

Observations on Greater Yellow-headed Vultures *Cathartes melambrotus* and other *Carthartes* species as Scavengers in Forest in Venezuela

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ABSTRACT

A series of carcasses were provided at a forest site in northern Venezuela to investigate the scavenging efficiency of forest vultures, especially *Cathartes melambrotus*, about which there is almost no published information. Out of 35 carcasses provided, 80% were located by vultures within two days. The first to locate a carcass was invariably either *C. melambrotus* or *C. aura*. Both species used olfaction to locate food and could find carcasses that were completely hidden. It is suggested that *C. melambrotus* may be better adapted for locating food in dense forest due to its low wing loading. A review of the efficiency of forest vultures as scavengers in six different forest sites shows these birds to be the major scavenging animals in neotropical forests, accounting for a substantially greater food consumption than either mammalian or insect scavengers.

INTRODUCTION

The New World Cathartid Vultures are not related to the Old World Vultures, and probably evolved from the same ancestry as the storks. The greatest diversity of species is found in the neotropical forest, where five species coexist: the King Vulture *Sarcoromphus papa*, the Black Vulture *Coragyps atratus*, the Turkey Vulture *Carthartes aura*, the Lesser Yellow-headed Vulture *Carthartes burrovianus* and the Greater Yellow-Headed Vulture *Carthartes melambrotus*. Few studies have been made on this guild of scavenging birds, but for one species, the Greater Yellow-headed, there is virtually no information published. This species was described scientifically only in 1964, despite being one of the largest, commonest and most conspicuous of all birds in South American lowland forest.

The Neotropical forest guild of vultures is unusual in that the location of carcasses is dependent on olfactory detection. The Turkey Vulture is known to have a highly developed sense of smell (Stager 1964), on which it depends to locate its food in forest (Houston 1986). Of the other two members of the genus *Cathartes* it is known that the Lesser Yellow-headed can also locate carcasses by olfaction (Houston 1988) but it is not known if the Greater Yellow-headed has this ability. This paper considers how Greater Yellow-headed Vultures locate food, their position in the feeding sequence of vulture species, and the ecological separation of the three members of the genus *Cathartes*. It is based on field work carried out in an area of lowland forest along the roadside near El Callao in northern Venezuela in 1989.

METHODS

A series of 32 carcasses were provided on the forest floor to act as 'bait' to attract vultures. Domestic chickens were used, these being of approximately the same body weight as sloths, monkeys and the other common mammal species whose carcasses are the natural food supply for vultures in neotropical forests (Houston 1985). The methods outlined in Houston (1986) were followed except that carcasses were one day old when taken into the forest and were not placed along trails, but at a distance of about 100 paces into the forest. Carcasses were about 500m apart and, to prevent birds becoming accustomed to food being provided in one area, the same site was never used twice. Half of the carcasses were placed straight on the forest floor and half were covered by dried leaves until invisible. Some of the latter were of white-feathered chickens, but all exposed birds had cryptic brown feathers. Carcasses were usually watched for an hour or more after placement to try to observe the first species to arrive. They were then visited at regular intervals throughout daylight hours, at least every 2 ½ hours, by a slow and careful approach to record any birds feeding or in close proximity to the carcass. Carcasses were watched until they had been completely consumed.

RESULTS

Greater Yellow-headed and Turkey Vultures were always the first species to locate a carcass (Table 1). If we assume that all vulture species were equally likely to locate a carcass, then the probability that any one species would arrive first would be determined by its relative abundance in the area. Table 1 also shows the total numbers of each species recorded throughout the whole feeding sequence so that, assuming that this represents their relative abundance in the area, we can calculate the expected number of occasions on which each species should arrive first. Greater Yellow-headed Vultures and Turkey Vultures combined were significantly more likely to locate carcasses than other species ($X = 58$, $p 0.001$) while Black Vultures were more numerous later in the feeding sequence.

Table 1. Vulture species recorded at carcasses

	Turkey vulture	Greater Yellow-headed vulture	Black vulture	King vulture
First species to locate carcass	11	13	0	2
Total number of birds seen at carcass during the feeding sequence	27	19	118	2

Neither Turkey nor Yellow-headed Vultures had any difficulty in locating carcasses hidden under leaves on the forest floor. If we use only the number of carcasses where the first bird to arrive was actually seen to locate the food and observed eating, for Yellow-headed Vultures 3 of the 7

carcasses found by this species were hidden, and for the Turkey Vulture 4 out of the 6. Even carcasses left uncovered were almost certainly invisible to a bird searching from above the forest canopy.

