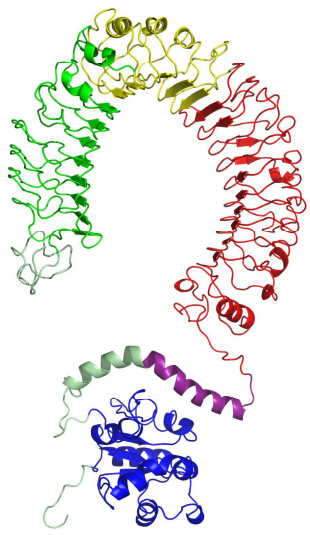
ABSTRACT

Host-parasite co-evolution belongs to the most important evolutionary relationships that shape natural and sexual selection. Parasites pose permanent selective pressure on their hosts. Toll-like receptors (TLRs) as a part of innate immunity are involved in mechanisms of a first immunological barrier which has to be overcome by parasites. These receptors play a key role in primary detection of pathogen-associated molecular patterns (PAMPs) and, hence, are responsible for early triggering of effector immunological mechanisms and for co-activating adaptive immunity. Several studies revealed that TLR4 may represent a suitable model molecule for host-parasite co-evolution studies. TLR4 interacts directly with several PAMPs and structural variability in this receptor was shown to affect host resistance to various diseases. Thus, there is potential for occurrence of parasite-mediated natural and sexual selection. Contrary to the number of fish and mammalian TLRs described, avian inter- and intraspecific TLR variability is only very insufficiently explored. This is especially true for passerine birds. In my diploma thesis I therefore provide the first description of the complete *Tlr4* translated region in a non-model free-living bird, great tit (*Parus major*), predict structure of the protein product of this gene and analyse its population polymorphism. To assess evolutionary forces acting on the great tit TLR4 I described the TLR4 also in several other passerine species. These data were used to investigate influence of the TLR4 polymorphism on condition-related traits in great tit. I found that that one particular amino acid substitution, Q549R, is associated with expression of plumage ornamentation. In both sexes individuals bearing this substitution express narrower melanin-pigmented black breast stripes and lighter carotenoid-pigmented yellow breast colouration. To my knowledge, this is the first evidence for possible association between TLR polymorphism and ornamental colouration in animals. In general, our data show influence of innate immunity on ornamental signalling and support indicator model of sexual selection.



Schematic structure of Toll-like receptor 4.