

COMUNICAÇÃO CIENTÍFICA

## Birds trapped in mist nets killed by opportunistic predators in a forest in Southwestern Amazonia

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### RESUMO

**Aves presas em redes de neblina abatidas por predadores oportunistas em uma floresta no Sudoeste da Amazônia.** O uso de redes de neblina é um método altamente utilizado entre os pesquisadores devido a sua eficiência na captura de aves e morcegos. No entanto, os animais presos ficam vulneráveis à ação de predadores. Durante a realização de três estudos ornitológicos realizados em um fragmento florestal no sudoeste da Amazônia, foram registrados 15 eventos de predação, com taxa de predação de 1,5%. Entre os predadores, 26,7% (n = 4) dos casos foram relacionados com primatas, 13,3% (n = 2) relacionados com formigas de correição, 13,3% (n = 2) relacionados com uma espécie de gavião não identificado e em 46,7% (n = 7) dos casos os predadores não foram identificados. Evitar o acesso de predadores às redes de neblina e diminuir o tempo de monitoramento das redes são algumas das medidas que podem evitar estes eventos.

**Palavras-chave:** *Eciton burchellii*, Falcão, *Plecturocebus toppini*, Predação

### ABSTRACT

The use of mist nets is a highly used method among researchers due to their efficiency in capture birds and bats. However, trapped animals are vulnerable to predator action. During three ornithological studies carried out in a forest fragment from southwest Amazonia, we recorded 15 predation events, with predation rate of 1.5%. Among predators, 26.7% (n = 4) of the cases were related to primates, 13.3% (n = 2) related to army ants, 13.3% (n = 2) related to an unidentified hawk species and in 46.7% (n = 7) of the cases the predators did not identified. Preventing predator access to mist nets and reducing network monitoring time are some of the measures that can prevent these events.

**Keywords:** *Eciton burchellii*, Hawk, *Plecturocebus toppini*, Predation

## INTRODUCTION

Mist nets are tools used mainly in research involving birds and bats. The efficiency of mist nets in capturing these animals makes them one of the most used tools in avifauna and chiropteroфаuna studies (Roos, 2010; Castro et al., 2011; Ruiz-Esparza, 2012). Although effective for research, these traps have a side effect that is the exposure of animals trapped to predation risk (Hilário et al., 2017).

Predations on mist nets are not so often reported, as being unusual to happen (Ruiz-Esparza, 2012). However, a large number of predators such as primates (Melo et al., 2018), birds of prey (Legal et al., 2018), army ants (Ross, 2010) snakes and even bees and wasps (E. Guilherme, pers. obs.) become opportunistic predators when they encounter an animal trapped in a mist net. Therefore, birds caught with mist nets are quite vulnerable to predator attacks (Roos, 2010). Some actions suggested by the Brazilian Guideline for the Care and Use of Animals in Teaching or Scientific Research Activities (DBCA, *Diretriz Brasileira para o Cuidado e a Utilização de Animais em Atividades de Ensino ou de Pesquisa Científica*) can reduce this vulnerability, such as the correct use of capture techniques, the time that animals will be trapped and the training of researchers in relation to capture techniques (DBCA, 2016). Here we describe cases of bird predations trapped in mist nets during three ornithological studies in a forest fragment from southwest Amazonia.

We conducted the study in the Humaitá Forest Reserve (HFR), that is a forest fragment located in the eastern state of Acre, southwest of the Brazilian Amazon. This fragment has approximately 2,000 ha and is predominantly covered by open forest dominated by bamboo (*Guadua weberbaueri* Pilg.) or palm trees, on *terra firme* and floodplain (*várzea*) soils (Barroso et al., 2011). The HFR has a very diverse avifauna with 356 confirmed species (Pedroza et al., 2020).

