

Predation of *Platyrrhinus lineatus* (E. Geoffroy, 1810) (Chiroptera: Phyllostomidae) by *Cyanocorax chrysops* (Vieillot, 1818) (Passeriformes: Corvidae)

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Abstract

The predation on vertebrates by birds, including bats, is very common in some families (Accipitridae, Falconidae, Tytonidae, Strigidae), constituting their main diet. For other families (except those that feed strictly on fish), it is occasional and sometimes a matter of opportunity. Here we recorded the predation on a bat (*Platyrrhinus lineatus*) by the neotropical bird plush-crested jay (*Cyanocorax chrysops*). On July 26, 2009, around 11:00 am, we recorded an individual of *C. chrysops* taking part of a *P. lineatus* on its beak. This record occurred on Jacarezinho Farm (Valparaíso – SP). The prey species identification was done by visual observation, considering the bat size and its external morphology, especially by the presence of the white dorsal bright stripe. Probably, *Platyrrhinus lineatus* behavior, which involves living together or in couples on tree canopies, made the capture by the plush-crested jay easier. This is a new record for the diet of *C. chrysops* and highlights the necessity of additional studies related to birds diet in the Neotropics, even the more conspicuous ones.

Keywords: Trophic relationships, bird, Phyllostomidae, Corvidae, New World.

The predation on vertebrates by birds, including bats, is common in birds of prey (Speakman, 1991; Motta-Junior and Taddei 1992; Hoetker and Gobalet, 1999; Lee and Kuo, 2001; Garcia *et al.*, 2005; Motta-Junior, 2006) and is possibly the factor that causes the most impact on natural populations of bats (Speakman, 1991). On the other hand, the predation on bats by some species of birds possibly derives from opportunistic captures, especially during food scarcity seasons (Lefevre, 2005; Hernández *et al.*, 2007; Estók *et al.*, 2010; Fisher *et al.*, 2010). These ecological pressures allied to these two conditions, scarcity of resources and opportunities, can create surprising innovations in animal behavior (Laland and Reader, 1999; Careau *et al.*, 2007; Popa-Lisseanu *et al.*, 2007; Estók *et al.*, 2010).

Such innovation was observed for *Pitangus sulphuratus* in the South Pantanal, predating *Myotis nigricans* and *M. albescens* (Fisher *et al.*, 2010), *Momotus momota* predating *Glossophaga*

sp. in secondary forest in Costa Rica (Chacón-Madrigal and Barrantes, 2004) and as it was verified in the present work. Some authors (Belton, 1994; Sick, 1997; Reinert and Borschein, 1998; Piratelli and Pereira, 2002) mention the presence of meat, fragments of eggshells, juvenile and adult birds besides insects as common items in the corvid diet from the Neotropical region. Reinert and Borschein (1998), studying the diet of *Cyanocorax caeruleus* in South Brazil registered the presence of crustaceans legs, fragments of diverse arthropods, and eggshells of the domestic hen *Gallus gallus*, (Phasianidae). Anjos (1991) mentions *Cyanocorax caeruleus* following ants in Southern Brazil. These records make the consumption of vertebrates by Corvidae species in the Neotropical region clear, and highlight the species mixed diet.

Platyrrhinus lineatus (E. Geoffroy 1810) presents external morphological features as facial and dorsal lists usually white, the coat color ranging from gray to brown, rounded ears on the

same head size, nose developed and lanceolate leaf (Zorzea, 2007). The forearm measures may vary between 43 and 50 cm (Vizotto and Taddei, 1973) and average weight of 23 grams for specimens from the Cerrado (Willig, 1983).

Platyrrhinus lineatus has been considered endemical to South America, with records in Colombia, Peru, Ecuador, French Guiana, Suriname, Bolivia, Brazil, Uruguay, Argentina and Paraguay (Simmons 2005). This bat species is predominantly frugivorous; however it can also feed on insects, nectar, pollen and leaves (Zórtea, 1993). According to Willig and Hollander (1987) this species takes shelter in caves and also among the dense foliage in tree canopies, including leaves of palm trees. This behavior of sheltering in exposed canopies, probably increases their vulnerability to predation, as mentioned in this record.

Belonging to the order Passeriformes, the family Corvidae gathers species popularly called jays. Currently, there are eight known species of jays in Brazil (CBRO, 2011), all represented by the genus *Cyanocorax*. Jays are basically omnivorous and according to Sick (1997), they are able to exploit any stratum, from the ground to the canopy. The representatives of this family are commonly known by the extensive behavioral repertoire reflecting a high degree of socialization, vocal repertoire (Sick, 1997) and reproductive patterns, including the emphasis on cooperative breeding (Woolfenden and Fitzpatrick, 1984; Madge and Burn, 1999; Iwaniuk and Arnold, 2004).

