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Interaction types between four genera of haemoparasites in blue tit females

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Host individuals commonly get infected with a vast array of parasites. Concurrent infections set the opportunity for interactions between parasites, which may arise either directly or indirectly. The outcome of these interactions – neutral, synergistic or antagonistic – may affect the host individual as it may translate into the size of its parasite community. Despite growing interest in identifying interaction types between different parasites, this field is still largely unexplored. Here, interaction types between four genera of common avian haemoparasites – *Plasmodium*, *Haemoproteus*, *Leucocytozoon* and *Trypanosoma* – were studied in a hole-nesting passerine, the blue tit (*Cyanistes caeruleus*). In contrast to previous studies, which examined interactions between these parasites in a single time point, the probability of infection with a given parasite was examined as a function of the presence of infection with other parasites assessed at an earlier stage of the nesting period. Because interactions between parasites may be affected by the environment they occupy, i.e. the quality of the host, this host characteristic was diversified by exposing adult females during the incubation and nestling period to different levels of infestation with fleas – a common ectoparasite of cavity nesting passerines. In the majority of cases, the interaction between different haemoparasite genera was neutral. However, the synergistic interaction was identified between *Haemoproteus* and *Leucocytozoon* as well as *Trypanosoma* and *Leucocytozoon* and the antagonistic interaction between *Haemoproteus* and *Plasmodium*. Contrary to expectations, the interactions between haemoparasites were similarly expressed in females exposed to low and high flea infestation level except for *Plasmodium*-*Trypanosoma*. This study suggests that the composition of the haemoparasite community in bird populations may shape the frequency of infection with individual parasite genera as well as the rate of multiple infections.