PARENTAL FEEDING IN A MALE GREAT-TAILED GRACKLE

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In the Common Grackle (*Quiscalus quiscula*) and other monogamous species of grackles of the genus *Quiscalus*, males feed the young as regularly as do the females, but males of the promiscuous Great-tailed Grackle (*Quiscalus mexicanus*) and Boat-tailed Grackle (*Q. major*) normally take no part in parental care of the young (Selander and Giller, Condor 63:55, 1961; Skutch, Pacific Coast Avifauna 31:328, 1954). Therefore, the following account of an adult male feeding fledglings is noteworthy.

On 29 July 1967 in Austin I saw an adult male walking across a lawn, followed closely by two juveniles, which were directing begging displays to him. This in itself was not novel, since hungry juveniles, especially when newly fledged, occasionally direct begging displays to males. However, as I approached the trio, the adult male, rather than flying away as I expected, became alert and wary, gave *chut* warning calls, and remained with the juveniles, thus exhibiting behavior that is typical of a female with fledglings. Backing off, I continued to watch the birds, and soon the juveniles starting begging again. The male picked an insect from the grass and fed one juvenile, foraged a moment, caught another insect, and fed the other juvenile. Shortly thereafter the male flew off, followed closely by the two juveniles.

This observation of parental feeding by a male *Quiscalus mexicanus* supplies another bit of evidence supporting the generalization, derived from studies of birds and other vertebrates, that behavior normally manifested only by the female is latent in the male and may be expressed under an appropriate set of internal and external stimulus conditions. In view of the importance of gonadal suppression in the facilitation of parental behavior in birds (see review by Eisner, Anim. Behav. 8:171, 1960), it is perhaps significant that the young birds involved had fledged unusually late in the season, when the male had, in all probability, completed gonadal regression and was in a phase of the annual cycle in which testosterone production by the testes is minimal (Selander and Hauser, Condor 67:165, 1965). Hence, as far as hormone titers are concerned, the internal state of the adult male may have been similar to that of a female in the post-incubation period of the annual cycle.

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THE EGGS AND YOUNG OF THE PALILA, AN ENDANGERED SPECIES

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The Palila (*Psittirostra bailleui*) is one of the few surviving "finch-billed" members of the Hawaiian honeycreeper family (Drepanididae). The Palila is a large-billed, large-headed, colorful bird about 6.5 inches in total length. In addition to its large cardinal-like bill, the Palila has a bright yellow head and throat, a soft gray back, and a whitish abdomen. There is little sexual dimorphism but the yellow tends to be richer in the males.

The Palila is endemic to the island of Hawaii. Although the species had a wider distribution on this island in the past, available information indicates that the Palila is presently restricted to the mamane (*Sophora chrysophylla*)-naio (*Myoporum sandwicense*) forest on the slopes of Mauna Kea, a mountain which towers 13,784 ft above sea level. This, too, is the only large extant mamane-naio forest on any of the Hawaiian Islands (fig. 1). Here the Palila subsists largely on the seeds and flowers of the mamane.

The nests and eggs of the three species of "Kona finches" (genus *Psittirostra*, all of which are presumed to be extinct) were never described, and presumably never were discovered. I am pleased, therefore, to be able to present the first photographs of the nest, eggs, and newly-hatched young of the Palila, especially in view of the precarious future for this species.

The first mention of the nest of the Palila was made in the work by Wilson and Evans (Aves Hawaiiensis: The birds of the Sandwich Islands, R. H. Porter, London, 1890): "On June 14th I found a nest from which I saw the bird fly; it was placed in the topmost branches of a *Naio* tree (*Myoporum santalinum*), about 35 feet from the ground, but contained no eggs, and when we subsequently revisited it we found it deserted. It may be briefly described as cup-shaped, 4 inches in diameter, and very loosely constructed of dry grass, among which is interwoven a considerable quantity of grey lichen; the inside being composed of the same lichen, with a few slender rootlets added."

