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Parasitic Behaviors of Cuckoos (Aves: Cuculidae) and Host Interactions in Bangladesh

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Abstract

Cuckoos are different on the basis of their brood parasitic behavior. They lay eggs in their host birds. In order to know the evolutionary biology and adaptation, the study on cuckoos' behavior is significant than other birds. A short review suggested the breeding season of all cuckoos was from January to October due to abundant pests and host birds in nature. In the family Cuculidae, out of 12 cuckoos of Bangladesh, resident cuckoos were 6 (plaintive cuckoo, gray-bellied cuckoo, banded bay cuckoo, Asian koel (resident but local migrant), common hawk-cuckoo, Asian drongo-cuckoo), and migratory were 6 too (chestnut-winged cuckoo, pied cuckoo, common cuckoo, large hawk-cuckoo, Indian cuckoo, Asian emerald cuckoo). They showed egg and chick mimicry in host birds' nest. Except the nest of house crow (Corvus splendens) where the Asian koel laid eggs, but other cuckoos preferred small host birds because of their wide-mouth, and they are very swift to collect food to nourish the chick of cuckoos. Additionally, they are not more intelligent as crows to recognize cuckoo chick in their nest.

Keywords: Cuckoo, parasitic bird, breeding, behavior, migration, conservation, Bangladesh

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Introduction

Cuckoos belonging to the family *Cuculidae* are well known for their remarkable breeding strategy called brood parasitism. Female cuckoos lay their eggs in the nests of other bird species, which unknowingly become the hosts. The host birds incubate the eggs and provide food and care to the developing cuckoo chicks, frequently at the expense of their own nestlings. This unusual reproductive behavior has drawn significant attention from ornithologists and evolutionary biologists because it reflects a highly specialized ecological interaction between parasitic birds and their hosts. To increase the success of parasitism, cuckoos have evolved several adaptations, such as rapid egg deposition, egg coloration that resembles that of the host species, and chicks that are highly competitive in securing food from foster parents. In some species, cuckoo chicks may even remove host eggs or nestlings from the nest to monopolize parental care. Many host birds have developed defensive strategies, including the ability to recognize foreign eggs, reject parasitic eggs, or defend their nests aggressively against cuckoos. These opposing adaptations create a dynamic coevolutionary relationship often described as an evolutionary arms race. Most studies of avian brood parasite deal with their interaction with hosts, which has been presented as coevolution (Davies and Brooke, 1988; Moksnes *et al.,* 1990; Roskaft and Moksnes, 1998; Rothstein, 1990). Due to different lineage of cuckoos, they exhibit this exceptional brood parasitism which is uncommon in avian kingdom. The number of host bird indicates the abundance of parasitic birds like cuckoos in a locality. Cuckoos always prefer to lay eggs in the nest of small birds like tailorbird, sunbird, babbler, and warbler because these birds are very swift in nature and they collect food early for their young, additionally, their mouth is wide-open which is suitable for feeding their chicks as well as cuckoos young. The brain of small birds is not more develop, so they cannot recognize cuckoo chick in their nest. Asian koel (*Eudynamys scolopaceus*) is found everywhere in Bangladesh because their habitats, host birds, and foods are available (Table 1; Table 2; Plate 2). Actually, this cuckoo is resident but it shows local migrant or short-distance migration. They lay their eggs in the nest of house crow (*Corvus splendens*). IUCN Bangladesh (2015) mentioned 12 cuckoos of Bangladesh under the family Cuculidae (Fig 1; Fig 2). The objective of this write-up is to focus the brood parasitic behavior of cuckoos in order to protect them.

Parasitic cuckoo species in Bangladesh

Based on the number of host birds, Bangladesh is a rich habitat, providing favorable conditions for brood-parasitic cuckoos. Several cuckoo species in the country depend entirely on host birds for reproduction and interact with numerous host species across forests, wetlands, agricultural lands, and urban ecosystems. Investigating these parasitic behaviors and host responses is therefore essential for understanding avian ecology and evolutionary processes in Bangladesh.

