MONTEIRO'S HORNBILLS

Selfish mothers

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Confined to arid regions where food is often scarce, breeding female Monteiro's Hornbills would rather sacrifice their young to starvation than die themselves.

Animals are genetically hard-wired to produce as many offspring as possible during their lifetime. However, the extra work-load of raising and caring for young can increase the exposure of a parent to life-threatening risks such as predation or physiological stress. Animals must therefore juggle the benefits of producing many young at one breeding attempt, and the associated likelihood of reduced life expectancy, with the benefits of producing fewer young at any one time to ensure they live to breed again. Theory predicts that potentially long-lived animals should evolve reproductive strategies that favour their own survival over that of their offspring in situations where the two options conflict with one another, such as in instances of food shortage.

Hornbills are long-lived birds with a particularly unusual chick-rearing strategy. With the help of their mate, female *Tockus* hornbills seal themselves into the nest cavity even before they begin to lay their eggs. As they start to lay and incubate their eggs, the females moult all their flight feathers simultaneously, and remain trapped in the nest for several weeks, until well after the chicks hatch. This places a large burden on the male, who has to feed not only himself, but also his incarcerated mate and their growing brood. The sooner the female leaves the nest, the sooner she can help the male in meeting the energy demands of the growing young. The additional food provided by the female gives the brood a greater chance of survival, so it would benefit the young if the female left earlier rather than later. However, if the female leaves the nest too soon, specifically before her feathers have re-grown properly, she places herself at risk because of reduced flight ability, which compromises both her ability to escape from predators and to move about to find food.

Michael Mills, a student at the Fitztitute, studied these trade-offs in Monteiro's Hornbill *Tockus monteiri*, a species endemic to semi-arid habitats in Namibia and Angola. Specifically, he addressed the question of whether the timing of a female's departure from the nest is determined primarily by her own body condition or by that of her offspring. Monteiro's Hornbills are estimated to live to an age of 35–40 years, so it was hypothesised that at any one breeding attempt, females should be more concerned about their own survival than about that of their offspring.

The study was carried out on a population of Monteiro's Hornbills breeding in nest boxes at Daan Viljoen Nature Reserve, just west of Windhoek, in central Namibia. The findings supported the initial hypothesis: the timing of the female's departure was not determined by either the developmental state of the nestlings (i.e. how big they were) or by how slowly or rapidly they were growing (i.e. their energy balance). Instead, the timing of her departure from the nest was 'selfish', being dictated primarily by her own physiological needs. While the female is in the nest, she receives less food from the male than she would find if foraging for herself and, as a result, she loses weight progressively. When her weight has dropped to a critically low level, the female can no longer afford to stay in the nest: the risk of starvation is too high and her lowered physiological state triggers her departure. Typically, this happens very soon after the female has fully regrown her feathers following the flightless moult.

Even though this selfish strategy can regularly lead to very low breeding success or to breeding failure, in an evolutionary context this cost must be more than overridden by the benefits of the female living for longer and maximising the number of occasions on which she can attempt to breed. □

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