

# Different factors dominate in each guild in Aculeata communities along an elevational gradient in a boreal forest

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## Abstract

The response of communities to climate change is expected to vary among feeding guilds. To evaluate the response of guilds to environmental factors without considering the taxonomic specificities, it is useful to examine Aculeata bees and wasps, which consist of closely related taxa including different guilds, pollinators, predators, and parasitoids. In this study, we evaluated changes in species diversity (SD) and functional traits of each feeding guild along an elevational gradient in a boreal forest in northern Japan. We used yellow pan traps to collect Aculeata bees and wasps at 200–1600 m above sea level. We investigated six functional traits (trophic level, flight duration, body size, elevational range, nesting position, and soil dependency) and the horizontal distribution of the species. The SD of all Aculeata predators and parasitoids decreased with an increase in elevation; however, the SD of pollinators did not show any specific trend. Although the functional trait composition of all Aculeata species did not show any trend, that of each feeding guild responded to elevation in different ways. Pollinators increased in body size and showed a decrease in flight duration with increasing elevation, suggesting that tolerance and seasonal escape from physical stress at high elevations are important for shaping pollinator communities. Predators showed increased elevational range and above-ground nesting species with increasing elevation, suggesting that the ability to live in a wider range of environments and avoid unsuitable soil environments at high elevations might be important. Parasitoids changed their hosts and variable traits with increasing elevation, suggesting that brood parasitoids have difficulty in surviving at high elevation. The traits for each guild responded in different ways, even if they were dominated by the same environmental factors. Differences in the response of functional traits would produce different patterns of community formation in different guilds during further climate change.

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