

NEST PREDATION OF THE PURPLE-THROATED EUPHONIA (*EUPHONIA CHLOROTICA*) BY THE GREAT KISKADEE (*PITANGUS SULPHURATUS*) IN AN URBAN ENVIRONMENT

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Abstract: Nesting predation is a significant factor influencing the life history traits and reproductive success of bird species, particularly in urban environments. However, there is a lack of studies documenting avian nest predation behavior in the Neotropical region, especially in urban areas. This study reports a case of nest predation on Purple-throated Euphonia (*Euphonia chlorotica*) by the Great Kiskadee (*Pitangus sulphuratus*) in an urban environment, leading to nest abandonment. Despite being a common urban bird, reports of the Great Kiskadee preying on nests are scarce. The study discusses the species' predatory behavior, which shares characteristics with other bird species known to be nest predators. This occurrence contributes to the limited literature on its predatory behavior and highlights the importance of case reports in documenting specific predator-prey interactions in urban environments to better understand species interaction ecology in these settings.

Keywords: Neotropical region, bird behavior, Tyrannidae, urban birds, urban ecosystem.

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PREDÇÃO DE NINHO DE FIM-FIM (*EUPHONIA CHLOROTICA*) PELO BEM-TE-VI (*PITANGUS SULPHURATUS*) EM UM AMBIENTE URBANO

Resumo: A predação de ninhos é um fator significativo que influencia as características da história de vida e o sucesso reprodutivo das espécies de aves, especialmente em ambientes urbanos. No entanto, há uma carência de estudos que documentem o comportamento de predação de ninhos por outras aves na região Neotropical, especialmente no ambiente urbano. Este estudo documenta um caso de predação do ninho de *Euphonia chlorotica* por *Pitangus sulphuratus* em um ambiente urbano, levando ao abandono do ninho. Apesar de ser uma ave urbana comum, relatos de *P. sulphuratus* predando ninhos são escassos. Discorre-se sobre o comportamento predatório da espécie, que apresenta características comuns a outras espécies de aves reconhecidas predadoras de ninhos. Essa ocorrência adiciona à limitada literatura sobre seu comportamento predatório e ainda destaca a importância de relatos de caso para documentar interações específicas entre predadores e presas em ambientes urbanos para melhor entender a ecologia da interação de espécies nesses ambientes.

Palavras-chave: Aves urbanas; ecossistema urbano; comportamento de aves; região Neotropical; Tyrannidae.

Nest predation plays a major role in the natural selection of life history traits in birds and is one of the main causes of reproductive failure and species persistence in some environments (Ricklefs, 1969; Martin, 1993; Newton, 1998). In urban ecosystems, studies have shown the impacts of different bird species as nest predators (e.g., Major et al., 1996; Jerzak, 2001; Marzluff et al., 2001; Rodewald & Kearns, 2011). Small birds, for example, can be responsible for 28% of nest losses (Rodewald & Kearns, 2011). Given its importance, it is crucial

to specifically identify species that play a key role in nest predation (Ibáñez-Álamo et al., 2015).

Little is known, however, about this phenomenon in the Neotropics, especially in the cities (Ortega-Álvarez & MacGregor-Fors, 2011; Rivera-López & MacGregor-Fors, 2016; Menezes & Marini, 2017). The few studies available have shown a high rate of nest predation especially by birds (e.g., López-Flores et al., 2009; Rivera-López & MacGregor-Fors, 2016). In Brazil, the largest country in the Neotropics, only a handful

of studies has evaluated nest predation in the urban environment (e.g., Begotti & Landesmann, 2008; Pereira et al., 2009; Almeida e Silva & Voltolini, 2015; Perrella et al., 2017). In most of the studies, however, the predator species were not identified.

Despite being isolated, naturalistic observations of predation events between species at the organismal level are essential for a comprehensive understanding of ecological interactions and, according to Anderson (2017), their publication as case reports should be encouraged. The significance of simple case reports is highlighted in systematic reviews of the literature, such as the synthesis by Menezes & Marini (2017) on nest predation in the Neotropics.

