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Proximity and preening in captive Humboldt penguins

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Highlights

- Humboldt penguins exhibit less frequent affiliative behaviors, such as preening and proximity, in non-mate pairs.
- Kin pairs show more affiliative behaviors than non-kin pairs in Humboldt penguins.
- Preening behavior in Humboldt penguins is immediately reciprocated, suggesting they gain mutual benefits.

Abstract

Group-living animals, including penguins, exhibit affiliative behaviors such as grooming (preening) and proximity. Such behaviors in non-primate animals have been less studied than those in primates. Our research focused on 20 identifiable Humboldt penguins in a zoo,

analyzing kin relationships and reciprocity in preening and proximity by employing a 5-minute scan sampling method to observe and record individual behavior. Our findings revealed that preening and proximity were more prevalent among mate pairs. However, among non-mate pairs, such behaviors were more commonly observed between siblings and parent-offspring pairs. Notably, the individuals preened on each other simultaneously in all instances. This study highlights the potential influence of kin selection in shaping the affiliative behavior of penguins. Additionally, our findings indicate that penguins gain benefits from mutual preening. This study contributes to our understanding of social behaviors in non-primate species and emphasizes the need for further comparative studies of various animal taxa to elucidate the evolution of sociality.

Introduction

Numerous mammals and birds exhibit affiliative behaviors such as proximity and grooming (preening in birds) within their groups. Grooming and preening, which consume a significant portion of the day (Viblanc et al., 2011), offer benefits such as parasite removal and distress reduction (Brooke, 1985, Ueno et al., 2015). Studies have suggested that such behaviors facilitate the formation of differentiated social relationships that could be adaptive in various species (e.g., Gokcekus et al., 2023).

Extensive research, particularly in primates, has examined grooming, and it has been shown that primates groom kin more often than non-kin and that they can gain reciprocal benefits through grooming (Nakamichi and Shizawa, 2003, Ueno and Nakamichi, 2018). These findings support kin selection (Hamilton, 1964) and reciprocal altruism (Trivers, 1971). However, detailed studies on affiliative behaviors within non-primates are less common, suggesting areas for further exploration in the evolutionary processes and selective pressures of sociality across different animal taxa (Massen, 2020).

Similar to primates, proximity and preening are important in birds, as they can offer adaptive values. For instance, Macaroni Penguins (*Eudyptes chrysolophus*) and Rockhopper Penguins (*E. chrysocome*) reduce ticks of their partners by preening their heads and necks with their beaks (Brooke, 1985). In birds, cooperative breeding is usually performed by individuals related to chicks; however, it is not uncommon for non-kin individuals to engage in rearing chicks (Riehl, 2013), suggesting that birds may gain direct and indirect benefits from affiliative behaviors. Nonetheless, research on affiliative behaviors in non-mate pairs of birds is less prevalent than in primates, highlighting the need for more detailed investigations to understand the evolution of animal sociality.

The aim of this study was to investigate the influence of kinship on proximity and preening behavior and examine the presence of reciprocity among captive Humboldt penguins (*Spheniscus humboldti*) at a zoo. More engagement in proximity and preening would be expected among kin than non-kin if kin selection influenced these behaviors. Additionally, if reciprocal altruism influences them, individuals who preen more would receive more preening.

Section snippets

Material and methods

This study focused on Humboldt penguins housed in the Tennoji Zoo (Osaka Zoo) in Osaka, Japan. The penguins in this study were kept in an outdoor enclosure of approximately 130 m^2, consisting of concrete rockwork and a pool. Some areas were obscured from visitors by fencing, and nesting boxes were provided for mate pairs to rear and incubate their young. The zoo housed 20 Humboldt penguins (six males, nine females, and five of unknown sex), all of which were included in the observations. The…

Descriptive information on preening

In the total group scan sampling, proximity within 1 m was recorded 191 times and preening 84 times. In all 84 preening instances, both individuals preened on each other simultaneously. Therefore, this study treated all preening as mutual preening and analyzed whether kinship influenced the occurrence of the 42 instances of mutual preening.

In pairs previously reproduced, mutual preening averaged 0.95%, versus 0.06% in non-mates. Similarly, average proximity was 8.65% in former, 1.05% in…

Discussion

Although penguins form groups and synchronize their behaviors with others (Imaki et al., 2024), research on affiliative behaviors among non-mate pairs is limited. Our study found that among non-mate pairs of Humboldt penguins, proximity and preening occurred less frequently than in pairs considered to be mates. However, among kin pairs, such as parent-offspring and siblings, affiliative behaviors occurred more frequently than in non-kin pairs. These results suggest that kin selection may…

CRediT authorship contribution statement

Yuka Kobayashi: Writing – review & editing, Writing – original draft, Project administration, Investigation, Data curation, Conceptualization. **Masataka Ueno:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization.…

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Declaration of Competing Interest

The authors declare no competing interests.…

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References (16)

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Anim. Behav. (2024)

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