

DESCRIPTION FOR THE GENERAL PUBLIC

Birds amaze us with their incredible diversity and fabulous colours of their feathers, but what is the mechanism behind this? The colour of the feather might be pigment-based, depend on feather keratin structure, or be a combination of both these factors. An example of this latter mechanism is carotenoid based colouration, which is a result of both pigment based and structural component. Carotenoids cannot be synthesised by birds, and they have to be ingested with food. Because of that they could be an honest signal of individual condition and foraging abilities. Carotenoids deposited in the feather, through the absorption of specific wavelengths, determine the hue and saturation of the colour, while the keratin nano-structure influence the amount of reflected light, thus deciding about its general brightness.

Colour ornaments of the birds has long attracted the attention of researchers but most of the studies has focused on their role in sexual selection. Far less attention has been given to the factors influencing phenotypic variation of this trait, especially on the structural component. The aim of this project is to answer the question of how the early growth conditions affects both components of carotenoid based colouration in blue tit nestling.

In order to check this we plan to perform an experiment with brood size manipulation, on two different stages of early growth of nestlings. This will allow us to establish not only how rearing condition influences feather colouration, but also to determine which stage of growth is more important for this process. The experiment will be performed in a wild blue tit population inhabiting the island of Gotland (Sweden). Nestlings from all experimental groups will be monitored and during the last visit before fledging a few feathers from breast of each nestling will be taken. In order to check the differences between the experimental groups spectrophotometric measurements of feather reflectance will be performed, and for further spectral analysis Tetrahedral Colour Space model (based on physiology of birds' vision) will be applied. In addition, we plan to analyse feathers' nano-structures, which will be carried out using transmission electron microscopy.

The combination of spectrophotometric and microscopic techniques allows us to understand the impact of early growth conditions on both components of carotenoid based colouration. As a result, we will be able to better understand the factors shaping nestlings' coloration, and thus understand the information content of the colourful ornament, and what does it signal to other individuals of this species.