

are extremely rare or absent elsewhere on the island include *Randia conchinchinensis*, *Cordia aspera*, *Psychotria insularum*, *Memecylon vitiense*, *Sphaeropteris lunulata*, *Corymborchis veratrifolia*, *Tarrena sambucina*, *Niervilia aragoana*, *Gynochthodes ovalifolia*, *Cryptocarya hornei*, *Alyxia bracteolosa*, *Melodinus vitiense*, *Ervatamia orientalis*, and *Pteris tripartita*.

Plant communities are not only characterized by a natural disturbance regime (e.g. White 1979, Denslow 1980), but, in populated areas, they also have an anthropogenic disturbance regime. Physical disturbance of Toloa Forest by students of Tupou College and others is quite substantial. Large trees are harvested for firewood and construction. *Rhus taitensis* is often burned in quest of bee honey, occasionally resulting in tree death. I have met several students in the forest searching for rare plants for medicine. Young trees and saplings are often cut down or slashed with machetes without any intent for use of the plants. The presence of cow manure suggests some level of grazing.

In many tropical forests, canopy gaps allow for the colonization and establishment of a large number of native species (Denslow 1980). In Toloa Forest, however, fast-growing nonnative species such as *Lantana camara*, *Solanum mauritianum*, *Psidium guajava*, and *Ipomoea* spp. form dense thickets under natural as well as man-made canopy openings. They undoubtedly reduce the establishment and growth of native species in gaps.

Another anthropogenic factor disturbing the forest is its proximity to the airport runway. Aside from possible damages inflicted to the plant and animal populations caused by noise and air pollution, the proposed expansion of the airport runway would partially or entirely destroy the forest.

I thank Tom Hubbard for suggesting the study, Drs. Dotty Douglas and Brent Smith for helpful suggestions, Gary Buelow for introducing me to the flora of Tonga and for plant identification, Solomone Fifita and Paula Taufa for help with Tongan plant names, and Dr. Tevita Puloka for permission to study Toloa Forest.

REFERENCES CITED

- Crane, E. A. 1979. *The Geography of Tonga*. Wendy Crane Publisher, Nuku'alofa, Tonga. 76 p., 203 fig.
- Denslow, J. S. 1980. Gap partitioning among tropical rainforest trees. *Biotropica* 12 (suppl.): 47-55.
- Mueller-Dombois, D. and H. Ellenberg. 1974. *Aims and Methods of Vegetation Ecology*. John Wiley and Sons, New York. xx+547 p.
- Myers, N. 1980. *Conversion of Tropical Moist Forests*. National Research Council, Washington. ix+205 pp.
- Straatmans, W. 1964. Dynamics of some Pacific island forest communities in relation to survival of the endemic flora. *Micronesica* 1: 113-122.
- Watling, D. 1982. *Birds of Fiji, Tonga, and Samoa*. Millwood Press, Wellington, New Zealand. 176pp. + 15 color plates.
- Whistler, W. A. 1980. The vegetation of Eastern Samoa. *Allertonia* 2: 46-190.
- White, P. S. 1979. Pattern, process, and natural disturbance in vegetation. *Botanical Review* 45: 229-299.
- Wodzicki, K. 1981. Some nature conservation problems in the South Pacific. *Biological Conservation* 21: 5-18.
- MICHAEL W. PALMER, *Department of Botany, Duke University, Durham, NC 27706, U.S.A.*
- FIRST DESCRIBED NEST AND NEST SITE ACTIVITY OF THE TRUK GREATER WHITE-EYE (*Rukia ruki*)
- The genus *Rukia* (Zosteropidae) contains four species of "greater" white-eyes endemic to island groups of Micronesia (Mayr 1945, Baker 1951, Morony *et al.* 1975). Little is known about the status and life histories of these species, and the taxonomic affinity of at least one (*R. palauensis*) has been strongly questioned (Pratt *et al.* 1980). Nests or nesting behavior have not been previously described for any member of this genus.
- The Truk Greater White-eye (*R. ruki*), confined to the Faichuk (Tol) Islands of Truk (6°22'N, 151°36'E) is perhaps the least known species of the genus. There have been virtually no published accounts of this white-eye since it was first described by Hartert (1897). Until recently, it was thought to inhabit only a small patch of forest on the top of Mount Tumuital, South Tol Island (R. Owen, pers. comm.). From 18 March to 29 April 1984 the U.S. Fish and Wildlife Service (USFWS) conducted bird surveys in Truk as part of the Micronesian Forest Bird Survey and located restricted populations of Truk Greater White-eye on nearby Polle, Pata, and Onei Islands (Engbring and Ramsey, in press). The species' total known range, however, remains only about 1 sq. km. It is presently listed as a candidate endangered species by the USFWS

(1984), and an endangered species under (former) U.S. Trust Territory of the Pacific Islands (1976) regulations. It is also considered endangered by the International Council for Bird Preservation (King 1981).