Table 1. Status of cuckoos in Bangladesh under the family Cuculidae

Names	Breeding season	Availability	Resident/Migratory	Status in Bangladesh
*Plaintive cuckoo, *Cacomantis merulinus*	March-August	Very common	Resident	LC
*Gray-bellied cuckoo, *C. passerines*	March-September	Rare	Resident	LC
*Banded bay cuckoo, *C. sonneratii*	May-July	Rare	Resident	LC
**Chestnut-winged cuckoo, *Clamator coromandus* (Plate 1)	Does not breed in Bangladesh	Uncommon	Vagrant	LC
**Pied cuckoo, *C. jacobinus*	March-July (jungle babbler)	Very common	Summer visitor	LC
**Indian cuckoo, *Cuculus micropterus*	March-August	Very common	Summer visitor	LC
**Common cuckoo, *C. canorus*	April-July	Rare	Passage migrant	DD
*Asian koel, *Eudynamys scolopaceus*	March-October (black-headed shrike, common myna)	Very common	Resident (Local migrant/Short-distance migrant)	LC
*Common hawk-cuckoo, *Hierococcyx varius*	January-June (jungle babbler)	Very common	Resident	LC
**Large hawk-cuckoo, *H. sparverioides*	April-June	Rare	Winter visitor	LC
**Asian emerald cuckoo, *Chrysococcyx maculatus*	April-July	Rare	Summer visitor	LC
*Asian drongo-cuckoo, *Surniculus lugubris*	April-August (small babbler, fulvetta)	Common	Resident	LC

***Resident cuckoos (6):** plaintive cuckoo, gray-bellied cuckoo, banded bay cuckoo, Asian koel (resident but local migrant), common hawk-cuckoo, Asian drongo-cuckoo

****True migratory cuckoos (6):** chestnut-winged cuckoo, pied cuckoo, common cuckoo, large hawk-cuckoo, Indian cuckoo, Asian emerald cuckoo

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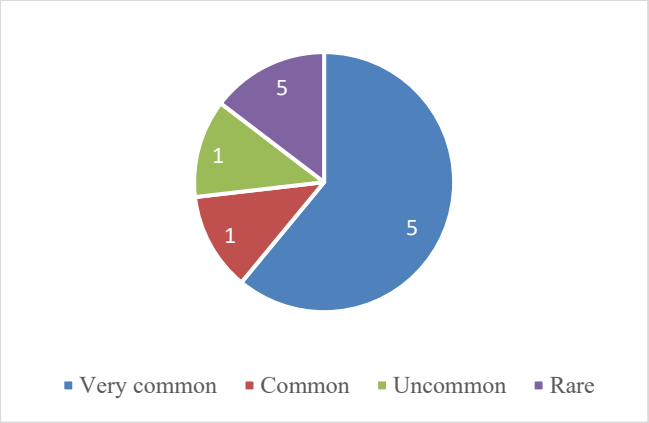

Fig 1. Common: frequently seen, widely distributed, large population. **Uncommon:** between common and rare; cannot see every day but in right time and right habitat will be needed. **Very common:** can find anywhere, anytime with huge numbers. **Rare:** usually difficult to find. **Resident:** found all the year round.

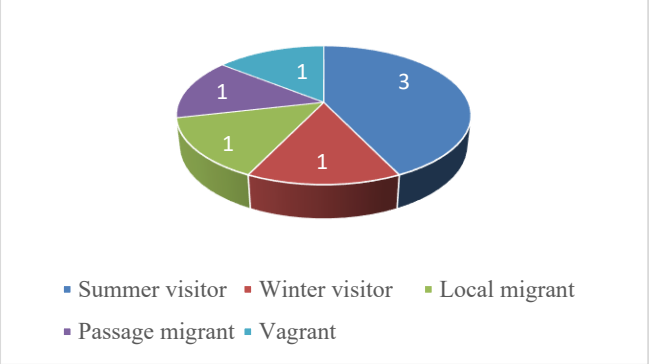

Fig 2. Summer visitor: when birds reproduce in summer season. **Winter visitor:** when birds reproduce in winter season. **Local migrant:** moves in different habitats within the same region. **Vagrant:** a vagrant bird is an individual found far outside from their breeding ground. **Passage migrant:** observe a bird temporarily in a specific region between breeding ground and wintering ground; it takes rest and food during traveling.

