

## NEST SITES, CLUTCH SIZE AND INCUBATION BEHAVIOR IN THE GOLDEN WHITE-EYE

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**Abstract.**—The Golden White-eye (*Cleptornis marchei*), a little-known endemic of the Mariana Islands in the western Pacific, nests throughout the year in a variety of forested and semi-open habitats. Data from 11 nests indicate the typical clutch size is two. Incubation at three nests lasted 14 d and the altricial young fledge 10–14 d after hatching. The parents seem to share equally in brooding and rearing tasks during daylight.

### LUGARES DE ANIDAMIENTO, TAMAÑO DE LA CAMADA Y CONDUCTA DE INCUBACIÓN DE *CLEPTORNIS MARCHEI*

**Sinopsis.**—*Cleptornis marchei* es una especie endémica de las Islas Marianas, de la cual se conoce muy poco. El ave anida a través de todo el año en una gran variedad de habitats forestados y semi-abiertos. El tamaño típico de la camada es de dos huevos ( $n = 11$ ). En tres nidos estudiados el período de incubación resultó ser de 14 días y los pichones, que son altriciales, dejaron el nido de 10 a 14 días luego de haber nacido. Los adultos parecen compartir de igual forma la incubación y cuidado de los pichones durante las horas diurnas.

The Golden White-eye (*Cleptornis marchei*), is a little known endemic to Saipan and Aguiguan in the Mariana Islands (Fig. 1). It was previously considered an aberrant honeyeater (Meliphagidae), but is now considered a white-eye (Zosteropidae) perhaps related to Rukia (Bruce 1978, Pratt et al. 1987, Sibley and Monroe 1990). Although the Golden White-eye is common in all wooded habitats, the nesting behavior has not been previously described (Craig 1990, Engbring et al. 1986). The Golden White-eye is the most distinctive of several forest bird species that face extinction on Saipan if recent snake sightings are an indication of an incipient population of brown tree snakes (*Boiga irregularis*) (McCoid and Stinson 1991). The introduced brown tree snake caused the extirpation or extinction of Guam's forest avifauna (nine species; Savidge 1987), and most cargo arriving on Saipan is transhipped through Guam (Fritts 1988).

### STUDY AREA AND METHODS

Saipan, a tropical uplifted coral island of 120 km<sup>2</sup>, is the largest in the Commonwealth of the Northern Mariana Islands (CNMI). The vege-

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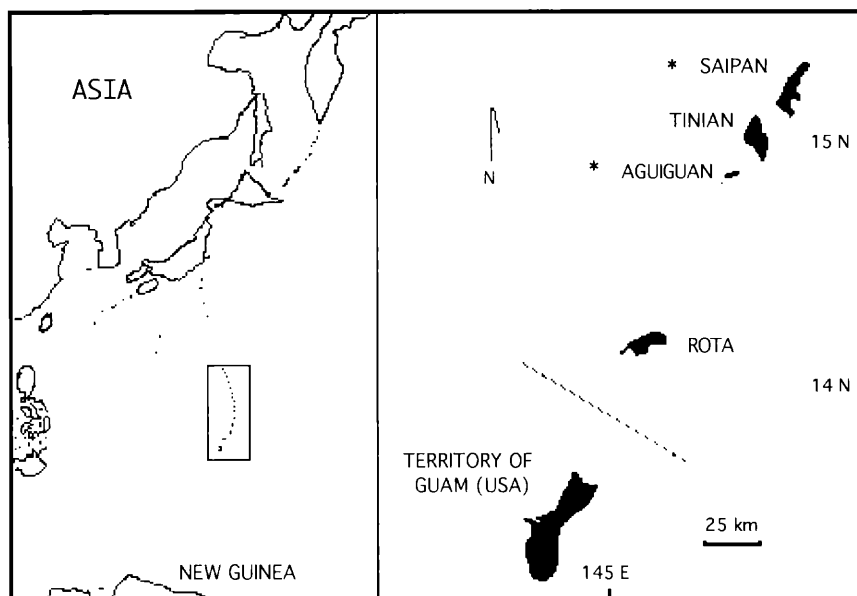


FIGURE 1. The five southernmost Mariana Islands and the distribution of the Golden White-eye. Asterisk (\*) indicates the two islands where the species is found.

tation includes limestone forest remnants, mixed second-growth forests, grass savannas and dense thickets of introduced *Leucaena leucocephala*. Native limestone forest is largely restricted to steep or rugged terrain that escaped past use for production of copra or sugar cane.

We observed three nests (A, B, and C) between 2 May and 28 Jun. 1989 in the Navy Hill residential area. Other data are from nests found throughout Saipan by personnel of the CNMI, Division of Fish and Wildlife (DFW). Golden White-eyes are not sexually dichromatic, but at least one member of each of the three pairs discussed herein had been previously color-banded allowing us to distinguish individuals. The sexes of members of pairs B and C were determined by the presence of a cloacal protuberance in the males. We hypothesized that the larger member of pair A was the male (Baker 1951). Nests A and B were observed between dawn and dusk (0600–1900 hours) for varying periods over several days. Nest C was observed briefly and checked periodically over a 19 d period.

