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Report of the Common Vampire Bat (*Desmodus rotundus*) Preying Upon Capybara (*Hydrochoerus hydrochaeris*)

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Keywords:

Foraging behavior; Chiroptera; hematophagy.

ABSTRACT – When evaluating different groups of capybaras in areas along the Paraíba do Sul river, in the municipality of São José dos Campos, an individual of *Desmodus rotundus* (E. Geoffroy, 1810) was recorded through photos and videos preying upon a capybara (*Hydrochoerus hydrochaeris*). Different reports of the interaction of this species with tapirs, wild deer, wild pigs, wild boars, cattle, and horses are observed, but with the capybara, only one mention was found in Anchieta Island/SP, and Brazil. In addition to staying under the capybara's paws to feed, the vampire bat was also seen jumping along the ground in an attempt to follow the individual and licking the blood on just one of its paws when it stopped feeding. The population density of *D. rotundus* is generally high in areas with domestic animals, especially cattle. Land use change has converted natural ecosystems into grasslands, which may have increased vampire bat populations due to the abundance of prey. The increase in populations of capybaras in urban areas in recent decades may increase populations of hematophagous bats, requiring further studies of this interaction, in addition to verifying the risk of rabies cases, taking into account domestic animals and humans that share the same areas.

Relato do morcego vampiro comum (*Desmodus rotundus*) predando capivara (*Hydrochoerus hydrochaeris*)

Palavras-chave:

Comportamento alimentar; Chiroptera; hematofagia.

RESUMO – Ao avaliar diferentes grupos de capivaras em áreas ao longo do rio Paraíba do Sul, no município de São José dos Campos, um indivíduo de *Desmodus rotundus* (E. Geoffroy, 1810) foi registrado através de fotos e vídeos predando uma capivara (*Hydrochoerus hydrochaeris*). São observados diferentes relatos da interação desta espécie com antas, veados, porcos selvagens, javalis, bovinos e cavalos, mas com a capivara apenas uma menção foi encontrada na Ilha Anchieta/SP e no Brasil. Além de ficar sob as patas da capivara para se alimentar, o morcego vampiro também foi visto pulando pelo chão na tentativa de seguir o indivíduo e lambendo o sangue de apenas uma das patas quando parava de se alimentar. A densidade populacional de *D. rotundus* é geralmente elevada em áreas com animais domésticos, especialmente bovinos. A mudança no uso da terra converteu ecossistemas naturais em pastagens, o que pode ter aumentado as populações de morcegos hematófagos devido à abundância de presas. O aumento das populações de capivaras em áreas urbanas nas últimas décadas pode aumentar as populações de morcegos hematófagos, necessitando de mais estudos dessa interação, além da verificação do risco de casos de raiva, levando em consideração animais domésticos e humanos que compartilham as mesmas áreas.

Informe del murciélago vampiro común (*Desmodus rotundus*) depredando el carpincho (*Hydrochoerus hydrochaeris*)

Palabras clave:

Comportamiento alimentario; Chiroptera; hematofagia.

RESUMEN – Al evaluar diferentes grupos de carpinchos en áreas a lo largo del río Paraíba do Sul, en el municipio de São José dos Campos, se registró a través de fotografías y videos un individuo de *Desmodus rotundus* (E. Geoffroy, 1810) depredando un carpincho (*Hydrochoerus hydrochaeris*). Se observan diferentes reportes de interacción de esta especie con dantas, venados silvestres, cerdos silvestres, jabalíes, bovinos y equinos, pero con el carpincho solo se encontró una mención en Isla Anchieta/SP y Brasil. Además de permanecer bajo las patas del carpincho para alimentarse, también se vio al murciélago vampiro saltando por el suelo en un intento de seguir al individuo y lamiendo la sangre de solo una de sus patas cuando dejó de alimentarse. La densidad de población de *D. rotundus* es generalmente alta en zonas con animales domésticos, especialmente ganado. El cambio de uso de la tierra ha convertido los ecosistemas naturales en pastizales, lo que puede haber aumentado las poblaciones de murciélagos vampiros debido a la abundancia de presas. El aumento de las poblaciones de capibaras en zonas urbanas en las últimas décadas puede aumentar las poblaciones de murciélagos hematófagos, lo que requiere mayores estudios de esta interacción, además de verificar el riesgo de casos de rabia, teniendo en cuenta animales domésticos y humanos que comparten las mismas áreas.

