

Urban Survival Strategies of Synanthropic Species: Exuviae Consumption by *Periplaneta americana* and Predatory Flexibility of *Hemidactylus frenatus* in Dhaka

Md. Ashiqun Nabi Litu^{1*}, Gourango Das¹, Palash Kumar Ray²

¹Department of Zoology, Jagannath University, Dhaka - 1100, Bangladesh

²Department of Chemistry, Affiliated Seven College, University of Dhaka - 1000

*E-mail: ashiqunnabilitu25786@gmail.com

ABSTRACT

Urban ecosystems present unique challenges and opportunities for organisms, which often drive the emergence of adaptive survival strategies. This article documented two urban survival behaviors observed in Old Dhaka, Bangladesh: exuviae consumption by the American cockroach (*Periplaneta americana*) and predation of a large adult American cockroach by the common house gecko (*Hemidactylus frenatus*). These behaviors reflect nutrient recycling and opportunistic foraging strategies in resource-limited environments, respectively. Their simultaneous observation in the same microhabitat provides rare insights into urban trophic interactions and behavioral plasticity. Such documentation from South Asia is still scarce and highlights the ecological role of neglected species in urban ecosystems.

Keywords: Urban ecology, behavioral adaptations, exuviae consumption, opportunistic predation.

INTRODUCTION

The American cockroach (*Periplaneta americana*) is thought to be originally native to tropical Africa but has become global through human-mediated transport and global trade and is now present in all inhabited continents (Rust et al., 1991; Cochran 1999; Bell et al., 2007). It thrives in warm, humid climates, especially in tropical and subtropical regions (Cochran 1999). In Bangladesh, they commonly found in all cities and inhabits in a variety of anthropogenic environments such as kitchens, bathrooms, markets, sewage drains and food storage areas (Ahmed et al., 2014, Rahman, 2015). One of their less reported behaviors is consuming post-molt exuviae, which gives them a chance to regain their nutrition in this type of habitats (Mira, 2000). On the other hand, common house gecko (*Hemidactylus frenatus*) is native to south and southeast Asia, including India, Bangladesh, Myanmar and Malaysia (Carranza & Arnold, 2006). It is one of the most common reptiles found in human-inhabited areas of Bangladesh (Khan, 2008). Its prevalence is

widespread in both urban centers like Dhaka and smaller towns and villages, which demonstrates a high level of environmental tolerance (Rahman, 2015). Its success in urban ecosystems is particularly influenced by anthropogenic habitats and the ability to use artificial light sources for foraging (Daniels, 2002; Perry & Fisher, 2006). Although both species are widespread in urban areas of Asia, field-based ethological studies remain scarce. This paper highlights the relevance of two survival behaviors observed in Dhaka, Bangladesh - a mega-city under environmental stress.

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OBSERVATIONS

Both observations were made opportunistically at night in residential areas of Old Dhaka. Each behavioral event was consistently observed and documented through field notes and photographs. On 30 June, 2025, at 10:30 PM, the first author observed an adult *P. americana* consuming its freshly molted exoskeleton on the exterior wall of a house along a street (23.711317 N, 90.414179 E). He observed the cockroach start consuming its exoskeleton from the back and gradually move towards the head capsule. This behavior lasted for approximately 6 minutes and the author observed the entire incident from a safe distance (~5m). Then, when a passerby walked near the wall, the cockroach shed its shell and quickly left the place. During this period, the cockroach was able to consume only a small portion of its exuviae.



Fig 1. An American cockroach (*P. americana*) consuming its freshly molted exuviae on a residential wall of Old Dhaka.

