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Photoregulatory functions drive variation in eye coloration across macaque species

Juan Olvido Perea-García^{1,2}✉, Jorg J. M. Massen³, Julia Ostner^{4,5,6}, Oliver Schülke^{4,5,6}, Alba Castellano-Navarro^{7,8,9}, Eva Gazagne^{9,10}, Juan Manuel José-Domínguez^{10,11}, Víctor Beltrán-Francés¹², Stefano Kaburu¹³, Nadine Ruppert^{14,15}, Jérôme Micheletta¹⁶, Shreejata Gupta¹⁷, Bonaventura Majolo¹⁸, Laëtitia Maréchal¹⁸, Lena S. Pflüger^{19,20}, Pia M. Böhm¹⁹, Marie Bourjade^{21,22}, Elif Duran²³, Catherine Hobaiter²⁴ & Antónia Monteiro^{1,25}✉

Primates, the most colorful mammalian radiation, have previously served as an interesting model to test the functions and evolutionary drivers of variation in eye color. We assess the contribution of photo-regulatory and communicative functions to the external eye appearance of nine macaque species representing all the branches of their radiation. Macaques' well described social structure and wide geographical distribution make them interesting to explore. We find that (1) the posterior option of the anterior eyeball is more pigmented closer to the equator, suggesting photoprotective functions. We also find that (2) the temporal side of the eyeball is more heavily pigmented than the nasal side. This suggests that eyeball pigmentation in macaques is distributed to reduce damage to the corneal limbus. The inclusion of a translocated population of *M. fuscata* in our analyses also suggests that external eye appearance may change quickly, perhaps owing to phenotypic plasticity. We find no evidence that communicative functions drive variation in external eye appearance in macaques. These results suggest that the amount of light in a species' environment drives variation in eye coloration across macaque species. Furthermore, the geographical distribution of macaques hints at important factors that have yet to be accounted for, such as the reflectivity of the terrain a given species inhabits.

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