Bat predation is common in some species of birds and in some cases can contribute significantly to the diet of them (Speakman, 1991; Hoetker and Gobalet, 1999; Garcia *et al.*, 2005; Lesinski, 2010). Motta-Junior and Taddei (1992) registered 11 species of bats – three of them from Phyllostomidae family (*Glossophaga soricina*, *Chiroderma doriae* and *Pygoderma bilabiatum*) in owls pellets. In a work carried out in Central Poland, Lesinski *et al.* (2009) verified 11 species of bats originated from tawny owls (*Strix aluco*) pellets of regurgitation. Such samples were taken between the years of 1990 to 2008, and accounted for 0,64% of the vertebrate preys itens hunted by the species. Records of predation on bats by crows are scarce, especially for the Neotropics. In temperate zones, some authors observed bat predation by crows.

Lefevre (2005) reported predation and possible group hunting of a bat by American Crows (*Corvus brachyrhynchos*) from North America. This author points out that predation of bats by birds is relatively rare in this region and,

according to the size and abundance of species in the area, the predated bat was possibly *Myotis lucifugus*. Speakman (1991) cites the presence of bats in the diet of two species of crows, *Corvus frugilegus* and *Corvus corone*, in Europe. We recorded here the *Platyrrhinus lineatus* capture and predation by one corvid.

On July 26, 2009, around 11:00 am, we recorded a specimen of *Cyanocorax chrysops* taking on its beak part of a *Platyrrhinus lineatus*. After crossing approximately 30m in an open area, the bird landed on a 5m high tree, and then held the *Platyrrhinus lineatus* by the feet and pecked it in the head, for 5 min, dilacerating it.

Due to the movement of people under the tree, the bird abandoned the prey, which fell among the branches, getting caught by the talon. It was not possible to determine the moment when the bird killed the bat; however, the prey seemed to be conserved and its coloration indicated that it would have been captured close to the site. This record occurred on Jacarezinho Farm (20°59'44''S, 50°51'22''W) (Valparaiso – SP) (Figure 1).

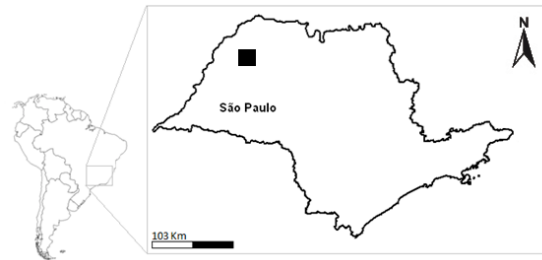


Figure 1. Present study record (square) in the state of São Paulo.

The prey species identification was done by visual observation, considering the bat size and its external morphology, especially by the presence of the white dorsal bright stripe. The biometric data collection was not possible, once the prey got trapped among the branches, after being released by the predator, therefore out of our reach (Figure 2).

We do not know the extent to which predation of bats is significant in the diet of this species of crow. It is possible that this is an initial behavior observed within the population. According to Reader and Laland (1999) when new behavior patterns spread through animal populations, typically one animal will initiate the diffusion. It is not known whether such 'innovators' are particularly creative individuals, individuals exposed to the appropriate environmental contingencies, or individuals in a particular motivational state (Laland and Reader, 1999).



Figure 2. Specimen of *Platyrrhinus lineatus* depredated by corvids. Dorsal view (left) and ventral view (right). In detail, the head of the bat torn by the bird (black arrow).

We believe that the main factors leading up to the crow predation of a bat were: (i) foraging behavior between branches, (ii) behavior adopted by this species of bat, to take shelter under leaves open during daytime, (iii) generalist feeding habit of this family of birds and (iv) foraging behavior in groups, combined with complex communication system by crows, which possibly facilitated the meeting with the prey (Brown, 1974; Raitt, 1979; Anjos, 1991). We assume that these considerations are important since the species do not share the same periods of activity, as commonly occurs among Chiroptera and some birds of prey.

This is the first published record of bat predation by *Cyanocorax chrysops* and highlights the need for additional studies on the diet of Neotropical species, even for species that are frequently observed.