In this study, I report for the first time a nest predation event of the Purple-Throated Euphonia (*Euphonia chlorotica* (Linnaeus, 1766)) by the Great Kiskadee (*Pitangus sulphuratus* (Linnaeus, 1766)) observed in an urban park. The Great Kiskadee stands out as one of the most abundant species – if not the most – in urban areas within its distribution (e.g., Ruszczyk et al., 1987; Cruz & Piratelli, 2011; Sacco et al., 2015). As I discuss later, despite being known as a predator of small vertebrates (Sick, 1997), few are the cases describing its behavior as a nest predator.

The predation event took place on 16 February 2020 (0850 h BRT) at the Vicentina Aranha Park (23°11'52.93"S; 45°53'48.88"W, WGS84), an urban green area in the central urbanized region of São José dos Campos, state of São Paulo, Brazil. The park has ≈80% of its 84,500 m² covered by ≈50 years-old secondary vegetation with at least 130 tree species (a mix of exotic and native species from the Atlantic Forest).

Bird species were identified by visual contact with binoculars 8x40 mm. The Great Kiskadee is a robust and conspicuous tyrant, easily identifiable by its distinctive features. This bird has a strong, sturdy beak, well-suited for its varied diet, which includes insects, fruits, and small vertebrates (Sick, 1997; Brush & Fitzpatrick, 2020). It is common in urban, suburban, and rural areas (Ruszczyk et al., 1987; Argel-de-Oliveira, 1995; Cintra, 1997) along its range from southern United States to central-southern Argentina (Sick, 1997; Brush & Fitzpatrick, 2020), demonstrating significant adaptability to different environments.

The Purple-throated Euphonia is a small, vibrant passerine in the Fringillidae family known for its striking plumage and melodic song, widely distributed in northern and central South America, reaching as far as northern Argentina and Uruguay (Sick, 1997; Hilty, 2020). This species is predominantly frugivorous, feeding on a variety of small fruits

and berries, but also on small invertebrates (Sick, 1997; Hilty, 2020). The Purple-throated Euphonia is often found in pairs or small groups, inhabiting tropical and subtropical forests, as well as urban environments (Sick, 1997; Hilty, 2020). Their nests are typically globular structures with a hidden lateral entrance, well-concealed within the dense foliage of trees (Sick, 1997; Hilty, 2020).

In this particular case, its nest, a globular-shaped structure, was located approximately 8 m high at the bottom edge of the tree crown of a pink trumpet tree (*Handroanthus heptaphyllus* (Vell.)). Although the tree was fully covered by leaves, the nest remained easily visible in the crown due to the naturally sparse leaf arrangement of this species, a factor that can increase nest predation risk (Michalski & Norris, 2014). The nest was attached laterally to a descending twig and intertwined with the stems of the mistletoe cactus (*Rhipsalis* Gaertn., 1788).

The Great Kiskadee was initially perched quietly on a tree approximately 5 meters away from the nest tree, without vocalizing. After about three minutes of the contact, it flew to a branch ~1 m away from the Purple-Throated Euphonia nest. With a quick flight towards the nest, the Great Kiskadee snatched one nestling through the nest side entrance. The snatching flight lasted less than 5 s. The Great Kiskadee performed a sally-hover maneuver (Remsen & Robinson, 1990), swiftly flying directly towards the nest from a perch with a brief hover in front of its entrance, then returning to its initial perch with the nestling in its bill. Due to the angle of view, there was doubt whether it hung on to the nest structure or not while hovering to capture the nestling. The nestling was still at an early developmental stage, completely featherless. On the perch, the Great Kiskadee ingested its prey after striking it against the tree branch, a common behavior in birds to kill the prey or separate undesirable parts (Remsen & Robinson, 1990). After consuming the prey, the Great Kiskadee flew out of sight.

The Purple-Throated Euphonia parents were present at the site during the event, agitated and vocalizing, but they did not attack the Great Kiskadee. Following the predation event, the nest was monitored for three consecutive days at different times of the day, with observation sessions lasting at least two hours in both the morning and afternoon. The absence of the adult birds indicated that the pair had abandoned the nest. Since this species typically lays a clutch of 1-3 eggs (2.1±0.6) (Perrella et al., 2017; Peñaranda Barrios, 2020), it is possible that a single nestling was being reared or the others had been predated earlier.

