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### Gene expression linked to timing of reproduction in the great tit

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Climate change, one of the major threats to biodiversity, has globally resulted in shifts in seasonal timing, varying between species and across taxonomic groups. The differences in shifts or advancements in seasonal timing, often lead to mismatches in timing between trophic levels. The great tit (*Parus major*) has advanced its seasonal timing, but fails to match with the more advanced shift of their caterpillar food. This mismatch of offspring needs and caterpillar abundance has major fitness consequences and, as earlier laying females now do better, there is strong natural selection for earlier laying. It is important to know which genes are contributing to evolutionary adaptation to a changing world. In order to investigate the genetic basis of laying date more, we generated selection lines for early and late laying and sequenced the whole transcriptomes of 12 pools of F1 birds for early and late egg laying. We had two tissues, hypothalamus and liver, and three different time points before and after laying the first eggs and two temperature treatments (warm and cold). We described several genes being differentially expressed between time points in great tits and showed also that there is differential expression of genes between liver and hypothalamus. Many of the differentially expressed genes in liver were bird specific related to egg laying e.g. the *VTG2* (vitellogenin 1) and *APOV1* (apovitellenin 1) and in hypothalamus many of the differentially expressed genes were linked to metabolism and signalling related gene-ontology groups. Furthermore, there was a significant interaction between temperature and time point in hypothalamus. A better understanding of gene expression patterns can contribute greatly to our understanding of molecular evolutionary processes in natural populations, and hence to assess the adaptive potential of species to cope with environmental change.