ORNITOLOGÍA NEOTROPICAL
(2024) 35: 46–49
DOI: 10.58843/ornneo.v35i1.1307
SHORT NOTE

ACTIVE ANTING BEHAVIOR IN RED-CRESTED CARDINAL *PAROARIA CORONATA* AND RUFOUS-COLLARED SPARROW *ZONOTRICHIA CAPENSIS*

Mario L. Chatellenaz [1]

[1] Laboratorio de Ornitología y Mastozoología (LABOMA)- Facultad de Ciencias Exactas y Naturales y Agrimensura, Universidad Nacional del Nordeste. Av. Libertad 5470, 3400 Corrientes, Argentina.
Email: Mario L. Chatellenaz · mlchatellenaz@exa.unne.edu.ar

Abstract · Over 200 bird species exhibit a behavior known as anting, wherein birds spread ants or other arthropods, along with their secretions, to their plumage. Anting is hypothesized to serve purposes such as controlling skin bacteria or fungi, repelling ectoparasites, alleviating skin irritation during molting, or pre-treating ants prior to ingestion. In this note, I present the first records of anting behavior in an adult Red-crested Cardinal *Paroaria coronata*, and in an adult and a juvenile Rufous-collared Sparrow *Zonotrichia capensis*. These birds rubbed ants of *Camponotus mus* (Formicidae: Formicinae) on their feathers. The cardinal rubbed the ants on the remiges of both wings, similar to the juvenile sparrow, while the adult sparrow applied them on its fairly deteriorated rectrices. In none of the cases were the ants consumed. These observations suggest that, at least in adult sparrows, the application of ants responded to the presence of ectoparasites.

Resumen · Comportamiento de hormigueo activo en el Cardenal Copete Rojo *Paroaria coronata* y en el Chingolo *Zonotrichia capensis*
Más de 200 especies de aves efectúan un comportamiento denominado "anting", en el cuál las aves se frotan hormigas u otros artrópodos y sus secreciones en el plumaje. Se ha hipotetizado su empleo como control de bacterias u hongos de la piel, repelente de ectoparásitos, reducción de la irritación de la piel durante la muda, o preparación de las hormigas para su ingestión. En esta nota, reporto los primeros registros de este comportamiento en un adulto de cardenal copete rojo *Paroaria coronata*, y en un adulto y un juvenil de chingolo *Zonotrichia capensis*, quienes utilizaron hormigas *Camponotus mus* (Formicidae: Formicinae) para frotarlas en su plumaje. El cardenal frotó las hormigas en las rémiges de ambas alas, al igual que el chingolo juvenil, mientras que el adulto las aplicó en sus rectrices las cuales estaban bastante deterioradas. En ningún caso las hormigas fueron consumidas. Estas observaciones sugieren que, al menos en el chingolo adulto, la aplicación de hormigas respondió a la presencia de ectoparásitos.

Key words: *Ants · body maintenance · Camponotus · feather maintenance · Passeriformes*

INTRODUCTION

Anting involves birds intentionally applying ants and their secretions to their plumage, and possibly the skin, using stereotyped movements (e.g., Stresemann 1935, Ali 1936, Chisholm 1944, McAtee 1938, Simmons 1957, Hendricks 2016). This behavior typically falls into two categories: passive and active anting. In passive anting, a bird permits ants to infiltrate its feathers, often by resting on an ant mound or trail. Conversely, active anting occurs when a bird picks up an ant and rubs it on its plumage, after which the ant can be crushed and consumed, or discarded (Ali 1936, Simmons 1957, 1966; Morozov 2015). Although ants are commonly used, birds are also known to use caterpillars or millipedes (Clunie 1976, Wenny 1998, Sazima 2009, Klavins et al. 2014, Pérez-Rivera 2019, Coulson 2023), and unconventional items such as mothballs (Clark et al. 1990), leaves (Cimadom et al. 2016), and fruits (Clayton & Vernon 1993). This broader behavior, incorporating ants and other agents, has been termed "anointing" (Weldon & Carroll 2006).

