet or more from the ground. Wanting the lining, as it does, it might be mistaken as the completed nest of some other species as the Ieie fibres used in its construction make a very creditable lining. But a close examination of the size, shape and material used, so far as completed, shows it to be substantially the same as the first described. However, the moss is of a different species and a more liberal use is made of small twigs in the foundation, while as just said, Ieie leaf fibre enters extensively into the secondary lining. Only a few of the

blackish moss stem fibres mentioned above, have been put in place, while two or three small wisps of pulu fibre have been woven into the brim. The eggs of the Iiwi are as yet undescribed.

### **Palmeria dolei** (Wilson).

I was unfortunate in not securing this species, though five individuals were seen in one flock at one time, and three at another, flying out over the pali at the head of Pelekunu valley. It was not seen or heard elsewhere. Mr. Munro, who immediately preceded me in the same woods, did not see the species at all during his month's work about Puualu Mountain. We therefore feel assured that though the bird is still to be had on Molokai, it is by no means as abundant as one might conclude from reading Mr. Perkins' account, published some years ago, where he records that he "assembled a flock of no less than nine adult birds at the same time in one small Ohia tree."

### **Himatione sanguinea** (Gmel.).

The Apapane is the most abundant species on Molokai. A short series was taken for comparison with the Museum's material, which has been collected at the same season on the other islands of the group. The song and general habits have already been fully recorded elsewhere. However, certain observations concerning the mating performance seem to be new. During the early part of our stay the Apapane were in the height of the mating season. The song of both sexes was frequent and varied. Quarrels between the contesting males were of common occurrence, and were often apparently extended into feuds. During the excitement of the mating period either sex is easily decoyed by imitating the notes of the opposite sex. The love dance described elsewhere (Oc. P. B. P. B. Mus., vol. i, no. 2, p. 43) in the series of notes was repeatedly witnessed. In addition to the fluttering dance there described, on one occasion I saw it carried to the extent of the male bird affectionately caressing its mate with the beak. The whole performance lasted several minutes.

The high palis of the island furnished an excellent opportunity to observe the Apapane in sustained flight. Flocks of seven



VESTIARIA COCCINEA. (4699)

or eight or ten will, not infrequently, fly from the forests at the edge of these precipices, thousands of feet above the valley below, and with little concern, steer a course that will take them in a direct line as far as the eye can follow them. At nightfall they are to be seen returning from their feeding grounds lower down on the mountains or in the valleys flying swiftly and directly in the higher altitudes to roost. This daily migration over open land or from place to place is a very strongly marked characteristic of this bird.

A number of nests—but unfortunately no eggs—were secured. I am convinced that the nesting season cannot be well defined. In substantiation of this opinion, I find that in the series of skins collected, two are immature, while perhaps five times that number of brownish-colored young were noted among the hundreds of adults seen at close range. This fact, coupled with the mating performances and the enlarged testes and ovaries examined, would indicate that on this island, at least, an occasional late brood is reared.

The series of eight nests do not vary in material or location from those elsewhere described, to a degree sufficient to warrant their redescription. However, a deserted nest (Mus. No. 4683) taken from twenty feet up in a moss-covered Ohia tree which was growing in the heart of the Puualu forest, is somewhat extraordinary in that it has returned to the original elements of which it was composed *in situ*, leaving a replica of itself in living green moss. The structure is of some years standing evidently. Old enough at least, so that the moss and sticks of which it was composed have had time to almost completely disintegrate. That portion which remains has, in the meantime, become completely covered with living moss, so that the shape and general appearance of the nest is retained with just enough of the old structure remaining to account for its form and history.

### **Chlorodrepanis kalaana** (Wilson).

Without here entering into a discussion of the very minute characters that have been used to separate this species from the very closely allied forms from Maui, Kauai and Oahu, it will be sufficient to say that the series of seventeen birds secured on Molo-kai, confirm rather than disprove the conclusions formerly arrived



HIMATIONE SANGUINEA. (4683)

at—namely: that *kalaana* has been separated as a species on characters that are of doubtful sub-specific value. Was it not for the definite geographical factor which enters in for consideration, the form would hardly have impressed the original describer as being worthy of designation as a sub-species.