This report is the result of a compilation made from captures with mist nets during three different ornithological surveys conducted at HFR. We sampled birds from April to December 2018. We used a total of 18 mist nets of 12 × 2.5 m and 36 mm mesh. We opened the mist nets around 6:00 am until 16:00 pm, totaling 9,750 hours/net. We checked the mist nets at 30 min intervals. Once captured, each individual was banded on one tarsus with a permanent, numbered aluminum ring provided by the Brazilian National Center for the Conservation of Wild Birds (CEMAVE/ICMBio) for use in project 1099, coordinated by Edson Guilherme. We identified predators visually as we approached the mist nets for checking. Some predators such as primates or birds of prey were identified as they abandoned the bird carcass in the mist net as they perceived our approach. Predation rates were calculated considering the number of predations \* 100 / total number of captures. Specimens were captured under ICMBio/SISBIO authorization nº 23269-1 and

ringed with permission of the Center for the Conservation of Wild Birds - CEMAVE/ICMBio (Project 1099, Junior Bird Bander, Registration Number: 5862483). The capture of birds in the HFR was approved by the Comitê de Ética no Uso dos Animais – CEUA (Committee on Animal Research and Ethics) of the Universidade Federal do Acre under process nº 23107.01002312018-77.

We captured 1063 birds during the HFR studies. We recorded 15 predation events affecting individuals of nine bird species, with the predation rate of 1.5%. In four predation events it was not possible to identify the bird species that was preyed (Table 1). Among predators, 26.7% (n = 4) of the cases were related to Toppin's titi monkey - *Plecturocebus toppini* (Figure 1A); 13.3% (n = 2) related to army ants of the species *Eciton burchellii* (Figure 1B); 13.3% (n = 2) related to an unidentified hawk and 46.7% (n = 7) of the cases we did not identify predators (Table 1). Birds killed by predation almost always had lacerations, abrasions, perforations in the ventral and / or cranial regions, with viscera exposures (Figure 2).

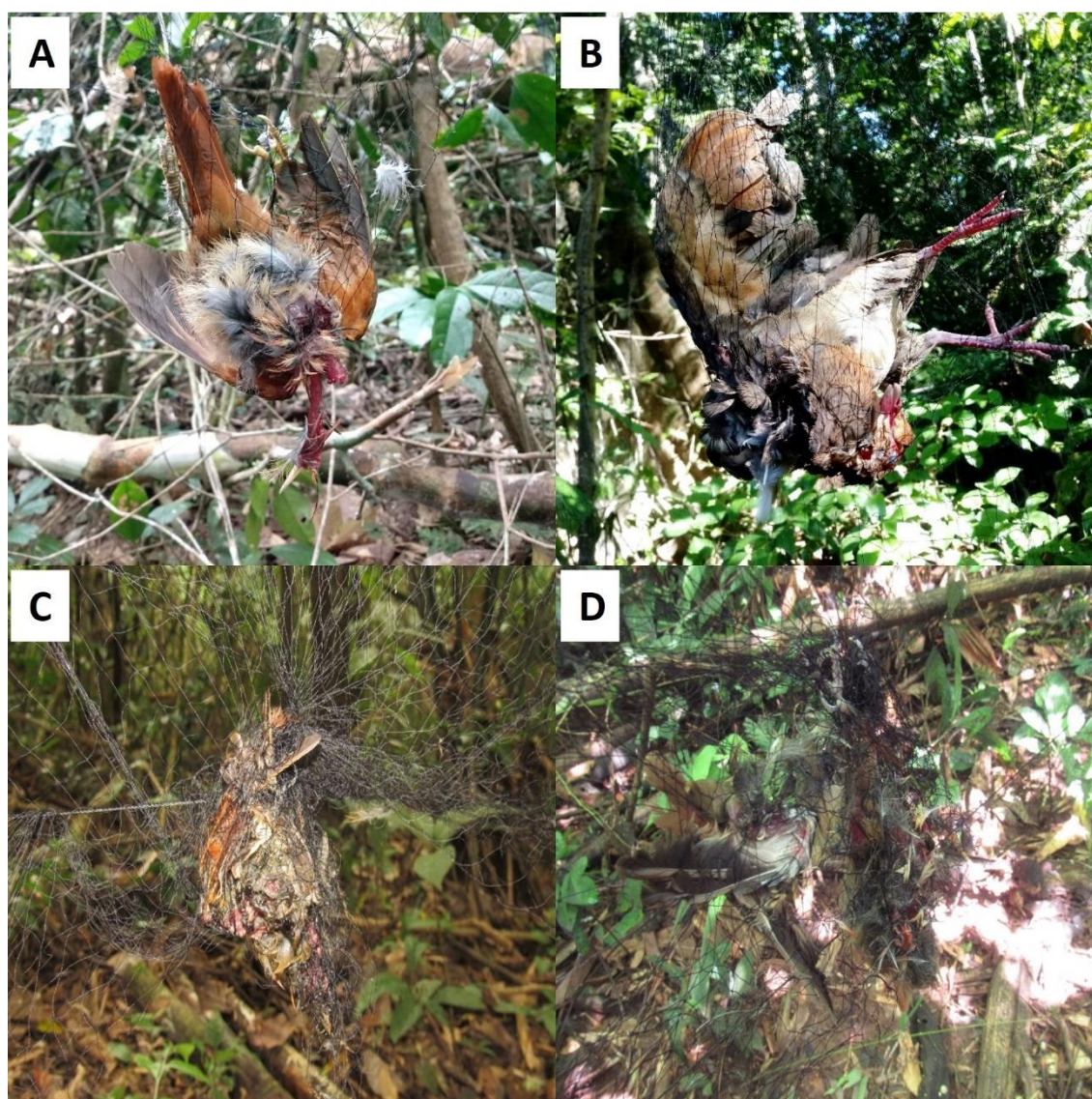
**Table 1.** Birds preyed on mist nets and their respective predators in the Humaitá Forest Reserve, Southwest Amazon.