Several hypotheses exist regarding the functions of anting: (1) to eradicate ectoparasites, fungi, and bacteria; (2) to cleanse the plumage; (3) to alleviate skin irritation from new feather growth; (4) to prompt ants or other arthropods to release toxins, such as formic acid, before the bird consumes them; and (5) to enjoy the sensation that these substances produce upon skin contact (Southern 1963, Simmons 1966, Potter 1970, Ehrlich et al. 1986, Eisner & Aneshansley 2008, Morozov 2015). Nevertheless, in many instances, the precise adaptive reasoning behind anting remains elusive (Simmons 1985, Revis & Waller 2004, Morozov 2015, Bush & Clayton 2018).

Over 200 bird species, predominantly passerines, exhibit anting (Morozov 2015). In this note, I report two occurrences of anting observed in a Red-crested Cardinal *Paroaria coronata* and an adult Rufous-collared Sparrow *Zonotrichia capensis*, accompanied by a

Submitted 31 Jan 2024 · First decision 22 Feb 2024 · Acceptance 22 Feb 2024 · Online publication 10 Sep 2024
Communicated by Carlos Bosque

Figure 1. Anting performed by a Red-crested Cardinal *Paroaria coronata* and a Rufous-collared Sparrow *Zonotrichia capensis* with *Camponotus mus* ants, in Colonia Liebig, Corrientes, Argentina, on January 4 and 5 2002, respectively. A) Red-crested Cardinal rubbing its remiges with ants; B) Rufous-collared Sparrow rubbing its rectrices, probably damaged by chewing lice, with the same ants (Photos by the author).

juvenile, in northeastern Argentina. These two species, common in the area, are granivorous-insectivorous and frequent semi-open areas, with isolated trees and shrubs, forest edges, and open copses; however, they are also present in urban areas (Canevari et al. 1991, Di Giacomo 2005, Segura & Arturi 2012).

METHODS

Observations were made in the backyard of a house in Colonia Liebig (27°54'46" S, 55°49'32" W, 122 m.a.s.l.), in the province of Corrientes, northeastern Argentina. The *ad libitum* observation method was employed (Altmann 1974), using 8x40 binoculars. During the observation, part of the anting behavior was filmed using a Nikon Coolpix P900 camera for subsequent analysis and a more detailed description. After the observation sessions, several ants were collected and sent for identification by a specialist.

RESULTS

Observations occurred during the southern summer, with hot and dry days, with minimum temperatures of 22°C and maximum of 40 °C (Servicio Meteorológico Nacional 2022). The first observation was made on the morning of 4 January, 2022, at 7:45 h when I noticed a Red-crested Cardinal standing on the ground at a distance of 15 m, visibly animated, and making unusual movements as if it was staggering and losing its balance. Using binoculars, I distinguished that the bird was near a trail of *Camponotus mus* ants (Formicidae: Formicinae). This ant trail extended 3 m from a fallen tree trunk to a mound of wood chips, and discarded firewood remnants. The bird's interaction with ants was swift. It would snatch an ant with its bill and then partially open a wing, extending it forward from the wrist such that the primary feathers were oriented vertically, with the wingtip touching the ground (Figure 1A). At times, the bird held its tail straight behind, but at other times, it tilted its tail to the side, momentarily making the cardinal lose its balance. After capturing each ant, the cardinal briskly rubbed it up and down along the primary remiges, before discarding it with a swift bill movement. The cardinal repeated this procedure, alternating the wings and using different ants. Notably, the bird shut its eyes during this process, a detail only perceptible when the recorded video was played back in a slow motion. After approximately two minutes, the cardinal moved away about 2 m and stopped anting. However, two minutes later, it returned to the ant trail, resuming the anting for another minute before finally taking flight and departing from the area.

The second observation took place the following morning at 6:45 h at the same location. An adult Rufous-collared Sparrow was observed to be accompanied by a juvenile, recognizable by the presence of brown streaks on the chest (Miller 1961). The juvenile foraged in the leaf litter, whereas the adult was positioned beside the ant trail. The adult sparrow picked up ants with its bill and applied them to its rectrices, the vains of which appeared to be notably worn (Figure 1B). As the bird angled its tail to one side during this process, it frequently lost balance, toppling backward or sideways. Like the Red-crested Cardinal, once it rubbed its feathers on an ant, it quickly discarded it by tossing it aside. After approximately two minutes, the adult moved approximately 2.5 m away from the ant trail to feed. Drawing on a lemon tree trunk, which was also frequented by these ants, resumed its anting behavior on its rectrices. On this occasion, the bird also applied ants to the primary feathers of each wing twice. The procedure took no more than 30 s. The juvenile did not seem to observe the adult while it carried out this procedure at approximately 1.5 m away and carried on rummaging through the leaf litter for food. However, on two separate occasions, the young bird picked up two ants and rubbed them against its primary feathers.

