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BREEDING BEHAVIOUR OF THE ZEBRA DOVE, *GEOPELIA STRIATA* (LINNAEUS, 1766)

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INTRODUCTION

The zebra dove (*Geopelia striata*) is a common resident in all open habitats in Singapore, walking rather than hopping, alone or in pairs to forage for grass seeds. It has traditionally been a favourite songbird in Southeast Asia and because of this there have always been illegal trappings as well as introductions through releases and escapes (Medway & Wells, 1976; Wells, 1999).

Nesting has been recorded in Singapore as far back as the first half of 1900s (Robinson, 1927; Robinson & Chasen, 1936; Gibson-Hill, 1950; Spittle, 1950). This species is rather seasonal in the timing of breeding in Singapore with nest building in Feb. and the last chick in Aug. (Wang & Hails, 2007). This report provides details of the zebra dove's breeding behaviour based on observations made from late Jul. to early Sep.2005.

All observations were made using a Canon digital SLR camera with a 500 mm lens attached and mounted on a tripod. Images were recorded mainly during the mornings and evenings from a distance of about 20 m initially and closer subsequently.

OBSERVATIONS

***Courtship.* –** The courtship dance of bowing and scraping to each other as reported by Robinson (1927) and Robinson & Chasen (1936) was not observed. However, repeated duettng of a soft 'kok-kurr-kurr' was heard prior to nesting and during post-nesting periods.

***Nest* –** The nest of a pair was detected on 15 Jul.2005. They duetted in the morning and evening of that day. The nest was a flat platform, 10 × 8 cm and 2–3 cm deep, made from five pieces of twigs, pieces of roots, stems of grass and those of the epiphytic fern, *Pyrrosia piloselloides*. It was lodged at the main fork of a small golden penda tree (*Xanthostemon chrysanthus*) 1.5 m above ground (Fig. 1). The tree was planted in a roadside pavement where there was a continual stream of pedestrians.

Fig. 1. Nesting site with nesting tree on the left of the tractor.

Fig. 2. Nest with egg lodged at the branch fork of the tree.

Fig. 3. Incubation, probably by the male during the day.

Fig. 4. Removal of eggshell after hatching.

Incubation – Two white eggs were laid, the first most probably on 15 Jul. or earlier. These eggs were observed when the nesting bird moved its bill downwards, as if to adjust the egg (Fig. 2). It was then that part of the white egg was noticed sticking out of the side of the incubating bird.

Earlier observations of a nesting pair of pink-necked green pigeons (*Treron vernans*) showed that the male took on the day duty while the female, the night shift (Wee, 2005). We expected the zebra doves to follow the same practice but as the sexes are not distinguishable, we cannot say for sure which sex was on duty when (Fig. 3). At approximately 0800 and 1700 hours, a call would be heard with the nesting bird responding. Sometimes the call would be initiated by the latter. The nesting bird would suddenly fly off and within seconds the other would fly in. When there were people around, there would be delays of shift changing of up to half an hour. On arriving at the nest, the bird would fluff its feathers and start preening, sometimes making soft, cooing sounds.

On 29 Jul., at approximately 0800 hours, as one bird flew out of the nest, another flew in. Instead of the usual preening before settling down to incubate, it picked up a piece of eggshell in its bill and flew off (Fig. 4). Minutes later it returned and settled in. This indicated that an egg had hatched. The period of incubation was probably 14 days, typical of the smaller species of the Columbidae, noted to have an incubation period of 11–16 days (Baptista et al., 1997).

Examination of photographic images of the nest revealed three chicks in the nest, and whether hatching was synchronous or otherwise was not ascertained (Fig. 5). However, subsequent observations showed only two chicks. The fate of the third chick was not known.

A pair of Javan mynas (*Acridotheres javanicus*) discovered the nest on 30 Jul. (Fig. 6). The dove on duty gave a distress call, flew off the nest and mobbed the mynas, and succeeded in chasing the intruders away. All this happened within a few minutes.

Fig. 5. Three zebra dove chicks in the nest.

Fig. 6. One of the pair of Javan mynas attempting to raid the nest.

Fig. 7. Adult brooding chicks.

Fig. 8. Adult preening chick.