The literature unveiled a few cases of the Great Kiskadee as a nest predator. Isolated

cases have been documented for the nests of the Bananaquit (*Coereba flaveola* (Linnaeus, 1758)) (Sick, 1997), the Double-Collared Seedeater (*Sporophila caerulea* (Vieillot, 1823)) (Francisco, 2006) and the Eared dove (*Zenaida auriculata* (Des Murs, 1847)) (De la Peña, 2011). In a comprehensive study of the Neotropical region, Menezes & Marini (2017) identified the Great Kiskadee as a nest predator of six bird species. Similarly, Salvador & Bodrati (2013) present a comprehensive collection of observations for different species in Argentina, where the Great Kiskadee is listed preying on the eggs or nestlings/fledglings of five species (see species list in both references).

The few reports may be attributed to the unique characteristics of nest predation. The swift and instantaneous nature of predation poses challenges for observation without the use of video recording devices near the nests (Cox et al., 2012). Additionally, researchers may be less motivated to publish such occasional events, potentially due to perceived lack of novelty or previous journal rejections, overlooking the importance of filling knowledge gaps in the phenomenon (Anderson, 2017). On the other hand, the Great Kiskadee has been found preying on a wide range of small vertebrates, including adult birds, fishes, turtles, snakes, lizards, amphibians, rodents, and bats (Beltzer, 1983; Richard, 1986; Gorena, 1997; Sick, 1997; Argel-de-Oliveira et al., 1998; Latino & Beltzer, 1999; Carvalho Filho, 2009; Fischer et al., 2010; Munin et al., 2012; Pereira & Melo, 2012; Salvador & Bodrati, 2013; Sazima, 2015).

The broad spectrum of vertebrates preyed upon by the Great Kiskadee allows one to speculate that nest predation can be overlooked. The diversity of vertebrates showcases its versatility as a generalist predator, possibly one of the most versatile among passerines (Fitzpatrick, 1980; Sick, 1997). This versatility stems from its medium size (20-25 cm) and its ability to forage on various substrates and strata in both forested and open areas (e.g., tree foliage and branches, on the ground, in the air, above and under the water surface) (Fitzpatrick, 1980; Beltzer, 1983; Richard, 1986; Cintra, 1997; Gorena, 1997; Latino & Beltzer, 1999; Gabriel & Pizo, 2005; Fischer et al., 2010; Martins-Oliveira et al., 2012). Its size and prolonged searching capabilities enable it to target larger prey (Schoener, 1971; Fitzpatrick, 1981; Gabriel & Pizo, 2005). These generalist characteristics make the Great Kiskadee a broad-spectrum omnivore, common in both wild and human-modified environments (Ruszczyk et al., 1987; Argel-de-Oliveira, 1995; Cintra, 1997; Sick, 1997). Also, its preference for foraging in tree canopies (Martins-Oliveira et al., 2012) may

increase the likelihood of encountering nests, as in the reported case.

The Great Kiskadee biology and ecology resemble other widely recognized birds known for preying on nests, particularly in urban environments. For instance, the Pied Currawong (*Strepera graculina* (Shaw, 1790)) has been implicated in over 50% of nest predation cases, leading to a decline in species recruitment in urban areas of Australia (Major et al., 1996; Debus, 2006). Similar patterns have been observed for magpies (*Pica pica* (Linnaeus, 1758)) (Jerzak, 2001), Western Scrub-Jay (*Aphelocoma californica* (Vigors, 1839)) (Reidy & Thompson III, 2012), and crows (*Corvus sp.*) (Marzluff et al., 2001; Rodewald & Kearns, 2011), recognized, among others, as major nest predators in urban habitats. In support of these observations, it has been noted that the foraging versatility of the Great Kiskadee more closely resembles that of the Corvidae family rather than a typical suboscine passerine (Fitzpatrick, 1980). Similar to these species, the Great Kiskadee also demonstrates remarkable adaptability in the urban environment, being the most abundant and widespread species in Brazilian urban areas (Ruszczyk et al., 1987; Argel-de-Oliveira, 1995; Matarazzo-Neuberger, 1995; Krügel & Anjos, 2000; Scherer et al., 2005; Galetti et al., 2009; Braga et al., 2010; Cruz & Piratelli, 2011; Vasconcelos et al., 2013; Sacco et al., 2015).

