

Summary

Aposematic animals signal to the predators their unprofitability (e.g. unpalatability, toxicity). Predators have either innate bias against warning signals or they have to learn to avoid aposematic prey. Aposematic species with similar warning signals profit from their resemblance and form mimetic complexes. Theoretically, there are five types of mimetic relations between species within the mimetic complex: Batesian, quasi-Batesian, quasi-Müllerian, Müllerian and super-Müllerian. Classification of mimetic relations depends on the level of mutual resemblance, and presence, type and efficiency of defensive mechanisms.

Central European red-and-black true bugs (Heteroptera) were used as a model of mimetic complex in my Ph.D. thesis. We used six species of passerine birds. The species differ in body size, preferred food and reactions toward aposematic red-and-black prey and non-aposematic brown-painted prey. Although the diet of some passerine birds may include true bugs, there is evidence that birds mostly avoid aposematic species.

In the first paper included in the thesis, we found that mimetic complexes may be predator dependent. There are differences in the extent of Batesian-Müllerian mimetic complexes and in the relations among the species involved.

In the second paper, we analysed reactions of experienced (wild-caught) predators towards red-and-black wild-form of the firebug (*Pyrrhocoris apterus*), its white, yellow, and orange colour mutants, and non-aposematic, brown-painted individuals. Birds avoided only the red-and-black firebugs and orange mutants, and attacked other colour forms.

In the third paper, we found that there are no differences in rate of avoidance learning among groups of birds learning to avoid variously coloured prey. We also found asymmetric generalization of warning colours. Naive hand-reared great tits (*Parus major*) generalized their negative experiences with yellow-and-black prey to red-and-black prey but not vice versa.

In the fourth paper, we analysed an influence of predator personality on the avoidance learning. Shy birds hesitated longer than bold birds before attacking the aposematic prey. Shy birds also learned to avoid aposematic prey faster, and killed fewer prey individuals than bold birds during the process of avoidance learning.

Fifth manuscript deals with functional colour change in adults of *Graphosoma lineatum* in Sweden. Pale-and-black form that occurs during the late summer and autumn on dry vegetation is for the passerine predators harder to detect than is the red-and-black form.