

# **The Social Structure, Ecology and Pathogens of Bats in the UK**

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Dedicated to the memory of  
Charles William Stewart Hartley



## Abstract

This thesis examines the ecology, parasites and pathogens of three insectivorous bat species in Wytham Woods, Oxfordshire; *Myotis nattereri* (Natterer's bat), *M. daubentonii* (Daubenton's bat) and *Plecotus auritus* (Brown long-eared bat).

The population structure was assessed by monitoring associations between ringed individuals, utilising recent advances in social network analysis. Populations of both *M. daubentonii* and *M. nattereri* were found to subdivide into tight-knit social groups roosting within small areas of a continuous woodland (average minimum roost home range of 0.23km<sup>2</sup> and 0.17km<sup>2</sup> respectively). If this population structure is a general attribute of these species it may make them more sensitive to small scale habitat change than previously thought and has implications for how diseases may spread through the population.

*M. daubentonii* had a strong preference for roosts close to water, away from woodland edge and in areas with an easterly aspect. The factors driving roost choice in *M. nattereri* and *P. auritus* remain elusive. The segregation of *M. daubentonii* into bachelor and nursery colonies was not a result of the exclusion of males from roosts close to water by females, or variation in microclimate preferences between the sexes, as was predicted. Body condition (weight/forearm length) was correlated with host characteristics including age and reproductive status, and weather variables.

Astroviruses and Coronaviruses, which have characteristics typical of zoonotic viruses, were identified in UK bat species for the first time. Coronaviruses identified formed species-specific clades while Astroviruses were highly diverse. Though not closely related to human viruses these are potential zoonotic diseases of the future. Models of Coronavirus and ectoparasite distribution suggest individual attributes (e.g. sex and age) and population structure (e.g. the formation of nursery and bachelor colonies) are important predictors of parasite and pathogen prevalence.

This study characterises a system that offers many opportunities for future research including studies of sociality, disease modelling and conservation management.



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