The other incident was observed on 6 July, 2025 in an area called Laxmibazar (23.708632 N, 90.415724 E) in Old Dhaka - a busy market place. At 9:45 PM, the second author observed a large adult *P. americana* (~4.2 cm body length) under an artificial light source near a tea shop, which was attacked by a single *H. frenatus*. The predation event took place on the leaning trunk of a Peepal tree (*Ficus religiosa*),

about 1 meter above the ground. The gecko initially bit the cockroach on the thorax in a sudden ambush. In response, the cockroach tried to escape and succeed by falling to a low surface on the first attempt. However, the house gecko quickly chased and retrieved the prey at a height of about 2 meters above ground level. Then The gecko held the cockroach and remained still until the prey stops all movement. After the cockroach's apparent death, the gecko tore the body into two pieces (Fig. 2). Grabbing the anterior part with its jaws, the gecko quickly retreated to a hollow inside the tree, presumably to devour the prey in a secure and concealed location.



Fig 2. A common house gecko (*H. frenatus*) dividing the body of a large American cockroach (*P. americana*) into two segments under an artificial light on a tree trunk.

The observed behavior of *P. americana* and *H. frenatus* in Dhaka city is an example of behavioral adaptability in response to urban environmental constraints. Exuviae consumption of *P. americana* has been reported under laboratory or semi-natural conditions, which is used as a strategy to recover nitrogen, calcium, chitin and minerals essential for cuticle regeneration (Durbin & Cochran, 1985; Mira, 2000). Rapid ingestion and removal of shed exuviae may eliminate visual or chemical signals that molting has occurred, thereby reducing predation risk (Bell et al., 2007). Comparative studies of related cockroach species (e.g., *Blaberus giganteus*) also confirm the regular ingestion of exuviae after ecdysis (Woodruff, 1938), but few have clearly linked this behavior to environmental constraints or nutritional stress in real-

world habitat. This highlights the importance of further research into the functional ecology of cockroach molting behavior outside of pest control or lab-based physiological contexts. Again, common house geckos are primarily nocturnal and often associate with lights both indoors and outdoors, where they feed on insects attracted by the light (Newberry and Jones, 2007). Moreover, their special characteristic is that they can adjust their diet based on availability (Gramentz, 2005). While Perry & Fisher (2006) and Daniels (2002) have noted light-assisted hunting in urban geckos, this observation showcases hunting on disproportionately large prey, demonstrating not only foraging flexibility but also the ability to exploit high-risk, high-reward prey in limited architectural spaces. This observation closely resembles a case reported by Norval & Mao (2013), in which *H. frenatus* preyed on a large *P. americana* in an urban environment. In contrast to their brief encounter, this observation provides additional ecological context, including the duration of prey-handling, light assisted ambush behavior and use of disturbed urban spaces - providing deeper insights into the gecko's feeding flexibility in competitive, resource-limited situations. Actually, these observations are rooted in the simultaneous documentation of two distinct survival strategies within the same microhabitat and temporal context. Such linked behavioral observations are extremely rare in the urban ecology literature especially in South Asia, where most research focuses on trends in habitat loss or species richness.

CONCLUSION

Observations of self-recycling in *P. americana* and opportunistic predation in *H. frenatus* illustrate distinct but effective behavioral strategies for survival in urban habitats, particularly in the context of Bangladesh. These behaviors reflect the ability of urban wildlife to adapt physiologically and ecologically to anthropogenic pressures. Simultaneously, such observations provide a baseline data for future research on urban food web dynamics, behavioral plasticity and species resilience. Furthermore, they emphasize the importance of monitoring inconspicuous species such as cockroaches and house geckos, which play an important role in nutrient cycling and pest control. Long-term and quantitative studies are needed to assess the frequency, ecological drivers and potential inter-species interactions associated

with these behaviors across different urban gradients.

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Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

Author's Contribution

- Md. Ashiqun Nabi Litu: Manuscript writing and fieldwork.
- Gourango Das: Fieldwork.
- Palash Kumar Ray: Fieldwork.

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Ethics Statement - Non-invasive observations.

Informed Consent - NA

Data Availability

All the observed data and evidence have been included within this manuscript.

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