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*Research*

# Nectar robbers deter legitimate pollinators by mutilating flowers

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Nectar robbing – harvesting nectar illegitimately – can have a variety of outcomes for plant sexual reproduction and for the pollinator community. Nectar robbers can damage flowers while robbing nectar, which could affect the behavior of subsequent flower visitors and, consequently, plant reproduction. However, only nectar manipulation by nectar robbers has so far received attention. We found a short-tongued bee, *Hoplonomia* sp. (Halictidae), mutilating the conspicuous lower petal of the zygomorphic flowers of *Leucas aspera* (Lamiaceae) while robbing nectar. We hypothesized that the mutilation of the conspicuous lower petal deters legitimate pollinators on *L. aspera* flowers, which, in turn, might affect plant reproduction. We first assessed the proportion of naturally-robbed flowers in plant populations for three years to confirm that it was not a purely local phenomenon due to a few individual bees. We then studied diversity, community and visitation characteristics of pollinators, nectar dynamics and fruit set in unrobbed and robbed open flowers in naturally-robbed populations. The proportion of robbed flowers varied significantly across sites and years. Robbing did not affect nectar dynamics in flowers, but it did alter flower morphology, so much so that it reduced pollinator visitation and altered the pollinator community on robbed flowers. However, the maternal function of plant reproduction was not affected by nectar robbing. This study for the first time shows that a nectar robber can have an ecologically significant impact on floral morphology.

Keywords: floral trait, *Hoplonomia* sp., *Leucas aspera*, nectar robbing, pollination, pollinator behavior, pollinator community, pollinator–robber competition, short-tongued bee

## Introduction

Animals interact with a variety of plants. Some interactions are mutualistic as in the case of pollinators and others are antagonistic, as seen in herbivores and nectar robbers (Irwin 2006). The plant–pollinator mutualistic interaction evolved from a plant–herbivore interaction through an adaptive radiation by both animals and plants (Herre 1996). It is, therefore, not rare to see herbivores in different roles – exploiters, cheaters and robbers – in modern-day plant–pollinator networks. Among them, nectar robbers have received much attention from pollination and evolutionary biologists.

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