

# Biology Seminar



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UNIVERSITY · CANADA

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via ZOOM



## Tanvi Deora

Faculty Fellow  
Department of Life Sciences  
School of Natural Sciences  
Shiv Nadar Institute of Eminence  
Deemed to be University, India

## Tactile sensing and learning in insect feeding and plant pollination

How animals sense their environment and control their movements shape their interaction with others in their environment. My research aims to understand how insects' sensorimotor dynamics and body mechanics shape their interaction with plants during pollination. Over millions of years of coevolution, plants have evolved several species specific visual and olfactory cues to attract insects. Insects, in turn, use these cues to navigate and locate their host flowers. However, upon reaching the flower, they still have the challenging task of finding a tiny nectary hole on the surface of the flower to feed from it. On approaching flowers, insects such as moths and butterflies uncoil their straw-like mouthparts, the proboscis. Hovering over the flowers, they probe the floral surface with their proboscis and several sensory cues on the floral surface, such as texture and colored guides, help them find a tiny nectary hole in the middle of the flower. This behavior, which often takes less than a second, requires sensory feedback to help find and guide the tip of its long proboscis into the nectary, often while the flowers are gently swaying in the wind. Despite the importance of pollination, surprisingly little is understood about the physical interaction of insects and flowers.

In my talk, I will discuss the role of tactile exploration in feeding and pollination interactions. My work aims to understand how insects extract floral features such as texture and curvature. We use 3D printed artificial flowers with different curvatures and track how naïve hawkmoths, *Manduca sexta* use their proboscis to explore flowers of different geometry. We find that they systematically explore floral surfaces, from edge to center to edge, in a manner reminiscent of rat whisking. These explorations vary with flower shapes and with experience. As moths learn to feed from flowers, they change their exploration patterns and approach a more direct strategy to reach the nectary. These results underscore the importance of active explorations in sensing and learning. Additionally, we also tested the role of vision and changing light levels on moth feeding and showed that higher light levels negatively impact feeding in *M. sexta*, a crepuscular insect. These results shed light on the dynamic process of multisensory integration and help understand the effect of human perturbations like light pollution on pollination.