Introduction

Desmodus rotundus (E. Geoffroy, 1810), known as the common vampire bat, has a wide distribution in Latin America, one of the three hematophagous bats[1]. In Brazil, this species is registered in almost all states, occurring in forested, semi-arid areas and environments with a significant anthropic alteration. The species has a strictly hematophagous diet[2], with vampire bats having a wider geographic distribution. It uses wild mammals, and in the absence of these in urban or rural areas, it can prey on domestic birds and mammals[3].

This species of bat can prey on an animal per night or visit the same animal on consecutive nights, feeding on the blood of its host through the inoculation of its prey, followed by the release of the anticoagulant present in its saliva, thus allowing the constant blood flow, where the animal stays close to the wound and licks the bleeding wounds[4]. The anticoagulant in its saliva makes it difficult for the wound to heal, causing the animal to lose a large amount of blood[5]. *D. rotundus* is nocturnal and inhabits caves and forest areas; they are not limited to a single perch, but can involve several other perches, the main one being the harem (with a predominance of females and few dominant males) and several perches with single males around them[6].

Among 1460 species of Chiroptera already recorded, only *D. rotundus, Diaemus youngi,* and *Diphylla ecaudata* are exclusively hematophagous[7]. Chiropterans are efficient in their flight; however, they are clumsy and inefficient when on the ground, except the vampire bat *D. rotundus*, which efficiently lands near the target mammal and uses its four limbs as a quadruped and, with small quick jumps, reaches its feeding target[8]. The common vampire bat can transmit the rabies virus to mammals, such as domestic livestock, as these are a more predictable feeding source than wild animals[9]. This disease causes a proper description of the RABV pathogenesis of the affected animals, frequently affecting animals from rural areas and wild mammals in a natural environment[9][10]. The purpose of this note is to describe the ecological interaction between *D. rotundus* (vampire bat) and *Hydrochoerus hydrochaeris* (Linnaeus, 1766) (capybara), based on the assumption that the interaction between these two animals is rarely seen and recorded.

Material and Methods

Study area

The city of São José dos Campos is located in the metropolitan region of Vale do Paraíba and is 90 km away from São Paulo. The municipality has a geographical area of approximately 1,100 km^2[11] with just over 620 thousand inhabitants according to the last census conducted by IBGE[12]. In 2020, a population diagnosis of capybaras was carried out in four areas of the municipality. The interaction between *D. rotundus* and *H. hydrochaeris* was recorded at the Parque da Cidade Roberto Burle Marx (study area 2), located in the center of São José dos Campos (Zone: 23, E 408909, S 747184) (Figure 1).

The park has a perimeter of 6.12 km and an area of 1.86 km^2. It is characterized by the following landscape elements: the presence of two lakes, one of which is smaller and the other main with arboreal vegetation in the surroundings composed of areas of a regenerated forest; an artificial island in the center of the main lake with tree and shrub vegetation, including native and exotic tree species, in addition to an extensive lawn area that is used for various activities such as leisure, picnics, sports, foraging area for some animals, including capybaras. The ecological density of capybaras in this area is around 18.27 ind ha^{-1} according to the diagnosis made by authors in 2020.

