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# Observations of Cape Parrot, *Poicephalus robustus*, nesting in the wild

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Most Cape Parrot, *Poicephalus robustus*, nests have been recorded in snags (standing dead trees) making monitoring of nest contents and nest activities difficult and dangerous. Here the breeding activity of a Cape Parrot pair in the cavity of a live Henkell's Yellowwood (*Podocarpus henkellii*) is presented. Four eggs were laid in early-August and three chicks successfully raised. Incubation period was estimated at 30–32 days. Two nestlings fledged successfully and one (the youngest) was removed because it was injured in the nest and would not have survived. Fledging period was estimated at 80 days.

## Introduction

The Cape Parrot, *Poicephalus robustus*, is considered Endangered in South Africa (Downs 2000) and less than 1 000 birds are estimated to remain in the wild (Downs and Symes 1998). Distribution of the Cape Parrot is confined to mature afromontane forests from the Eastern Cape to central KwaZulu-Natal (KZN), with a relic population occurring in the forests of eastern Mpumalanga and southern Limpopo Province (Wirminghaus 1997). Breeding usually occurs in these forests from August to February (Wirminghaus *et al.* 2001a), but breeding has been observed in other months in captivity (W Horsfield pers. comm.). Nests are in natural or previously excavated cavities, usually in dead yellowwoods *Podocarpus* spp. at a height of 6–12m (Wirminghaus *et al.* 2001a).

Dead trees known as snags are difficult and dangerous to climb for nest inspection. Three Cape Parrot nests discovered in snags in Hlabeni Forest, between 1993 and 2001, fell over after three, three and one years respectively following their discovery (Downs and Symes 2004). However, in 2001 a Cape Parrot nest was discovered in a living Henkell's Yellowwood *Podocarpus henkellii*, in a forest in the KZN midlands. Little is known of the breeding biology of the Cape Parrot in the wild and the opportunity was taken to record this.

## Materials and methods

In late 2001 the Cape Parrot nest cavity found in the living Henkell's Yellowwood *P. henkellii* was inspected at opportunistic intervals of 3–18 days. Inspections occurred on 4 and 16 August, 1, 19 and 27 September, 15 and 24 October, 3, 6, 16, 21 and 22 November. The tree was climbed by only one observer using standard rock-climbing equipment. Once the Cape Parrot chicks had hatched they were removed for inspection, lowered in a bucket to the base of the tree, and measured. They were then returned to the cavity after a total chick handling period of <40min. The nest was then observed to ensure that at least one of the adults returned to the nest. Measurements were taken in the morning between 08h00 and 10h00. It was assumed that during this period there would be the least disturbance to the birds as they usually feed early morning after sunrise (Wirminghaus, Downs, Symes pers. obs.). Body mass of the chicks was recorded initially with a 100g (1g intervals) Pesola ® balance, and then with a 600g (5g intervals) Pesola ® balance once the chicks exceeded 100g. Wing and tail length were measured with a 30cm stainless steel wing rule. Tarsus and bill length (edge of culmen direct to tip of upper mandible; measurement MB6 in: Wirminghaus *et al.* 2002a) were measured with 150mm analog Vernier calipers. During the first handling session of the chicks, they were close ringed with uniquely numbered stainless steel rings (ID = 9mm; OD = 12mm; depth = 5mm) to distinguish individuals at successive measuring sessions. Feather growth and anecdotal comments about chick appearance were recorded at each observation. Blood samples were taken from each chick for DNA, disease and gender analyses on 15 October and 3 November.

Nest characteristics measured included cavity height, diameter at breast height (dbh) of nest tree, aspect of nest hole, size and shape of nest hole entrance, and dimensions and shape of nest cavity. Nest temperature conditions were recorded using pre-calibrated temperature dataloggers (DS1921 Thermochron iButtons®, Dallas Semiconductor, USA) placed at nest height on the west side of tree, at the cavity entrance, on the cavity floor (two) and at the base of the nest tree on the forest floor. The iButtons were removed at the last inspection (Table 1).

An additional nest cavity was found in a snag in a nearby forest and Cape Parrots were observed using it until it was destroyed in high winds. Two Cape Parrot chicks had not fledged and died. They were removed two days later, weighed and body tissue was used for DNA analysis. Partial decomposition had occurred. The body weights of the chicks were compared with the other nestlings. Dimensions of the fallen nest were also measured.

In the following two years the nest in the live tree was checked for breeding activity, however detailed descriptions of breeding were not recorded.

