Ibis (2006), doi: 10.1111/j.1474-919x.2006.00501.x

Short communication

First documentation of sibling cannibalism in a small passerine species

AVIGAIL BEN-DOV,* YONI VORTMAN & ARNON LOTEM
Department of Zoology, Tel-Aviv University, Tel-Aviv 69978, Israel

In its broadest definition, cannibalism refers to feeding on an individual of the same species. Sibling cannibalism in birds is usually ascribed to raptor species. The cannibalistic behaviour generally follows brood reduction caused by sibling competition over resources or siblicide (Ingram 1959, Bortolotti *et al.* 1991, Stanback & Koenig 1992, Mock & Parker 1997). It has been suggested that nestlings of non-predatory species are incapable of feeding on a dead sibling because of physical constraints, feeding method or inclination (Stanback & Koenig 1992). Among passerines, sibling cannibalism might be expected in predatory groups such as corvids or shrikes, and it has been observed in nestlings of the Black-billed Magpie *Pica pica*, following aggressive behaviour and siblicide (Reynolds 1996). However, to date, there has been no evidence for sibling cannibalism in small non-predatory passerines. In this paper, we report on a female House Sparrow *Passer domesticus*, caught on video camera feeding her nestlings with the carcass of their dead sibling. We are unaware of any previous documentation of sibling cannibalism of this kind in a passerine species.

Our observation was recorded in the course of a study on parent–offspring communication in free-living House Sparrows during spring 2004. The Sparrows breed in nestboxes located on two large buildings on the campus of Tel-Aviv University. We used infrared video cameras to monitor parental response to 3-day-old nestlings supplemented by begging playbacks broadcast from a small speaker inside the nest. The playbacks were activated for 10 s during several parental visits; their frequency and intensity were within the natural range of Sparrow begging calls; and both parents and nestlings behaved normally during these experiments.

In one of the experimental nests, the two smallest of the five nestlings died, probably due to starvation, one during the night before the experiment and the other early in the morning of the experiment (25 May 2004). Brood reduction of this magnitude is common in Sparrow nests at this stage (Singer & Yom-Tov 1988). While monitoring the behaviour at this particular nest, the female was observed removing one of the carcasses from the nestbox (Fig. 1a). Twenty minutes later, she returned with a carcass, its head and one of its legs removed, and attempted to feed it to its living siblings. Several feeding attempts were made, but the nestlings were unable to swallow the uncommonly large food item. The female then left again and returned 3 min later with the carcass further reduced in size (a small reduction of about 15–20%), and again attempted to feed the nestlings (Fig. 1b,c). Eventually, one of the nestlings was fed with the carcass (Fig. 1d). Between the corpse removal and the female's first return to the nest, the male visited and fed the nestlings three times. Although we cannot exclude the possibility that the carcass consumed was not that of the formerly observed sibling but of a different nestling, this possibility seems unlikely given the circumstances.

A complete documentation of the feeding event on a video clip can be viewed at: http://www.tau.ac.il/video/Research/Life_Sciences/Zoology/Animal_Behavio/cannibalism_in_sparrows/

Our observation suggests that the female parent processed and treated the dead nestling as a potential food item, and then offered it to its offspring. This may support the ice box hypothesis (Alexander 1974) or the trophic hypothesis (Mock & Forbes 1995), according to which residual nestlings of a brood can serve as a stable reservoir of nutrients which can be recycled and provided to the core nestlings in case of food shortage (see Margalida *et al.* 2004 for a recent example in Bearded Vulture *Gypaetus barbatus*). Other known forms of nutrient recycling by parent birds are egg, eggshell and faecal sac consumption (Tinbergen 1953, Welty 1975, Dell'omo *et al.* 1998).

However, as this appears to be a rare event in the House Sparrow, adaptive explanations of this behaviour should be considered with some caution. Alternatively, this form of cannibalism can also be explained as a simple combination of two independent behavioural modes, namely nest sanitation and foraging behaviour. Dead nestlings are usually removed from the nest by their parents in nest sanitation (Skutch 1976, Stanback & Koenig 1992). Outside the context of the nest, the dead nestling may have appeared to the parent as a potential food item. The 20 min that passed between the removal of the nestling carcass and the feeding could have been used for handling it as a food item. An additional possibility may be that the parent discarded the carcass in the vicinity of the nest and re-discovered it several minutes later.

