

Abstract

In many species carotenoid-based ornaments play a fundamental role in sexual selection. It is believed that carotenoid-based ornaments act as indicators of individual quality and condition during mate-choice, as associations between their expression, individual fitness and various condition indicators were observed. Despite the long-term research, mechanisms ensuring signalling honesty remain unknown. Currently, the most accepted hypothesis suggests antioxidant properties of carotenoids, and, therefore, a trade-off between their allocation to ornamentation or defence against free radicals. The antioxidant function of carotenoids *in vivo* was challenged in birds, however, and alternative hypotheses were proposed, assuming either carotenoid loss due to free-radical oxidation, or harmful (pro-oxidant) effects of high carotenoid levels in the body, or interconnection of metabolic pathways for both, the carotenoid conversion and homeostatic control of mitochondrial respiration and redox state. These hypotheses assume differing allocation of carotenoids under elevated oxidative stress, which we tested using experimental manipulations of oxidative state and carotenoid intake in adult male zebra finches (*Taeniopygia guttata*). The results are inconsistent with all the alternative hypotheses, but partly support allocation trade-off, based on carotenoid antioxidant properties. On the other hand, the results also suggest that zebra finch beak colouration is partly independent on beak carotenoid concentration, and that the mechanisms of condition-dependent carotenoid-based signalling are probably much more complex than assumed by the current hypotheses.