Brooding – Soon after hatching, the adult was seen nodding its head and feeding the chicks with crop milk. This is a protein-rich secretion that needs no diet supplement like insects and allows the chicks to develop and fledge in a relatively short time, thus reducing the most vulnerable period in the life cycle (Gibbs et al., 2001).

As with incubation, both parents took turns brooding, changing shifts around the same times every morning and evening (Fig. 7). Unlike incubation, the day-shift adult bird was not in the nest all the time but left for short periods when the chicks were a few days old but mostly stayed around the nesting tree, keeping a close watch. As the chicks grew, the adult spent less and less time in the nest during the day. It is most likely that there would always be an adult in the nest at night but no night time observations were made.

The nest and its occupants were well camouflaged. When pedestrians walked less than half a metre away, the birds remained quiet and did not fly off. Even eye contact with the bird did not cause any alarm, as long as there were no sudden movements.

Feeding of the chicks was regular (the frequency of feeding was not recorded) and the adult was constantly preening the chicks (Fig. 8). Feeding may be one at a time, with the chick's bill buried deep inside the adult's buccal cavity (Fig. 9), or both may be fed at the same time, with the bill of each chick inserted from either side (Fig. 10). At the evening shift change, the adult may feed the chicks before flying off (Fig. 11). If this was not done, the arriving adult fed the chicks.

Fig. 9. Adult feeding one chick.

Fig. 10. Adult feeding both chicks.

Fig. 11. Adult with both chicks just before the evening shift change.

Fig. 12. Ten-day old chick exercising its wings.

Fledging and after – At about 10 days old, the chicks began exercising their wings (Fig. 12). Five days later, at 15 days' old, the chicks were finally ready to fledge (Fig. 13). An adult was nearby in the morning encouraging them to fly off. There was no feeding that entire morning. By 1430 hours both chicks had fledged. They had moved to a nearby tree where the adults continued to feed them (Fig. 14). This is consistent with the 10–17 days old of smaller dove species that fledge compared to 20–36 days with larger ones (Baptista et al., 1997).

For the next 35 days, the two fledglings and an adult returned to the trees around the original nesting site every evening at around 1900 hours to roost (Fig. 15). Their arrivals were usually preceded by a call from an adult or even duetting. The birds would then fly in, settle on a branch and huddle together. There they remained until around 0700 hours when the birds began fluffing their feathers, preening themselves or the adults preening the fledglings. In the morning there would be a call by an adult from outside, whereupon one or more of the birds would respond before flying off to join the other adult. The fledgling was heard vocalising only when 30 days old.

During the day the family would forage together. Subsequently the family returned but perched on scaffoldings of the building behind under renovation (Fig. 16). The birds even perched on the sides of other buildings. The adults usually located themselves at high lookout points to gather the two juveniles together.

Fig. 13. Fifteen-day old chicks in nest just before fledging

Fig. 14. Adult feeding juveniles after fledging.

Fig. 15. Adult roosting with both month-old fledglings.

Fig. 16. Adult with fledglings perching on scaffolding.

***A Second Nesting?* –** On the morning of 4 Sep.2005, an adult returned to the nesting site together with both the presumably 24-day-old juveniles. At this stage it was difficult to distinguish the adults from the juveniles although the juveniles may be distinguished by more barring on the plumage and a brownish tinge to the breast instead of the pinkish tinge on the breast of the adult (Burknill & Chasen, 1927). For some time the birds were singing and duetting. Then one bird landed on the nest site and started cleaning up the area, purring 'gurro-gurro-gurro' for up to nearly 10 minutes. At the same time its nasal feathers were erected (Fig. 17). All the birds left after about half an hour later. On and off after this, the birds would arrive at the nest and there would be similar purring sounds.

At one time the birds brought new nest material to the old nest site, as if to refurbish the nest. This was about two months after the first clutch of eggs were laid. However, a week later all the new nesting material was gone. It could be that they were disturbed by the increased construction activities in the house behind the tree as more workers and vehicles were moving too close for comfort. The birds did not return to the nesting site after this.

However, they did return to the area, three birds, possibly an adult and the two juveniles, foraging on the ground in the nearby houses, even when the latter were two and a half months old.

Fig. 17. An adult returning to the nest about three weeks after the chicks fledged.

Fig. 18. Two birds at the old nest site.

