

**Extremely long mouthparts in flower-visiting insects: form,  
function and evolution**  
**Extrem lange Mundwerkzeuge blütenbesuchender Insekten:  
Form, Funktion und Evolution**

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Extremely long mouthparts that serve for the uptake of nectar in flower visiting insects provide ample opportunity to examine constraints in organ evolution. The majority of the flower visiting insects are regarded as short-tongued since their mouthparts are shorter than the head, while extremely long proboscides, i.e., exceeding body length, are rare. Advantages of long proboscides have been previously formulated and tested in nectar feeding from long spurred flowers. The study represents the first attempt to evaluate the costs and possible disadvantages of very long mouthparts by comparing insects which have an average-sized tubular proboscis with related species having extremely long mouthparts. The study includes Neotropical butterflies (Hesperiidae, Riodinidae), orchid bees (Euglossini), and South African tangle-veined flies (Nemestrinidae). We found that anatomical costs are optimized in those regions of the proboscis which are disproportionately elongated to the extent that they contain fewer muscles and sensillae compared to corresponding regions in average-sized proboscides of closely related species. Flower handling times and cibarial muscle mass increase in species of butterflies and nemestrinid flies that exhibit extremely long proboscides.

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**The importance of urban cemeteries for wild bees – a case study  
based in Vienna**  
**Die Rolle städtischer Friedhöfe als Habitat für Wildbienen  
am Beispiel der Stadt Wien**

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Cemeteries in big cities provide large extensive green areas, and therefore can play an important role for the local fauna and flora. For wild bees they offer a considerable variety of flowering plants and habitat structures like ruderal areas but also graves used as nesting habitats.

Therefore we addressed the following questions: How diverse is the wild bee fauna of cemeteries with special attention to rare and endangered species? What are the responsible factors for diversity and frequency of bee species?

In total, the wild bee fauna of four cemeteries located in the western peripheral area of Vienna was investigated from April until late August 2013. Alleys, ruderal areas, trees and bushes, well maintained and neglected graves were recorded separately.

Overall there were found 19 different genera with 99 different species of wild bees. Common species like *Bombus lapidarius* followed by *Lasioglossum marginatum* and *Lasioglossum pauxillum* dominated, but also rare species like *Anthidium septemspinatum* and *Andrena combaella* were found. Graves, well maintained as well as neglected ones, and ruderal areas were identified as most species rich areas. These findings can be directly associated with the richness of flowering plants in those areas, from which specially oligolectic bee species (18) benefited.

The results show that cemeteries in cities have high potential to provide habitats for wild bees. Awareness of the people, that cemeteries also can function as an area of nature conservation, is an important part to implement bee friendly management to cemeteries.

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## **ASSISibf: Honeybees and robots form a bio-hybrid society ASSISibf: Honigbienen und Roboter bilden eine biohybride Gesellschaft**

M. SZOPEK, S. HAHSHOLD, R. THENIUS, M. BODI, K. CRAILSHEIM & T. SCHMICKL

Most young honeybees will fail in locating themselves at their temperature preferendum of 36 °C in a thermal gradient if they run alone in an arena. In contrast to that, groups of such young bees aggregate at the optimum in such an environment. Thus we infer that groups of honeybees choose the optimum in a collective process by making collective decisions: To test that, we confronted them with a thermal field having one optimum spot (36 °C) and one sub-optimum spot (32 °C). It showed that groups of bees were capable to discriminate this sub-optimum from the optimum during gradient exploration. They collectively chose the optimum place without getting stuck in the sub-optimum. In

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