

## A Comparative Study on the Eye Colour Variations in Racing Pigeons (*Columba livia domestica*)

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### ABSTRACT

In the animal kingdom, there is an extensive variation in colouration and pigmentation of iris of the eyes across the species. Racing pigeons (*Columba livia domestica*) have three common iris colours. They are yellow - orange, pearl (white), and bull (dark brown), segregating in a single species, thereby providing a unique opportunity to identify the genetic basis of the iris coloration. A total of sixty pigeons were collected from three different locations for the study. Pigeons with a yellow-orange eye colour are the most numerous among a total of 60 racing pigeons. The total number of pigeons was divided into different eye colours based on pigmentation and structural colouration.

## INTRODUCTION

Racing pigeons (also known as homing pigeons, or racing homers) are the product of crosses between some previously existing pigeon breeds, followed by greater than 100 years of strong directional selection for extreme flying and spatial orientation capabilities to produce faster birds (Blechman, 2007). Eye color is an essential component of decorative diversity in birds, originating from interactions between pigment and scattering elements in specialized cells of the iris (Pedro Andrade et al., 2021). The common measures of homer pigeons are homing ability, average-sized bird, slim and slender-bodied, strong breast muscle, and eyes are clean and clear. The racing homer is the official name of a homing pigeon. Most racing pigeons are like their feral cousins, and these birds are muscular and real avian athletes (Brown, 2015).

The pigeon eye has three primary iris colours: yellow-orange, pearl(white), and bull (dark brown). Orange iris colour is the genealogical state (Bond, 1919), and orange eyes in reality range in shades from yellow to ruddy, depending on the density of blood vessels within the eye (Hollander and Owen 1939; Sell, 2012). Pearl's iris colour is white, with tinges of pink and ruddy from blood vessels. Lastly, the bull iris colour is named based on its similitude in colour to dull bovine eyes and ranges from dark brown to nearly black (Hollander and Owen, 1939; Levi, 1986). Two types of non-melanin pigment colour within the iris of pigeons. They are guanidine and pteridines (Oliphant, 1987a). Guanidine is a white pigment, and pteridine is a yellow-orange pigment (Oliphant, 1987). The orange-eyed pigeons have both guanidine and pteridine colour shown within the iris. Only guanidine, in the form of a pigment known as 'white', is found in white eyed birds. (Oliphant, 1987a). In bull-eyed pigeons, both white and orange colours are missing from the iris stroma, so the underlying dim melanin colour of the iris isn't clouded (Bond, 1919; Oliphant, 1987b). The gravel and pearl iris in pigeons contains, bright pigment cells with birefringent crystals in the anterior stromal tissue, while the bull results from the complete absence of stromal pigment cells (Oliphant LW, 1987b). The irises of all newly hatched pigeons were bull- eyed dark, while those with gravel or pearl eyes gradually grew into brighter colour after three months (Hollander and Owen, 1939). This study supports and clarifies the nature of the pigmentation of the pigeon iris based on morphometric characterization.

## Materials and methods

This study was conducted to determine the difference in pigmentation of the eyes of racing pigeons. A total of 60 racing pigeons (*Columba livia domestica*) were selected from three different racing pigeon breeders' location in Tirunelveli district. The sixty racing pigeons were classified according to the eye colour variation: (Group I, n=29), (Group II, n=20), and (Group III, n=11). Characteristics of pigeon eye colour were determined with the naked eye qualitatively. Photographs were also taken.

