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## Hypotheses Related to Anting by Birds

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**Title:**

**HYPOTHESES RELATED TO ANTING BY BIRDS**

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**Abstract:**

“Anting” is a widespread behavior among bird species and mammals. Due to the various characteristics of this behavior, numerous hypotheses have been proposed to explain it. This behavior can be classified as “active”, in which birds take a bill full of ants and rub them into their feathers, or “passive” when birds let ants wander through their plumage. The hypotheses state that anting may be performed as an (1) antiparasitic behavior, for (2) feather grooming, as a way of (3) food preparation or to (4) decrease skin irritation during molt, even as a (5) sensory stimulation tool. This review compiles several anting observations and provides suggestions for future research.

Key words: Active anting, Passive anting, Anting hypotheses

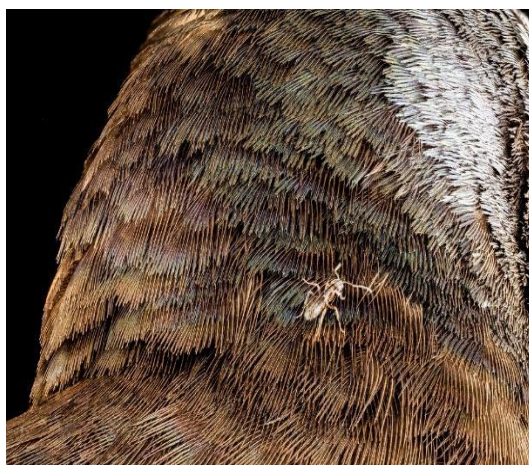
**1. INTRODUCTION**

The term “Anting” consists of a widespread behavior amongst bird species (Cimadom et al. 2016). Often referred to as “self-anointing” for other species of animals, this activity can be divided into two main categories, “active” and “passive” anting. During active anting procedures, many birds have been observed to take a bill full of ants and rub them against their plumage; this process frequently presents as abrupt movements. On the other hand, throughout passive anting, birds stand over anthills and let the insects cover their entire body, usually shaking their heads and legs to protect themselves from stings. Due to the characteristics of various anting sessions, many questions about the purpose of this behavior have been raised, and consequently the proposal of several hypotheses that try to explain it (Morozov, 2015).

Figure 1. Common grackle (*Quiscalus quiscula*) with ant in its feathers

## 2. ANTIPARASITIC BEHAVIOR

Birds have many internal or external parasites, such as bacteria and fungi (Bush & Clayton, 2018); anting is thought to help in the control of ectoparasite infestations. Some ant species release chemicals like formic acid as an act of self-defense; this secretion is thought to help reduce feather bacteria populations, thus the idea that formic acid may trigger this behavior. However, according to a study carried by Hutchinson & Kellam (2015) which tested the efficacy of this chemical secretion on feather degrading bacteria (*Bacillus licheniformis*) on blue jays (*Cyanocitta cristata*), it was concluded that there was no significant difference in the number of colonies of control samples in contrast with the experimental samples, where formic acid was applied. Nevertheless, when provided with Western harvester ants (*Pogonomyrmex occidentalis*) and black carpenter ants (*Camponotus pennsylvanicus*), the blue jays tend to choose *C. pennsylvanicus*, which is the only species of the two that is capable of ejecting formic acid. Thus, other possible causes of this behavior besides of an antiparasitic purpose, were not ruled out by this experiment.



## 3. FEATHER GROOMING

Preening is the act of grooming among birds; this activity involves dust and ectoparasite removal. During maintenance activities, the production of oil is common, which takes place in the bird's uropygial gland. This type of oil helps to maintain a good feather condition by helping to lubricate the bird's skin and feathers (Zabawski, 2020). Although the accumulation of oily sebum can develop health problems for the bird, anting is thought to help with the removal of stale grease or even increase saliva secretion (Morozov, 2015). Furthermore, given the nature of maintenance behaviors, this theory is widely linked to the antiparasitic theory. Good preening habits

help to keep up a good feather condition, thus the decrease of ectoparasite infestations.

## 4. FOOD PREPARATION

During active anting procedures, birds rub ants into their feathers; this is thought to serve as a way of removing irritant ant secretions by emptying the poison gland and anal sac. Even though for most observations birds were seen eating the ants afterwards, this was not always true in a field study carried out inside the forests of central Japan where various bird species were observed, mostly *Turdus cardis*, *Garrulus glandarius* and *Emberiza cioides*. In this study eating ants without anting behavior patterns in *T. cardis* was confirmed in 42.6% of the visits, whereas only 29.4% of ant eating was reported among all species. The conclusion, that foraging and anting were independently carried out, ruled out the food preparation hypothesis for all cases of the study (Ohkawara et al., 2022). In addition to that, the hypothesis fails to explain why in some cases birds have been seen to self-anoint with inedible objects such as moth balls or cigarette butts (Hutchinson & Kellam, 2015).

## 5. DECREASING SKIN IRRITATION DURING MOLT

As a result of different observations in which birds were seen anting during molting periods, it was believed that this behavior may help soothe irritated skin as a consequence of feather emergence (Wiles & McAllister, 2011). A study carried out by Hendricks & Norment (2015) reported observations in various anting episodes by wild Northwestern Crows (*Corvus caurinus*) and wild American Crows (*Corvus brachyrhynchos*) in which passive anting was mostly observed, thus the food preparation theory was discarded. It was concluded that in these field observations, the molting theory may be a better explanation for the passive anting episodes, because the crows observed were in various stages of molt; although it was suggested that this may not be the only reason for passive anting activities.

## 6. SENSORY SELF-STIMULATION TOOL

This hypothesis may be the least favored by the scientific community, because of the serious evolutionary disadvantages that it carries, such as the vulnerability to predators during the state of ecstasy. Although it is questioned that this behavior provides a sensual pleasure for the bird, soothing irritated skin may be a more suitable explanation for the apparent pleasurable sensation that birds experience during anting episodes (Hendricks, 2016).

## 7. CONCLUSIONS

Although the motivation of anting behavior is not entirely clear, the possibility of serving various purposes for each bird may depend on context of the individual (Hendricks & Norment, 2015). There is a need for further research to lead to a better understanding of the topic, and a wider statistical analysis of the variables of each study. Nevertheless, performing more field studies is imperative to support the current findings and dismiss former conclusions.

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