The Amakihi is the second species in abundance on the island, and was met with throughout the forested districts generally, often coming well down to the coast line on the weather side of the island, where conditions are favorable. The species is sociable by nature, usually feeding in small companies or at least, never singly. Their call note is a fine clearly whistled "Tse-et." This is usually given when for any reason an individual becomes detached from the flock or separated by any distance from its mate. The call note, as with most all the mountain birds, is given more frequently during foggy, cloudy weather, for obvious reasons. They are sure to be found where sunny slopes covered with open woods are interspersed with plenty of bushes and low shrubs. In such situations, if food is abundant, they become fairly established in their habits, often feeding over the same range a number of times each day. Their song on such occasions is usually frequent and identical, I believe, for both sexes. It consists simply of a repetition of "Ts-chee-chee-chee-chee-chee", trilled without variation, in a surprisingly loud and penetrating voice, which always impresses one as being forced and metallic in quality.

Though generally favoring woods of the character described, they are to be met with in all sorts of places. I have found them—usually in isolated pairs, it is true—in the darkest and wettest parts of the forests, where flowers were almost wholly wanting. In such places they were feeding on the limbs and leaves of the trees high over head. At other times, they are plentiful on the low bushes growing on the sharp, and more or less dry and barren ridges. Or again, they will be met with on the outskirts of the forest feeding on the flowers and leaves of whatever species of tree or shrub was at hand, not even shunning the introduced species, as Lantana and Guava, which crowd well into the edge of the forests in some places. In their feeding, however, there is a preference shown for the Ohia both in and out of flower. Lobelias, especially the flowers, were seldom visited. But the white bloom,





(4693)

CHLORODREPANIS KALAANA.

(4698)

as well as the leaves, of the *Scævola*, were always carefully inspected by them.

The nests of this species, of which three fine specimens were collected, are so similar *inter se* as to be easily distinguished from nests of the other species on the island. Still they differ considerably, especially in the materials used, from others of the same genus now in the Museum collection. The most definitely identified, and best constructed nest (Mus. No. 4696) is one taken May 27, about half way down the Pelekunu pali. It was built in a stunted Ohia tree beside the trail and was poorly, if at all, concealed. It was placed on a horizontal limb fifteen feet from the ground, which brought it on a level with the path on the crest of the ridge. Its external dimensions are 5.00 inches across by 2.25 inches in depth. The bowl is 2.25 inches across by 1.25 inches in depth. Externally, the structure is loosely woven from green moss. Into this as a secondary lining, is worked some brown fibrous material of the color of pulu but resembling closely the soft inner bark of the Ohia. The lining proper is a generous one, composed entirely of the fibre of the dead leaves of the Ieie. The nest is a well woven compact structure. When first taken it was strongly scented by the peculiar drepanine odor, a trace of which still clings to it. Though no eggs were in the nest the parent bird was on when it was discovered.

A second nest, taken at Halawa May 24, is a sort of concession to civilization, being placed in the upright fork of a Lantana bush that was growing among the Ohia trees, a considerable distance into the forest. It is substantially the same as the one just described though not of as high order of workmanship.

### ***Oreomystis flammea* (Wilson).**

Of this species an excellent select series was collected which shows the various stages through which the birds of both sexes go before attaining their adult plumage. In the field the flame-red males are in a decided minority, occurring in the ratio of about one in nine. But in my series of study specimens, they are in the ratio of one to three. This is owing to the tendency in the field to take the bright colored bird, and not (as might erroneously be concluded) because they are easier to obtain than the females or

immature. The fully adult male at this season is usually accompanied by the female and from two to four parti-colored immature birds of both sexes. Occasionally young birds that have assumed more than three-fourths of the red plumage of the adult will be found in such companies. On the other hand one is rather more apt to find pairs mated and settled before the male has assumed one-third of the conspicuous red plumage to which he is heir.