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References

- Anjos L. 1991. O ciclo anual de *Cyanocorax caeruleus* em floresta de araucária (Passeriformes: Corvidae). Ararajuba, Revista Brasileira de Ornitologia 2: 19-23.
- Belton W. 1994. Aves do Rio Grande do Sul: distribuição e biologia. Editora Unisinos, São Leopoldo.
- Brown J.L. 1974. Alternate routes to sociality in Jays with a theory for evolution of altruism and communal breeding. American Zoologist. 14:63-80.
- Careau V.; Lecomte N.; Giroux J.F. & Berteaux D. 2007. Common ravens raid Arctic fox food caches. Journal of Ethology. 25, 79–82.
- Chacón-Madrigal E. & Barrantes G. 2004. Blue-crowned Motmot (*Momotus momota*) predation on a long-tongued bat (Glossophaginae). Wilson Bulletin 116:108–110.
- Comitê Brasileiro de Registros Ornitológicos (2011) Listas das aves do Brasil. 10ª Edição. Disponível em <<http://www.cbro.org.br>>. Acesso em 20 de Julho de 2011.
- Estók P.; Zsebók S. & Siemers B.M. 2010. Great tits search for, capture, kill and eat hibernating bats. Biology Letters, 6: 59-62.
- Fisher E.; Munin R.L.; Longo J.M.; Fisher W. & Souza P.R. 2010. Predation on bats by Great Kiskadeess. Journal of Field Ornithology, 81: 17-20.
- García A.M.; Cervera F. & Rodríguez A. 2005. Bat predation by long-eared owls in mediterranean and temperate regions of Southern Europe. Journal of Raptor Research 4: 445-453.
- Hernández D.L.; Mell J.J. & Eaton M.D. 2007. Aerial predation of a bat by an American Crow. The Wilson Journal of Ornithology 4: 763-764.
- Hoetker G.M. & Gobalet K. 1999. Predation on mexican free-tailed bats by burrowing owls in California. Journal of Raptor Research 4:333-335.
- Iwaniuk A. N. & Arnold K.E. 2004. Is cooperative breeding associated with bigger brains? A comparative test in the Corvida (Passeriformes). Ethology 110: 203–220.
- Laland K.N. & Reader S. M. 1999 Foraging innovation in the guppy. Animal. Behavior. 57, 331–340.
- Lee Y.F. & Y.M. Kuo. 2001. Predation on Mexican freetailed bats by Peregrine Falcons and Red-tailed Hawks. Journal of Raptor Research 35: 115-123.

- Lefevre K.L. 2005. Predation of a bat by American Crows, *Corvus brachyrhynchos*. The Canadian Field-Naturalist. 3:443-444.
- Lesinski G. 2010. Long-term changes in abundance of bats as revealed by this frequency in tawny owls' diet. *Biologia*, 4: 749-753.
- Lesinski G.; Gryz J. & Kowalski M. 2009. Bat predation by tawny owls *Strix aluco* in differently human-transformed habitats. *Italian Journal of Zoology*, 4: 415-421.
- Madge S.E. & Burn, H. 1999. Crows and Jays. Princeton University Press. Princeton, New Jersey. USA. pp 216.
- Motta-Junior J.C. 2006. Relações tróficas entre cinco Strigiformes simpátricas na região central do Estado de São Paulo, Brasil. *Revista Brasileira de Ornitologia* 14: 359-377.
- Motta-Junior J.C. & Taddei V. A. 1992. Bats as prey of Stygian Owls in Southeastern Brazil. *Journal of Raptor Research* 26: 259-260.
- Piratelli A. & Pereira M.R. 2002. Dieta de aves na região leste do Mato Grosso do Sul, Brasil. *Revista Brasileira de Ornitologia* 10(2): 131-139.
- Popa-Lisseanu A.G.; Delgado-Huertas A.; Forero M.G.; Rodriguez A.; Arlettaz R. & Ibanez C. 2007 Bats' conquest of a formidable foraging niche: the myriads of nocturnally migrating songbirds. *PLoS ONE* 2, unpaginated.
- Raitt R.J. 1979. Social behavior, habitat and food of the Beechey Jay. *Wilson Bulletin*. 91(1): 1-176.
- Reinert B.L. & Bornschein M.R. 1998. Alimentação da gralha-azul (*Cyanocorax caeruleus*, Corvidae). *Ornitologia Neotropical* 9: 213-217.
- Sick H. 1997. *Ornitologia brasileira*. Nova Fronteira, Rio de Janeiro, 912p.
- Simmons N.B. 2005. Order Chiroptera. In: *Mammal species of the world: a taxonomic and geographic reference*, (edited by Wilson D.E. and Reeder D.M.), pp. 312-529. Baltimore, Maryland Johns Hopkins University Press. 3rd ed.
- Speakman J. R. 1991. The impact of predation by birds on bat populations in the British Isles. *Mammal Review*, 21: 123-142.
- Vizotto L.D. & Taddei V.A. 1973. Chave para determinação de quirópteros brasileiros. *Revista da Faculdade de Filosofia, Ciências e Letras São José do Rio Preto – Boletim de Ciências*. n.1. São José do Rio Preto. p.1-72.
- Willig M.R. 1983. Composition, microgeographic variation, and sexual dimorphism in Caatingas and Cerrado bat communities from northeast Brazil. *Bulletin of the Carnegie Museum of Natural History*. v.23, Pittsburg:1983, p.1-131.
- Willig M.R. & Hollander R.R. 1987. *Vampyrops lineatus*. *Mammalian Species* 275: 1-4.
- Wolfenden G. E. & Fitzpatrick J.W. 1984. The Florida scrub jay: demography of a cooperative breeding bird. Princeton University Press. Princeton, New Jersey. USA. 407 pp.
- Zortéa M. 2007. Subfamília Stenodermatinae. In: Reis N.R.; Peracchi A.L.; Pedro, W.A. and Lima I.P. eds. *Morcegos do Brasil*. Londrina, p.107-128.
- Zortéa M. 1993. Folivory in *Platyrrhinus (Vampyrops) lineatus* (Chiroptera: Phyllostomidae) *Bat Research News*, 34: 59-60.