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Adaptations and Behaviors in Avian against Parasitic Infestations

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ABSTRACT

Given the diversity of birds across the globe combined with the fact that avian life is directly hindered by parasitic infestations, it is evident that avian life forms must have developed certain adaptations and behavioral changes to overcome this biological threat. This article explores the relationship between avian and parasites, and examines the mechanisms utilized by avian to protect themselves against parasites. Foremost, it addresses how bird behavior allows them to manipulate the environment around them to protect themselves against parasitic infections. Next, this article mentions the communal behavioral immunity against parasitic infections. Finally, this article addresses the adaptations in birds that have allowed them to have a selective advantage over parasites

Introduction:

It can be argued that at the basis of each life form is an innate desire to survive, grow, and reproduce. For these phenomena to occur one must overcome the challenges of life. One such challenge is faced by avian life from parasitic infections. Birds have exemplified that they have indeed overcome this challenge given their ecological vastness and the uniqueness of each breed. The basis of this achievement is the physiological and immunological makeup of the birds. Avian life forms have illustrated that they are capable of manipulating their physiological makeup to undergo certain adaptations that will aid their survival against parasites. Likewise, the immunological makeup of birds has allowed them to generate certain behavioral changes that protect them from pathological infestations of parasitic origin. Below are discussed various behavioral adaptations of avian species to overcome parasitic infestation.

1. Behavioral immunity: Sunning

Sunning refers to the act of sitting or lying in the sun. It was previously known that sunning plays a pivotal role in thermoregulation. However, recent studies on European Starlings have illustrated that the sunrays reduced mites' concentration on the surface of birds (1). This illustrates that avian have utilized sunshine to have passive protection against parasitic infections.

2. Behavioral immunity: Dust bathing

Previous studies had shown that caged *vs* non-caged hens did not significantly differ in their levels of northern fowl mites, and chicken body lice. However, scientists noticed that upon exposure to dust-boxes, domesticated hens partook in dust bathing, and they showed lower levels of mites and lice relative to hens that did not receive dust-boxes (2). This illustrates that domesticated hens utilize the anti-microbial properties of dust to shed themselves from the ectoparasites.

3. Behavioral Immunity: Nest Sanitization

Over time birds have developed certain nesting techniques that aid their survival against parasitic infestations. One of these ways is the foraging of nesting materials that provide chemical defense mechanisms against microbial growth. This phenomenon is illustrated by the Eurasian Blue Tilt. This species of bird utilizes certain aromatic plants that produce compounds that are lethal for parasitic infestations (3).

4. Communal behavioral immunity: Preening

Preening refers to the pulling back of feathers using the beak or nibbling on the feathers through the utilization of the tip of the mandibles. Birds undergo communal and individual preening to remove the ectoparasites (4). Studies illustrate that birds scavenge their feathers and selectively remove the colored ectoparasites. This reduces parasitic infestation in bird species.

5. Communal behavioral immunity: Synchronized molting

Molting refers to the act of shedding feathers in birds. Although this phenomenon can occur individually, research shows that species of birds have opted to perform group molting (5). This phenomenon leads to parasitic elimination and thus the flock continues to survive.

6. Physiological adaptations: Preen oil

Birds contain a uropygial gland at the base of their tail (6). This gland secretes a multitude of biochemical substances including preen oil which is antimicrobial in nature. In light of this, Rock pigeon's exemplified that the presence of preen oil led to a reduction in lice concentration (6). This correlation suggests that preen oil production is a selective adaptation against lice infection.

7. Physiological adaptations: Diversity in eggshell microbiota

Articles indicate that bird eggshell microbiota has an adaptive role against parasitic infection. For instance, House Sparrow birds have exhibited an elaborate microbiota in their eggshell. This has led to a reduction in antimicrobial infestations (7). This research indicates that diversity in gut microbiota is proportional to a reduction in antimicrobial activity.

Conclusion

The assimilation of behavioral and adaptive changes in birds has led to a reduction in parasitic load over ecological time. The ability of the birds to undergo individual behavioral changes, as well as group behavioral changes has allowed them to strive over a multitude of generations. Furthermore, the physiological adaptation in birds further enhances their defense mechanism against parasitic loads. It can therefore be concluded that the tussle between avian and parasites will continue to occur long into the future and what new behavioral changes and adaptations birds undergo to continue their lineages is yet to be seen.

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