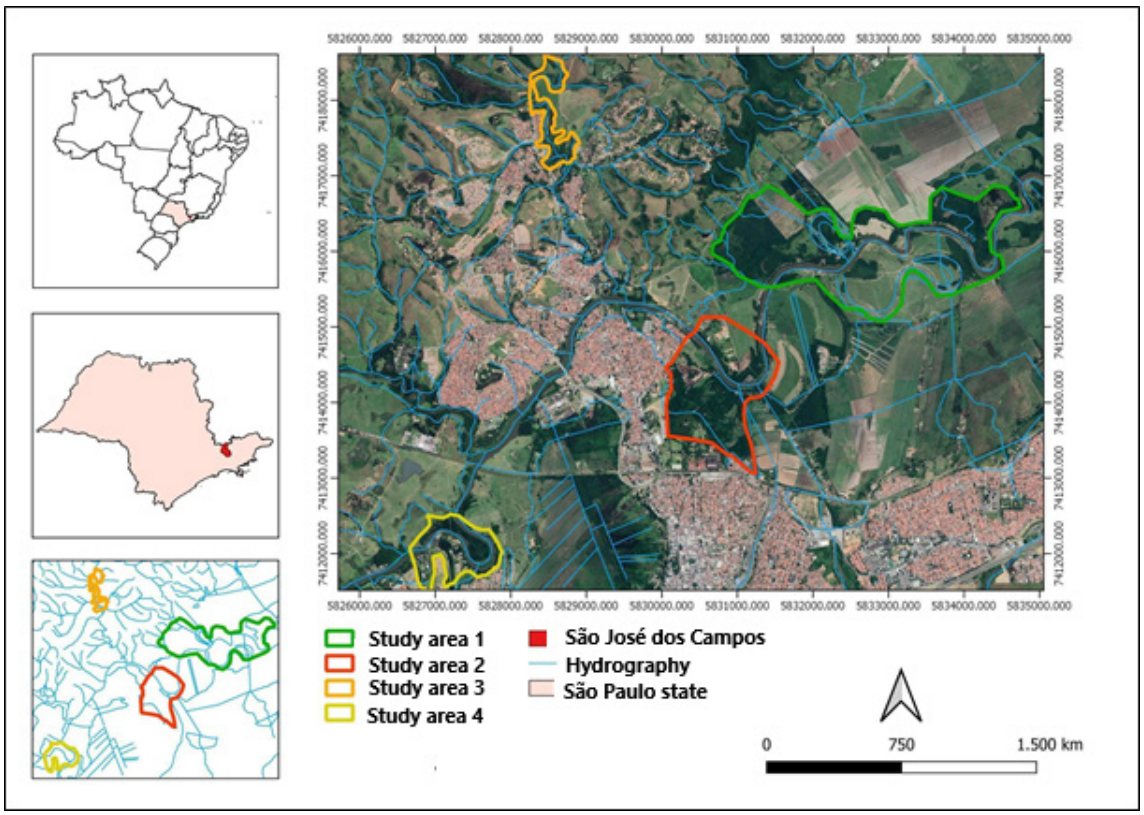

Figure 1 – Study area with the delimitation of study area 2, where interaction (spoliation) between *D. rotundus* and *H. hydrochaeris* was detected.

Methodology

The methodology used to obtain this encounter was the active search where transects were covered in the park area totaling 120 hours of sampling effort; this activity can be used for other groups besides mammals, which is a generalist technique, allowing finding species with both diurnal and nocturnal habits, which can be randomly or unexpectedly linear, as was performed in this study[13]. The records were obtained through cameras with photos and videos of the interaction between the vampire bat and the capybara.

Results

The interaction of an individual from *D. rotundus* with *H. hydrochaeris* (Figure 2) was recorded in the coordinates Zona 23K E 408909, S 747184, at Parque da Cidade Roberto Burle Marx, on July 10, 2020, at night, coinciding with the foraging period of the two species. In the record, the vampire bat followed the capybara, jumping between its paws under the ground to feed on the blood dripping from the animal's rear paw; the bat skillfully avoided being trampled. When the capybara stopped to forage the vampire bat, it stopped feeding on the blood dripping from the capybara's paw and remained so until it started moving again.

Figure 2 – *D. rotundus* feeding on the blood of an individual of *H. hydrochaeris*.

Figures 3 and 4 – Vampire bat following the capybara and jumping between its paws along the ground.

Discussion

D. rotundus, as well as the other species belonging to the group that feeds exclusively on blood[14], benefit from the existing capybaras in the park, in an opportune act, considering that they have diurnal to nocturnal habits, being an easy target for the predator. As a consequence, It can bring economic losses in cattle raising[15], as well as in domestic pets and, consequently, the people who live around, due to the fact to are considered a potential transmitter of rabies virus[16] since hematophagous bats have a high adaptability to urban and disturbed environments, which have an easy food source close to their roost[17].

The observed behavior of the bat in the act of predation is quite curious, as it uses very unconventional methods to obtain its food, as previously described by several authors such as Uieda[14] and Pereira[22], low-flying, quadrupedal way of walking on the ground and often on the victim's back, capable of jumping and flying off the

ground, with well-developed thumbs, which facilitates their locomotion on the ground, methods observed when around the capybara that did not even feel the presence of the predator, thus not using defense methods.

