Host behaviour and nest-site characteristics affect the likelihood of brood parasitism by shiny cowbirds on chalk-browed mockingbirds

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Summary

We investigated the association between brood parasitism by shiny cowbirds (Molothrus bonariensis), and behaviour and nest-site characteristics of chalk-browed mockingbirds (Mimus saturninus). This host builds nests on trees, it is aggressive against intruders and it is larger than shiny cowbirds. We conducted focal observations of mockingbird nests, and registered mockingbird activity and attentiveness around the nest. To characterize nest sites, we measured nest cover, nest height, and distance from the nest to the closest perch, and included host laying date and year as additional predictor variables. We also evaluated experimentally host agonistic behaviours directed towards a female cowbird and a control model, and the association between aggressive behaviour and parasitism. Nest attentiveness, nest cover and laying date were associated with parasitism. These results contradict the host-activity hypothesis, because more attentive pairs were less parasitized, and the nest-exposure hypothesis, because more concealed nests were more parasitized. Experiments showed that unparasitized pairs were more aggressive against cowbird models than were parasitized ones. Our findings indicate that shiny cowbirds prefer to parasitize more concealed nests, where they could lay undetected by the host, and that mockingbird nest attentiveness and aggression towards cowbirds are effective first lines of defence against brood parasitism.

Keywords: brood parasitism, host behaviour, Molothrus bonariensis, Mimus saturninus, nest-site characteristics.

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Introduction

Brood parasitism generally has significant costs to host fitness (Payne, 1977; Rothstein, 1990; Ortega, 1998; Rothstein & Robinson, 1998; Davies, 2000; Krüger, 2007) and, thus, exerts a strong selective pressure on host species to evolve antiparasite defences (Davies & Brooke, 1988; Sealy, 1996). Because parasites must find host nests in which to lay their eggs, one antiparasite defence would be to select nest sites that are difficult to find. A second defence would be to avoid giving behavioural cues that allow parasites to find nests (Sealy et al., 1998).

There has been considerable effort to identify cues and search modes that brood parasites use to find nests (Thompson & Gottfried, 1981; Gill et al., 1997; Clotfelter, 1998; Teuschl et al., 1998; Moskát & Honza, 2000; Banks & Martin, 2001; Antonov et al., 2007). A major motivation to understand which cues are used by brood parasites in locating host nests are frequent observations that brood parasitism is not random within and across host populations (Lindholm, 1999; Krüger, 2007). Such non-random parasitism has been widely documented for host nest-site characteristics (Øien et al., 1996; Grim, 2002). Røskaft et al. (2002) found that the host breeding habitat explains the rate of parasitism by the common cuckoo (Cuculus canorus) and Hauber (2001) found that brown-headed cowbirds (Molothrus ater) preferentially parasitize eastern phoebe (Sayornis phoebe) nests under eaves versus those under bridges. Other characteristics such as host age and/or experience (Brooker & Brooker, 1996), host quality (Soler et al., 1995), and host behaviours around nests (Clotfelter, 1998) also affect the probability of parasitism.

There are at least four non-exclusive hypotheses for mechanisms and cues used by parasites to find host nests (Clotfelter, 1998; Hauber & Russo, 2000). The host-activity hypothesis states that vocal and visible activities of hosts attract brood parasites and thereby increase probability of parasitism (Uyehara & Narins, 1995; Banks & Martin, 2001). The nesting-cue hypothesis asserts that parasites use nest-defence responses by hosts directed towards them as a cue to locate hosts’ nests. Thus, hosts that respond more aggressively towards parasites would be parasitized more often than less aggressive ones (Robertson & Norman, 1976, 1977; Smith et al., 1984). The nest-exposure hypothesis proposes that brood parasites find more easily those host nests that are visually conspicuous. According to this hypothesis, nests with little cover are more likely to be parasitized (Larison et al., 1998; Moskát &