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Bird feathers are one of the most spectacular examples of the power of evolution – the diversity of their colours and shapes outperforms many morphological traits. Feather colours provide also one of the most important tools in evolutionary biology: thank to the mechanisms ensuring honesty of their signalling they are often used in studying inter-individual communication and mate choice mechanisms. It is not surprising therefore that amounts of data collected about the biology of feather colour is enormous. However, in spite of this huge research effort our knowledge about the function of feather colours is still limited – and many studies provide conflicting explanations or do not support any hypothesis at all. In my project I want to fill this apparent gap by showing, that it results from focusing on colours themselves rather than on underlying mechanisms. Mechanisms generating variation in colour have been studied rather rarely – and since they are more basic and fundamental, they should be more tightly correlated with other physiological traits and remain under stronger genetic control.

To achieve this I have constructed a 4-part multidisciplinary project in which I will study mechanisms generating colours in two model bird systems: in yellow carotenoid-based feathers of blue tits, UV/blue-coloured tail feathers of blue tits and black, melanised bib feathers of the house sparrow. The methods used will include novel techniques such as electron microscopy of the feather nano-structure or stable isotopes labelling of feather pigments. I will also take advantage of a huge sample of complete colour spectra in over 700 bird species to perform a comparative analysis looking at the colour regions in these spectra that are characterised by the greatest evolutionary potential.

The topic I decided to tackle is important, very current and weakly explored – as such my project will significantly enrich our knowledge about the role and mechanisms of colour in biology. Colour is also a fascinating trait, especially from the point of view of aesthetics – thus my project will not only be important scientifically, but also will help me to spread the word about evolutionary biology by engaging people in science of this beautiful trait: colour.