This small trial in Venezuela confirms the major role that vultures play as scavengers in Neotropical forests. 29 of the 35 carcasses available were located and totally consumed within two days. The other carcasses all vanished, presumably taken by mammalian scavengers. Two were taken during the day, probably by dogs from local villages, the others disappeared overnight. A series of bait trails has now been run in which carcasses have been monitored to record which scavenging species arrive and how much food they consume. These studies, carried out at seven different sites in four different countries, have shown that in forests with relatively undisturbed mammal populations vultures locate 70 - 99% of all carcasses available and are the major scavengers (Table 2). Areas mentioned in Table 2 where only a low proportion of carcasses were located are all heavily disturbed forests with greatly reduced mammal populations, and it is known that these also have very low densities of searching vultures (Houston 1987; Kirk 1988).

Table 2. Proportion of carcasses located by Turkey or Greater Yellow-headed Vultures in forested neotropical sites

	<u>n</u>	<u>%</u>	
Barro Colorado, Panama	74	96%	(Houston, 1986)
Gamboa, Panama	8	25%	(Houston, 1987)
Manaus, Brazil	40	0%	(Houston, 1987)
Masaguarel, Venezuela	46	98%	(Houston, 1987)
Masaguarel, Venezuela	88	89%	(Kirk, 1988)
nr. El Callao, Venezuela	35	83%	this study
Amacayacu Nat. Pk., Colombia	40	66%	(Bernal, 1991)

DISCUSSION

The Greater Yellow-headed Vulture clearly has the ability to locate carcasses by smell, because those made invisible by a covering of leaves were located as frequently as those that were fully visible. This is also known to be the case for the Turkey Vulture (Stager 1964) and Lesser Yellow-headed (Houston 1986). These three species are very similar, closely related, and it is not surprising that they share good olfactory abilities on which they rely to locate carcasses. The other two small cathartid vultures, the Black and the King Vultures, however, have no functional sense of smell and depend on *Cathartes* species to be led to food (Stager 1964; Houston 1984). They fly at a considerably higher altitude over the forest, from where they can observe the low altitude flight paths of the *Cathartes* species and follow them down to any sources of food (Houston 1988). It is well known that they arrive later in the feeding sequence, are usually dominant over the *Cathartes* species, and take different food items from the carcass (Houston 1988; Kirk 1988). The small cathartid vultures differ considerably in their wing loadings (Table 3). The Black, and presumably also the King Vultures for which there are no data, have high wing loadings and need strong upcurrents to soar, usually using thermal uplift to reach the high altitudes from which they search. The three *Cathartes* species can use much weaker lift, but differ considerably in their wing shape and mass. Among Turkey Vultures the migrant race has higher wing loadings than the resident race, and the latter is probably better adapted to using the weak lift available at a low altitude over the forest canopy. The two Yellow-headed species are able to exploit weaker sources of lift than any other species, the Lesser Yellow-headed doing this over open wetland habitats, and the Greater Yellow-headed from small patches of lift at emergent trees projecting from the forest canopy. Within their respective habitats, the three *Cathartes* species fulfil very similar roles: locating sources of carrion first, and leading in other species in the guild. The ecological separation

Table 3. Mean weight and wing loadings from small cathartid vultures

	n	Weight kg	Wing area m ²	Wing loading N/m ²
Black Vulture ¹	64	1.63	0.37	43.6
Migrant Turkey ¹ Vulture	140	1.42	0.49	28.2
Resident Turkey ¹ Vulture	60	1.22	0.47	25.1
Lesser Yellow-headed ¹ Vulture	4	0.95	0.42	22.3
Greater Yellow-headed Vulture	2	1.165 ²	0.48 ³	23.8

Source 1. Kirk 1988

2. Karr *et al*, 1990

3. Estimate from museum wing measurements, assuming the same ratio of wing length: wing areas as the other cathartid species

of these *Cathartes* species is probably dependent on slightly different sources of lift available in different habitats, each species being better adapted to one type of soaring behaviour over its preferred habitat. The two Yellow-headed species are both found in restricted habitats, flat grass and wetlands for the Lesser Yellow-headed, and mature lowland forest for the Greater Yellow-headed. The Turkey Vulture is a more generalist species and has a slightly higher wing loading. It is probably slightly less efficient at exploiting the very weak regions of low altitude lift that the Yellow-headed species use. Turkey Vultures are found in the same habitats as the two Yellow-headed species, but they also extend into savannas and higher altitude areas and, in the case of the migrant race, also occupy diverse habitats in North America. The slightly higher wing loading probably makes them more successful at using a wide variety of different flying conditions.

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