DISCUSSION

These records mark the first observations of anting behavior in the Red-crested Cardinal and Rufous-collared Sparrow, and the use of *C. mus* for this purpose.

While various authors have reported the use of *Camponotus* ants for anting (e.g., Chisholm 1944, Groskin 1950, Potter 1970, Morozov 2015), the choice of *C. mus* for this purpose had not been recorded until now. These ants behave aggressively and swiftly to attack any perceived threat (pers. observ.). This aggressive nature may explain why the birds used them briefly before discarding them. These, in addition to biting, discharge the secretion of their poison glands, composed of water and approximately 50% formic acid, free amino acids, and peptides, through the acidopore at the end of the abdomen. These characteristics are similar to those of other genera of Formicinae that are used by birds for anting throughout the world, such as *Formica* and *Lasius*, and to a lesser extent, some species of Dolichoderinae (See Morozov et al. 2015).

In both instances detailed herein, the observed anting behaviors broadly mirror the descriptions provided by Simmons

(1957) in terms of postures and the method of ant application. Notably, the Red-crested Cardinal was seen closing its eyelids while rubbing the ants on itself, a phenomenon possibly tied to protecting the eyes from formic acid, as noted by Ivor (1943) and Simmons (1955).

Regarding the behavior of the juvenile Rufous-collared Sparrow, although it initially appeared to pay no attention to the anting activities of its "parent", it later engaged in the same behavior twice, targeting its wing feathers, instead of the rectrices, as the adult did previously. Although this suggests that the juvenile could have learned this behavior through observation of the adult, it cannot be confirmed that this was the case. The existing literature is inconclusive regarding whether anting is an innate or learned behavior. However, Heinroth (1911) documented a juvenile Dipper *Cinclus cinclus* engaging in anting without prior exposure to adults exhibiting the behavior, suggesting that it might be instinctual. Eisner and Aneshansley (2008) experimentally demonstrated that individuals of Blue Jays *Cyanocitta cristata* raised in captivity and without previous experience performed this behavior as a step prior to ingesting *Formica exsectoides* ants. Morozov (2015) also supported this hypothesis, suggesting that inexperienced juveniles may be stimulated to perform this behavior by olfactory stimuli such as the odor of formic acid.

The function of anting remains a subject of ongoing debate (Bush & Clayton 2018). Although several hypotheses suggest anting have bactericidal, antifungal, or anti-ectoparasitic arthropod properties, none have been definitively proven (e.g., Revis & Waller 2004, Clayton et al. 2010, Morozov 2015, Hendricks 2016). The observations presented here do not support the hypothesis regarding the preparation of ants to be consumed. Notably, the adult Rufous-collared Sparrow was observed applying ants to its deteriorated rectrices. This deterioration might be attributable to the presence of chewing lice (order Phthiraptera), which predominantly feeds on feather tissue and dead skin (Bonser 2001). Although the deterioration of the rectrices could indicate that the bird was about to molt, existing data on post-nuptial and post-juvenile molting from northern Argentina indicate that it begins from the second week of February, extending until March-April (King 1972, Soria et al. 2012). Therefore, it is estimated that the adult and juvenile sparrows would not have started molting at the time they were observed. This suggests that rubbing with ants would not be aimed at relieving skin irritation that would occur during molting (e.g., Morozov 2015).

The typically discreet nature of anting suggests that its occurrence might be more common than currently assumed (Nice 1945). However, it is not predictable, and as the literature review shows, the majority of observations of this behavior are fortuitous. This unpredictability complicates data collection on behavior, often spotted just once or sporadically, making statistical analysis challenging (Ohkawara et al. 2022). Moreover, when observed, both active and passive anting can be easily misinterpreted (e.g., confused with grooming or sunning, respectively) and as a result, are often not recorded in scientific literature. Given the ecological and behavioral importance of these interactions, researchers should document and report all records of this type, to increase our understanding of this behavior and the species involved.

