

### Encadrement :

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Nature du financement de la gratification :

acquis prévu

### Titre du stage :

**Investigating personality and parasite infection of introduced grey squirrels**

### Mots clés :

Capture-mark-recapture ; trappability, trap-diversity index, arena test, faecal egg counts

### Résumé :

The presence of invasive alien species (IAS) is a major threat to the conservation of biodiversity. For vertebrates, one of the hypotheses that explains why IAS can be so successful in the area where they have been introduced is the parasite-release hypothesis : in the new range the alien species has lost many parasite species which it normally hosts in its natural range. Within a host population, (macro)parasites typically occur in an aggregated distribution: a limited proportion of individuals have high abundances, while the majority have few (or even no) parasites. This heterogeneity is due to variable risk of infection between individuals, and this risk is influenced by varying degree of susceptibility and exposure to parasites. Apart from sex and age effects, it is suggested that exposure is, at least partly, affected by differences among individuals in personality while susceptibility differs with levels of physiological stress.

In this study we will concentrate on individual variation in personality and an index of parasite load. Personality has been related to host-parasite interactions with the general idea that boldness or risk-taking behaviour results in higher risk of infection by parasites. In fact, variation in activity and host behaviour (including boldness) may affect the probability of encountering parasite infective stages (i.e. exposure), resulting in higher parasite loads in bold than in shy individuals. We will test this using the grey squirrel (*Sciurus carolinensis*) introduced to Italy as model species. Grey squirrels in Italy show wide individual variation in intensity of infection by the most common helminth, *Strongyloides robustus*. We will investigate whether indices of boldness are related to an index of abundance of this helminth using different methods in a population of grey squirrels.

Two indices of personality (trappability and trap-diversity index) will be calculated from two capture-mark-recapture (CMR) sessions based on the number of times a given animal is trapped and in how many different traps. The same animals will also be used in the arena test, where two situations will be created: the hole board test and the mirror test. Continuous filming will allow to construct the behavioural patterns for each animal from which a behavioural profile is derived which will be compared with the personality indices from CMR. During trapping, faecal pellets will be collected from all individuals and parasite load of grey squirrels will be determined indirectly by faecal egg count (FEC), using quantitative methods (McMaster technique: helminth eggs/g faeces).

This project for the master student is part of a wider PhD research project which explores how trait-mediated effects of parasite infection affect reproductive performance in an invasive alien species, and how all or some of these effects are involved in disease-mediated competition between alien and native species.

Foreseen period for fieldwork and data analyses: February – May 2016.

### Deux références bibliographiques:

Boyer N, Réale D, Marmet J, Pisanu B, Chapuis J-L (2010) Personality, space use and tick load in an introduced population of Siberian chipmunks *Tamias sibiricus*. *J Anim Ecol* 79:538–547.

Romeo C, Wauters LA, Cauchie S, Martinoli A, Matthysen E, Saino N, Ferrari N (2014b) Faecal egg counts from field experiment reveal density dependence in helminth fecundity: *Strongyloides robustus* infecting grey squirrels (*Sciurus carolinensis*) *Parasitol Res* 113:3403-3408.

### Techniques mises en œuvre:

Capture-mark-recapture of grey squirrels ; handling animals, taking body measurements, sexing and determining reproductive condition, collecting faecal samples, FEC using microscope, data analyses to calculate personality indices, carrying out arena test

### Compétences particulières exigées:

None, the student will be trained in all techniques