DISCUSSION

The protracted parental care observed, lasting 35 days after the chicks left the nest and until the young were 49 days old appears a common phenomenon in many species of small birds, as reported by Ward (1969) working in Singapore on the yellow-vented bulbul (*Pycnonotus goiavier*) and Fogden (1972) working on a number of small species in Sarawak, Malaysia.

This prolonged parental care in tropical birds may be a strategy against the high rate of egg and nestling mortality. Ricklefs (1969) suggested that predation rates are about twice as high in the tropics compared to temperate regions. In Sarawak, Fodgen (1972) reported 144 out of 167 nests, or 86%, were predated upon thus parental care increases the survival rate of offspring during and after the period of dependence.

Ashmole & Tovar (1968) suggested that prolonged parental care is developed in species in which the young might require an extended amount of time in learning foraging skills. This family of zebra doves spent a considerable amount of time together, even after the immature birds became independent, suggesting that these doves may need to learn some skills from their parents.

We were unable to confirm if the zebra doves were preparing for a second nesting attempt or perhaps, the fledged birds were just learning how to build a nest from their parents. Fledged young in the tropics are more valuable than new clutches and are cared for at the expense of a less valuable second clutch (because of the high nest mortality rates). In view of the lean period (the period when food resources is minimal) coming in the northwest monsoon in October, it is unlikely that the doves nested again that year.

CONCLUSIONS

This paper documents the nesting behaviour of zebra dove. Our observations suggest prolonged parental care in zebra dove may be a result of high nest mortality in the tropics and perhaps to allow juveniles to learn important survival skills from their parents.

LITERATURE CITED

Ashmole, N. P. & S. H. Tovar, 1968. Prolonged parental care in royal terns and other birds. *The Auk*, **85**(1): 90–100.

Baptista, L. F., P. W. Trail, & H. M. Horblit, 1997. Family Columbidae (pigeons and doves). in: del Hoyo, J., A. Elliott, & J. Sargatal (eds.), *Handbook of the Birds of the World.* Vol. 4. Sandgrouse to Cuckoos. Lynx Editions, Barcelona. Pp. 60–245

Bucknill, J. A. S. & F. N. Chasen, 1927. *Birds of Singapore and South-east Asia. 2nd Ed. 1990*. Tyron Press, Scotland. 247 pp.

Fogden, M. P. L., 1972. The seasonality and population dynamics of equatorial forest birds in Sarawak. *Ibis*, **114**(3): 307–343.

Gibbs, D., E. Barnes & J. Cox, 2001. *Pigeons and Doves: A Guide to the Pigeons and Doves of the World*. Pica Press, Sussex. 615 pp.

Gibson-Hill, C. A., 1950. A checklist of the birds of Singapore Island. *Bulletin of the Raffles Museum*, **21**: 132–183.

Medway, L. & D. R. Wells, 1976. *The Birds of the Malay Peninsular. Volume V: Conclusion, and Survey of Every Species.* H.F. & G. Whiterby, London & University of Malaya Press. 448 pp.

Ricklefs, R. E., 1969. The nesting cycle of songbirds in tropical and temperate regions. *Living Bird*, **8**: 165–175.

Robinson, H. C., 1927. *The Birds of the Malay Peninsula. Volume I: The Commoner Birds.* H. F. & G. Witherby, London. 329 pp.

Robinson, H. C. & F. N. Chasen, 1936. *The Birds of the Malay Peninsula. Vol. III: Sporting Birds; Birds of the Shore and Estuaries.* H. F. & G. Witherby, London. 264 pp.

Spittle, R. J., 1950. Nesting habits of some Singapore birds. *Bulletin of the Raffles Museum*, **21**: 184–204.

Wang, L. K. & C. Hails, 2007. Annotated checklist of birds of Singapore. *Raffles Bulletin of Zoology*, Supplement **15**: 1–179.

Ward, P., 1969. The annual cycle of the yellow-vented bulbul *Pycnonotus goiavier* in a humid equatorial environment. Journal of Zoology, London, **157**: 25–45.

Wells, D.R., 1999. *The Birds of the Thai-Malay Peninsula. Volume I: Non-Passerines.* Academic Press, London. 648 pp.

Wee, Y. C., 2005. Forging a closer relationship with pink-necked green-pigeons. *Nature Watch*, **13**(3): 16–22.