

OR018*The nutritional dimensions of animal collective behaviour*

Jerome Buhl, Mathieu Lihoreau, Michael Charleston, Gregory Sword, David Raubenheimer, Stephen Simpson

There are many well described examples of collective behaviour phenomena where local interactions between individuals scale up to produce rich group level dynamics and patterns often beneficial to group members. Such self-organised phenomena allow groups to synchronise, achieve cohesive mass migration, and perform collective decisions and complex task partitioning. Here we revisit some of the classic collective behaviour models applied to group living insects and embed them in a nutritional framework where individuals attempt to regulate their nutrient intake to reach their desired target. Using these simple models, we illustrate how integrating nutritional constraints in the framework of animal collective behaviour opens new opportunities to study and understand the evolution of group-living and sociality. In particular, we study how individual nutritional requirements can affect collective decisions and synchronisation in simple gregarious groups. We show how the influence of individual nutritional states can affect their movement and shape locust marching bands. Finally, we revisit a model initially used to explore the emergence of dominance hierarchy in wasps to study how competition for nutrients can shape the distribution of nutritional states in a group and provides a basis for the emergence of division of reproductive labour.