ACKNOWLEDGEMENTS

I thank Osvaldo Arbino from the Laboratory of Invertebrate Biology, FaCENA-UNNE, for identifying the *Camponotus* species mentioned in this note. I thank Drs. Carlos Bosque, Jennifer Coulson, Paul Hendricks, and an anonymous reviewer, for their comments and suggestions, which helped to considerably improve this manuscript.

REFERENCES

Ali, S (1936) Do birds employ ants to rid themselves of ectoparasites? *Journal of the Bombay Natural History Society* 38: 628–631.

Altmann, J (1974) Observational study of behavior: sampling methods. *Behaviour* 49: 227–267. https://doi.org/10.1163/156853974X00534

Bonser, RHC (2001) Mites on birds. *Trends in Ecology & Evolution* 16: 18–19. https://doi.org/10.1016/S0169-5347(00)02012-7

Bush, SE & DH Clayton (2018) Anti-parasite behaviour of birds. *Philosophical Transactions of the Royal Society B* 373: 20170196. http://dx.doi.org/10.1098/rstb.2017.0196

Canevari, MP, P Canevari, GR Carrizo, G Harris, J Rodríguez Mata, R J Stranneck (1991) *Nueva Guía de las Aves Argentinas*. T. II. Fundación Acindar, Buenos Aires, Argentina.

Chisholm, AH (1944) The problem of "anting". *Ibis* 86: 389–405. https://doi.org/10.1111/j.1474-919X.1944.tb04095.x

Cimadom, A, C Causton, D Cha, D Damiens, B Fessl, R Hood-Nowotny, P Lincango, AE Mieles, E Nemeth, EM Semler, SA Teale & S Tebbich (2016) Darwin's finches treat their feathers with a natural repellent. *Scientific Reports* 6: 34559. https://doi.org/10.1038/srep34559

Clark, CC, L Clark & L Clark (1990) "Anting" behavior by Common Grackles and European Starlings. *Wilson Bulletin* 102: 167–169.

Clayton, DH, JAH Koop, CW Harbison, BB Moyer & SE Bush (2010) How birds combat ectoparasites. *Open Ornithology Journal* 3: 41–71. https://doi.org/10.2174/1874453201003010041

Clunie, F (1976) Jungle mynah "anting" with millipede. *Notornis* 23: 77.

Coulson, JO (2023) Turquoise Jay *Cyanolyca turcosa* self-anointing (anting) with a millipede. *Ornitología Neotropical* 34: 17–20. https://doi.org/10.58843/ornneo.v34i1.971

Di Giacomo, A (2005) Aves de la Reserva El Bagual. Pp. 201–465 *in* Di Giacomo, AG & SF Krapovickas (eds). *Historia natural y paisaje de la Reserva El Bagual, provincia de Formosa, Argentina*. Temas de Naturaleza y Conservación 4. Aves Argentinas, Buenos Aires, Argentina.

Ehrlich, PR, DS Dobkin & D Where (1986) The adaptive significance of anting. *Auk* 103: 835.

Eisner, T & D Aneshansley (2008) "Anting" in Blue Jays: evidence in support of a food-preparatory function. *Chemoecology* 18: 197–203. https://doi.org/10.1007/s00049-008-0406-3

Groskin, H (1950) Additional observations and comments on "anting" by birds. *Auk* 67: 201–209. https://doi.org/10.2307/4081213

Heinroth, O (1911) Bericht über die November-Sitzung 1910. *Journal für Ornithologie* 59: 170–173. https://doi.org/10.1007/BF02135103

Hendricks, P (2016) Anting. *In* Shackelford, TK & VA Weekes-Shackelford (eds). *Encyclopedia of Evolutionary Psychological Science*. Springer International Publishing, Cham, USA. https://doi.org/10.1007/978-3-319-16999-6_3167-1

Ivor, HR (1943) Further studies of anting by birds. *Auk* 60: 51–55. https://doi.org/10.2307/4079310

