

The smell of fear warns other voles

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Many encounters between predators and prey take place in dense vegetation. Predators lurk and wait for the best moment to attack, but are seldom visible. For a prey animal, the smell of a predator is one of many signals for danger. The studies in Thorbjörn Sievert's dissertation showed that prey individuals can communicate with each other about the

presence of a predator. An individual, who was attacked or chased by a predator, can signal danger with its body odour, i.e. alarm pheromones. The studies showed that alarm pheromone caused different responses in vole behaviour and reproduction compared to the direct predator odour.

Fights for survival regularly take place in the wild: when hares smell a lynx preparing to ambush, they increase their vigilance and flee. When a bank [vole](#) detects the characteristic smell of the weasel, they change their behaviour.

Studies in Thorbjörn Sievert's dissertation compared the effects of a direct signal from a [predator](#), the smell of the least weasel, and an indirect signal, the "smell of fear" secreted by a vole that has encountered a weasel, on behaviour and reproduction of the bank vole.

The studies showed that the [alarm pheromone](#) and predator odour had different effects on vole behaviour and reproduction. Thus, the alarm pheromone appeared to contain different information about the nature or quality of the threat. When a vole encounters a predator, the secreted odours signal an acutely increased threat level, resulting in changes in behaviour and reproduction in voles receiving the message. While both the direct predator odour and the alarm pheromone caused changes in the voles, they differed from each other.

When confronted with the "[smell](#) of fear," female voles increased their reproduction despite the increased predation risk, and probably the decreased probability of survival. This phenomenon is the so-called terminal investment hypothesis. It assumes that it is favourable for an individual to maximise its efforts to reproduce when their own survival chances are low.

In the biochemical part of the dissertation, the compounds conveying the information in [bank vole](#) alarm pheromone have been identified for the

first time. The study provides new insights for the study of mammalian predator-prey interactions, especially for a more in-depth focus of the effects caused by the threat.

The research in this dissertation was carried out partly in laboratory conditions as well as in semi-natural outdoor enclosures at the Konnevesi Research Station, part of the University of Jyväskylä.

More information: Indirect and Transgenerational Effects of Predation Risk: Predator Odour and Alarm Pheromones in the Bank Vole: jyx.jyu.fi/handle/123456789/68490

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