The only other reference to the nest of this species is a very odd and misleading one. W. A. Bryan (Occas. Papers Bernice P. Bishop Museum. 1905, p. 59–60), described two deserted nests (one of which "was evidently a year or more old") found in October as being those of the Palila because Mr. Blacow "was fairly convinced that the egg is that of the Palila, since it was not only a fairly common bird in the locality, but one found usually frequenting Mamani." On the following two pages of the same journal, however, Bryan reported that the two nests were not those of the Palila but had been "orginally erroneously identified by the collector, through circumstantial evidence." He quotes Mr. Blacow as writing: "So the Palila that I saw fly out of the tree that I found one of the other nests in was probably feeding and did not have any connection with the nest whatever."

Field work in Hawaii is, for a variety of reasons, very difficult. I saw my first Palila in the Kaohe Game Management Area on 13 June 1966. I did extensive field work there on 32 different occasions during the following two years, but did not find the first Palila nest until 6 July 1968.

I had discovered earlier that the Hawaii Amakihi (*Loxops v. virens*) had begun to nest on Mauna Kea by mid-October in 1966. Consequently, I began again to make periodic field trips to the study area on 17 October 1967, making 14 additional visits during the following eight months. Although I had no difficulty in locating the Palila on each field trip, nor in finding the nests of nearly all other species, I could not find the Palila's nest.

There was no adult at the nest I found on 6 July 1968, and, from the ground, the nest looked as

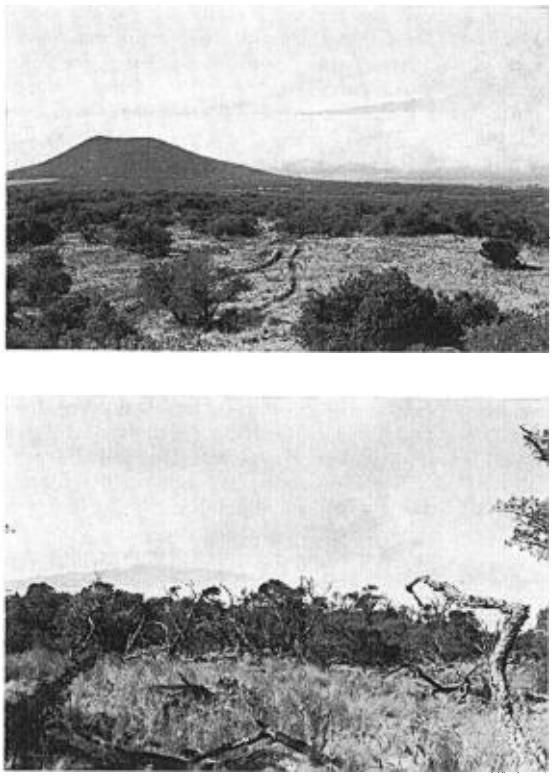

FIGURE 1. (upper) The mamane-naio forest looking downslope toward Puu Ahumoa and Mauna Loa, mostly concealed by clouds in the "saddle" area between Mauna Kea and Mauna Loa. Photograph taken from an elevation of approximately 7500 ft. (lower) The remains of part of the mamane-naio forest on the Mauna Kea Game Management area; elevation approximately 8000 ft.

though it might be that of the Hawaii Amakihi, the most common honeycreeper in this habitat. Although the nest was only 15.3 ft above the ground in a mamane tree, it was placed in a small branch so near the top of the tree that I could not climb high enough to look into the nest. I knew as soon as I picked up one of the two eggs, however, that they were too large to belong to any of the species whose nests I had already found on the study area, and, as I held the egg carefully in my finger tips, I heard a bird fly into the tree behind me. The bird was a female Palila. The bird began to give its melodious callnote, and a male answered from a short distance away. The male did not, however, come to the vicinity of the nest. I climbed down the tree and moved off a short distance, whereupon the female returned to the nest to incubate the eggs.

I returned to the study area on 15 July. No Palila was singing, nor did I hear any callnotes. Nevertheless, I discovered that the Palila nest contained one egg and one nestling less than 24 hr old, and, as I was examining the nest, again a female Palila flew into a nearby tree and began to give her alarm notes.

This Palila's nest was irregular in shape, being about 5 × 7 inches in maximum outside diameters. The nest rim varied from about 1–1.25 inches in thickness. The nest cup itself varied from 2.25–2.5 inches in diameter, and was about 1.25 inches in depth.