King, JR (1972) Postnuptial and postjuvenal molt in Rufous-Collared Sparrows in northwestern Argentina. *Condor* 74: 5–16. https://doi.org/10.2307/1366444

Klavins, J, E Mérida & NA Villafañe (2014) Record of the White-throated Woodcreeper *Xiphocolaptes albicollis* using a millipede for anting in Argentina. *Revista Brasileira de Ornitologia* 22: 242–243. https://doi.org/10.1007/BF03544252

McAtee, WL (1938) Anting by birds. *Auk* 55: 98–105. https://doi.org/10.2307/4078505

Miller, AH (1961) Molt cycles in equatorial andean sparrows. Condor 63: 143–161. https://doi.org/10.2307/1365527

Morozov, NS (2015) Why do birds practice anting? *Biology Bulletin Reviews* 5: 353–365. https://doi.org/10.1134/S2079086415040076

Nice, MM (1945) Cowbirds anting. *Auk* 62: 302–303. https://doi.org/10.2307/4079714

Ohkawara, K, Y Kamei & T Akino (2022) Anting behavior in birds: the behavioral patterns and the interactions with ants in the subgenus *Dendrolasius* of

the genus *Lasius*. *Journal of Ornithology* 163: 633–641. https://doi.org/10.1007/s10336-022-01974-5

Pérez-Rivera, RA (2019) Use of millipedes as food and for self-anointing by the Puerto Rican Grackle (*Quiscalus niger brachypterus*). *Ornitología Neotropical* 30: 69–71. https://doi.org/10.58843/ornneo.v30i0.441

Potter, EF (1970) Anting in wild birds, its frequency and probable purpose. *Auk* 87: 692–713. https://doi.org/10.2307/4083703

Revis, HC & DA Waller (2004) Bactericidal and fungicidal activity of ant chemicals on feather parasites: an evaluation of anting behavior as a method of self-medication in songbirds. *Auk* 121: 1262–1268. https://doi.org/10.1093/auk/121.4.1262

Sazima, I (2009) Anting behaviour with millipedes by the dendrocolaptid bird *Xiphocolaptes albicollis* in southeastern Brazil. *Biota Neotropica* 9: 249–252. https://doi.org/10.1590/S1676-06032009000100027

Segura, LN & MF Arturi (2012) La estructura del hábitat influye en la abundancia del Cardenal Común (*Paroaria coronata*) en un bosque templado de Argentina. *Ornitologia Neotropical* 23: 11–21.

Servicio Meteorológico Nacional (2022) *Clima de Argentina. Estadísticas climáticas.* Available at https://www.smn.gob.ar/estadisticas [Accessed 15 May 2022]

Simmons, KEL (1955) The nature of anting. *British Birds* 48: 94–96.

Simmons, KEL (1957) A review of the anting-behaviour of Passerine birds. *British Birds* 10: 401–424.

Simmons, KEL (1966) Anting and the problem of self-stimulation. *Journal of Zoology* 149: 145–162. https://doi.org/10.1111/j.1469-7998.1966.tb03890.x

Simmons KEL (1985) Anting. P 19 *in* Campbell B, & E Lack (eds*). A Dictionary of birds*. Volume 19. Buteo Books, Vermillion, USA.

Soria, K, P Zelaya, D Ortiz & P Capllonch (2012) Breve análisis de la avifauna de Pozo Hondo, Santiago del Estero, Argentina. *Nuestras Aves* 57: 3–8. https://doi.org/10.56178/na.vi57.344

Southern, WE (1963) Three species observed anting on a wet lawn. *Wilson Bulletin* 75: 275–276.

Stresemann, E (1935) Die Benutzüng von Ameisen zur Gefiederpflege. *Ornithologische Monatsherichte* 43:134–138.

Weldon, PJ & JF Carroll (2006) Vertebrate chemical defense: secreted and topically acquired deterrents of arthropods. Pp 47–75 *in* Debboun, M, SP Frances & D Stickman (eds). Insect repellents: principles, methods and uses. CRC Press, New York, USA. https://doi.org/10.1201/9781420006650.ch3

Wenny, D (1998) Three-striped warbler (*Basileuterus tristriatus*) "anting" with a caterpillar. *Wilson Bulletin* 110: 128–131.