The observation of the nest predation event of the Purple-Throated Euphonia by the Great Kiskadee adds one more piece to the puzzle of ecological interactions among urban species in the Neotropics. This report highlights the versatility of the Great Kiskadee as a generalist predator and underscores the importance of documenting singular events that, although isolated, contribute to a broader understanding of nest predation patterns. The identification of specific predators and their preys is crucial for the conservation and management of avifauna, and this study reiterates the need to continue monitoring and reporting such events.

I am deeply thankful to Association for the Promotion of Art and Culture (AFAC in Portuguese) for their invaluable support in establishing the Bird Observatory Project at Vicentina Aranha Park. Initiated in 2014, this social project focuses on providing nature-based experiences through birdwatching activities, promoting eco-literacy, and advancing citizen science.

REFERENCES

- Almeida e Silva, A. S. & J. C. Voltolini.** 2015. Predação de ninhos artificiais em dois fragmentos urbanos de Mata Atlântica no Sudeste do Brasil. *Rev. Biociências* 21(2): 19-37.

- Anderson, J. G. T.** 2017. Why Ecology needs Natural History. *Am. Sci.* 105(5): 290. <https://doi.org/10.1511/2017.105.5.290>
- Argel-de-Oliveira, M. M.** 1995. Aves e vegetação em um bairro residencial da cidade de São Paulo, São Paulo, Brasil. *Rev. Bras. Zool.* 12(1): 81-92. <https://doi.org/10.1590/S0101-81751995000100011>
- Argel-de-Oliveira, M. M., N. A. Curi & T. Passerini.** 1998. Alimentação de um filhote de bem-te-vi, *Pitangus sulphuratus* (Linnaeus) (Passeriformes, Tyrannidae), em ambiente urbano. *Rev. Bras. Zool.* 15(4): 1103-1109. <https://doi.org/10.1590/S0101-81751998000400027>
- Begotti, R. A. & L. F. Landesmann.** 2008. Predação de ninhos por um grupo híbrido de sagüis (*Callithrix jacchus/penicillata*) introduzidos em área urbana: implicações para a estrutura da comunidade. *Neotrop. Primates* 15(1): 28-29. <https://doi.org/10.1896/044.015.0107>
- Beltzer, A. H.** 1983. Alimentación del "Benteveo" (*Pitangus sulphuratus*) en el Valle Aluvial del Río Paraná Medio. *Rev. Asociación Cien. Naturales del Litoral* 14(1): 47-52. <https://doi.org/10.14409/-natura.v1i14.3414>
- Braga, T. V., A. C. S. Zanzini, R. A. S. Cerboncini, M. Miguel & A. S. Moura.** 2010. Avifauna em praças da cidade de Lavras (MG): riqueza, similaridade e influência de variáveis do ambiente urbano. *Rev. Bras. Ornitol.* 18(1): 26-33.
- Brush, T. & J. W. Fitzpatrick.** 2020. Great Kiskadee (*Pitangus sulphuratus*), version 1.0. In: Poole, A. F. & F. B. Gill (Eds.). *Birds of the World*. Ithaca, NY, Cornell Lab of Ornithology.