The bulk of the body of the nest was composed of

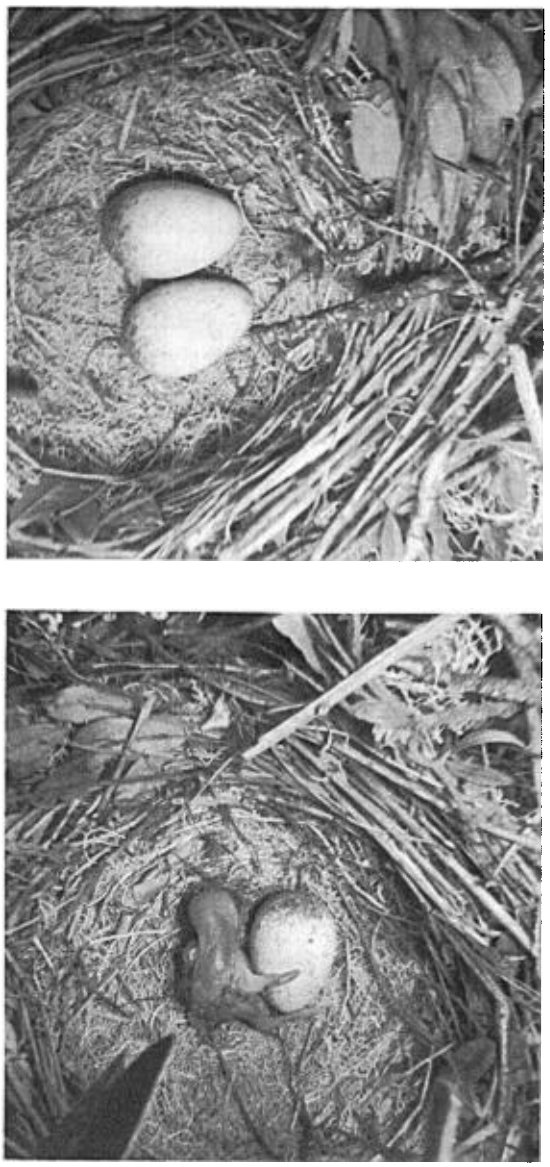

FIGURE 2. (upper) The first photograph of the nest of the Palila and its two eggs. Photograph taken 6 July 1968. (lower) Palila nest, egg, and nestling less than 24 hr old. Photograph taken 15 July 1968.

unidentifiable grass leaves, stems, and roots, with large dead mamane twigs woven into and around the exterior. Among these larger twigs there were mamane leaflets, fine strips of bark, and several dead flower stalks of a composite. The nest was lined with lichen.

Reddish-brown markings formed a dense cap around the larger end of each egg and lighter markings were scattered thinly and irregularly over the remaining surface. The two eggs were virtually identical in coloration.

The skin of the newly-hatched nestling was a bright reddish-orange. The lining of the oral cavity was only slightly redder than the general skin color. Long black down feathers in discrete tracts were conspicuous on the top of the head, back, and thighs. Photographs of the nest with eggs (6 July) and with egg and nestling (15 July) are shown in figure 2.

THE PALILA AS AN ENDANGERED SPECIES

The Palila is found at elevations between about 7000 and 9500 ft, the approximate elevation of the present treeline. The forest extended to nearly 10,000 ft before feral horses, cattle, and sheep destroyed it. The last wild horses and cattle were not exterminated from Mauna Kea until the 1930's. At the present time feral sheep, especially, are a serious threat to any significant regeneration of this interesting native forest (see R. E. Warner, Pacific Discovery 13:6, 1960). Hordes of pigs and smaller numbers of goats add to the problem.