Date	Prey family	Prey species	Predator species
05/23/2018	Dendrocolaptidae	<i>Sittasomus griseicapillus</i>	Unidentified Hawk
05/30/2018	Thamnophilidae	<i>Sciaphylax hemimelaena</i>	Unidentified
06/06/2018	Unidentified	Unidentified	<i>Plecturocebus toppini</i>
07/08/2018	Unidentified	Unidentified	Unidentified
08/02/2018	Pipridae	<i>Pipra fasciicauda</i>	Unidentified
08/08/2018	Unidentified	Unidentified	Unidentified
08/30/2018	Furnariidae	<i>Automolus ochrolaemus</i>	<i>Plecturocebus toppini</i>
09/01/2019	Thamnophilidae	<i>Sciaphylax hemimelaena</i>	Unidentified Hawk
09/20/2018	Furnariidae	<i>Automolus ochrolaemus</i>	<i>Plecturocebus toppini</i>
10/13/2018	Thamnophilidae	<i>Iseria hauxwelli</i>	Unidentified
10/18/2018	Columbidae	<i>Geotrygon montana</i>	Unidentified
11/01/2018	Onychorhynchidae	<i>Onychorhynchus coronatus</i>	<i>Plecturocebus toppini</i>
11/01/2018	Unidentified	Unidentified	Unidentified
11/12/2018	Thamnophilidae	<i>Phlegopsis nigromaculata</i>	<i>Eciton burchellii</i>
11/12/2018	Dendrocolaptidae	<i>Dendrocolaptes picumnus</i>	<i>Eciton burchellii</i>





**Figure 1.** Predators of birds trapped in mist nets in the Humaitá Forest Reserve, Southwestern Amazonia. A: Toppin's titi monkey (*Plecturocebus toppini*). B: Army ants swarm (*Eciton burchellii*) preying on an individual of the Black-spotted Bare-eye (*Phlegopsis nigromaculata*). Photos: A: David Pedroza Guimarães, B: Jônatas Lima.