The contribution of the sexes to incubation was estimated by considering each minute of observation as an instantaneous observation point. The resulting frequencies were tested using a Goodness-of-Fit test ( $G$  statistic) (Sokal and Rohlf 1981). All tests were conducted at  $\alpha = 0.05$ .

#### RESULTS AND DISCUSSION

Nest A was discovered 2.0 m above the ground in a casuarina tree (*Casuarina equisetifolia*) on 2 May. For the week prior to egg laying the

adults visited the nest intermittently and moved in and out of the nest tree while calling loudly. We checked the nest daily from 2 to 10 May; one egg was present on 9 May and a second was present on 10 May.

Nest A was composed primarily of casuarina “needles” (casuarina stems resemble pine needles), grasses, vine tendrils and some coarse hairs about three inches long (possibly pig hair from a nearby pigpen). It was observed for 21 h over a 22-d period. One of the two eggs in Nest A hatched after 14 d of incubation. The other egg vanished on day 13; its fate is unknown. The abundant introduced green tree skink (*Lamprolepis smaragdina*) has been observed depredating Golden White-eye eggs (DWS pers. obs.; T. Pratt, pers. comm.) and may have been responsible for the disappearance.

The single nestling was altricial with yellow skin at hatching. Two days later it weighed 6.4 g and on day 7 it weighed 15.2 g. During the nestling period both adult birds brought food, brooded the young and removed fecal sacs from the nest. During 232 min of observation the nestling was fed 13 times and four fecal sacs were removed. The week-old nestling was seen unsuccessfully begging for food from a curious Eurasian Tree Sparrow (*Passer montanus*). The nestling was fed insects exclusively and four times out of 13 the food appeared to be a green caterpillar. The nestling fledged 10–12 d after hatching and was seen with both adults near the nest tree on day 16. At that time the fledgling appeared to be unable to fly well. One or both of the adult birds stayed with the fledgling and noisily chased away other Golden White-eyes that approached it.

Nest B contained two eggs when it was found on 8 May 1.5 m above the ground in an acerola cherry tree (*Maltighia glabra*). Nest B was also primarily made of casuarina “needles” and grasses. It was observed for 10.3 h over 4 d but was destroyed by children on 15 May.

Nest C was discovered on 9 June in a casuarina tree. The height of this nest (6.5 m) made it difficult for direct observation but when the nest was checked on 15 June it contained two newly hatched chicks. Both adults of this pair had been previously color banded and at least the male is known to have nested in the same tree in March to early April. The female of pair C was banded in late April so it is not certain that she was the mate of this male for the March–April nesting. The two chicks in Nest C were observed flapping their wings on 27 June and appeared to be close to fledging. The nest was empty on 28 June, the chicks presumed fledged.

All three pairs incubated continuously during the daylight hours. Adults left the nest unoccupied infrequently and then only briefly (5 min maximum; 50 min total during 29 h of observation). When the members of an incubating pair exchanged places on the nest, the approaching bird usually called and the bird on the nest would leave the nest moments before the other bird arrived. The adults chased away other birds from the nest including Eurasian Tree Sparrows, Bridled White-eyes (*Zosterops conspicillatus*) and other Golden White-eyes.

The sexes share the incubating chores nearly equally. The total number of incubation observation points for each sex (675 male, 673 female;  $G_{\text{total}} = 0.054$ ), and the contribution of each member of a pair (Pair A: 380 and 383 [ $G = 0.018$ ]; Pair B: 295 and 290 [ $G = 0.0424$ ]) did not significantly differ, nor did the mean duration of an incubation period (Pair A: 25 and 27 min; Pair B: 21 and 23 min) (One-tailed Student's  $t$ ).

One of the adults at Nest A brooded the chick for 72 min and the other brooded for 40 min. In the possibly related *Rukia ruki* the female did 96% of the brooding (Pyle and Engbring 1988), but the average brooding period (9.1 min; range 1–34 min for *C. marchei*) is nearly the same as that of *R. ruki* (Pyle and Engbring 1988).

The nest of the Golden White-eye is cup shaped and unlined, as previously described by Hartert (1898). Nests from DFW records, including ours, were found a few meters above the ground ( $\bar{x} = 2.92$  m,  $SD = 1.62$ ,  $n = 13$ , range = 1.5–6.5), in a variety of tree species including *Casuarina equisetifolia* (3), *Guamia mariannae* (3), *Cynometra ramiflora* (2), *Leucaena leucocephala* (2), *Citrus* spp. (1), *Maltighia glabra* (1) and *Randia cochinchensis* (1). Nests were located in all types of wooded and semi-open habitats, including limestone forest (5), suburban yards (4), farms/agroforest (2) and *Leucaena* thickets (2).

Hartert's (1898) Golden White-eye egg measurements and descriptions agree closely with the eggs from Nests A and B, which were a pale bluish/green with reddish/brown splotches concentrated on the wide end. Egg weights were 1.8, 2.2, 2.2 and 2.3 g. Hartert (1898) reports "two or three" eggs found in each of four nests, but gives measurements for eight eggs. Our data suggest that the most common clutch size is two. Of 11 active nests found, 10 contained two eggs, the other contained a hatchling. Of these, one nest produced two fledglings (Nest C), one nest produced one or two, Nest A produced one fledgling, two nests were depredated, and the results of the others are unknown. DFW nest records (including ours) and those in Hartert (1898) report nesting in all months except November.

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