

Ecological observations on an endangered species: the Maui Parrotbill, *Pseudonestor xanthophrys*

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DESPITE THEIR REMARKABLE adaptive radiation (Raikow 1977), the natural histories of the Hawaiian honeycreepers (Drepanidinae) are poorly known. Within this fringillid subfamily are birds with foraging behaviors similar to finches, warblers, nectar feeders, woodpeckers, creepers, and parrots: they thereby fill a diversity of niches that in continental areas requires almost as many orders (Mueller-Dombois *et al.* 1981). Despite recent work on fossil remnants of the archipelago's avifauna (Olson and Wetmore 1976, Olson and James 1982), much of the evolutionary story of the birds will never be told. At the turn of the century, 32 species of native passerines lived on the main islands—13 are now extinct. Of the 19 remaining species, 13 are on the endangered species list (Shallenberger 1981). Although some species still survive in numbers, many insular populations are now extinct, such as the Akohekohe (*Palmeria dolei*) on Molokai, or the I'iwi (*Vestiaria coccinea*) and Amakihi (*Hemignathus virens*) on Lanai. Other island populations are endangered (e.g., the Akepa, *Loxops coccinea*, on Maui and Hawaii).

Field studies on Maui rainforest birds have in particular suffered long neglect. In 1973 a new species of drepanidid was discovered on Maui, the Po'o Uli (*Melamprosops phaeosoma*) (Casey and Jacoby 1974), and in 1981 Bishops's O'o (*Moho bishopi*) was discovered in the same montane rainforest (Sabo 1982). The montane rainforest of east Maui is trackless and forbiddingly remote. A long strenuous hike across a cinder desert is required to reach the remnant forest that still harbors an invitingly rich fraction of the native avifauna. There the terrain is typically hazardous, with dense vegetation concealing many gorges, sheer ravines, and deep stream cuts. Add to these privations the frequent rains depositing 300 inches annually that can continue for

weeks, and the neglect of Maui's birds becomes quite understandable.

WE FIRST BECAME acquainted with the Maui Parrotbill as members of the U.S. Fish and Wildlife Service's Hawaiian Forest Bird Survey. In May 1980, we traveled to a remote area in the Ko'olau Forest Reserve on the north slope of Haleakala volcano of east Maui. Here the Maui Parrotbill and the still rarer Nukupu'u (*Hemignathus lucidus affinis*) were seen in 1973 by a research team conducting the first floral and faunal investigation of this area, the team that discovered the Po'o Uli. Very few expeditions in this area (Banko 1968, Shallenberger *pers. comm.*, and Scott *pers. comm.*) have reported sightings of a parrotbill. Prior to these accounts, the only other record for this century was in December 1950 by Richards and Baldwin (1953).

On this first expedition into the forest,

we encountered the parrotbill on three occasions. The first time, a fleeting glimpse was caught of a singing male which flew by us. Perhaps because of its massive bill, the bird appeared to drag its head in flight. In our next encounter, we observed its typical foraging method. When perched on a branch, a feeding parrotbill reaches forward with its head, grasping the branch in its bill. This may be performed in an upright, vertical, or upside-down posture. Then, while pulling its head back, it uses the tip of its upper mandible to scratch or peel off bark and outer twig layers. A feeding bird may perform several "peeling" motions in quick succession, making it difficult at first to tell whether the bill is used when the head is reached forward or pulled back.

The extraordinary bill shape of this bird intrigued us, and as part of a documentary study, we collected data on the



Fig. 1. Maui Parrotbill. Photo/John H. Carothers.

height, tree species, substrate, and feeding method for 127 Maui Parrotbill prey captures during subsequent expeditions in 1980 and 1981. The parrotbill prefers to forage for insects on dead branches or twigs on live trees (65% of all captures). As expected, it feeds most often (51%) on the dominant forest tree, the Ohia (*Metrosideros collina*), but there are records of its foraging on 12 other plant species. It forages in the foliage column, usually from 1 to 11 meters high, with males on the average feeding higher than females. Gleans for insect prey off a variety of substrates constitute 17% of all prey captures. It also occasionally probes in flowers and leaf axils (7%). Most common is excavation on a branch or trunk (65%); the bird may begin by inserting its upper mandible in a bark deformity, peel up several inches of bark by using its bill sideways, and finally dig in with its bill tip when the prey is accessible. Even more amazing maneuvers occur when the bird locates a borer larva in a twig (12% of prey captures). Here the bird takes the twig between its mandibles and splits it; if the twig is stubborn, the bird may attempt to shear it in half using its head as a wrench. Should the larva retreat down its twig burrow, the bird splits the twig again. Foraging in this manner, the Maui Parrotbill resembles a feathered can-opener. In both splitting and excavating, the parrotbill uses its tongue to extract prey.

MALE PARROTBILLS are larger than females, particularly in bill length. Males appear to excavate deeper into the substrate than females. Moreover, males feed more often on large trees than females, while females feed more often on shrubs, perhaps because the dominant Ohia and Koa (*Acacia koa*) trees have harder wood than shrubs. Sexual dimorphism is well known in some groups, and in woodpeckers, for example, bill differences also relate to foraging styles (Selander 1966). It is possible that this dimorphism evolved to reduce intra- and interspecific competition, although nowadays the parrotbill and its potential competitor, the Nukupu'u, are both so rare that there must be little present advantage.

We heard males singing from May through August. The song is quite distinct, and comprises about seven trilled "tuey" notes that typically descend, although there may be only a slight change in pitch. Both males and females produce three types of call notes, a brief upslurred

whistled "doo-weet", a similar "pweet", and a short repeated chip. The first of these is also given by the Nukupu'u and the much more common Akohekohe, and a similar call is given by the common I'iwi and Amakihi. The repetitive chip is virtually identical to contact notes produced by the abundant Maui Creeper (*Paroreomyza montana*). Interestingly, many of our Maui Parrotbill sightings were of individuals foraging with small groups of creepers, with both species apparently calling back and forth among themselves. Both species are similarly sized (11-14cm), with females olive drab above and yellow-green below. Males of both species in breeding plumage are olive drab above and bright yellow below. The male Maui Parrotbill also has a yellow superciliary streak and a dark line through the eye (see photo). Although often seen with creepers, parrotbills were formerly also associated with Nukupu'us when both were more abundant (Perkins 1903). In over 120 observations of the parrotbill, we never saw these two species together.

Perkins (1903) frequently found the Maui Parrotbill feeding in Koa trees, and we saw the bird probing rust-infected Koa leaves on several occasions. Unfortunately, most of the drier Koa forest, a favored habitat that at one time covered much of the western slopes of Haleakala, has been almost entirely destroyed through lumbering and especially grazing domestic cattle. Feral pigs are also a very serious problem within the rainforest, causing persistent erosion and often severe understory damage. In addition to habitat destruction, other factors detrimental to the Maui Parrotbill include the introduced Polynesian rat, mongooses, and feral cats. The presence of avian malaria vectors have also been suggested as a major factor in the extinction of many Hawaiian endemic birds (Warner 1968). Our observations indicate that the Maui Parrotbill, although very rare, is more common than previously believed. Replanting native Koa forest in some areas to replace exotic trees and pastureland, along with feral animal management, may aid the survival of this endangered, fascinating bird.

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