In habits the Kakawahia resembles the species of the genus to which it belongs, and from which it differs in color so widely. They prefer to feed over the trunks and branches of the trees. Here they secure the insects that make up almost the whole of their diet. However, they will be seen in the tops of the tallest trees, but apparently paying little or no attention to their flowers. In short, they are persistent and sturdy entomologists, always active and alert, but strange to say, they seldom, if ever, take insects on the wing. At intervals moths are taken of such size they are compelled to hold them under their feet and pull them to pieces so as to devour them piecemeal, much after the fashion of the common chickadee.

When they have once settled on a home in the forest they at once set about to establish their sphere of influence, over which they rule, so far as possible, to the exclusion of every trespasser. On the approach of some intruder, as a man or a dog, they will both set up a scolding "Chirk, chirk", that is no uncertain sound to one familiar with birds' voices and ways. If the alarm chirk is continued long enough, the nearest neighbors are rarely so far away that they will not come in to satisfy their natural curiosity and add the weight of their presence and voice to the protest.

The Kakawahia, like his cousins, is full of curiosity. The sound of one making one's way through the woods is sure to attract the little resident to the scene, when uttering their never-varied "chirk", they will come close enough to the person to take in every detail of his makeup in wide-eyed inquisitiveness. Once satisfied that their show of authority has no intimidating effect, they will resume their feeding close to the observer. One can thus study their movements at close range. I have often watched them under the most favorable circumstances, for an hour or more at a time, but have never seen them paying the slightest attention to the nectar-bearing flowers about them. Occasionally they go down

in the shrubs to within a foot or so of the ground, and it is probable that on rare occasions they do alight on the ground, although I have never seen them do so.

A good series of fairly well identified nests was taken, but the eggs were not secured and remain as yet unknown. The best specimen (Mus. No. 4691) was secured in the middle of the Halawa forest on May 27. I had climbed into an Ohia tree to take a survey of the surrounding country, when my attention was attracted by the disturbance being made by a fine red male Kakawahia, accompanied by its mate and three immature birds. They came up close to me and were loud and determined in their "chirks". Looking about for the cause, I found it in the shape of a nest but a few feet from me. It appeared to be just completed. It is made up of moss neatly woven together, and measures 4.00 inches in diameter by 2.75 inches deep. The interior is lined with the blackish root-like stems of dead moss and a few fibres from disintegrated Ieie leaves. The bowl is just over 2.00 inches across by 1.50 inches deep. A horizontal fork of an Ohia limb some fifteen feet from the ground has been used as the site.

I conclude that the young birds following the adults were from a late brood of the year before, and doubtless would themselves not breed until the following fall or spring; though one of the young was well advanced in assuming the plumage of the adult.

The second nest (Mus. No. 4694) was also taken from an Ohia tree. It was collected at Mapulehu June 9, and is in every way similar to No. 4691, except that it was placed in an upright crotch.

A third nest, in an unfinished condition, was taken on Kilo-hana in the wet forest on April 30. The old bird was seen carrying the moss of which the exterior is composed. The site was an upright fork of a small Kawau tree about eight feet from the ground.

### ***Psittirostra psittacea* (Gmel.).**

It is my intention in a separate paper to discuss at some length the Museum's choice series of almost a hundred skins of the *Ou* that have been collected on the large islands of the group. It is felt that certain questions that have been raised concerning this interesting genus can then be cleared up. For the present it is



(4694)

OREOMYSTIS FLAMMEA.

(4691)

sufficient to say that sixteen skins of both sexes, adult and immature, were secured on Molokai during April, May and June.