In the first record between *D. rotundus* and *Tapirus terrestris*, in an area of the Atlantic Forest (north of Espírito Santo) in 2015, in this case, the tapir seemed to perceive the bat's attack attempts and tried to dodge, as demonstrated by the records obtained by traps photographs[18]. In the case of the individual reported in this study, he presented a different behavior, not showing discomfort with the presence of the bat. Other records were obtained from photographic traps with interactions between *D. rotundus* and other prey, such as *Priodontes maximus*[19], *Mazama americana*, *Pecari tajacu*[7] and *Sus scrofa*[2].

Like the domestic animals that *D. rotundus* typically preys upon, the capybaras found in the study area are animals used to human presence because they are located in a public park, which is very popular with the population. The fact that these animals are considered docile may be one of the assumptions by which the capybara was preyed on because despite being in a region where there are also domestic animals, including cattle, capybaras are accessible to bats due to the delimited area in which they are found, as well as being in large numbers. The population of capybaras in the Roberto Burle Marx Park (Parque da Cidade) is around 15 individuals, in a group composed of adults, juveniles, and calves, which have food available and are relatively protected, making these animals remain residents of the Park, and the relatively large group may be a determining factor for the presence of the bat.

Therefore, the increase in capybara populations in urban areas in recent decades[20] may increase the populations of hematophagous bats, requiring further studies of this interaction, in addition to verifying the risk of rabies cases, taking into account the domestic animals and humans that live in the same areas. The sharing of habitats of the human species with wild animals can lead to cases of hematophagy in humans and transmission of rabies. With that in mind, more detailed studies of these interactions as well as the monitoring of these areas, such as the Parque da Cidade in São José dos Campos, should be effective, as rabies is common in humans and other mammals and has been proven to be transmitted by *D. rotundus*[21][22].

Conclusion

This study reported the occurrence of this independent event between the common vampire bat and the capybara can be described as little seen and recorded, assuming that the interaction with the capybara was mentioned only once in Anchieta Island/SP, Brazil. Interactions between *D. rotundus* (vampire bat) and other mammals have already been observed and reported in several publications, but this is the first record of this species feeding on an individual of *H. hydrochaeris* (capybara), and it was observed in person. The diet of the bat in question is primarily associated with domestic animals, and attacks on these animals may even occur, as already recorded by Mialhe[21] who reported attacks on cattle and horses.

References

1. Ito F, Bernard E, Torres RA. What is for Dinner? First Report of Human Blood in the Diet of the Hairy-Legged Vampire Bat *Diphylla ecaudata*. Acta Chiropterologica. 2016 December; 18(2): 509.

2. Galetti M, Pedrosa F, Keuroghlian A, Sazima I. Liquid lunch – vampire bats feed on invasive feral pigs and other ungulates. Frontiers in Ecology and the Environment. 2016 November; 14(9): 505-6.

3. Hernández-Pérez EL, Castillo-Vela G, García-Marmolejo G, López MS, Reyna-Hurtado R. Wild pig (*Sus scrofa*) as prey of the Common Vampire Bat (*Desmodus rotundus*). Therya [Internet]. 2019 January; 10(2): 195-9. Available from: https://www.redalyc.org/journal/4023/402362668017/movil

4. Scheffer KC, Barros RF, Iamamoto K, Mori E, Asano KM, Lima JYO et al. *Desmodus rotundus* – biología y comportamiento. Open Science Research III [Internet]. 2022; 505-29. Available from: https://downloads.editoracientifica.com.br/articles/220308371.pdf

5. Voigt CC, Kelm DH. Host preference of the common vampire bat (*Desmodus rotundus*; Chiroptera) assessed by stable isotopes. Journal of Mammalogy. 2006 February; 87(1): 1-6.

6. Martins F, Ditchfield AD, Meyer D, Morgante J. Mitochondrial DNA phylogeography reveals marked population structure in the common vampire bat, *Desmodus rotundus* (Phyllostomidae). Journal of Zoological Systematics and Evolutionary Research. 2007 November; 45(4): 372-8.

7. Zortéa M, Silva DA, Calaça AM. Susceptibility of targets to the vampire bat *Desmodus rotundus* are proportional to their abundance in Atlantic Forest fragments? Iheringia

Série Zoologia [Internet]. 2018 November; 108: e2018037. Available from: https://www.scielo.br/j/isz/a/KNqDfVsjqGsqr4cM9dVygrj/

8. Riskin DK, Parsons S, Schutt WA, Jr Carter GG, Hermanson JW. Terrestrial locomotion of the New Zealand short-tailed bat *Mystacina tuberculata* and the common vampire bat *Desmodus rotundus*. Journal of Experimental Biology. 2006 May; 209(Pt 9): 1725-1736.