As part of the USFWS survey team, we spent 11–15 April, 1984, camping atop Mount Tumuital studying birds of the unique and restricted native broadleaf forest found there. On 12 April Pyle found a nest of the Truk Greater White-eye at an elevation of 350 m on the heavily forested southeast slope of the mountain. It was located 20 m above the ground in a terminal leaf cluster of a 30 m tall "Truk poison tree" (*Semecarpus kraemeri*). The tree was situated near the base of a 20 m high, sparsely vegetated cliff face, and the nest was on a branch extending into a narrow (5 × 20 m) opening created by the cliff. The entire area around the small opening was forested, with the poison tree and a fig (*Ficus prolixa*) being the prevalent canopy species, and *Randia* dominating the understory. The canopy also contained numerous epiphytes including *Piper*, *Asplenium*, and *Schefflera*. A large tangle of several epiphytic species was situated 5–8 m above the nest. From the top of the cliff, the nest could be studied from a distance of 10 m at eye level.

The cup-shaped nest was suspended from the base of two petioles within the leaf cluster. The large leaves of the cluster partially covered the nest, offering protection from the weather. The nest was estimated to be 7.5 cm in diameter and 7 cm deep. It was thin-walled and finely woven with a combination of bark strips, moss filaments, and dried grass-like plant fibers. No spider egg cases or other white objects were obvious on the sides of the nest, in contrast to what is found in other species of white-eyes (Guest 1973, Kikkawa and Wilson 1983). The nest contained a single, mostly naked, half-grown young with a fleshy, yellow gape, yellowish pink legs, and dusky down on the back and head. The young was estimated to be 2–4 days old.

Nest-site surveillance was conducted by Pyle from 1400–1530 on 12 April and 0600–1800 (dawn to dusk) on 13 April. During these periods, parental nest visits and activities were timed and recorded, and incidental observations were made on the foraging behavior of the adults in the immediate vicinity of the nest. The nest site was also visited on both dates by Engbring and USFWS co-workers David Jickling and James Moore. The weather on both days was typical of the region; sunny and warm with occasional showers.

Two adults frequented the nest area, where they maintained a constant close contact. They foraged

both in the vicinity of the nest and in an area (est. 50 × 100 m) along the slope southwest of the site. Foraging was confined to inner branches, limbs, and vine-tangles rather than the outer branches and foliage, where the locally common Cardinal Honey-eaters (*Myzomela cardinalis*) and Bridled White-eyes (*Zosterops conspicillatus*) were often found. A variety of trees were used for foraging, particularly *Ficus* and *Semecarpus*. In the 12 hours of surveillance on 13 April, at least one adult was present at the nest for a total of 244 minutes (34% of the time). This is a lower nest attendance than noted by Guest (1973) for the Japanese White-eye (*Zosterops japonicus*) with similar aged chicks. Though the Truk Greater White-eye is sexually monomorphic, we learned by the second day to distinguish the two adults by subtle individual differences in appearance and behavior. Most of the feeding and brooding of the young was carried out by only one of the adults (presumably the female) while the other stood guard in the vicinity, often in the epiphytic tangle above the nest.

During the 12-hour watch, the nestling was fed 54 times, an average of once every 13.3 minutes. The "female" fed the young 41 times (76% of the feedings) and the "male" 13 times. The longest period between feedings was 61 minutes. The feedings usually lasted 4–12 seconds and were accompanied by fairly loud, high-pitched peepings from the young. After joint parental forays, the "male" often came to the nest first to briefly feed the nestling, after which the "female" would usually follow, spending a longer period feeding the young and often entering the brooding position after the feeding.

Feeding forays were often initiated by the "male," which flew to the southwest and gave distinct "peer-peer" call notes. This always enticed the brooding "female" to leave the nest and follow. These contact calls continued at a lower volume as the adults foraged. When returning, the adults most often entered through the tangle of epiphytes above the nest. Insect material was the only food source observed and included small to medium, tan-winged moths (Lepidoptera), and soft-bodied, winged, green (Orthoptera) and black (Diptera and/or Hymenoptera) insects.

