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Howler Monkeys

Behavior, Ecology, and Conservation

 Editors: **Kowalewski, M.M.**, **Garber, P.A.**, **Cortes-Ortiz, L.**, **Urbani, B.**, **Youlatos, D.** (Eds.)

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Examines howler behavior and ecology within a comparative framework

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Howler monkeys (genus *Alouatta*) comprise twelve species of leaf-eating New World monkeys that range from southern Mexico through northern Argentina. This genus is the most widespread of any New World primate taxa, and can be found to inhabit a range of forest types from undisturbed rainforest to severely anthropogenically impacted forest fragments. Although there have been many studies on individual species of howler monkeys, this book is the first comprehensive volume to place information on howler behavior and biology within a theoretical framework of ecological and social adaptability. This is the second of two volumes devoted to the genus *Alouatta*.

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Chapter 13

Fruit as a Key Factor in Howler Monkey Population Density: Conservation Implications

Alison M. Behie and Mary S.M. Pavelka

Abstract Howler monkeys (*Alouatta*) are widely regarded as the most folivorous of the neotropical monkeys and the ability of howlers to live in a wide range of environments including highly disturbed forests has been linked to this ability. Generally categorized as energy minimizing folivores leaves comprise at least half and as much as 90 % of annual feeding time. All howler species also consume fruit; however, this amount is quite variable both within and between species, and across different months of the year. Seasonality in fruit consumption in *Alouatta* appears to be directly tied to its availability, suggesting that for all species fruit is a preferred food item. A study of population density and diet in *A. pigra* following a severe hurricane suggests that frugivory may be more crucial to population stability and growth than previously thought. This chapter considers the effects of this hurricane on *A. pigra* in relation to what is known about frugivory in the Mesoamerican clade of *Alouatta* (*A. palliata* and *A. pigra*), focusing on relationships between diet, population density, group size, behavior, ranging, and reproduction. These data suggest that frugivory is an important part of the feeding ecology of these species and that periods of prolonged fruit shortage may have significant impacts on their population dynamics and survival. Given that both natural and anthropogenic habitat disturbance generally have a negative effect on fruit production, this could have important conservation implications for this primate genus.

Resumen Los monos aulladores (*Alouatta*) son generalmente considerados como los más folívoros de los monos neotropicales y su habilidad para vivir en una amplia variedad de ambientes, incluyendo bosques altamente perturbados, ha sido relacionada con esta característica. Generalmente clasificados como folívoros minimizadores de energía, las hojas comprenden desde el 50 % hasta un máximo del 90 %

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de su tiempo de alimentación anual. Todas las especies de aulladores consumen también fruta, pero la cantidad de ésta es variable tanto dentro de cada especie como entre diferentes especies, y a lo largo de los diferentes meses del año. La estacionalidad en el consumo de fruta en *Alouatta* parece estar directamente relacionada con su disponibilidad, sugiriendo que la fruta es un elemento preferido en la dieta de todas las especies. Un estudio sobre la densidad poblacional y la dieta de *A. pigra* tras el impacto de un fuerte huracán sugiere que la frugivoría podría ser más crucial para la estabilidad y crecimiento de la población de lo que se pensaba. Este artículo considera los efectos de este huracán en *A. pigra* en relación a lo que se conoce sobre la frugivoría en el clado Mesoamericano de *Alouatta* (*A. palliata* y *A. pigra*), centrándose en las relaciones entre dieta, densidad de población, tamaño del grupo, comportamiento, campeo y reproducción. Los datos sugieren que la frugivoría es una parte importante de la ecología alimentaria de estas especies y que períodos de prolongada escasez de fruta pueden tener un impacto significativo sobre la supervivencia y las dinámicas de la población. Dado que las perturbaciones del hábitat, tanto naturales como antropogénicas, tienen un efecto negativo en la producción de fruta, esto puede tener importantes implicaciones para la conservación de este género de primates.

Keywords Fruit consumption • Population density • Reproduction

13.1 Introduction

Howler monkeys (genus: *Alouatta*) have the largest distribution of any New World monkey, ranging from Southern Mexico, through Central and South America to Argentina. Characterized as the most folivorous neotropical primate, howler monkeys ingest a diet similar to that of Old World colobines relying heavily on leafy matter. Also similar to colobines, howlers are energy minimizers, generally employing behavioral strategies that are designed to conserve energy in order to cope with this highly folivorous diet (Milton 1980; Stanford 1991; DaSilva 1992; Milton 1998; Fashing et al. 2007; Bicca-Marques 2003; Pavelka and Knopff 2004). Such behaviors include direct and efficient foraging (Milton 1980; 1981), highly selective feeding (Milton 1981; 1979; Glander 1982; Crockett 1987; Lopez et al. 2005; Behie and Pavelka 2012), and spending between 60 and 80 % of their day inactive (DaSilva 1992; Silver et al. 1998; Pavelka and Knopff 2004; Prates and Bicca-Marques 2008; Dias et al. 2011). Despite these dietary and behavioral similarities with Old World colobines, howler monkeys lack the specialized stomach and foregut fermentation of colobines, instead relying on hindgut fermentation that takes place in the cecum and proximal colon (Milton and McBee 1983). However, as these organs are located past the small intestine, where mammals most efficiently absorb nutrients (Stevens 1988) the amount of energy and protein extracted from leafy foods during hindgut fermentation is potentially quite low. As a result, howlers may need to be selective

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