Much of the Palila's habitat lies within the Kaohe Game Management Area and the contiguous Mauna Kea Game Management Area, both of which are owned and controlled by the State of Hawaii. The two areas contain about 10,000 acres of mamane-naio forest. Unfortunately, political pressure by a small group of hunters and other uninformed people have made it impossible for the professionally trained personnel of the State Division of Fish and Game to set adequate hunting seasons and bag limits, or to put into practice other wise management practices. Consequently, sheep and pig populations build up to the point where it can be stated emphatically that the Palila do, indeed, inhabit a dying forest, as Warner pointed out several years ago. Contributing to the public's lack of awareness of such conservation problems is the fact that the State Legislature has never granted the State Division of Fish and Game any funds to carry on an education program on the State's unique biological heritage. The State Division of Fish and Game also has been directed by the State Legislature to release Axis Deer in the Game Management Areas at the earliest practical date, which presumably will be during 1970.

The last remaining extensive native mamane-naio forest in Hawaii also faces a new threat because of a proposal to build a new road to the summit of Mauna Kea, a road that would pass through the Game Management areas and, consequently, through the heart of the Palila's habitat. Hunting restrictions for some distance on each side of the proposed new road would complicate further the continuing problem of controlling the populations of both sheep and pigs. This would be unfortunate in the extreme, not only because this unique Hawaiian ecosystem is the only known habitat for the Palila, but also because it is the only one in which the rare Akiapolaau (*Hemignathous wilsoni*), a peculiar honeycreeper with woodpecker-like habits, has been found in recent years.

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THE WHITE-EYE AS AN INTERSPECIFIC FEEDING HELPER

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Skutch (Condor 63:198, 1961) defines a helper as "a bird which assists in the nesting of an individual other than its mate, or feeds or otherwise attends a bird of whatever age which is neither its mate nor its dependent offspring."

In my work on the White-eye (*Zosterops palpebrosa japonica*) I reported on the role of immature White-eyes as intraspecific feeding helpers (Eddinger, Condor 69:530, 1967). I have since observed nonbreeding mature White-eyes feeding nestlings and fledglings of two other species, the House Finch (*Carpodacus mexicanus frontalis*) and the House Sparrow (*Passer domesticus*).

I hand-raised five White-eyes in the indoor aviary (Eddinger op. cit.). These birds fledged between 27 April and 28 July 1966. All five White-eyes were independent by 15 August 1966. The White-eyes were caged with an adult female House Finch that I caught in a mist net on 4 February 1966.

On 9 April 1968 I collected three half-feathered nestling House Finches. The birds gaped readily, revealing a bright pink color inside the mouth with bright yellow around the tip of the bill. The three nestling House Finches with their nest were placed inside the cage containing the five adult White-eyes and the adult female House Finch.

Within 5 min after the House Finch nest had been placed in the cage, the White-eyes flew down to the nest. The finches gaped when the White-eyes approached. The White-eyes flew directly to the food containers and carried papaya and mixed cereal to the gaping nestlings. I provided papayas, avocados, egg yolks, and mixed cereal with vitamins in the cage feeding cups. The adult female House Finch made no attempt to feed the nestlings at this time.

The three House Finches fledged on 16 April and flew to the White-eyes to be fed. On 29 April I saw one fledgling fly to the adult female House Finch and the gaping fledgling was fed, but this was the only time that I observed feeding by the female finch. The White-eyes continued to feed the three House Finches until they became independent on 10 May 1968.

On 2 May 1968 I collected four nestling House Sparrows. The feathers were about half unsheathed on the nestlings. Because the nest was dome-shaped, I cut the top off so that the nestlings would be exposed. The nest and the nestlings were placed in the cage with the White-eyes. The White-eyes were still carrying food to the House Finch fledglings, but again the White-eyes flew to the newly introduced nest and, when the nestlings gaped, carried food to them. The White-eyes continued to feed the sparrows until they became independent on 3 June 1968.

From 2 May to 10 May the five White-eyes fed the three fledgling House Finches and four nestling House Sparrows. I noted at this time that the five White-eyes showed little discrimination in food selection. On five occasions I saw the White-eyes pick up fecal material from the floor of the cage and feed it to the sparrows.

The interspecific feeding behavior observed here may well be the result of aviary conditions, but it has provided me with an easy and efficient way of hand-rearing nestling birds.

I am indebted to A. J. Berger for suggesting techniques for raising the birds in captivity and for encouraging me to prepare my observations for publication.

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