**General Zoology ‘Project Module’. Projects 2021**

**1. Seed dispersal by reptiles and its effects on plant diversification. (Belinda Kahnt)** In addition to birds and mammals, reptiles are important seed dispersers for plants, especially on islands. Seed dispersal does not only increase the survival of a plant but also promotes gene flow between plant populations. However, the amount of gene flow is likely influenced by the mobility of the seed disperser, with less mobile seed dispersers promoting only short distance gene flow between plants. This might in turn favour genetic differentiation between plant populations and speciation. This project aims to test if less mobile seed dispersers such as reptiles lead to a higher speciation (diversification) rate in plants than flying seed dispersers such as birds or bats using a comparative approach.

**2. How efficiently can bumble bees and honey bees transmit viruses to one another? (Robert Paxton)** Honey bees and bumble bees living in the same habitat are often infected with the same viral strain, suggesting that their viruses readily spill over from one species to another, presumably at jointly visited flowers. That is, virus deposited by one bee during feeding at a flower is assumed to be viable and assumed to be transmitted to a following bee that visits the same flower. The aim of this project is to design and run experiments to test some of the assumptions of this route of transmission.

**3. (BSc project, 3 students) Formic acid in the poison gland of ants as a detoxification agent. (Simon Tragust)** Formicine ants swallow their highly acidic, formic acid containing poison gland secretion to control microbes ingested together with food. Concordantly, formicine ants also use their poison gland secretion to detoxify alkaloids from venoms of other ant species in interspecies fights. The aim of the current project is to investigate whether plant alkaloids in honeydew ingested by the ants are also detoxified by their poison gland secretion. The project will entail field behavioural observations.

**4. At what scale do orchid bees respond to anthropogenic change? (Antonella Soro)** Spatial scale is fundamental in understanding species–landscape relationships because responses of species to landscape characteristics typically vary across scales. Many landscapes worldwide are being profoundly affected by human impact (through both urbanization and agriculture intensification), yet the spatial scaling of species responses to these dramatic changes is poorly understood. In this project you will investigate the spatial scaling of anthropogenic effects on the body size of two orchid bee species, collected in Mexico from a gradient of anthropogenic change using GIS and related information to capture data on land use variables at different spatial scales.

**5. (BSc project, 3 students) Effects of urbanisation on bumble bee foraging behaviour. (Panas Theodorou)** Urbanization is a global change phenomenon that leads to greater habitat loss, fragmentation and degradation, increased in pollution and more impervious surfaces compared to nearby non-urban habitats. To investigate the effects of urbanisation on bumble bee colony performance, in 2018 we placed 20 commercial *Bombus terrestris* colonies in 10 sites in the city of Halle, spanning from the edges of the city and into the city’s core. We then monitored bumble bee colony growth and foraging behavior using video cameras across the entire colony cycle. The students will analyse the video recordings from our experimental setup to explore multiple potential drivers operating locally and at the landscape levels that could affect bumblebee foraging behavior. This information will contribute to our understanding of the effects of urbanization in a major pollinator group, the bumble bees.

**6. What are the main environmental drivers of bumble bee parasitism in changing landscapes? (Panas Theodorou)** Land-use change and pathogens pose significant threats to bee health and food security. Pathogen prevalence is influenced by host density and can be mediated by environmental heterogeneity including land-use change. In 2014 we performed a well-replicated urban–rural sampling design in Germany to investigate the effect of land-use change on bees. Here, the student will screen bumble bee individuals for parasites using molecular approaches (qPCR), from our 2014 sampling, belonging to the three most abundant bumble bee species in Germany. The aim of the project will be to disentangle the effects of land-use, local floral resource availability (abundance and richness) and host density on parasite prevalence in a major pollinator group, the bumble bees.