

Coprophagy of Lion *Panthera leo* faeces by Hooded Vultures *Necrosyrtes monachus*: a case study in Serengeti National Park, Tanzania.

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Heterospecific coprophagy in vertebrates has been little reported, especially among birds (Soave & Brand 1991). Old World vultures are known to consume faeces of mammals (del Hoyo *et al.* 1994). Several other species of bird have been observed to eat the faeces of mammals and other birds (Table 1).

Among Old World vultures, Egyptian Vultures *Neophron percnopterus* (Ash & Atkins 2009) are reported as consuming excrement in the vicinity of human habitation, while Brown *et al.* (1982) specify that they eat human excrement and Houston (1975, 1979) reports that they consume the dung of carnivores. Houston (1988) observed Egyptian Vultures avidly eating piles of Lion *Panthera leo* faeces on several occasions. They also consume the dung of herbivores (Negro *et al.* 2002, Hidalgo *et al.* 2005, di Vittorio *et al.* 2017).

Hooded Vultures *Necrosyrtes monachus* have been observed eating the faeces of African Wild Dogs *Lycaon pictus* (Reading *et al.* 2017, van der Meer *et al.* 2022), carnivores (Houston 1975, 1979), and are reported as consuming faeces in the vicinity of human habitation (Allan 1996, Kemp *et al.* 2020). Mundy (1982) mentioned that “Hooded Vultures are noted for collecting and eating mammalian faeces, such as lion, zebra, and warthog droppings, and in Nigeria human faeces”. Despite almost continuous research on carnivores in Serengeti National Park since 1964, the only other published references to coprophagy of Lion faeces by vultures are (1) by Schaller (1972) who mentions that vultures, Spotted Hyaenas *Crocuta*

crocuta and jackals eat them, and dung beetles bury them, eliminating faeces as a fruitful source of information on Lion diet; and (2) by Bertram (1978) who observed Hooded Vultures waiting in the vicinity of Lions even when there was no kill and eating their faeces when these were deposited.

Here I describe a case of coprophagy by Hooded Vulture of Lion faeces in Tanzania, and discuss its ecological significance for this threatened vulture.

On 22 February 1986 at Seronera (2°25'32"S, 34°49'00"E) in Serengeti National Park, Tanzania, I observed a group of at least 30 Hooded Vultures, together with one Lappet-faced Vulture *Torgos tracheliotos* and a few African White-backed Vultures *Gyps africanus*, in large *Acacia xanthophloea* trees above a pride of 13 Lions with the carcass of an unidentified large herbivore. Only a few of the bones of the carcass could be seen in the grass, but it had apparently been mostly consumed as the Lions began to move off soon after I had located them. Before departing, an adult male Lion defaecated, causing interest among the Hooded Vultures above, several of whom dropped to lower branches. The Lion had not gone more than 10 m from the faeces when several Hooded Vultures dropped to the ground and swallowed the faeces rapidly without dismembering them. Neither these individuals, nor the other Hooded Vultures present, showed any immediate interest in the carcass, but only in the Lion faeces.

Hooded Vultures are known to follow Spotted Hyaenas (Kruuk 1972) and African Wild Dogs (Squires 2005, Steyn 2005, Stapelkamp 2011,

Table 1: Bird species, other than Old World vultures, recorded as consuming mammal or bird faeces, and the respective sources of faeces and published reports.

