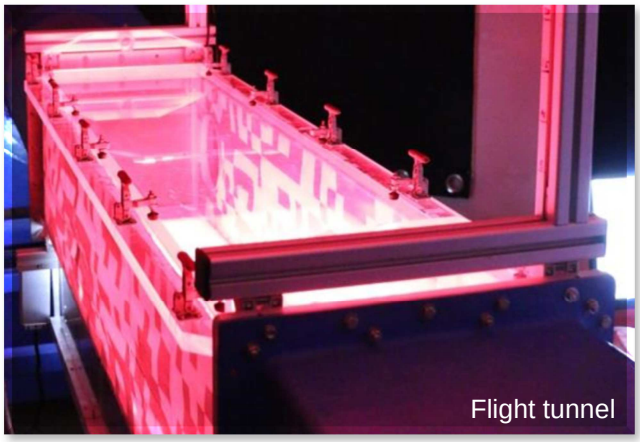
IS FLIGHT IMPROVED BY WINGS THAT ARE SENSITIVE TO TASTE?


Flight tunnel

Flight is an extremely elaborate behavioral pattern that allows insects to flee from predators, explore new ecological niches and discover food sources that are inaccessible to terrestrial animals. In fact, learning to fly has even allowed insects to increase their migration distance and thus their dispersion.

In most insects, the wing is formed of a double layer of an inert component that is rich in chitin. Upon reaching adulthood, the only remaining living cells are neurons and accessory cells present in mechanosensory bristles and chemosensory hairs of the anterior wing margin. While mechanosensory bristles are known to allow an insect to detect air currents, to date no role has been demonstrated for chemosensory sensilla in the process of flight.

Recent research led by a CSGA team in collaboration with a team from the University of Nice-Sophia-Antipolis showed that the chemosensory sensilla of the drosophila wing are capable of detecting sweet and bitter molecules (Raad et al., 2016, Cell Reports) and that they are implicated in chemo-orientated free flight (Houot et al., 2017 Scientific Reports). The experiment consisted of analyzing the flight path of drosophila through a tunnel that contained odorants or tastants at one end. The results showed that transgenic drosophila that only have mechanosensory bristles (in other words insects with purely "mechanosensitive" wings) showed reduced performance compared to control flies. Finally, other researchers have shown that non-nervous tissue (for example fat bodies) can, just like nervous tissue, be involved in the free flight performances of drosophila.

The next avenues of research will be to study the molecular and cellular mechanisms in wing chemoreceptors, which allow the insect to analyze the quality of the food sources that it encounters during flight.

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To know more

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Houot, B., Gigot, V., Robichon, A. Ferveur, JF (2017). Free-flight odor tracking in Drosophila : effect of wing chemosensors, sex, and pheromonal gene regulation. *Scientific Reports* **7:** 40221

Key words

Flight; wing ; insect ; Drosophila ; chemosensory sensilla; flight tunnel