Plate 1. Chestnut-winged cuckoo

Plate 2. Asian koel

Table 2. Six seasons of Bangladesh corresponding to the English months

Seasons (in Bangla)	Months	Duration (months)
Summer (Grishmo)	April—May	2
Rainy (Borsha)	June—September	4
Autumn (Sharat)	mid-August—mid-October	2
*Late-autumn (Hemonto)	mid-October—mid-December	2
*Winter (Shit)	December—February	3
Spring (Boshonto)	mid-February—mid-April	2

*November-December is not the breeding season of cuckoos; some seasons are overlapping.

Host species and parasitic associations

Different cuckoo species in Bangladesh select particular host birds in whose nests they deposit their eggs (Fig 3). These host–parasite associations vary among cuckoo species and are influenced by factors such as habitat type, nesting behavior of the host, and ecological interactions. The host birds unknowingly incubate the parasitic eggs and provide care for the cuckoo chicks after hatching. Several studies have documented these relationships, showing that certain cuckoo species repeatedly exploit the same host species for successful reproduction.

Table 3. The listed host species represent examples of brood parasitism in Bangladesh

Cuckoo species	Main host species
Asian koel (*Eudynamys scolopaceus*)	House crow (*Corvus splendens*), Common myna (*Acridotheres tristis*), Long-tailed shrike (*Lanius schach*)
Indian cuckoo (*Cuculus micropterus*)	Black drongo (*Dicrurus macrocercus*)
Jacobin cuckoo (*Clamator jacobinus*)	Jungle babbler (*Turdoides striata*)
Common hawk-cuckoo (*Cuculus varius*)	Jungle babbler (*Turdoides striata*)
Plaintive cuckoo (*Cacomantis merulinus*)	Common tailorbird (*Orthotomus sutorius*)

Parasitized birds

Asian koel (35.7%) laid eggs in the nest of long-tailed shrike (*Lanius schach*), common hawk- cuckoo (25.9%) in jungle babbler (*Turdoides striata*), jacobin cuckoo (1.7%) in jungle babbler (*Turdoides striata*), and Indian cuckoo (3.7%) in the nest of black drongo (*Dicrurus macrocercus*) (Begum, 2017). Highest number of nests were found in the nest of common myna (*Acridotherus tristis*) (Begum, 2017). Multiple parasitism was seen in Asian koel (Begum, 2017). House crow and common myna is common host birds of cuckoos (Begum, 2017). The Asian koel exploits different hosts such as black-naped oriole (*Oriolus chinensis*) and black drongo (*Dicrurus macrocercus*) if crows are not available (Holmes and van Balen, 1996; Smith, 1950). High frequency of multiple parasitism reflects high density of cuckoos locally (Preston, 1948; Wyllie, 1981). Female cuckoos can be induced to lay more eggs when more host nests are available in nature (Chance, 1940; Payne, 1974). Begum (2017) mentioned 14 host birds for four sympatric cuckoos of Bangladesh.

Egg crypsis

Egg morphology and mimicry are important factor for selection suitable host birds for cuckoos (Davies and Brooke, 1988; Lack, 1968; Payne, 1974). The eggs of common hawk-cuckoo and jacobin cuckoo showed the same type of egg mimicry (Begum, 2017) (Fig 3). By matching the color, size, and pattern of host eggs, parasitic cuckoos reduce the likelihood of egg rejection and increase their reproductive success. The eggs of Indian cuckoo, common hawk-cuckoo, and pied cuckoo showed excellent egg mimicry, but the

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Asian koel's eggs are highly non-mimetic (Nahid *et al.,* 2016). This convergence in egg appearance underscores the adaptive strategies cuckoos employ to exploit multiple host species effectively.

