

Proximity of trees facilitates parasitism by Cuckoos *Cuculus canorus* on Rufous Warblers *Cercotrichas galactotes*

As a defence against brood parasitism by Cuckoos *Cuculus canorus*, hosts react in various ways to the presence of an adult Cuckoo near their nests. They often attack adult female Cuckoos (Chance 1940, Baker 1942, Molnár 1944) and, in experiments with model hosts, react to the presence of an adult Cuckoo dummy by rejecting Cuckoo egg models or by deserting their parasitized nests more frequently (Davies & Brooke 1988, Moksnes & Røskaft 1989). Female Cuckoos often watch prospective hosts for several days before parasitizing their nests (Chance 1940, Wyllie 1981). While this behaviour must be useful to synchronize egg-laying with the hosts' egg-laying period, it could be to the Cuckoo's advantage to remain concealed while watching the hosts' activities. If so, the occurrence of visual shelter near the nest sites of potential hosts would perhaps facilitate brood parasitism.

This note reports observations made during a study of a highly parasitized population of Rufous Warblers *Cercotrichas galactotes* in which Cuckoos were several times observed watching warbler nest-building activities from inside tree tops.

The study area (3.1 ha), 20 km to the southeast of the city of Seville, Spain, was mostly covered with vineyard (on whose stocks all nests were found) with small patches dedicated to vegetable growing (tomatoes and potatoes) and interspersed trees (cork oaks and peach, olive, almond, fig, pomegranate and pear trees, 23 trees/ha).

In order to detect any possible influence of tree proximity, the distance to the nearest tree of parasitized and unparasitized nests of Rufous Warblers was measured to the nearest 1 m during the laying period from 15 May (date of first egg laid) until 17 July 1992 (last day when Cuckoos were observed).

To eliminate the effect of the perching opportunities provided by trees on the occurrence of brood parasitism, reed sticks about 3 cm thick and 1.5 m high were placed every 15 m in the study area (Cuckoos would perch on these sticks in full view and a copulation occurred on one of them). Nevertheless, it could still be that Cuckoos

might choose to watch prospective hosts from the higher viewpoint of trees since these would perhaps enable them to overlook the nesting area, making it easier to identify where Rufous Warblers were nest-building. The reduced visibility from viewpoints inside tree tops (where Cuckoos were observed watching Rufous Warbler nest-building activities) suggests that this is unlikely.

Of a total of 23 Rufous Warbler nests with complete clutches, those parasitized by Cuckoos were closer to trees than those not parasitized (mean distance to nearest tree \pm s.e. of parasitized nests: 22.9 ± 2.8 m, $n = 8$; not parasitized nests: 40.7 ± 12.4 m, $n = 15$; Mann-Whitney U -test, $U = 14$, $P = 0.001$). Although no appreciable difference was noticed in Cuckoo egg colour pattern, according to simultaneous observations of female Cuckoos and listening to their calls, I estimate the number of females present in the study area as two and not more than three.

While the covert surveillance of nest-building Rufous Warblers may be the main reason why Cuckoos hide inside tree tops, by so doing they probably also reduce the frequency of mobbing by other bird species, particularly by Melodious Warblers *Hippolais polyglotta*, which, although not parasitized by Cuckoos, react very aggressively to their presence.

The higher rate of parasitism by the Great-spotted Cuckoo *Clamator glandarius* in forested areas, compared with that in habitats without trees (Valverde 1960, Alvarez & Arias de Reyna 1974, Arias de Reyna *et al.* 1982), suggests that this species also may be using secretive surveillance of prospective hosts.

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