The observed incidence of sibling cannibalism in the House Sparrow seems rare. Such an incident has never been observed before during our long-term study of this outdoor colony, despite our having analysed many hours of videos from dozens of nests (Yedvab 1999, Kedar *et al.* 2000, 2002, I. Biran unpubl. data). Nonetheless, considering that such an event can easily be missed, it may not be

*Corresponding author.
Email: bendovav@post.tau.ac.il

Figure 1. Video frames documented the female House Sparrow: (a) removing the carcass of the dead nestling from the nest, (b) bringing it as a food item to the nestlings (note the leg of the dead nestling on the right side), (c) attempting to feed one of the nestlings unsuccessfully and (d) feeding successfully one of the nestlings with the carcass. The entire video clip of the feeding event can be viewed at: http://www.tau.ac.il/video/Research/Life_Sciences/Zoology/Animal_Behavio/cannibalism_in_sparrows/

as rare as has been thought to date. An additional observation in which a House Sparrow fed its young with a dead nestling occurred in our captive breeding colony at the research zoo of the university, where House Sparrows breed in large cages (R. Dor unpubl. data). During the breeding season of 2004, a half-ingested nestling was found in the mouth of another nestling, still with a plastic ring on its leg, allowing us to identify it as having come from a different nest. This observation, uncommon in the captive colony, was first assumed to derive from the conditions of captivity. However, together with the reported observation from the wild colony, it seems that sparrows

are capable, occasionally, of feeding their nestlings with the carcasses of other nestlings, including those of the chicks' own siblings. We cannot determine at this stage whether this behaviour is a case of coincidental foraging or, rather, an adaptive form of recycling of a nestling by its parent.

We thank D.W. Winkler, D.W. Mock, Y. Yom-Tov, U. Grodzinski, R. Dor and an anonymous reviewer for their helpful comments, and R. Dor, I. Biran-Yoeli and H. Kedar for personal information.

SUPPLEMENTARY MATERIAL

Video footage of figure 1 is available with the full text version of this article online at www.blackwell-Synergy.com.

REFERENCES

Alexander, R.D. 1974. The evolution of social behaviour. *Ann. Rev. Ecol. Syst.* **5**: 325–383.

Bortolotti, G.R., Weibe, K.L. & Iko, W.M. 1991. Cannibalism of nestling American Kestrels by their parents and siblings. *Can. J. Zool.* **69**: 1447–1453.

Dell'omo, G., Alleva, E. & Carer, C. 1998. Parental recycling of nestling faeces in the Common Swift. *Anim. Behav.* **56**: 631–637.

Ingram, C. 1959. The importance of juvenile cannibalism in the breeding biology of certain birds of prey. *Auk* **76**: 218–226.

Kedar, H., Rodríguez-Girones, M., Yebab, S., Winkler, D.W. & Lotem, A. 2000. Experimental evidence for offspring learning in parent–offspring communication. *Proc. R. Soc. Lond. B* **267**: 1723–1727.

Kedar, H. 2002. *The Role of Learning in the Communication between Bird Nestlings and their Parents*. PhD thesis, Tel-Aviv Universty.

Margalida, A., Bertran, J., Boudet, J. & Heredia, R. 2004. Hatching asynchrony, sibling aggression and cannibalism in the Bearded Vulture *Gypaetus barbatus*. *Ibis* **146**: 386–393.

Mock, D.W. & Forbes, L.S. 1995. The evolution of parental optimism. *Trends Ecol. Evol.* **10**: 130–134.

Mock, D.W. & Parker, G.A. 1997. *The Evolution of Sibling Rivalry*. Oxford: Oxford University Press.

Reynolds, P.S. 1996. Brood reduction and siblicide in Black-Billed Magpies (*Pica pica*). *Auk* **113**: 189–199.

Singer, R. & Yom-Tov, Y. 1988. The breeding biology of the House Sparrow *Passer domesticus* in Israel. *Ornis Scand.* **19**: 139–144.

Skutch, A.F. 1976. *Parent Birds and Their Young*. Austin: University of Texas Press.

Stanback, M.T. & Koenig, W.D. 1992. Cannibalism in birds. In Elgar, M.A. & Crespi, B.J. (eds) *Cannibalism: Ecology and Evolution Among Diverse Taxa*: 277–298. Oxford: Oxford University Press.

Tinbergen, N. 1953. *The Herring Gull's World*. London: William Collins and Sons.

Welty, J.C. 1975. *The Life of Birds*. Philadelphia: W.B. Saunders.

Yedvab, S. 1999. Begging strategies of House Sparrow nestlings. MSc thesis, Tel-Aviv University.

Received 31 May 2005; revision accepted 19 September 2005.