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Ashraful Kabir

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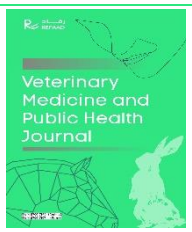

Exploring Sexual Morphisms in Pigeon Breeds and Doves: Selection Forces and Ecological Significance

Ashraful Kabir [1*]

[1] Department of Biology, Cantonment Public College, Saidpur Cantonment—5311, Nilphamari, Bangladesh.

*** Corresponding author:** Ashraful Kabir (ashraful.mission@gmail.com)

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Abstract

Sexual dimorphism is an import phenomenon in avian kingdom. Through this, birds maintain their reproductive life. In this regard, the birds in dove group are very diversified creatures. A critical review of a renowned book, 33 species of doves were shown pronounced sexual dimorphism. For continuing the mode of breeding status and evolutionary divergence, this write-up could enhance the future guide readers.

Keywords: *Selection; sexual dimorphism; bird; dove.*

1 Introduction

1.1. Selection on pigeon morphology

In the case of pigeon breeds the selection could influence their morphology strongly (Pares-Casanova & Kabir, 2020). The head is the focal point of all attacks and most sexual advances. Blue-footed booby parents produce the smaller male birds, and in this group, the female chicks grow faster than males when foods are limited in nature (Velando, 2002). The female black-tailed godwits (*Limosa limosa limosa*) are larger in size. In addition, the growth rate of female chicks is more susceptible to limited environmental factors (Loonstra *et al.,* 2018).

1.2. Sexual size dimorphism

Sexual size dimorphism is defined the male-female differences at their adult stage by observing their plumage or feather. Sexual size dimorphism is widespread and for male-biased when males are larger in size, and for female-biased, females are larger (Bidau & Martinez, 2016). Most endothermic vertebrates exhibit this type of dimorphism (Bidau & Martinez, 2016). Smaller species of pigeons have more color variations than the larger species. Island or in montane forests, often show a partial or complete loss of bright markings of animals. White and dark patterned outer tail feathers of the turtle dove and diamond dove are easily shown during displaying the tail. Very sexually dichromatic pigeons, the sexes differ in the color of head, neck, or breast.

1.3. Plumage color and reproductive behavior

Very marked differences in appearance between the sexes of birds are correlated with the male to mate with more than one female, either taking no care of his mate's eggs or young. The juvenile plumage of pigeons has a protective value from the predators (Goodwin, 1970). Differences in plumage-color dimorphism are associated with the frequency of paternity, and size dimorphism with plumage-color of cryptic females (Owens & Hartley, 1998). In corn bunting (*Miliaria calandra*) males are 40% heavier than females (Owens & Hartley, 1998). The traditional explanation for variation of sexual dimorphism is social mating system and pattern of parental care (Darwin 1871; Wallace 1889) reviewed in Butcher and Rohwer (1889) and Andersson (1994). Many extremely polygamous species (both size and plumage color) care for the offspring alone (Hoglund, 1989; Trail, 1990; Oakes, 1992). Red bill of zebra finches (*Taeniopygia guttata*), and the black patches on throat of male house-sparrows (*Passer domesticus*) is the result of sexual selection (Burley & Coopersmith, 1987; Moller 1988, 1992). Males of blue tits are more yellow than females, and is believed by the ingestion of green lepidopteran larvae which contain carotenoids lutein and zeaxanthin (Slagsvold & Lifjeld, 1985). This is a relation between the chromas of the tail and breast feathers (Johnsen *et al.,* 2003). Larger males are better to cope with difficulties during migration and more successful in reproducing (Rubolini *et al.,* 2004). Color dimorphism increases the vulnerability of bird species to predation by European sparrowhawks (Moller & Nielsen, 2006).

The objective of this study is to focus various sexual dimorphisms in birds which allow more help to guide readers.

2 Materials and Methods

A book review of Gibbs *et al.* (2016) was the writing material of this paper. Authors focused a detailed description of all species of wild pigeons and doves with pictorial plates. This book was helpful to distinguish these known dove species with their juveniles, males, and females.

3 Results and Discussion

3.1. Morphological status

Blue-footed booby parents produce the smaller male birds, the female chicks grow faster than males when foods are limited in nature (Velando, 2002). The growth rate of female chicks is more susceptible to limited environmental factors (Loonstra *et al.,* 2018). The laughing dove (*Spilopelia senegalensis*) is sexually monomorphic, but seems to be slightly dimorphic in size (Ayadi *et al.,* 2016). Eurasian collared-dove was larger in all measurements than mourning dove but tail length (Salazer-Borunda *et al.,* 2015).

3.2. Sexual dimorphisms

Most endothermic vertebrates exhibit dimorphism (Bidau & Martinez, 2016). White and dark patterned outer tail feathers of the turtle-dove and diamond dove are easily shown during their displaying. In the case of very sexually dichromatic pigeons, the sexes differ in the color of head, neck, or breast.

