Gleaning in *t*ipspringer preorbital glands by Redwinged Starlings and Yellowbellied BullsIs.

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Feeding associations between klipspringer *Oreotragus oreotragus* and at least three passerine species are recorded, two of these, with Redwinged *Oreochromis mossi* and Palewinger *Ochotyrus aurifrons*, are already well documented (e.g. Angwin 1971; Gordon 1974; Gargett 1975; Tilson 1977; Dean & MacDonald 1981) while the third, with Yellowbellied BullsIs *Chlorocebus flaviverris*, has been only recently reported (Roberts 1993, 1994). The birds apparently feed on ectoparasites, particularly ticks, and usually concentrate gleaning on the back, neck and around the ears (e.g. Gordon 1974; Tilson 1977; Roberts 1993). In contrast, I found that much of the birds’ attention was directed towards the klipspringer’s preorbital glands.

Bird/klipspringer interactions were observed during a field study of klipspringers in Zhubabwe at the Malene Dam area of Matobo National Park and at Sentinel Ranch, 60 km west of Beit Bridge (see Roberts 1994). Data were recorded using a dictaphone while observing the animals through binoculars or a telescope. The duration of each visit and time spent by the birds on different klipspringers or parts of the body could be determined with a stopwatch (to the nearest second). Although *O. mossi* occasionally gleaned from nearby rocks, most gleaning occurred while perching on the klipspringer. Pecks on the head were divided into those in the preorbital glands and those directed elsewhere on the head. Distance between the observer and the subject varied greatly, but distances were smaller at Matobo than at Sentinel, including two observations within 35 m, and it was therefore possible to take accurate note of the target of gland-directed pecks.

Visits to klipspringer groups by *O. mossi* were observed on four separate occasions: twice at Matobo and Sentinel, four visits by *C. flaviverris* to klipspringer groups were recorded at Matobo. In 7 out of 8 observations a juvenile was present in the klipspringer group and in 3 cases a subadult was present. However, both bird species appeared to show preferences for adults or subadults, a juvenile being visited only once, by *O. mossi* at Sentinel. In total, 93 pecks by *O. mossi* (1.3/min) and 42 by *C. flaviverris* (3.8/min) were recorded. These were spread relatively evenly over the body, although the back received fewest pecks (see Table 1) and peck sites were higher on the neck, head and scent glands than on the back.

Pecking at the preorbital glands occurred during every visit by *O. mossi* (at both field sites), but in only one *C. flaviverris* visit (at Matobo, during which it pecked at the left gland 16 times and the right gland 4 times in 94sec). Pecks directed here usually resulted in rapid head shaking by the klipspringer to dislodge the bird, the exception being during the visits by *C. flaviverris*, in which the klipspringer remained very still. In every case when birds pecked a klipspringer on which it was not perching at the time (n=21, all by *O. mossi*), most pecks were directed at the scent glands (14) or the rest of the head (5).

There are two possible reasons for gleaning around the preorbital glands: (i) that there is an abundance of ectoparasite prey in the area of the scent glands, and (ii) that birds deliberately ingest preorbital gland secretion.

Ticks may concentrate in and around the glands: in the Matobo NP, an adult tick (*Ixodes angustii*) aggregates on twigs that have previously been

<table>
<thead>
<tr>
<th>Table 1</th>
<th>PECKS MADE BY TWO GLEANING BIRD SPECIES ON DIFFERENT BODY AREAS OF KLIPSPRINGER</th>
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</thead>
<tbody>
<tr>
<td>Back</td>
<td>Neck</td>
</tr>
<tr>
<td>Oreochromis mossi</td>
<td></td>
</tr>
<tr>
<td>No. of pecks</td>
<td>11</td>
</tr>
<tr>
<td>Rate (min⁻¹)</td>
<td>4.1</td>
</tr>
<tr>
<td>Chlorocebus flaviverris</td>
<td></td>
</tr>
<tr>
<td>No. of pecks</td>
<td>2</td>
</tr>
<tr>
<td>Rate (min⁻¹)</td>
<td>4.8</td>
</tr>
</tbody>
</table>
scent marked by klippringers in order to gain access to the host on subsequent visits (Rechav et al. 1978; Spickett et al. 1980).

However, ecological studies on I. matoppi show that there should have been few, if any, adult ticks active at the time of these observations (Colborne et al. 1981). There had been no rain for several months prior to any of the interactions at Matobo, and ticks would not have been able to locate scent marked branches as this depends on the release of an aqueous active component of the scentsecretion when it dissolves in rainwater (Rechav et al. 1978). No I. matoppi were found at Sentinel, despite daily examination (including after rainfall) of nearly 2,000 scent marks (see Roberts 1994) and ticks recovered from a klippringer at Sentinel were all Rhipicephalus spp. (identified at the Onderstepoort Veterinary Research Institute, South Africa). Moreover, no examination of klippringers has found ticks on the scent glands: ticks on a male examined at Sentinel were concentrated between the hooves (18), hoocks (7), chest (29), inner thighs (2) and testicles (2). Similarly, Colborne et al. (1981) found that they were confined to the under-side of the body. Three traquillized klippringers at Chipangali Wildlife Orphanage, Zimbabwe, had no ticks present in the preorbital glands.

The observations described here are the first to note a concentration of foraging effort around the preorbital glands by any gleaning bird. The scent secretion which accumulates there may be highly nutritious (in other small antelopes it consists of azalely short-chain alcohols and fatty acids: Burger et al. 1980, 1981; Bigalke et al. 1980). As only adult klippringers usually have actively-producing scent glands, birds are likely to pay much less attention to juveniles. While it seems certain that some glandular secretion is ingested indirectly, it remains unclear whether O. morio and C. rivaseni-trez do so purposely. If they do, this would represent a form of bird-mammal feeding relationship which has not been previously documented.

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REFERENCES


Observations on roosting Blue Cranes

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All cranes, including Blue Cranes Anthropoides paradiseus (Tarboton et al. 1987), show a strong preference for roosting communally at night in shallow waterbodies (e.g. Lovors & Kirkpatrick 1981). The Black Balearica pavonina and Grey B. regularorum Crowned Cranes are unique in the group in regularly roosting in trees (e.g. Wallinshaw 1964a) and even on overhead electricity transmission structures (Allan 1994). Detailed investigations have been carried out on the characteristics and use of roosts by Sandhill Grus canadensis (e.g. Pogson & Lindstedt 1991). Eurasian G. grus (e.g. Alonso & et al. 1987) and Hooded G monacha (Kawamura 1981) Cranes. These studies have shown the importance of roosts in dictating the habits of cranes, including their patterns of large-scale distribution, abundance, local dispersion and use of foraging habitats (e.g-