

From carrion-eaters to bathers' bags plunderers: how Black Vultures (*Coragyps atratus*) could have found that plastic bags may contain food

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RESUMO: De necrófagos a saqueadores de sacolas de banhistas: como urubus-de-cabeça-preta (*Coragyps atratus*) podem ter descoberto que sacos plásticos conteriam alimento. O urubu-de-cabeça-preta (*Coragyps atratus*) alimenta-se de carniça, pequenos animais vivos, fezes de carnívoros, lixo orgânico, até frutos. Registro aqui esta espécie de urubu saqueando sacos plásticos contendo toalhas, roupas e outros objetos, que banhistas deixam na praia quando entram no mar. Esse comportamento pode ter-se originado no fato de sacos plásticos semelhantes conterem lixo exposto ao ar livre. Uma seqüência de passos comportamentais que podem ter dado origem ao furto de sacolas de banhistas por urubus é aqui postulada, começando com agrupamentos em carcaças na praia, continuando com agrupamentos em pequenos depósitos de lixo ao ar livre e, finalmente, saqueando sacolas plásticas deixadas na praia. As etapas postuladas para este cenário plausível são aqui documentadas, incluindo manipulação experimental. O comportamento de furtar sacolas pode ser beneficiado pelo comportamento social do urubu-de-cabeça-preta, o qual facilitaria aprendizado por imitação.

PALAVRAS-CHAVE: Carcaças, lixo exposto, lixo acondicionado, sacolas de plástico, aprendizado.

KEY-WORDS: Carcasses, refuse dumps, packed refuse, plastic bags, learning.

Most vulture species of the New World Cathartidae are omnivores that forage on whatever edible (Houston 1994, Sick 1997). The Black Vulture (*Coragyps atratus*) has a particularly wide diet and its food includes carrion, human organic refuse, carnivore feces, fruits, and small live animals (Haverschmidt 1947, Houston 1994, Sick 1997, review in Buckley 1999). For daily recruitment to food Black Vultures benefit from high soaring flight, communal roosting, foraging groups composed of adults and juveniles, and ability to quickly learn and accommodate to new feeding situations (Witoslawski *et al.* 1963, Coleman and Fraser 1987, Rabenold 1983, Houston 1994, Sick 1997, Buckley 1999).

I report here on Black Vultures plundering plastic bags containing towels, clothes and other objects bathers leave on the beach while entering the sea on the northern coast of São Paulo, Brazil. Such behaviour likely originated from the fact that similar plastic bags are used to pack refuse disposed of in the open. A sequence of relatively simple behavioural steps that might have given origin to dismantling bathers' bags by the vultures is here postulated.

All records were made at the Praia do Lázaro, Ubatuba (~23°32'S, 45°09'W), São Paulo, southeastern Brazil. Black vultures' behaviour while feeding on small to medium carcasses, small refuse dumps in the open, as well as dismantling plastic bags, was recorded on several occasions from July 1983 to July 1987. Records were made with naked eye or with use of binoculars in 10-50 min observational sessions totaling 3,190 min (about 50 h). "Ad libitum" and "behaviour" sampling rules (Martin and Bateson 1986) were used throughout. A simple experiment to check that vultures are attracted to a plastic bag using visual cues was performed. Plastic

bags (N = 15) identical to those used to discard refuse (and to accommodate bathers' objects) were stuffed with unused crumpled newspapers (N = 8) or with organic garbage such as fish leftovers (N = 7), haphazardly scattered on the beach, and left unattended. Approach by the vultures and their subsequent behaviours were thus recorded.

Black Vultures fed on small to medium carcasses on the beach, either washed ashore or thrown there by local people. Sometimes a single vulture located a carcass while flying low or perched on a pole or a palm crown. Afterwards it landed near the carcass and pecked at it searching for a soft spot or an opening and then began to dismantle it usually taking hold with one or both feet while tearing off pieces with its bill (Figure 1). In all occasions a vulture was feeding on a dead animal (except for a very small one or pieces), it was soon joined by others and a foraging group quickly formed around the carcass (Figure 2).

Vacant lots used by the local population to discard garbage were regularly visited by vultures to forage on anything edible from fish and poultry entrails and leftovers to spoilt fruits. By the time the sanitary authorities instructed the population that organic refuse should be packed in plastic bags, the people usually left both packed and unpacked leftovers at the dumps (Figure 3). Thus, vultures likely had a first-hand opportunity to learn that plastic bags, often improperly closed or partly torn, contained food. At the same time I began to record vultures landing on open garbage containers in front of houses and tearing open the bags (Figure 4). Techniques used on the bags were similar to those used to dismantle small carcasses (see above and Figure 1).