The Ou was met with at all the stations visited in the forest area, in a ratio of about one to twenty, as compared with the Amakihi. Hence it is not, relatively speaking, the abundant species its size and song would seem to make it, especially when compared with the much smaller and more obscurely colored *Chlorodrepanis*.

The Halawa forest makes an ideal home for this Ieie-loving bird, since that region, as has elsewhere been mentioned, is a perfect tangle of this vine. Along the streams patches of wild banana are also common, while Olona (*Touchardia*), another food plant of the species, is met with everywhere in suitable places. As Ieie has apparently had much to do in the evolution of its peculiar beak, the Ou commonly frequents the forests where it is most abundant. It is, nevertheless, always to be found in the more dense Ohia forests, even though the amount of Ieie is small, or wanting entirely. In the heavily wooded localities, it feeds through the tops of the trees, seldom coming near the ground. At such times there are usually several birds in the locality scattered about in scout formation. They seem rarely to alight together in the same tree, yet they always keep within easy call of each other. The inquiringly whistled call note "Psweet" is frequently given, and answered by birds thus deployed, especially during cloudy weather. If the call is imitated the bird will readily respond a number of times in succession, often cautiously approaching the observer to satisfy its curiosity. The young birds are much easier decoyed in this way than are the more experienced adults. It is not uncommon to have the green inconspicuously colored birds answer one from a tree near at hand, several minutes before its whereabouts can be determined. A number of times during drenching rains, I have heard the call note plaintively given, and after protracted search have found the bird standing motionless in a very dejected attitude, huddled close against a tree trunk, or stowed away in a thick bunch of leaves for shelter.

Of its musical powers much has been written, as it has been quite commonly given first place among the singing Drepanididæ. The song—which, by the way, it rarely gives in its entirety—is especially sweet and pleasing, resembling in many respects that of the canary. Perhaps the favorite place for delivering its song is

from the topmost branch of some dead Ohia tree, standing in an opening in the dense surrounding forest. From such a station it will often sing intermittently for an hour or more. It is liable at any time to disappear in the woods, only to return presently to take up its song again.

The adult male is, by reason of its golden yellow head, a conspicuous bird, but with the head has been supplied a large amount of caution which results in it being much rarer in collections than would otherwise be the case. The female and the immature of both sexes are inconspicuously colored, and for that reason are often passed by the collector unobserved. As is so often the case, owing to the curiosity and want of fear in the young, more immature than adult birds are always collected.

The flight of the Ou is rapid, heavy and direct. During their more extended flights, as from one ridge to another, they are more often than otherwise in small flocks. Birds of both sexes answer a decoy whistle frequently, coming within easy range of one, eyeing the intruder narrowly all the while. A sudden motion, or an unusual noise will invariably put the bird to flight, when they will dart off without further ado, not infrequently flying half a mile or more in a direct line. Like the Apapane, I have observed the Ou making long-sustained flights from the palis of the large valleys, that carried them readily from one valley to another. At such times they rarely, if ever, soar or circle about, but set off directly for the fresher fields with a show of knowledge and determination that makes them while on the wing, easily distinguished from their neighbors, as far as they can be seen.

The series of skins give the following maximum, minimum and average measurements:

FOUR ADULT MALES.						
	Length	Wing	Tail	Tarsus	Toe	Culmen
Minimum .....	7.00	3.50	2.20	87	90	60
Average .....	7.06	3.70	2.24	90	97	60
Maximum .....	7.25	3.80	2.40	92	1.05	60
FIVE FEMALES.						
Minimum .....	6.75	3.50	2.10	87	95	60
Average .....	7.00	3.61	2.22	90	95	60
Maximum .....	7.25	3.70	2.40	92	95	60
FOUR IMMATURE.						
Minimum .....	6.70	3.50	2.15	..	..	..
Average .....	6.92	3.59	2.20	..	95	60
Maximum .....	7.10	3.65	2.40	..	..	..

It is remarkable that the nesting habits of this bird, which has in times past been common on all the islands of the group and has been so generally collected and studied, should as yet remain entirely unknown.