Bird species	Source of faeces	Publication
Kelp Gull <i>Larus dominicanus</i>	Southern Sea-lion <i>Otaria flavescens</i>	Pavés <i>et al.</i> 2008
	South American Fur-seal <i>Arctocephalus australis</i>	Seguel <i>et al.</i> 2017
Dolphin Gull <i>Leucophaeus scoresbii</i>	South American Fur-seal	Seguel <i>et al.</i> 2017
Snowy Sheathbill <i>Chionis albus</i>	Southern Elephant Seals <i>Mirounga leonina</i>	Favero 1996
Wilson's Storm Petrel <i>Oceanites oceanicus</i>	North Atlantic Right Whales <i>Eubalaena glacialis</i>	Kraus & Stone 1995
Two-barred Crossbill <i>Loxia leucoptera</i>	River Otter <i>Lontra canadensis</i>	Gallant 2004
Mallard <i>Anas platyrhynchos</i>	Whooper Swan <i>Cygnus cygnus</i>	Shimada 2012
Eurasian Teal <i>Anas crecca</i>	Whooper Swan	Shimada 2012
Baikal Teal <i>Sibirionetta formosa</i>	Whooper Swan	Shimada 2012
Turkey Vulture <i>Cathartes aura</i>	Coyote <i>Canis latrans</i>	Buckley 1996
	California Sea Lion <i>Zalophus californianus</i>	Beebe 1974
	Southern Sea-lion	Pavés <i>et al.</i> 2008
	Cougar <i>Puma concolor</i>	González-Jáuregui <i>et al.</i> 2021
	Neotropical Otter <i>Lontra longicaudis</i>	Gula 2021
Black Vulture <i>Coragyps atratus</i>	Coyote	Buckley 1996
	Southern Sea-lion	Pavés <i>et al.</i> 2008

Reading *et al.* 2017, van der Meer *et al.* 2022) while they are hunting. Given the competition they usually receive from larger vultures at a carcass (Kruuk 1967, Brown & Amadon 1968, Brown 1970, Houston 1975, Kendall *et al.* 2012), it is possible that the faeces of predators are an important supplementary source of food for Hooded Vultures. Nesení & Heidler (1966) estimated that Lion faeces, which may include fragments of bone, contain up to 45% protein. Houston (1988) commented on differences in digestive efficiencies between cats, which are less efficient digesters of meat, on the one hand, and the more efficient dogs and hyaenas on the other, while vultures have even greater digestive efficiency. Thus, he considered that this might be why he observed Egyptian Vultures only consume Lion faeces and not those of African Wild Dog and Spotted Hyaena when they were available. In the absence of other information, it seems logical to suggest that it is for the residual nutrients that Hooded Vultures eat predator faeces. Egyptian

Vultures are known also to eat herbivore faeces to obtain the carotenoids that provide the yellow colour on the bare skin of the head of the adult (Negro *et al.* 2002).

Lions are active at night, when Hooded Vultures are roosting and inactive, and any nocturnal defaecations by Lions are not immediately available to the vultures. Therefore, with 24-hour activity by Spotted Hyaenas, jackals and dung beetles and diurnal activity from Hooded and Egyptian Vultures, there is some competition for Lion faeces. It is of interest that Hooded Vultures do not merely look for faeces but also anticipate their production by responding to the squatting postures of Lions, in this study, and humans (Allan 1996).

Hooded Vultures are considered to be of global conservation concern under the criteria of the IUCN Red List categories (del Hoyo 2020), and are classified as Critically Endangered. Lions (Vulnerable: Bauer *et al.* 2016) and African Wild Dogs (Critically Endangered: Woodroffe and

Sillero-Zubiri 2020) are similarly threatened. The association between Hooded Vultures and large carnivores, could, therefore, be disappearing just as it has been documented. It is surprising that it is mentioned so little in the relatively large literature on wild carnivores in Africa, although the close association between Hooded Vultures and African Wild Dogs has been well described. Whether this is because the behaviour is rarely observed, whether it has been ignored by researchers, or whether the observations have been made but remain unpublished in field notebooks, is not clear. A single paragraph in Bertram (1978) suggests the

third possibility. It is notable that most of the detailed descriptions of coprophagy by Old World vultures are relatively recent, while the older publications (e.g. Schaller 1972) mention it but without much detail. Further study is needed of the benefits derived by Hooded Vultures from the faeces of Lions and other carnivores, as has been done in the case of African Wild Dogs (van der Meer et al. 2022). The results might provide further insights into how the Hooded Vulture maintains one half of its “dichotomy of lifestyle” (Anderson 1999).

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