

PARASITE COMMUNITY OF APODEMUS FLAVICOLLIS IN
TRENTINIAN ALPS: THE EFFECT OF SPATIAL, ENVIRONMENTAL
AND HOST FACTORS ON ITS STRUCTURE AND COMPOSITION

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The composition and structure of parasite communities of rodents is known to show great spatial variability. Some studies identified increasing differences between parasite communities with increasing distance of the host population, supporting island biogeography effects where observed patterns are the results of stochastic events as colonisation or extinction. Other studies evidenced the main role of habitat composition or of host population dynamics as shaping factors.

The comprehension of the forces structuring the parasite communities is a fundamental step for the understanding of the mechanisms leading to the host infection. The parasite community structure is not only the result of processes acting on singles parasite species but may reflect the ability of new species to colonise vacant or underexploited niches.

We analysed the parasite communities of six *A. flavicollis* population sampled in Trentino (north-east Italian Alps) province with the aim to identify whether in a mountain environment the parasite communities exhibit common pattern or whether the observed differences may be associated to isolation of the population or to other factors.

Mice were trapped using multi-capture live trap set up for three nights (total of 3456 trap nights) in six study sites, each one represented by three trapping grid of 64 traps. The six sampling sites located at a mean altitude of 850 m. a.s.l. (± 22 m S.E.), were represented by woodland composed mainly by mature beech (*Fagus sylvatica*) with patchy distribution of Scots pine (*Pinus sylvestris*) and spruce (*Picea abies*). Each mice trapped was weighted and details on age classes, breeding status were recorded and euthanased for parasitological post mortem analyses.

The parasite community was inspected at two hierarchical levels: the component community (i.e. all parasites associated with a host population) and infra-community (i.e. all parasites associated with a single host). The effects of mice factors (sex, breeding condition, age) and population density on parasite richness and abundance were analysed through Generalised Linear Models. Similarity between the parasite communities was inspected against geographical distance to test whether population isolation influenced parasite occurrence. A similarity matrix of the parasite communities was built computing Jaccard's index between pairs of population. The similarity matrix was compared with a matrix of Euclidean distance through the Mantel's test for association between matrixes.

A total of 230 mice were trapped. While there was a significant difference between the six study site on the number of individual trapped ($\chi^2_5 = 178.8$, $P < 0.0001$), the sex ratio, age and breeding conditions did not differ between the sampled populations (sex, GLM, family = binomial; link = logit: $\chi^2_5 = 5$, $P = 0.41$; age, GLM, family = gaussian, link = identity; $F_5 =$

201.17, $P = 0.148$; Breeding status, GLM, family =binomial; link = logit; $\chi^2_5 = 3.46$, $P = 0.628$).

In the whole sample eight parasites species were identified: the nematodes *Heligmosomoides polygyrus*, *Syphacia frederici*, *S. stroma*, *Trichuris muris*, *Rictularia proni* and *Aonchotheca murissylvatici*, the cestode *Hymenolepis fraterna* and the trematode *Corrigia vitta*.

The parasite community exhibited significant difference between the six populations at any level investigated. The number of parasite species detected on the study sites ranged between six and three and the mean parasite species richness per mouse (GLM family=Poisson, link=log, $\chi^2_5 = 18.94$, $P = 0.002$), with the mean total parasite abundance were different among study sites (GLM, Total number of parasite by site, $\chi^2_5 = 36.62$, $P < 0.001$).

The parasite species richness was positively associated with mouse abundance (GLM, family=quasi, link=identity $F_1 = 3.86$, $P = 0.03$) while similarities between parasites communities were not correlated with the distance between them (Matel test $r = -0.115$, $t = -0.3522$, $P = 0.3623$). Moreover the mice abundance had a positive direct effect on the total parasite load (GLM family=negative.binomial, link=log Mice abundance $\chi^2_1 = 22.9$, $P < 0.001$) and indirectly on the mean parasite species richness.

The parasite community of *A. flavicollis* in Trentino exhibited great variability between the six sampled populations. Despite the Alpine environment, characterised by high mountains that may limit the mice moving from one population to the next, the parasite communities did not evidenced community changes associated with the distances, suggesting a limited effect of isolation as shaping factor. Moreover the similar altitude and wood composition of the trapping sites underlined a limited effect played by environmental factors. On the contrary, the mice abundance affected the different levels of the parasite community inspected suggesting that the mice population dynamics had a relevant aspect in shaping the parasite communities.