## Results and discussion

### Clutch stage

The Cape Parrot nest was first inspected on 4 August 2001 and three eggs were present. On 16 August there were four eggs in the nest. In captivity eggs are laid at 2–3 day intervals (Wirminghaus *et al.* 2001a); therefore laying dates were estimated (Table 1). On 19 September three chicks were observed in the nest. From experience of captive birds, the ages of the nestlings were estimated at 14–17 days and hatching dates determined to be 2–5 September. Error is estimated to not exceed two days. If eggs were laid on successive days (as in captivity), incubation period is extrapolated to 31 days. The egg that did not hatch measured 35.54mm x 28.66mm and was infertile (W Horsfield pers. comm.). The other eggs were not measured.

### Chick development

Cape Parrot chick development in the wild is shown in Figures 1 and 2. Body mass of each of the chicks together with that of chicks recovered from the toppled nest with time (Figure 1) shows asynchrony of c. two weeks in laying dates between the two nests. The dead chicks from the toppled nest each weighed 57.7g and 80.6g and were estimated to be 9–12 days old. Chick growth and development measurements (tarsus length, bill length, wing length and tail length) *versus* age are shown in Figure 2a and b.

This is the first time growth of Cape Parrot nestlings in the wild has been monitored. Previously this has not been attempted as all nests discovered were in snags, making inspection difficult or dangerous (Wirminghaus *et al.* 2001a). Clutch size in the wild was in the range of that recorded in captivity (Wirminghaus *et al.* 2001a). In captivity Cape Parrots fledging period is dependent on clutch size, food availability and environmental weather conditions (pers. obs.). In this study the older chicks grew more rapidly than those hatching after them as shown by separation of growth rate slopes (Figure 1).

In captivity Cape Parrots are generally hand-fed a mixture of Kaytee Plus® up to five times a day from hatching to fledging (W Horsfield pers. comm.). In the wild contents of the crops of young nestlings had a smooth consistency. Whole seeds were observed in the crop of chicks aged c. 60 days. These were possibly *Podocarpus* spp. seed kernels that are high in fat, protein and energy (Wirminghaus *et al.* 2002b).

Two of the wild Cape Parrot chicks were male and one, the youngest, was female. All tested negative for psittacine beak and feather virus. The youngest chick was observed to have an injured bill on 3 November (age 59 days). The severity of the damaged bill indicated that an adult parrot possibly caused it. Significant weight loss had occurred since the previous observation on 24 October (Table 1). However, inspection on 6 November indicated a weight gain, although it was still significantly smaller than the elder two chicks. A decision was made, after consulting various international veterinarians and KZN Wildlife, to remove the chick and incorporate it into a captive breeding programme. This occurred on 16 November at 77 days. In captivity the bill healed after two months but is skew and lacks the end tip.

Fledging occurred at 79 and 81 days. However, it is likely that these birds may have fledged earlier and had returned to roost in the nest. The last of the remaining chicks was observed leaving the nest prior to climbing the tree and inspecting the cavity on 22 November.

In 2003 the nest site was visited on 7 September. A female was observed leaving the cavity and at least six other birds were active in the immediate vicinity. Juvenile soliciting calls were heard from the cavity. On 1 November two eggs were observed in the nest. There was no activity of Cape Parrots in the vicinity and the nest appeared abandoned. It was likely that the chicks had already fledged or the nest was abandoned before the complete clutch was laid.

### Nest conditions

Ambient temperatures of the Cape Parrot nest (interior and exterior) are reported for various stages of the nesting period in Figure 3. Temperatures at the base of the cavity increased as the nestling period progressed, while temperatures at the

**Table 1:** Progress of a Cape Parrot nest in the wild and extrapolated dates for laying and hatching (actual nest inspection dates are given in text)

| Date | Nest observations | Extrapolation of nest progress |
|---|---|---|
| 21 July | Nest discovered | |
| 1 August | | 1st egg laid |
| 2 August | | 2nd egg laid |
| 4 August | 3 eggs | 3rd egg laid |
| 6 August | | 4th egg laid |
| 16 August | 4 eggs | |
| 1 September | 4 eggs | |
| 2 September | | 1st egg hatches (32 days) |
| 3 September | | 2nd egg hatches (32 days) |
| 4 September | | 3rd egg does not hatch (appears infertile) |
| 5 September | | 4th egg hatches (30 days) |
| 16 November | injured chick removed | 75, 74, 72 (injured chick age) |
| 21 November | 1 chick | 80 (1st chick fledges), 79, 77 |
| 22 November | 0 chick | 81, 80 (2nd chick fledges), 78 |