Brooding was observed 24 times during the 12-hour watch, with a parent remaining on the nest an average of 9.1 minutes per brooding period. The nestling was brooded a total of 226 minutes, the "female" accounting for 216 minutes (96%) and the "male" 10 minutes. While brooding, adults always faced into the leaf cluster. Peaks of up to 30 minutes of brooding per hour were noted from 0600–0800 and 1200–1500. The

latter peak was possibly due to increased shower activity during the early afternoon. The 10 minutes of brooding by the "male" occurred during a heavy rain squall and he may have been protecting the nestling from the rain rather than actually brooding. After the squall passed, the "female" displaced the "male" and spent the following 23 minutes brooding, the longest such period observed. On four occasions, the "female" stood over the nest for up to 3 minutes and bobbed her head up and down (at 1431 on 12 April and 0812, 0824, and 1147 on 13 April). It is believed that in these instances she was preening the young or gleaning the nest of mites, ants, or other small organisms. At 0837 on 13 April, the "female" removed a fecal sac, the only time this action was noted.

The male was heard singing only once in the vicinity of the nest, at 1433 on 12 April. Other Truk Greater White-eyes could be heard singing 50–100 m northeast and southeast of the nest site. These birds never approached the nest area, however, and no intra-specific interaction was noted between the nesting adults and other greater white-eyes. The adults did chase other bird species away from the nest. They were most agitated by Micronesian Starlings (*Aplonis opaca*), which were chased away three times during the two days of observation. Other species repulsed were Nightingale Reed-Warbler (*Acrocephalus luscinia*) (three times) and Cardinal Honeyeater (once). The adults did not seem excited, however, when a Long-tailed Cuckoo (*Eudynamis taitensis*), known for its nest predation, foraged to within 7 m of the nest. Allopreening between the adults was noted on one occasion, in the tangle of epiphytes above the nest.

At 1250 on 13 April the entire right leg of the young was noticed protruding from a hole in the bottom of the nest. Although the leg was well developed, the nestling was not able to withdraw it despite kicking and struggling. It remained as such until 1800 on 13 April, when we last observed the nest.

The Truk poison tree, considered endangered under Trust Territory regulations, is only found on the top of Mount Tumuital. R. Owen (pers. comm.) has speculated that the Truk Greater White-eye is dependent in some way on the poison tree. That the nest was located in a poison tree supports the premise that a commensal and possibly mutual relationship does indeed exist between these two unique species.

ACKNOWLEDGEMENTS

We thank Sleeper Sared, Eusepio Pisek, David Ivra, Redley Killion, and Susumu Aizawa of Truk for

their assistance and permission to visit Mount Tumuital. Derral Herbst kindly assisted us with botanical identifications, and Thane Pratt offered helpful comments about the text.

REFERENCES CITED

- Baker, R. H. 1951. The avifauna of Micronesia, its origin, evolution, and distribution. Univ. Kansas Publ., Mus. Nat. Hist., 3: 1–359.
- Engbring, J. and F. L. Ramsey. In press. Micronesia forest bird survey; 1983–84, Kosrae, Ponape, Truk, and Yap. U.S. Fish and Wildlife Service Technical Report.
- Guest, S. J. 1973. A reproductive biology and natural history of the Japanese White-eye (*Zosterops j. japonica*) in urban Oahu. Univ. of Hawaii, Dept. of Botany, Island Ecosystems Technical Report No. 29. 95 pp.
- Hartert, E. 1897. On a new species of *Tephras* (*Zosteropidae*) from the Caroline Islands. Bull. British Ornith. Club 7: 5.
- Kikkawa, J., and J. M. Wilson. 1983. Breeding and dominance among the Heron Island Silvereyes. *Emu* 83: 181–198.
- King, W. B. 1981. Endangered Birds of the World: the ICBP Bird Red Data Book. Smithsonian Inst. Press, Washington D.C.
- Mayr, E. 1945. Birds of the Southwest Pacific. MacMillan Co., New York. xix + 316 pp.
- Morony, J. J., W. J. Bock and J. Farrand. 1975. Reference list of the birds of the world. *Am. Mus. Nat. Hist.*, New York. 207 pp.
- Pratt, H. D., J. Engbring, P. L. Bruner and D. G. Barrett. 1980. Notes on the taxonomy, natural history, and status of the resident birds of Palau. *Condor* 82: 117–131.
- U.S. Fish and Wildlife Service. 1984. Endangered and threatened wildlife and plants; findings on pending petitions and description of progress on listing actions. *Federal Register* 49(14): 2485–2488.
- U.S. Trust Territory of the Pacific Islands (Office of the Chief Conservationist). 1976. Fish, shellfish and game, chapter 5, Endangered Species Act. *Territorial Register* 1(12): October 29, 1976.
- PETER PYLE and JOHN ENGBRING, *U.S. Fish and Wildlife Service, P. O. Box 50167, Honolulu, HI 96850*