### **Moho bishopi** (Roths.).

After two months in the forest of the island, I have no hesitancy in pronouncing the Bishop Oo a very rare bird. During that time not a specimen was secured, nor was I able to hear so much as a sound that could be even attributed to it. This is the more remarkable since we know that its characteristic call can be heard in the forests, especially in the more favorable districts—as at the heads of the great valleys mentioned—for a half mile or more.

My disappointment at not securing this species was most keen. However, as the Museum received but three imperfect specimens as its third share of the collection made by Mr. Perkins, I feel sure the species was at that time (September and August, 1893) by no means common. Since the above date it has certainly very appreciably decreased in numbers, as Mr. Munro and I are ready to testify. The requirements of the Museum's exhibition and study series, no less than my desire to see and study the bird alive, nerved me to put forth every effort to discover its whereabouts. No pains were spared in making a thorough examination of every locality suited to its habits, as well as every place where it had been merely reported as having been seen in recent times. As a result, the wildest and most difficult parts of the island forests were visited, not once, but repeatedly. On several occasions a night or more was spent, sleeping in the open, in the centre of promising localities not to be reached otherwise, in the hope of hearing, if possible, the call of the Oo either in the late afternoon or early morning. Feeding grounds where the bird was reported to have been seen "in small flocks" a few months before, were revisited, usually accompanied by the persons reporting the observation, with the uniformly discouraging result. Virgin forest, unfrequented by man or beast, was traversed to no avail. Many hours were spent in silently watching and listening in places, where according to the oldest natives and even those of the present generation, birds were formerly to be met with, almost always on even the most casual day's ramble in the woods. Its feeding grounds among the



Ohia, the bananas and the lobelias were regularly visited. The deep gloomy woods, the bright forested ridges, the secluded valleys were explored from end to end of its habitat, all without seeing so much as a single sign of the bird to encourage one to further effort.

Nevertheless, since the present species, as well as its cousins on Kauai and Hawaii are known to be gregarious and nomadic at certain seasons, it may be that such habits account for its occasional appearance, and more frequent complete disappearance in certain sections. However that may be, of the fact that the Oo is a rare—indeed an exceedingly rare bird, there seems little question. As to its being already extinct, I am not yet convinced, but that it is very near the verge of extermination, cannot longer be doubted by any one.

**Phæornis rutha**, new species.

*Type Specimens.* Male: B. P. Bishop Museum No. 4631; Kilo-hana Mountain, Molokai; April 30, 1907; W. A. Bryan. Female: B. B. Bishop Museum No. 4632; Puualu Mountain, Molokai; April 22, 1907; W. A. Bryan. Immature Male: B. P. Bishop Museum No. 4628; Halawa, Molokai; May 25, 1907; W. A. Bryan.

*Habitat.* Forest area of the island of Molokai only.

*Specific Characters.* Similar to *lanaiensis* but with the throat and breast much grayer; abdomen and under tail coverts whiter; back darker olive-brown; size uniformly a trifle larger; bill averaging longer and slightly broader.

*Diagnostic Characters.* Uniform in color; above brown or hair-brown with an olive wash; with no conspicuous markings on the outer tail feathers; size larger, length (in the flesh) 8.25–8.40, wing 3.67–3.80, tail 3.10–3.25; darker above in adult and immature, and without any rusty gray cast on the crown and mantle. Grayer on the throat and breast.

*Description of Type.* Adult Male; Above inconspicuous dull brown with dusky olive tinge; head darker colored than the mantle. The grayish wash of *lanaiensis* over the head and rump wanting even in moulting birds. Outer webs of the inner primaries and most of the secondaries with a blackish patch at their bases, which is bordered before with a rusty brown patch; centre tail feathers like the back; outer pair paler on their outer webs on the basal

portion, but not conspicuously so. Lores blackish and gray, grayest on the breast and palest on the throat; sides of the body like the breast. Flanks and thighs rusty olive. Centre of the abdomen clear white; under tail coverts ranging from pale buffy cream to white; bill black, iris brown; feet and tarsus dark brown; soles pale yellow in life. Length 8.25 (8.31)-8.40, wing 3.67 (3.73)-3.80, tail 3.10 (3.17)-3.25, tarsus 1.22, toe 1.00, culmen .72.