- Carvalho Filho, F. S.** 2009. Predação pelo bem-te-vi *Pitangus sulphuratus* (Passeriformes, Tyrannidae) no baiacu *Colomesus asellus* (Actinopterygii, Tetraodontidae) e camarão de água doce (Crustacea, Decapoda). *Rev. Bras. Ornitol.* 17(1): 77-78.
- Cintra, R.** 1997. Spatial distribution and foraging tactics of tyrant flycatchers in two habitats in the Brazilian Amazon. *Stud. Neotrop. Fauna Environ.* 32(1): 17-27. <https://doi.org/10.1076/sn-fe.32.1.17.13459>
- Cox, W. A., M. S. Pruett, T. J. Benson, S. J. Chiavacci & F. R. Thompson III.** 2012. Development of camera technology for monitoring nests. *Stud. Avian Biol.* 43: 185-210.
- Cruz, B. B. & A. J. Piratelli.** 2011. Avifauna associada a um trecho urbano do rio Sorocaba, Sudeste do Brasil. *Biota Neotrop.* 11(4): 255-264. <https://doi.org/10.1590/S1676-06032011000400022>
- de la Peña, M. R.** 2011. Observaciones de campo en la alimentación de las aves. *Biologica* 13: 1-88.
- Debus, S. J. S.** 2006. The role of intense nest predation in the decline of Scarlet Robins and Eastern Yellow Robins in remnant woodland near Armidale, New South Wales. *Pac. Conserv. Biol.* 12(4): 279-287. <https://doi.org/10.1071/PC060279>
- Fischer, E., R. L. Munin, J. M. Longo, W. Fischer & P. R. de Souza.** 2010. Predation on bats by Great Kiskadees. *J. Field Ornithol.* 81(1): 17-20. <https://doi.org/10.1111/j.1557-9263.2009.00256.x>
- Fitzpatrick, J. W.** 1980. Foraging behavior of Neotropical tyrant flycatchers. *Condor* 82(1): 43-57. <https://doi.org/10.2307/1366784>
- Fitzpatrick, J. W.** 1981. Search strategies of tyrant flycatchers. *Anim. Behav.* 29(3): 810-821. [https://doi.org/10.1016/S0003-3472\(81\)80015-2](https://doi.org/10.1016/S0003-3472(81)80015-2)
- Francisco, M. R.** 2006. Breeding biology of the Double-Collared Seedeater (*Sporophila Caerulescens*). *Wilson J. Ornithol.* 118(1): 85-90. [https://doi.org/10.1676/1559-4491\(2006\)118\[0085:BBOTDS\]2.0.CO;2](https://doi.org/10.1676/1559-4491(2006)118[0085:BBOTDS]2.0.CO;2)
- Gabriel, V. A. & M. A. Pizo.** 2005. Foraging behavior of tyrant flycatchers (Aves, Tyrannidae) in Brazil. *Rev. Bras. Zool.* 22: 1072-1077.
- Galetti, M., R. S. Bovendorp, R. F. Fadini, C. O. A. Gussoni, M. Rodrigues, A. D. Alvarez, P. R. Guimarães, Jr. & K. Alves.** 2009. Hyper abundant mesopredators and bird extinction in an Atlantic forest island. *Zoologia* 26(2): 288-298. <https://doi.org/10.1590/S1984-46702009000200011>
- Gorena, R. L.** 1997. Notes on the feeding habits and prey of adult Great Kiskadees. *Bull. Texas Ornithol. Soc.* 30(1): 18-19.

