Antipredatory behaviour of Red-backed Shrike (Lanius collurio) in breeding season

The aim of this study was to evaluate nest defence behaviour of the Red-backed Shrike (*Lanius collurio*) in response to five different predator mounts. These predators differ in the degree of potential threat they represent to defending birds and their eggs or nestlings in the nest. The Red-backed Shrike was chosen as a model species because of its well known aggressivity towards predators including humans. Mobbing (form of antipredatory behaviour) can occur year round, although it is more intense during the breeding season and is usually used to deter predators from the vicinity of the nest. Like other forms of parental investment, predator mobbing could be valuable if the predator is successfully chased away, but may also bring serious threat of injury. It is also both time and energy consuming. Moreover, different predators represent different perils either to nest content or to defending parents. Thus, it is very demanding for parents to evaluate the situation properly and choose the best nest defence strategy.

Nest defence responses were studied in two different predator guilds: raptors/owl and corvids. We presented mounted individuals of two raptor species (Sparrowhawk and Kestrel), mount of Long-eared owl and two corvid species (Magpie and Jay). Mount of Feral Pigeon was used as non-threatening control species. The mounts were placed in a 1 m distance from the nest, facing toward the nest. All mounts were presented to each pair of Shrikes. Each mount trial lasted 20 minutes from appearance of at least one parent and was taped on a VHS-C video camera on a tripod. If the parents showed no inclination to mob a mount within 20 minutes, the trial was terminated with a null reaction. The minimum interval between the presentation of the next dummy was one hour.

Main recorded components of mobbing behaviour were: the total number of attack events (frequency of attacks when bird flies over mount and decreases its flight altitude) and the total number of attacks with physical contact (intensity of attacks when bird hits the mount). While the Sparrowhawk is the most specialized predator of adult birds, the Kestrel is specialized to hunt small mammals and birds form only minority portion of its diet. The Magpie is presumably more specialized in destroying the nest content than the Jay.

The following hypotheses were tested: 1) The frequency of mobbing behaviour (total number of attacks) is adjusted according to the apparent threat to the nest content, 2) The intensity of mobbing behaviour (total number of attacks with physical contact) is adjusted according to the threat perceived by the defending birds to themselves, 3) Female invests to breeding more than male, so its reaction should be less intense.

The observed variability in mobbing behaviour was predominantly caused by behavior of each individual nesting pair. Shrike pairs that behaved non-agresively to almost all mounts were also observed during the trials. If the factor „pair“ was omitted from analyses, the most important became the model type. The mobbing frequency, which was evaluated as a number of attacks per 20 minutes, was highest towards the Kestrel. Lower intensity was performed towards the Sparrowhawk in comparison to the Long-eared owl and the lowest intensity was observed towards the Jay. The Magpie and the Pigeon weren't almost attacked. This results doesn`t support the first hypothesis, which predicted the Jay being the most attacked species and the Sparrowhawk the least attacked one. This implicates that Shrike uses mobbing behaviour particularly to chase the predator away from the nest as they attacked regularly mobbed predators almost equally. The proportion of attacks with physical contact (mobbing intensity) was the highest towards the Jay and continuously decreased through the Kestrel to the Sparrowhawk, which is considered the most dangerous for adult birds. The main conclusion of this study is the proof that the Red-backed Shrikes are able to actively evaluate the potencial threat of different guilds of predators. They are also capable to discriminate within the guilds (e.g. the Jay x the Magpie) and adjust the type of mobbing behaviour (active attacks or pasive vocalization). When shrikes decided to use active mobbing, they adjusted rather it's intensity with respect to potential predator threat to themselves, than with respect to predator threat to nestlings. These findings thus support the second hypothesis. The most confusing result we found was the absence of attacks towards the Magpie. We hypothetize that Shrikes chose an optimal passive antipredatory strategy toward the Magpie with the effort not to disclose the location of the nest. The mobbing frequency of male and female was correlated but the difference wasn`t statistically significant. These results showed the importance of distinguishing between intensity and frequency in this type of ethological studies.