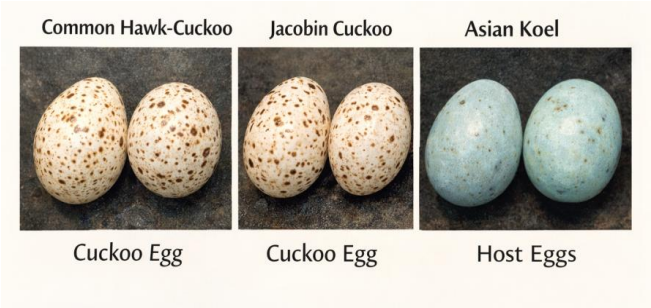

Fig 3. Cuckoo eggs mimic the color and pattern of host eggs

Host species and host selection

Cuckoos generally parasitize specific host species that provide suitable nests, incubation conditions, and parental care for their offspring. In Bangladesh, several passerine birds serve as common hosts for parasitic cuckoos, including the house crow **(***Corvus splendens*), common myna **(***Acridotheres tristis*), long-tailed shrike **(***Lanius schach*), jungle babbler **(***Turdoides striata*), black drongo **(***Dicrurus macrocercus***)**, and common tailorbird **(***Orthotomus sutorius*) (Table 3). Different cuckoo species often show host specialization, selecting particular host birds based on nest structure, breeding season, and egg characteristics. For instance, the Asian koel **(***Eudynamys scolopaceus***)** commonly parasitizes the nests of house crows and common mynas, while the Indian cuckoo (*Cuculus micropterus***)** frequently targets black drongo nests. Similarly, the jacobin cuckoo (*Clamator jacobinus***)** and common hawk-cuckoo **(***Cuculus varius***)** often parasitize the nests of jungle babblers, whereas the plaintive cuckoo **(***Cacomantis merulinus***)** has been recorded laying their eggs in the nests of the common tailorbird in Bangladesh. All the host species suffered the cost of the brood parasitism, showing reduced breeding success (Nahid *et al.,* 2016).

Host defense mechanisms

Host birds have evolved several strategies to defend themselves against cuckoo brood parasitism. One common mechanism is egg recognition and rejection, where host birds identify eggs that differ in color, size, or pattern from their own and remove them from the nest. Another strategy is nest abandonment, in which hosts leave a nest containing suspicious eggs and build a new one elsewhere, thereby avoiding the cost of raising a parasitic chick. In addition, many hosts display aggressive or mobbing behavior, actively attacking or chasing cuckoos that approach their nesting sites. Studies conducted in Bangladesh indicate that host responses vary among species; for instance, the black drongo **(***Dicrurus macrocercus***)** often detects and rejects foreign eggs, demonstrating strong defensive behavior, whereas the common myna **(***Acridotheres tristis***)** and jungle babbler **(***Turdoides striata***)** frequently accept parasitic eggs even when they do not closely resemble their own, suggesting differences in evolutionary adaptation and experience with brood parasites.

Coevolutionary arms race

The interaction between cuckoos and their hosts is often described as an evolutionary arms race. As hosts evolve better abilities to detect parasitic eggs, cuckoos evolve more accurate egg mimicry and better strategies for locating host nests. This coevolution shapes the behavior, physiology, and reproductive strategies of both parasite and host species. When two cuckoo species parasitized the same host, their non-overlapping breeding seasons helped them to minimize the competition (Nahid *et al.,* 2016).

Ecological importance of cuckoos in Bangladesh

Brood parasitism by cuckoos significantly affects bird community dynamics by reducing host reproductive success, eliciting defensive behaviors, and promoting evolutionary responses in both parasites and hosts. Bangladesh has wide variety of host species and a rich assemblage of potential hosts, provides an ideal setting to examine these interactions. The country's mosaic of habitats including forests, farmlands, plantations, and urbanized areas—shapes host availability and parasitism frequency. Evidence indicates that areas with mixed vegetation and human settlements often harbor high densities of host birds, thereby influencing cuckoo reproductive strategies. Studying these patterns enhances our understanding of the ecological and evolutionary mechanisms underlying brood parasitism of cuckoos in the region.

Conservation implications

Reforestation with native plants can attract and sustain host birds, ensuring that cuckoos have access to suitable nesting opportunities. By observing host population trends, habitat quality, and parasitism frequency, conservation strategies can be optimized. This integrated approach helps maintain both parasitic cuckoo populations and the bird communities they depend on.

Conclusions

Through the plantation of native trees, it is possible to attract host birds for cuckoos in a specific area. Due to locally abundance of food, microclimate, habitats, and predator cuckoos show their very diversified migratory behavior. To increase the cuckoo population, need to implement more scientific studies on their brood parasitism. Studies on brood parasitism of cuckoos' perspective Bangladesh offer a model for understanding coevolutionary processes, ecological dynamics, and biodiversity conservation in tropical bird communities.

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