

# Parasites and sex: How Collared Flycatchers manage to combat malaria infection and succeed.

William Jones

Parasites are everywhere. It is likely that every species has at least one parasite and parasitism itself is probably the most common life-history strategy in nature. Parasites live of resources taken from their hosts, therefore host organisms need to replace lost resources and combat the parasite with an immune system. However, this is costly and resources are finite. Therefore many individuals need to choose between a strong immune system and other traits including reproductive effort. Malaria is a parasite that infects red blood cells and has been found in a wide range of mammalian, reptilian and avian species. One such species is the collared flycatcher (*Ficedula albicollis*), a migratory songbird species that breeds in Central and Eastern Europe, as well as the Swedish islands of Gotland and Öland, and migrates to South-Central Africa for the winter. Male and female collared flycatchers are differently patterned with males having striking black and white plumage including a large white forehead patch, white collar and large white wing patches. Females are duller with the black replaced with grey-brown tones and reduced or absent forehead patches. Some of the male traits such as the white forehead patch are known to be attractive to females and the size of this patch varies widely in the population, with a larger patch generally being more desirable.

This study aimed to find out where in the world individuals were being infected and how infection rates vary across the population and to discover whether infected male collared flycatchers had smaller forehead patches and lower reproductive success.

From blood samples taken from birds on Öland I found that females were more likely to catch malaria than males and that both sexes were much more likely to be infected in Europe than in Africa with over 80% of infected birds having European strains. Females may be more susceptible because of their behaviour. Females are the sole incubator of eggs and are possibly an easier target for the blood-sucking insects that carry the disease. The fact that birds are more likely to be infected in Europe is more surprising, given that flycatchers spend roughly half their time in the breeding areas and half in the wintering grounds. This highly skewed result could be evidence for a trade-off in birds where individuals are putting extra effort into their breeding success in Europe at the expense of their immune system. For the second part of the study I found that infected males were more likely to have large forehead patches and to have higher fledging success of their offspring. This is surprising as one would expect that infected individuals would need to invest more into their immune system. Therefore my study appears to show that infected birds are not reallocating resources from reproduction to their immune system and it remains to be investigated where else these birds are paying the cost of infection.

Understanding how birds cope with parasite infection could have important applications in conservation, and while collared flycatchers themselves are not endangered, they could be used as a model species for other, endangered migratory species, such as the aquatic warbler (*Acrocephalus paludicola*) or the European turtle dove (*Streptopelia turtur*).

Degree project in Biology, Master of Science (2 years), 2015

Examensarbete i biologi 45 hp till magisterexamen, Uppsala universitet, 2015

Biology Education Center and the Department of Animal Ecology

Supervisor: Anna Qvarnström