9. Rocha F, Dias RA. The common vampire bat *Desmodus rotundus* (Chiroptera: Phyllostomidae) and the transmission of the rabies virus to livestock: A contact network approach and recommendations for surveillance and control. Preventive Veterinary Medicine [Internet]. 2020 January; 174:104809. Available from: https://www.sciencedirect.com/science/article/pii/S0167587719305987

10. Corrêa MMO, Lazar A, Dias D, Bonvicino CR. Quirópteros hospedeiros de zoonoses no Brasil. Boletim da Sociedade Brasileira de Mastozoologia. [Internet]. 2013; 67: 23-38.

11. Silva JE, Rosa MAG, Pacini AA. Evolução da emissão de monóxido de carbono associada à frota de veículos leves na cidade de São José dos Campos/SP, Brasil. Revista Univa. 22(39): 84-95.

12. Censo IBGE. Disponível em: <http://www.censo2010.ibge.gov.br/>. Acesso em: 15/11/2020.

13. Pereira AC, Serra JCV. Dispositivos e equipamentos de monitoramento de herpetofauna, mastofauna e avifauna utilizados em pequenas centrais hidrelétricas (pchs) no estado do Tocantins. Engenharia Ambiental [Internet]. 2020; 9: 249-263.

14. Uieda W. Aspectos do comportamento alimentar das três espécies de morcegos hematófagos (Chiroptera, Phyllostomidae) [dissertação]. Campinas: Universidade Estadual de Campinas; 1982. 166 f.

15. Acha PN, Alba AM. Perdas econômicas por *Desmodus rotundus*. In: História natural dos morcegos vampiros. CRC Press; 2018. P. 207-214.

16. Albas A, Souza EAN de, Picolo MR, Favoretto SR, Gama AR da, Sodré MM. Os morcegos e a raiva na região oeste do Estado de São Paulo. Revista da Sociedade Brasileira de Medicina Tropical. 2011; 44(2): 201-5.

17. Gomes MN, Uieda W. Abrigos diurnos, composição de colônias, dimorfismo sexual e reprodução do morcego hematófago *Desmodus rotundus* (E. Geoffroy) (Chiroptera, Phyllostomidae) no Estado de São Paulo, Brasil. Revista Brasileira de Zoologia [Internet]. 2004; 21: 629-38. Disponível em: https://www.scielo.br/j/rbzool/a/yfPJ6Pv5Q5cwHRVdbbJf5Dd/citation/?lang=pt

18. Gnocchi AP, Srbek-Araujo AC. Common vampire bat (*Desmodus rotundus*) feeding on lowland Tapir (*Tapirus terrestris*) in an Atlantic Forest remnant in southeastern Brazil. Biota Neotropica. 2017; 17(3).

19. Oliveira M. Potential feeding event of *Priodontes maximus* (Cingulata: Dasypodidae) by *Desmodus rotundus* (Chiroptera: Desmodontinae) in the Cerrado, Western Brazil. Notas sobre Mamíferos Sudamericanos [Internet]. Available from: https://www.academia.edu/114219378/Potential_feeding_event_of_Priodontes_maximus_Cingulata_Dasypodidae_by_Desmodus_rotundus_Chiroptera_Desmodontinae_in_the_Cerrado_Western_Brazil?uc-sb-sw=83804558

20. Almeida AMR, Biondi D. Estudo da paisagem e a ocorrência de capivaras (*Hydrochaerus hydrochaeris*) no Parque Municipal Tingui, Curitiba/PR. Rev. Ci. Agra., [Internet]. 2011; 54(3): 280-9. Disponível em: https://ajaes.ufra.edu.br/index.php/ajaes/article/view/365

21. Mialhe PJ, Moschini LE. Controle populacional do morcego hematofago *Desmodus rotundus* e redução de ataques a herbívoros domésticos no município de São Pedro, São Paulo, Brasil. Fronteiras: Journal of Social, Technological and Environmental Science. [Internet]. 2016; 5(3): 238-251.

22. Pereira SN, Gitti CB, Cabral MMO. Análise da distribuição da região dos ferimentos provocados por morcegos hematófagos *Desmodus rotundus* (Geoffroy, 1810) em bovinos sob condições de campo. Arquivos do Instituto Biológico [Internet]. 2020; 77: 203-208.

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