- Hilty, S.** 2020. Purple-throated Euphonia (*Euphonia chlorotica*), version 1.0. In: del Hoyo, J., A. Elliott, J. Sargatal, D. A. Christie & E. de Juana (Eds.). Birds of the World. Ithaca, NY, Cornell Lab of Ornithology.
- Ibáñez-Álamo, J. D., R. D. Magrath, J. C. Oteyza, A. D. Chalfoun, T. M. Haff, K. A. Schmidt, R. L. Thomson & T. E. Martin.** 2015. Nest predation research: recent findings and future perspectives. *J. Ornithol.* 156(1): 247-262. <https://doi.org/10.1007/s10336-015-1207-4>
- Jerzak, L.** 2001. Synurbanization of the magpie in the Palearctic. pp. 403-425. In: Marzluff, J. M., R. Bowman & R. Donnelly (Eds.). *Avian Ecology and Conservation in an Urbanizing World*. New York, Springer Science+Business Media.
- Krügel, M. M. & L. Anjos.** 2000. Bird communities in forest remnants in the city of Maringá, Paraná state, southern Brazil. *Ornitol. Neotrop.* 11: 315-330.
- Latino, S. & A. H. Beltzer.** 1999. Ecología trófica del benteveo *Pitangus sulphuratus* (aves: Tyrannidae) en el valle de inundación del río Paraná, Argentina. *Orsis* 14: 69-78.
- López-Flores, V., I. MacGregor-Fors & J. E. Schondube.** 2009. Artificial nest predation along a Neotropical urban gradient. *Landscape Urban Plann.* 92(2): 90-95. <https://doi.org/10.1016/j.landurbplan.2009.03.001>
- Major, R. E., G. Gowing & C. E. Kendal.** 1996. Nest predation in Australian urban environments and the role of the pied currawong, *Strepera graculina*. *Aust. J. Ecol.* 21(4): 399-409. <https://doi.org/10.1111/j.1442-9993.1996.tb00626.x>
- Martin, T. E.** 1993. Nest predation and nest sites. *Bioscience* 43(8): 523-532. <https://doi.org/10.2307/1311947>
- Martins-Oliveira, L., R. Leal-Marques, C. H. Nunes, A. G. Franchin & O. Marçal, Jr.** 2012. Forrageamento de *Pitangus sulphuratus* e de *Tyrannus melancholicus* (Aves: Tyrannidae) em habitats urbanos. *Biosci. J.* 28(6): 1038-1850.
- Marzluff, J. M., K. J. McGowan, R. Donnelly & R. L. Knight.** 2001. Causes and consequences of expanding American Crow populations. pp. 331-364. In: Marzluff, J. M., R. Bowman & R. Donnelly (Eds.). *Avian Ecology and Conservation in an Urbanizing World*. New York, Springer Science+Business Media.
- Matarazzo-Neuberger, W. M.** 1995. Comunidades de aves de cinco parques e praças da Grande São Paulo, Estado de São Paulo. *Ararajuba* 3: 13-19.
- Menezes, J. C. T. & M. A. Marini.** 2017. Predators of bird nests in the Neotropics: a review. *J. Field Ornithol.* 88(2): 99-114. <https://doi.org/10.1111/jofo.12203>
- Michalski, F. & D. Norris.** 2014. Artificial nest predation rates vary depending on visibility in the eastern Brazilian Amazon. *Acta Amazon.* 44(3): 393-396. <https://doi.org/10.1590/1809-4392201302553>
- Munin, R., E. Fischer & J. Longo.** 2012. Foraging of Great Kiskadees (*Pitangus sulphuratus*) and food items offered to nestlings in the Pantanal. *Braz. J. Biol.* 72(3): 459-462. <https://doi.org/10.1590/S1519-69842012000300007>
- Newton, I.** 1998. Population Limitation in Birds. San Diego, Academic Press.
- Ortega-Álvarez, R. & I. MacGregor-Fors.** 2011. Dusting-off the file: a review of knowledge on urban ornithology in Latin America. *Landscape Urban Plann.* 101: 1-10. <https://doi.org/10.1016/j.landurbplan.2010.12.020>
- Peñaranda Barrios, E. M.** 2020. Descripción del nido y cuidado parental de *Euphonia chlorotica* (Aves: Fringillidae) en Santa Cruz, Bolivia. *Acta Zool. Lilloana* 64(2): 166-175. <https://doi.org/10.30550/j.azl/2020.64.2/6>
- Pereira, Z. P. & C. Melo.** 2012. Nestling's pellets of the Great Kiskadee (*Pitangus sulphuratus*) in Brazilian urban environment. *Ornitol. Neotrop.* 23: 269-276.