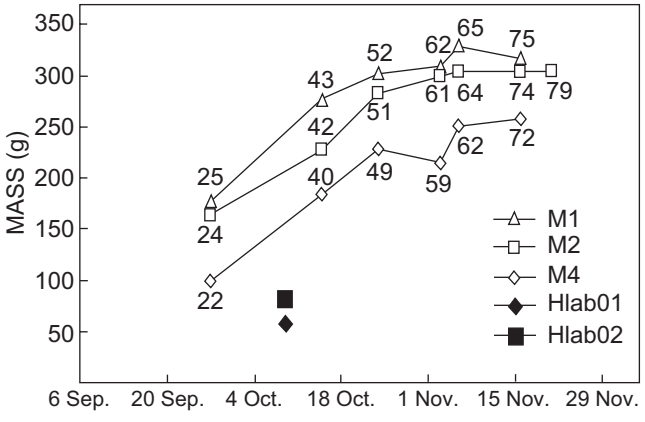


**Figure 1:** Change in body mass of Cape Parrot nestlings at the live Yellowwood nest (M1 = chick 1, M2 = chick 2 and M4 = chick 4). Body masses of the two chicks from the toppled nest are also shown (Hlab01 = chick 1 and Hlab02 = chick 2)

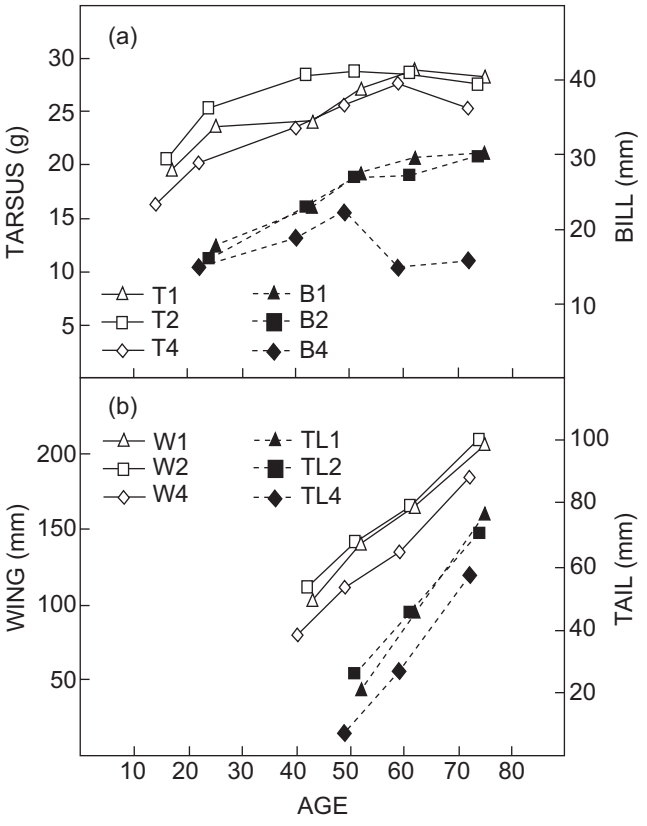


**Figure 2:** Growth rates of three Cape Parrot nestlings in the wild indicating, a) tarsus and bill length, and, b) wing and tail length, in relation to age of the respective chicks (T = tarsus, B = bill, W = wing, TL = tail). (Chick numbering as in Figure 1)

top of the cavity, at the base of the tree and on the forest floor remained relatively constant. The temperature at the bottom of the cavity was significantly lower when it contained only eggs than when it contained chicks up to 16 days old (t test; t = –2.72; df = 22; P < 0.01), and lower with chicks between hatching and 16 days old than chicks aged 17–43 days old (t test; t = –9.52; df = 22; P < 0.0001). Similarly, cavity bottom temperatures of chicks aged 17–42 days were significantly lower than with chicks 43–61 days old (t test; t = –4.85; df = 22; P < 0.0001), as were cavity bottom temperatures of these chicks (43–61 days old) compared to chicks 62 days old to fledging (t test; t = –0.72; df = 22; P < 0.5).

Mean cavity base temperature increased throughout the nestling period, but remained more or less constant throughout the day. An increase in nest cavity temperature through the nestling period in comparison to ambient temperature reflects an increase in the heat produced by the growing chicks. As the chicks got older, they presumably improved their ability to thermoregulate independently, and so the increased cavity temperature probably does not negatively affect the chicks. The temperature data showed that the cavity provides a relatively stable, warm environment for the parrot nestlings. The difference between cavity temperature and ambient temperature was approximately 10°C, which would significantly reduce energy expenditure of the chicks

