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SHORT COMMUNICATION

Vultures and others scavenger vertebrates associated with man-sized pig carcasses: a perspective in Forensic Taphonomy

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ABSTRACT. The activity of vertebrates that feed on corpses can modify the chronology of the decomposition process and interfere with postmortem interval estimates. Further, by destroying the soft parts of the cadaver, scattering, burying or causing the disappearance of bones, it can entirely change the crime scene. In this study, we simulated a clandestine cemetery in an area of Cerrado located inside a farm in Brasília, Distrito Federal. Three domestic pigs of the size of a human of about 60 kg were placed on the ground in different periods of 2010 and 2011. We recorded four species of birds and one of mammal eating the carcasses: 1) Cathartidae: *Coragyps atratus* (Bechstein, 1973), *Cathartes aura* (Linnaeus, 1758), *Sarcoramphus papa* (Linnaeus, 1758); 2) Falconidae: *Caracara plancus* (Miller, 1777); and 3) Felidae: *Leopardus pardalis* (Lund, 1840). The behavior of these animals interfered in the decomposition process and resulted in the dispersion and loss of bony parts.

KEY WORDS. Cerrado; chronothanatognosis; clandestine cemeteries; decomposition; necrophagy.

Forensic Taphonomy is applied in several situations where the causes of death, or evidence, cannot be explained through routine methods (e.g., mass accidents, summary and mass executions, clandestine cemeteries) (UN 1991). The activities of scavengers animals, specially vultures, can modify the crime scene and generate several artifacts (Morton & Lord 2006, Carter *et al*. 2007, Ururahy-Rodrigues *et al*. 2008, Reeves 2009), as the concealment of the body and/or its dismemberment (Haglund & Sorg 1997, Spradley *et al*. 2012). Either opportunistically or by lack of food, some predators such as big cats (Rippley *et al*. 2012), rodents, dogs, and coyotes (Haglund 1997a,b) may occasionally feed on the carcasses, dismantling and moving it. The activity of these animals can modify the rate of decomposition and the post-mortem events, as well as the estimative of the post-mortem interval (PMI) (Spradley *et al*. 2012).

During 2010 and 2011, three man-sized pigs (60 kg) were placed on the ground of a savannah-like formation (Cerrado) in a farm near to the urban area of Brasília, Distrito Federal, in order to simulate a clandestine cemetery. With the aim to record the vertebrates that fed on the carcasses, we installed a camera trap near them and left it there for 24 hours/day, from the moment of death until skeletonization.

The camera took a total of 831 photos. Five species of vertebrates, four birds and one mammal (Figs 1-6), were recorded: 1) Cathartidae: *Coragyps atratus* (Bechstein, 1973), *Cathartes aura* (Linnaeus, 1758), *Sarcoramphus papa* (Linnaeus, 1758); 2) Falconidae: *Caracara plancus* (Miller, 1777); and 3) Felidae: *Leopardus pardalis* (Lund, 1840). The presence of the scavenger vertebrates was associated with the five stages of decomposition: initial, bloated, decay, postdecay, and dry (Table I).

Vultures, one of the most versatile scavenger birds, were the only vertebrates observed during the experiments that are known to have a diet composed almost entirely of carcasses (Ruxton & Houston 2004). In Brazil, they are represented by six species: *C. atratus*, *C. aura, Cathartes burrovianus* (Cassin, 1845), *Cathartes melambrotus* (Wetmore, 1964), and *S. papa*. These birds are usually the first vertebrate scavenger to access the body (DeVault *et al*. 2004, Kjorlien *et al*.2009, O'Brien *et al*. 2010), and can eat meat in advanced stage of putrefaction. The most remarkable interaction we observed was the lack of competition for food between *C. plancus* and *C. atratus*. The southern

Table I. Species of vertebrates visiting the pigs carcasses at the different stages of decomposition.

Species	Decomposition Stages				
	Initial	Bloted	Decay	Postdecay	Dry
Coragyps atratus (Bechstein, 1793)	■	■	■	■	■
Cathartes aura (Linnaeus, 1758)		■	■		
Sarcoramphus papa (Linnaeus, 1758)			■		
Caracara plancus (Miller, 1777)		■	■	■	■
Leopardus pardalis (Lund, 1840)		■			

Figures 1-6. Scavenger vertebrates fotographed by the camera trap using pigs carcasses as a food resource: (1) *Sarcoramphus papa*; (2) *Cathartes aura*; (3) *Caracara plancus*; (4) *Coragyps atratus*; (5) *Caracara plancus* and *Coragyps atratus* in a social behavior; (5) *Leopardus pardalis*.

crested caracara (*C. plancus*) is not limited to consuming carcasses, it can also eat the remains around it, beetle larvae and other insects that move away from the body. As a result of the intense activity of *C. atratus* on the carcasses, large bones, for instance the scapula and femur, were taken about six meters away from the site of decomposition. The desarticulation and transport of flesh and skeletonized remains is a well-known phenomenon attributed to scavenger birds, especially vultures (Reeves 2009, Spradley *et al*. 2012).

Despite the fact that big cats are not commonly found feeding on carcasses, Rippley *et al.* (2012) reported bob cats *Lynx rufus* (Schreber, 1777) feeding on human corpses. The ocelot (*L. pardalis*) has a solitary and terrestrial habits, predominantly nocturnal, and feeds on small vertebrates (DiBitetti *et al*. 2006). Nevertheless, in our experiment, when *L. pardalis* fed on a carcass, it displaced it from its original position (Figs 7 and 8). Mechanical movements, spontaneous or deliberate, become important events for the interpretation of the crime scenes. Allied to this, moving the carcasses facilitates the dispersion of the body parts, as observed by Ururahy-Rodrigues *et al*. (2008).

Studies involving the reconstruction of crime scenes are important and must consider the activity of scavengers in order to separate the peri-mortem and post-mortem events in the investigation (Ubelaker 1997).

Figures 7-8. *Leopardus pardalis* accessing the carcass and changing the angle of it by 90°: (7) August 31, 2011 at night; (8) September 1, 2011 at morning, where is possible to observe the movement of the carcass.

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