- Pereira, Z. P., M. P. Pereira, C. A. Arantes & C. Melo.** 2009. Monitoramento de ninhos de aves em um parque urbano. *Rev. Bras. Zoociências* 11(1): 39-45.
- Perrella, D. F., P. V. Davanço, L. S. Oliveira, L. M. S. Sousa & M. R. Francisco.** 2017. Reproductive aspects of the Purple-throated Euphonia, *Euphonia chlorotica* (Aves: Fringillidae) in southeastern Brazil, and first record of the species nesting inside a vespiary. *Zoologia* 34: e19989. <https://doi.org/10.3897/zoologia-a.34.e19989>.
- Reidy, J. L. & F. R. Thompson III.** 2012. Predatory identity can explain nest predation patterns. *Stud. Avian Biol.* 43: 135-148.
- Remsen, J. V., Jr. & S. K. Robinson.** 1990. A classification scheme for foraging behavior of birds in terrestrial habitats. *Stud. Avian Biol.* 13: 144-160.
- Richard, E.** 1986. Predación del Benteveo sobre peces y tortugas. *Nuestras Aves* 4(11): 3-4.
- Ricklefs, R. E.** 1969. An analysis of nesting mortality in birds. *Smithson. Contrib. Zool.* 9: 1-48. <https://doi.org/10.5479/si.00810282.9>
- Rivera-López, A. & I. MacGregor-Fors.** 2016. Urban predation: a case study assessing artificial nest survival in a neotropical city. *Urban Ecosyst.* 19(2): 649-655. <https://doi.org/10.1007/s11252-015-0523-z>
- Rodewald, A. D. & L. J. Kearns.** 2011. Shifts in dominant nest predators along a rural-to-urban landscape gradient. *Condor* 113(4): 899-906. <https://doi.org/10.1525/cond.2011.100132>
- Ruszczyk, A., J. J. S. Rodrigues, T. M. T. Roberts, M. M. A. Bendati, R. S. del Pino, J. C. V. Marques & M. T. Q. Melo.** 1987. Distribution patterns of eight bird species in the urbanization gradient of Porto Alegre, Brazil. *Ciênc. Cult.* 39(1): 14-19.
- Sacco, A. G., A. M. Rui, F. B. Bergmann, S. C. Müller & S. M. Hartz.** 2015. Perda de diversidade taxonômica e funcional de aves em área urbana no sul do Brasil. *Iheringia, Ser. Zool.* 105(3): 276-287. <https://doi.org/10.1590/1678-476620151053276287>
- Salvador, S. A. & A. Bodrati.** 2013. Vertebrados y huevos en la alimentación de algunos passeriformes de Argentina. *Biologica* 16: 135-140.
- Sazima, I.** 2015. Tropical House Gecko (*Hemidactylus mabouia*) shelter raided by a single tyrannid bird (*Pitangus sulphuratus*) in an urban park. *Herpetol. Notes* 8: 433-435.
- Scherer, A., S. B. Scherer, L. Bugoni, L. V. Mohr, M. A. Efe & S. M. Hartz.** 2005. Estrutura trófica da avifauna em oito parques da cidade de Porto Alegre, Rio Grande do Sul, Brasil. *Ornithologia* 1: 25-32.
- Schoener, T. W.** 1971. Theory of Feeding Strategies. *Annu. Rev. Ecol. Syst.* 2(1): 369-404. <https://doi.org/10.1146/annu-rev.es.02.110171.002101>
- Sick, H.** 1997. *Ornitologia Brasileira*. Rio de Janeiro, Nova Fronteira.
- Vasconcelos, M. F., E. d. C. Dutra, L. G. Mazzoni, L. F. Pedroso, A. Perillo, F. A. Valério, T. Guerra, D. Petrocchi, R. Morais, L. P. S. Santos, B. Garzon, J. E. M. Dias, J. E. Santos, A. S. Morais, L. S. L. Guimarães, F. I. A. Garcia, T. Oliveira e Almeida, C. E. R. T. Benfica, H. J. C. Peixoto & B. P. Ribeiro.** 2013. Long-term avifaunal survey in an urban ecosystem from southeastern Brazil, with comments on range extensions, new and disappearing species. *Pap. Avuls. Zool.* 53(25): 327-344. <https://doi.org/10.1590/S0031-10492013002500001>

Editor Científico/ Scientific Editor: Guilherme Henrique Silva de Freitas, Universidade Federal de Goiás, Goiânia, Goiás, Brasil.

Recebido / Recibido / Received: 01.09.2024

Revisado / Revised: 08.04.2025

Aceito / Aceptado / Accepted: 08.04.2025

Publicado / Published: 20.09.2025

Dados disponíveis / Datos disponibles / Available data: Repository not informed