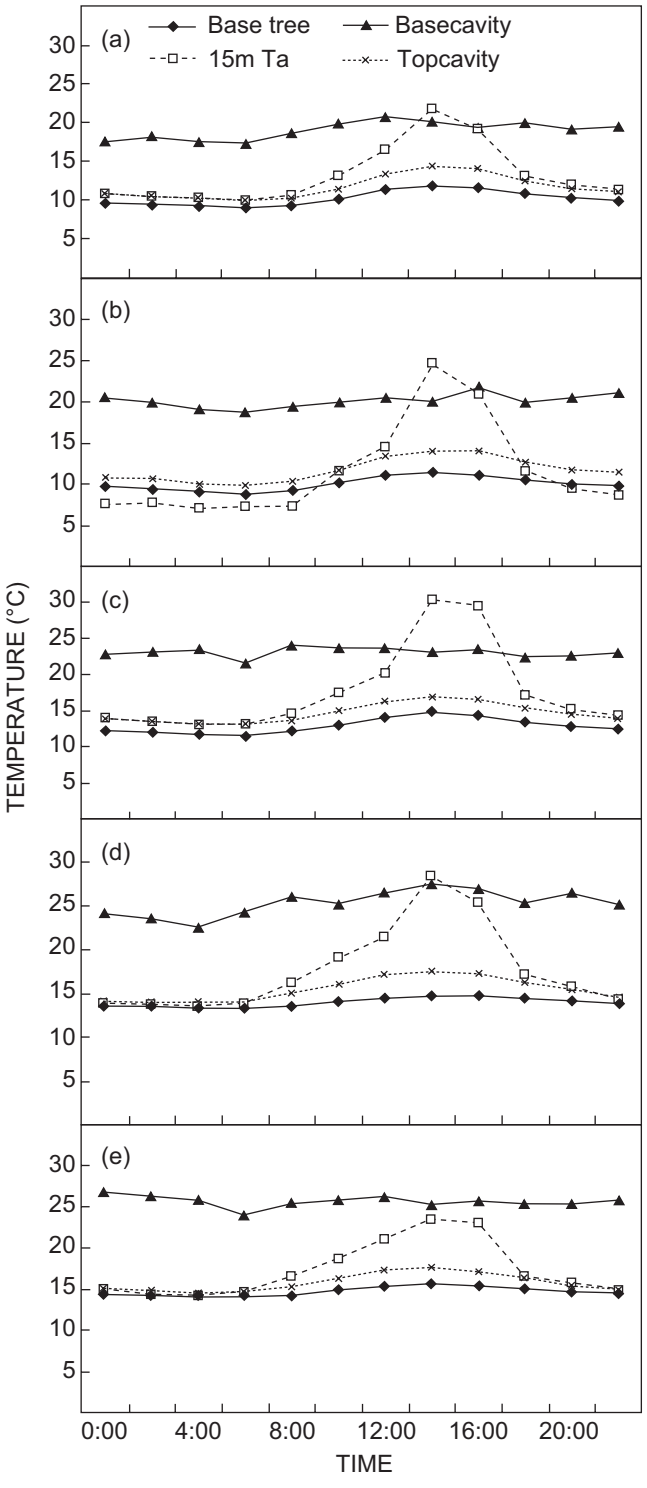


**Figure 3:** Mean ambient temperatures and cavity temperatures at a Cape Parrot nest in the wild where (a) eggs only; (b) hatching to 16 days; (c) 17–42 days; (d) 43–61 days and (e) 62 days until fledging

than if they were to be exposed to outside ambient temperatures. This shows an adaptive benefit of cavity nesting in this species, as it allows the female to spend less time brooding chicks and more time foraging for food for them.

This is important in the Cape Parrot where long distance flights to forage occur (Wirminghaus *et al.* 2001b).

**Nest characteristics**

The height of the Cape Parrot nest cavity in the living *P. henkelii* was 13.6m above ground. Cavity depth from the lip of the entrance was c. 65cm and measured c. 30cm x 25cm at the base. The cavity entrance measured c. 9cm at the base and extended in a slit c. 40cm up the tree trunk. Cavity aspect was 210° and nest tree dbh measured 90cm. The base of the cavity was flat and lined with faeces.

The nest dimensions of the other nest in the snag blown over in heavy winds were recorded soon after this occurred. The nest tree was a dead *Podocarpus falcatus* with a dbh of 96cm. Nest cavity aspect was c. 80° with a hole height of c.12m above ground. The nest cavity entrance was situated at a broken off branch and measured c. 79cm deep. The cavity base was excavated and measured c. 14cm x 30cm.

Nest tree dimensions were similar to those previously reported (Wirminghaus *et al.* 2001a). Very few nests have been identified in the wild (Wirminghaus *et al*. 2001a), therefore forests in which they occur, albeit in low numbers, are important for conservation. Aspects of breeding biology in the wild, such as nest site requirements, may assist in providing information for nest-box construction. The decline of the Cape Parrot in the wild has been attributed to a number of factors, including habitat destruction and degradation (Wirminghaus *et al.* 1999). The possible success of nest-box supplementation may improve recruitment and contribute towards the long-term survival of this species in the wild.

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