3.3. Plumages and reproductive biology

The plumage of juvenile pigeons has a protective value from predators (Goodwin, 1970). In corn bunting (*Miliaria calandra*) males are (40%) heavier than the females (Owens & Hartley, 1998). Red bill of zebra finches (*Taeniopygia guttata*), and black patches on throat and head of male house-sparrows (*Passer domesticus*) is the result of sexual selection (Burley & Coopersmith, 1987; Moller 1988, 1992). Males of blue tits are more yellow than females (Slagsvold & Lifjeld, 1985). Larger males are better to cope with difficulties during the route of migration and more successful in reproduction (Rubolini *et al.*, 2004). Dimorphisms were weakly correlated and predicted by different reproductive, social and life-history traits, suggesting an independent evolution (Valcu *et al.*, 2023).

3.4. Very sexually dimorphic doves

Following doves (33 species) were sexually different with their drastic plumage colors. Commonly, the plumage colors of females are lighter than males. Most dimorphisms were found in the genus *Treron* then *Ptilinopus* because of their many species (Table 1; Fig. 1).

Table 1: Sexually dimorphic doves on plumage colors.

English name	Scientific name
Red-collared dove	*Streptopelia tranquebarica*
Spot-breasted cuckoo-dove	*Macropygia mackinlayi*
Namaqua-dove	*Oena capensis*
Ruddy ground-dove	*Columbina talpacoti*
Blue ground-dove	*Claravis pretiosa*
Purple-winged ground-dove	*Claravis godefrida*
Maroon-chested ground-dove	*Claravis mondetoura*
Ruddy quail-dove	*Geotrygon montana*
White-throated ground-dove	*Gallicolumba xanthonura*
Bronze ground-dove	*Gallicolumba beccarii*
Wetar ground-dove	*Gallicolumba hoedtii*
Cinnamon-headed green-pigeon	*Treron fulvicollis*
Little green-pigeon	*Treron olax*
Pink-necked green-pigeon	*Treron vernans*
Orange-breasted green-pigeon	*Treron bicincta*
Pompador green-pigeon	*Treron pompadora*
Thick-billed green-pigeon	*Treron curvirostra*
Grey-cheeked green-pigeon	*Treron griseicauda*
Sumba green-pigeon	*Treron teysmanni*
Wedge-tailed green-pigeon	*Treron sphenura*
White-bellied green-pigeon	*Treron sieboldii*
Whistling green-pigeon	*Treron formosae*
Red-eared fruit-dove	*Ptilinopus fischeri*
Jambu fruit-dove	*Ptilinopus jambu*
Black-chinned fruit-dove	*Ptilinopus leclancheri*
Scarlet-breasted fruit-dove	*Ptilinopus bernsteinii*
Many-colored fruit-dove	*Ptilinopus perousii*
Palau fruit-dove	*Ptilinopus pelewensis*
Black-naped fruit-dove	*Ptilinopus melanospila*
Orange-dove	*Ptilinopus victor*
Golden dove	*Ptilinopus luteovirens*
Whistling dove	*Ptilinopus layardi*
Spotted imperial dove	*Ducula carola*

Source: Gibbs *et al.*, 2016

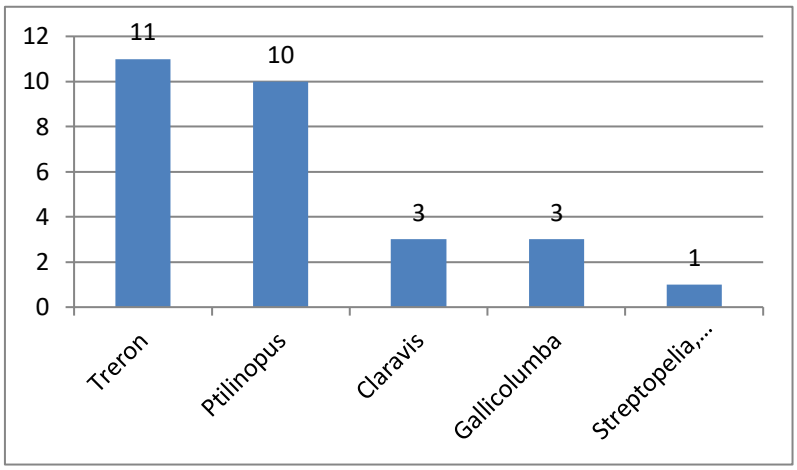

Fig. 1: Number of sexually dimorphic doves with their numbers.

4 Conclusions

For the sexual selection from the beginning, many doves have more color dimorphism than females. Duller color of females provided them to protect eggs or young whereas males are responsible for protecting them from the predators and with their size-dimorphism. Many sexual dimorphisms (size and color dimorphism) of doves are more sustainable than the other species in the wild. Further studies need to observe their dimorphism in nature.

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