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Iridescent plumage in a juvenile dromaeosaurid theropod dinosaur

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Colour reconstructions have provided new insights into the lives of dinosaurs and other extinct animals, by predicting colouration patterns from fossilised pigment-bearing organelles called melanosomes. Although these methods have become increasingly popular, only a small number of dinosaurs have been studied using these techniques, which require exceptional preservation of fossil feathers, leaving open key questions such as whether dinosaurs changed their plumage patterns during ontogeny. Here we reconstruct the feather colouration of an approximately one-year-old individual of the Early Cretaceous dromaeosaurid theropod *Wulong bohaiensis*, which to our knowledge is the first unequivocal juvenile paravian for which aspects of the original colour has been predicted. Using quadratic discriminant analysis (QDA) and multinomial logistic regression (MLR) on the most comprehensive available datasets, we find strong evidence for iridescent plumage of the forelimb and hindlimb remiges and grey plumage on other portions of the body. This suggests that some juvenile paravians used shiny iridescent feathers for signalling purposes, possibly even before reaching somatic or sexual maturity, and thus we can conclude that this paravian used iridescent signalling for intraspecific communication other than sexual signalling. Finally, our results show that when analysing fossil datasets that are entirely comprised of solid and cylindrical melanosomes QDA consistently outperforms MLR, providing more accurate and higher classification probability colour predictions.

Key words: Dinosauria, Theropoda, Dromaeosauridae, Paraves, *Wulong bohaiensis* , iridescence, melanosome, palaeocolour, juvenile, colour reconstruction, Cretaceous, China.

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