Adult Female: Similar to the male in color. Length 8.40, wing 3.70 (3.72)-3.75, tail 3.05 (3.09)-3.12, culmen .70.

Immature Male: Similar to young *lanaiensis*, but much darker and less rusty olive over the back; under parts uniformly grayer; wings and tail longer. Length 8.00, wing 3.65 (3.69)-3.75, tail 3.05 (3.11)-3.15, culmen .71.

When studying the material preparatory to writing my Key to the Hawaiian Birds, in 1899, I was convinced that the Molokai form would prove distinct from the Lanai form. Since then as the Museum's series of specimens from the two islands has increased, evidence has accumulated all tending to substantiate the premise there expressed (Memoir B. P. Bishop Museum, vol. i, p. 311) until now, with the additional series of twenty carefully sexed birds in the collection just made, there is no reason for hesitating longer in separating these two closely allied forms. This I have done, naming the Molokai Olomao in memory of my wife.

That the species from the two islands are very similar is not surprising, since the islands are only a few miles apart. Yet the conclusion which has been generally accepted, namely, that the birds from both islands cross the channel with sufficient frequency and regularity to keep the individuals of both habitats uniform, receives a serious rebuttal when we consider that neither Lanai nor Molokai has, to our knowledge, sent out settlers to the nearby and larger islands of Maui and Oahu, in sufficient numbers, if at all, to in the least way prevent the genus from disappearing entirely from the last mentioned islands, while they have continued to remain common on both Lanai and Molokai. A sufficient cause for their not throwing out stragglers or regular settlers is perfectly apparent when a close study of the genus is made in the field.

As is well known, all the species of *Phæornis* are highly sylvan, rarely leaving the deeper woods. Or, if occasionally inhabiting the more open parts of the woods, they are always of settled habits,

frequenting the same sections throughout the year. They never seem to range very far from any particular locality where they have taken up a residence. If they do go afield, it is always by short covered flights. For the Olomao is by nature a shy, timid bird, and for that reason, instead of exposing itself in the open it prefers to proceed from place to place by short low flights, usually through the shade of the forest. Again, a flock of Olomao, even a flock in the most restricted sense, has, I believe, never been seen. When they rove about at all they are alone, or at most in pairs. In my experience with the genus on Kauai, Molokai and Hawaii, I have never seen them high up in the air, and sustain a flight of any distance above the tree tops. Their buoyant spirit not infrequently lifts them into the air in a prolonged burst of song, but when they have finished the effort they drop back into cover and if so minded, work off through the trees to some other favorite retreat. In marked contrast with the habits of the wide-ranging Apapane or Iiwi, I have never witnessed a bold flight of even a solitary individual from the high forest-clad palis where it abounds.

It would be perfectly possible physically for the Olomao to readily pass back and forth from Molokai to Lanai, or to Maui, or Oahu, so far as the inter-island distances and its power of flight are concerned. But I am convinced that its habits are such that it does not venture voluntarily on such flights. Furthermore, by rarely exposing itself in the open or getting far from cover, it reduces the possibility of such migrations being accidentally made through the agencies of wind and weather to the minimum. Hence it is highly probable that the inter-island migration and breeding of sufficient numbers of the two forms to influence the mass of individuals on both islands sufficiently to keep them breeding to type does not occur.

The general habits of the Molokai species coincide very closely with those of the other species of the genus. Berries are by far its commonest food. While insects were found in the stomachs of a part of the birds examined, they occurred in no considerable quantity in any of them. Several times I came on the birds feeding on berries and had an opportunity to watch their behavior at close range unobserved. It was thus possible for me to settle some minor points as to their behavior, particularly as to the

cause of the peculiar trembling motion of the wings which has been attributed by one or two authors to fear alone.