**Figure 2.** Birds victims of predation in mist nets. A: Buff-throated Foliage-gleaner (*Automolus ochrolaemus*) predated by Toppin's titi monkey (*Plecturocebus toppini*) on 09/20/2018. B: Ruddy Quail-Dove (*Geotrygon montana*) predated on 10/18/2018 by an unidentified predator. C: Olivaceous Woodcreeper (*Sittasomus griseicapillus*) predated by Unidentified Hawk on 05/23/2018 and D: Chestnut-tailed Antbird (*Sciaphylax hemimelaena*) predated on 05/30/2018 by an unidentified predator. Photos: A and B: Jônatas Lima, C and D: David Pedroza Guimarães.



The predation rate obtained in HFR was less than 2% which is the acceptable limit in scientific research developed with mist nets (Ralph et al., 1993). The predation rate in HFR was slightly above that recorded in two areas where ornithological studies with mist nets were developed in the Atlantic forest in the state of São Paulo, which presented 1.17% and 1.20% respectively (Melo et al., 2018) and below that recorded in an area of Caatinga in the state of Sergipe where a predation rate of 1.8% was recorded (Ruiz-Esparza, 2012). All birds cited in this study were reported for the first time as predated in mist nets.

Although we did not observe the predators in eight events, we believe that the responsible for the bird deaths in the mist nets were Toppin's titi monkey and White-fronted capuchin - *Cebus albifrons*. This conclusion is supported by the markings left on the carcasses and also by the fact that mist nets are within the territory of these species on the days the birds were preyed. Several studies reported primates as the main predators of birds trapped in mist nets (Silva et al., 2008; Hilário & Ferrari, 2010; Hilário et al., 2017; Melo et al., 2018). However, we report for the first time the species Toppin's titi monkey - *Plecturocebus toppini* preying on birds trapped in the mist nets. Due to their high mobility, adult birds are not part of the primate diet (Hilário & Ferrari, 2010). However, birds immobilized in mist nets become easy prey for primates that are attracted due to the birds' alarm vocalizations (Ross, 2010). One recommendation for decreasing primate predation is to avoid primate access to mist nets (Hilário et al., 2017). Primates may have access to prey by branches close to nets, so cutting these branches is an easy and simple way to avoid predation by this group of animals (Hilário et al., 2017).

Birds of prey (mainly hawks) are another group of vertebrates that prey on birds caught in mist nets (Freer, 1978; Komar, 2003; Curcino et al., 2009; Legal et al., 2018; Melo et al., 2018). These predatory birds realize that the nets immobilize the birds and, therefore, are under observation nearby, waiting for the moment of attack (Roos, 2010). In these situations it is necessary to temporarily close the networks or exchange them to another location (Roos, 2010).

Other predators may also be attracted to mist nets such as deer (Allan, 1978), spiders (Carvalho et al., 2016), praying mantis (Nyffeler et al., 2017) and ants (Ross, 2010; Bichinski, 2015). Ant predation is related to birds caught near ground level that are vulnerable to attack, so we need to avoid arming nets near anthills (Ross, 2010). Army ants of the species *Eciton burchellii* form swarm that sweep across the forest floor and surrounding vegetation. Therefore, you need to be aware of mist nets when army ants swarms are passing because they can climb onto the rods and reach the mesh of the nets where a bird may be trapped, as was the case in HFR (Figure 1B). In our case, the army ants attack on one Black-spotted Bare-eye - *Phlegopsis nigromaculata* (Figure 1B) and one on Black-banded Woodcreeper - *Dendrocolaptes picumnus* occurred very quickly in the interval between mist nets checks.

Although we follow some aspects suggested by the DBCA (DBCA, 2016) in relation to the use of traps, predations were inevitable. The main recommendation for avoiding mist nets birds predation is to shorten network monitoring time (Ross, 2010; Hilário et al., 2017) or in extreme cases to avoid mist nets installation in predation sites (Roos, 2010). Although bird predation in mist nets is considered rare, it is possible to further mitigate these risks with relatively simple measures.

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