The first time I noticed vultures plundering plastic bags bathers left on the shore when entering the water was 27 June

1985. These bags were the same (or similar to those) the local people used to pack garbage and, due to their low cost, they were used to wrap and carry several types of objects to the beach, including towels, clothes, watches, and sometimes food. When such a bag was left unattended, the vultures approached and began to work on it (Figure 5) until the bag was torn open. Usually the birds pulled the lighter and more accessible objects from within the bag. On finding no food, the vultures

eventually left. However, when a bag contained food such as sandwiches or small fruits such as grapes or guava, these were picked off and swallowed and fed upon. Several vultures could peck at and dismantle a bag, the groups often being composed of adults and juveniles.

The experiment with plastic bags stuffed with newspapers and those with organic garbage yielded similar results. The vultures located a bag in the same way they did with carcasses.



FIGURES 1-6. (1) A Black Vulture (*Coragyps atratus*) dismantles a recently dead Big-eared Opossum (*Didelphis aurita*) on the beach; (2) a small group of vultures scavenge on a Green Turtle (*Chelonia mydas*) carcass on the beach; (3) a small group of vultures search for food in a small refuse dump on a street near a vacant lot by the beach; (4) a vulture dismantles a plastic bag in an open refuse container in front of a house near the beach; (5) a vulture begins to dismantle a plastic bag with towels, clothes, and other objects left on the beach by a bather – note other vultures approaching; (6) a vulture pecks at a plastic bag stuffed with unused, crumpled newspapers experimentally left on the beach – note that sizes of the bag and the opossum (1) are roughly similar.

Then they approached the bag, inspected it briefly and began to peck at it (Figure 6). As the newspapers bags were much lighter than those containing organic garbage, the vultures did not tear the former open as easily as the latter, and five newspaper bags were left after pecking at them with no result for up to 6 min. The experiment leaves little doubt that the birds relied on visual cues; additionally, they were unable to discriminate between bags containing newspapers and those containing organic garbage. These findings agree with the widespread knowledge that Black Vultures locate their food visually (Rabenold 1983, 1987, Houston 1994, Sick 1997, Buckley 1999). I suggest that the vultures used a searching image to locate the plastic bags haphazardly located on the beach (see Croze 1970 for this concept in crows).

From the behavioural viewpoint, dismantling small carcasses and plastic bags does not differ greatly. The vultures have to find a soft spot or an opening – natural or accidental – and from there ripe open the carcass or the garbage bag and reach the contents (Hertel 1994, Houston 1994, Buckley 1999, present paper). Thus, garbage dumps containing both packed and unpacked leftovers possibly set the stage for the behavioural steps needed to shift from small carcasses to plastic garbage bags once the vultures found that the latter contain food.

Plundering bathers' bags likely resulted from the previous finding that plastic bags used to pack garbage contain accessible food. As both bag types are similar if not identical in form, size, and often colour as well, the association between them may be simple for the Black Vulture, a versatile bird capable of quick learning (Witoslawski *et al.* 1963) and that takes advantages of varied foraging situations (Houston 1994, Sick 1997, Buckley 1999, Sazima 2007). Black Vultures are social birds and forage in familiar groups (Rabenold 1983, Buckley 1999), a characteristic that facilitate learning of novel food sources and/or techniques (Houston 1994). Plundering bathers' bag could be initiated by a few "innovative" individuals, which were imitated by others (see Fisher and Hinde 1949, Palameta and Lefebvre 1985, West and King 1996 for diverse learning processes in birds). Additionally, foraging groups of this vulture are composed of adults and juveniles that remain together for an extended period (Rabenold 1983, Houston 1994, Buckley 1999), and thus the latter would have plenty of opportunities to learn new food sources and/or abilities.

A sequence of relatively simple behavioural steps that might have given origin to bag plundering is here postulated: 1) vultures would assemble at carcasses large and small on the beach; 2) with human settlement on the shore, the birds would assemble at small refuse dumps that contain leftovers both unpacked and packed in plastic bags; 3) the birds would learn to rip open the garbage bags both in the small dumps and refuse containers in front of beach houses; 4) finally, the birds would associate garbage plastic bags with any similar plastic bag left on the beach. The above scenario with four escalated steps seems the most parsimonious one for the question of how Black Vultures could have found that plastic bags may contain

food and, additionally, it would explain how these carrion-feeding birds could turn into bathers' bags plunderers under particular circumstances.

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