A bird under close observation flew down to feed on the drupes of a small Olapa (*Cheirodendron*). After a few moments it flew up into a nearby tree, when after deliberately cleaning its bill it broke forth into its fullest song. Pausing as if to study the effect, or to see if the melody would be taken up by its neighbors, it would tremble the wings and hop idly about from branch to branch. This program was repeated many times, singing, feeding, and fluttering its wings alternatively. It is true that the quivering is more often resorted to under the stress of excitement, but it is equally certain that it is indulged in at other times quite naturally and frequently.

As to the song of the Olomao little can be added to the excellent accounts already in print. No one is able to see the singer or hear its song without being impressed by its thrush-like character. The effort is more usually delivered from the topmost branches of some favorite tree; although it is to be found frequently singing joyously in the underbrush. When singing the head is always thrown well back, the throat full and free, and the wings and tail are invariably relaxed and drooping. The irregular, at times, somewhat jerky, though always melodious song is given not once or twice, but often dozens of times. Once heard its character will live in the memory for years, though its component parts are wholly inimitable.

Not only does the Olomao sing early and late, but in fine weather I have heard it far into the night. One of the peculiarities of the song is its ventriloquistic character. A bird may be singing volubly in a tree not twenty yards away, and so varied in volume and timbre are the notes as the song increases from its beginning of a few low chirping notes to the zenith of its power and beauty, that even an experienced observer is at times at a loss to locate the songster. In truth it seems that the whole tree might be full of song. The voice comes from the centre, from the right, from the left, from the back and from the top of the tree successively or simultaneously, seemingly at the pleasure of the musician. So marked is this power that a bird in plain sight may sing a half dozen times before the sombre-colored piper will be discovered. In addition to the song the Olomao has a number of notes and



NEST OF PHÆORNIS RUTHA. (4710)

calls. One which is very puzzling, especially to the natives, is a cat-like cry which is given in an inquiring intonation from some hiding place in the undergrowth.

The species was more abundant at Halawa than at any of the other localities visited. This was doubtless due to the seclusion afforded by the untrodden forests of that section. A few immature birds were taken, but the majority of those seen were in the fully adult plumage. The length of time required for the young to acquire the adult plumage is apparently more than one year.

On May 1 I took from thirty feet up in an Ohia tree growing in the dense woods on the summit of Puualu, a nest which I have no hesitancy in referring to this species. In the locality was a pair of resident Olomao, evidently the owners of the nest (Mus. No. 4710) here described. Externally it is over 6.00 inches in diameter by 3.50 inches deep. Small dead Ohia twigs form the foundation of the structure. Into this is placed a generous lining of moss and fine rootlets neatly woven together to form a substantial thrush-like nest. The hollow of the nest is 3.50 inches across by 1.50 inches in depth. The nest has evidently been used and deserted, though unmistakably of recent construction. It is singular that as yet nothing is known of the egg of any of the species of the genus, save the reference by Henshaw (Birds of the Hawaiian Islands, p. 31) to the finding of a small fragment of an egg shell in the stomach of a Hawaiian Hawk (*Buteo solitarius*) which he suggests might be a portion of an egg of *Phæornis obscura* of Hawaii.

It seems worth while recording that an old native who accompanied me on my Moanui trip said that he had heard from his father "that a long time ago there was on Molokai a small brown bird that ran on the ground but could not fly," but that they had all been dead for a long time. He gave its name as Moho (*Pen-nula*). He also said that his father had told him of the Elepaio (*Chasiempis*) being on Molokai in the olden time. Mr. Theodore Meyer substantiated this report by saying that when he was a boy it was generally known to the old natives that both the Moho and Elepaio had been plentiful, but that they had long ago died out.