## Result and Discussion

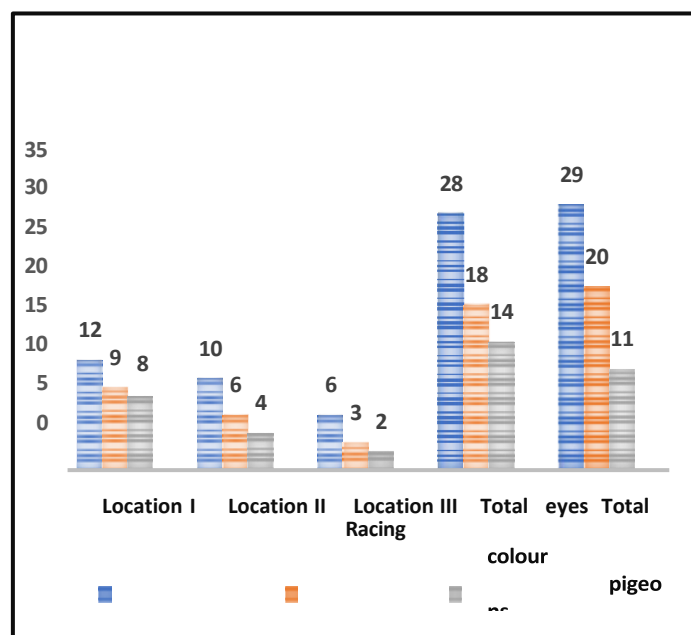
The purpose of the study was to ascertain the colour variation of the eyes of racing pigeons and the nature of the pigments responsible for the colour variation. The colour variation of the eyes of racing pigeons usually consists of three distinct colours. They are yellow-orange, Pearl (White) and Bull (Dark brown) (Figure 1). Similar results were reported by Si *et al.* (2021) that the domestic pigeon has three main iris colours including yellow to orange "pebble", white "pearl" and black "bull" eyes. While pigeon's yellow to orange and pearl irises have bright pigment cells with birefringent crystal in the anterior stromal tissue a bull's iris results from a complete lock of stromal pigment cells. Out of the total of 60 pigeons, 28 shows yellow-orange eye colour, 18 shows pearl (white) eye colour and 14 have bull (dark brown) eye colour has been identified, pigeons with a yellow - orange

eye colour are the most numerous(n=28) among a total of 60 racing pigeons (Table1). The pearl - type iris is structurally identical to the gravel iris, the except for its colour, which varies from white to red or pink due to the abundance of blood vessels. Bright stromal pigment granules are missing in immature pigeons and do not fully emerge until after fledgling. Adult pigeons with bull eyes lack stromal pigment cells. According to recent investigation on the pigment cells of the avian iris, pteridines, and purines are intimately related within a single type of pigment cell in numerous species (Table 2). The presence of pteridine and purine (guanine) pigments in the avian iris was recently confirmed (Oliphant,1981,1987b).

Table 1: Number of eye colours and racing pigeons.

Location	Colour Variation			Total Number. of Racing pigeons
	Yellow to Orange	Pearl (White)	Bull (Dark brown)	
I	12	9	8	29
II	10	6	4	20
III	6	3	2	11
Total Number. of eye colour	28	18	14	60

Graph 1: Comparison of eye colour variation



**Table 2:** Three types of eye colour and their pigments

S. No	Eye Colours	Pigments
1	Yellow-Orange	Presence of Guanidine & Pteridine
2	Pearl(white)	Presence of Guanidine (Purine)
3	Bull (dark brown)	Absence of Guanidine & Pteridine



**Figure 1:** Eye Colour Variation of Racing Pigeons.

- ❖ Yellow to Orange (First row)
- ❖ Pearl (White) (Second row)
- ❖ Bull (Third row)

## CONCLUSION

This study is an attempt to clarify and resolve the nature of the pigmentation of the racing pigeon iris. The present results confirm that racing pigeon has three specific eyes colour.

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## REFERENCES

- Andrade P, Gazda MA, Araujo PM, Afonso S, Rasmussen J. A, Marques CI, et al. 2021. Molecular parallels between pigmentation in the avian iris and the integument of ectothermic vertebrates. *PLoS Genetics* 17(2).
- Blechman AD. 2007. Pigeons: the fascinating saga of the world's most revered and reviled bird. New York, USA: Grove Press.
- Brown, L. 2015. Pigeon Racing. *NRB Publishing Company*, 140 pp.
- Bond C. 1919. On certain factors concerned in the production of eye colour in birds. *Journal of Genetics*. 9(1):69-81.

- Hollander WF, Owen RD. 1939. Iris pigmentation in domestic pigeons. *Genetica* 21(5- 6):408-419.
- Levi W. 1986. The Pigeon, Second Revised Edition (Sumter, SC: *Levi Publishing Co., Inc.*
- Oliphant LW. 1987a. Pteridine and purines are major pigments of the avian iris. *Pigment Cell Research*. 1(2):129-131.
- Oliphant LW. 1987b. Observations on the pigmentation of the pigeon iris. *Pigment Cell Research*. 1(3):202-208.
- Sell A. 2012. Pigeon Genetics: Applied Genetics in the Domestic Pigeon. Achim, Germany: *Sell Publishing*.
- Si, S., Xu, X., Zhuang, Y., Gao, X., Zhang, H., Zou, Z. & Luo, S.J. (2021). The genetic and evolution of the eye colour in pigeons (*Columba livia*). *PLoS genetics* 17(8): e10009770.

