

Supporting Information

Combes and Dudley 10.1073/pnas.0902186106

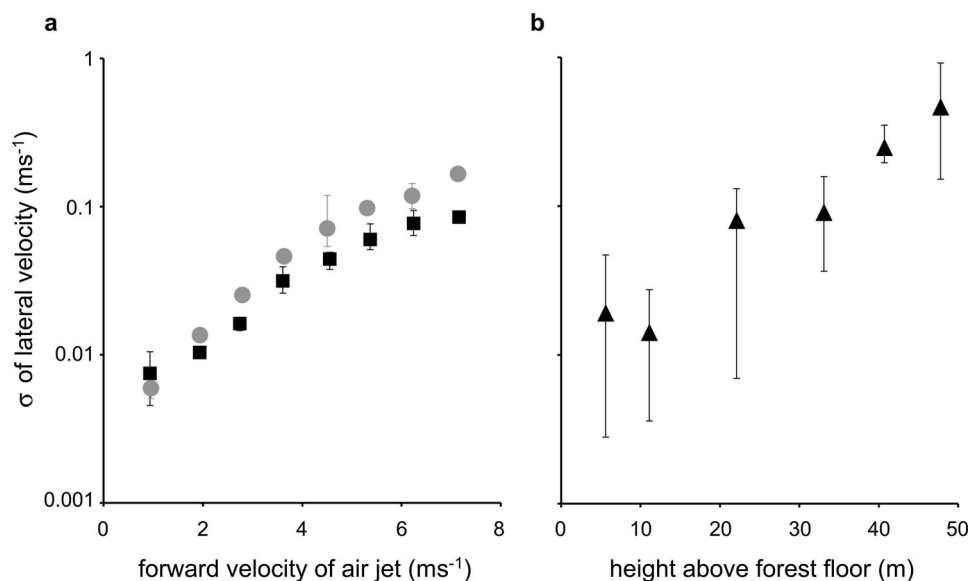


Fig. S1. Flow variability in front of the outdoor air jet and in the natural environment. Average standard deviation (σ) of lateral flow velocity (over multiple trials) is indicated by symbols; error bars show minima and maxima of trials. (a) Flow variability in front of the outdoor air jet as a function of velocity and grid type. Data were calculated from multiple 10-min recordings performed at each forward velocity. The standard deviation of lateral flow velocity at mean airspeeds $\geq 3.6 \text{ ms}^{-1}$ was significantly higher with the honeycomb (gray circles) than with the square grid (black squares) in place (see text for statistics). (b) Flow variability in the natural environment as a function of height above the forest floor. The highest measurements (47.8 m) were taken just above the canopy. Data were calculated from multiple 15-min recordings at each height.

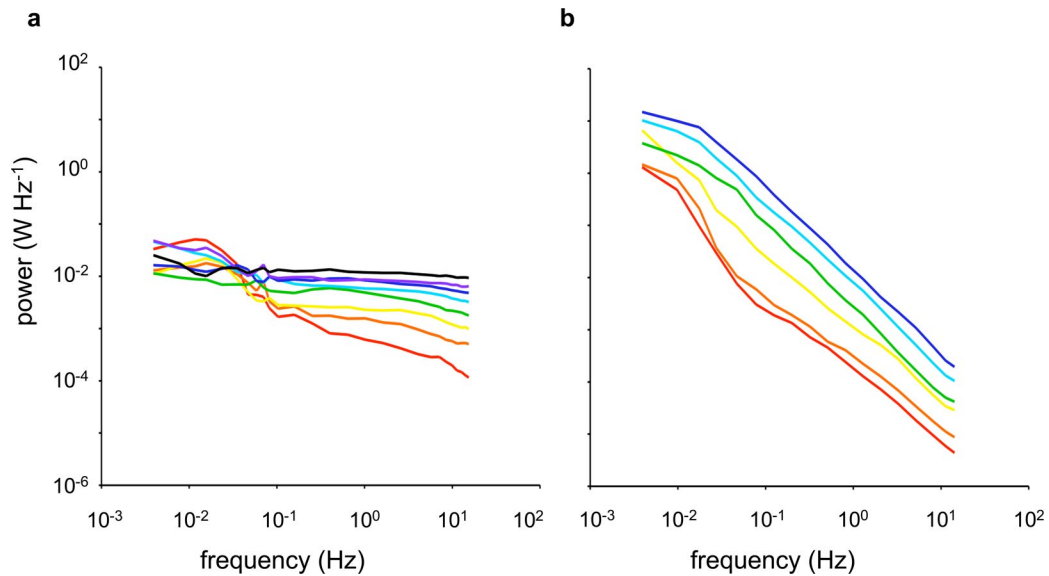
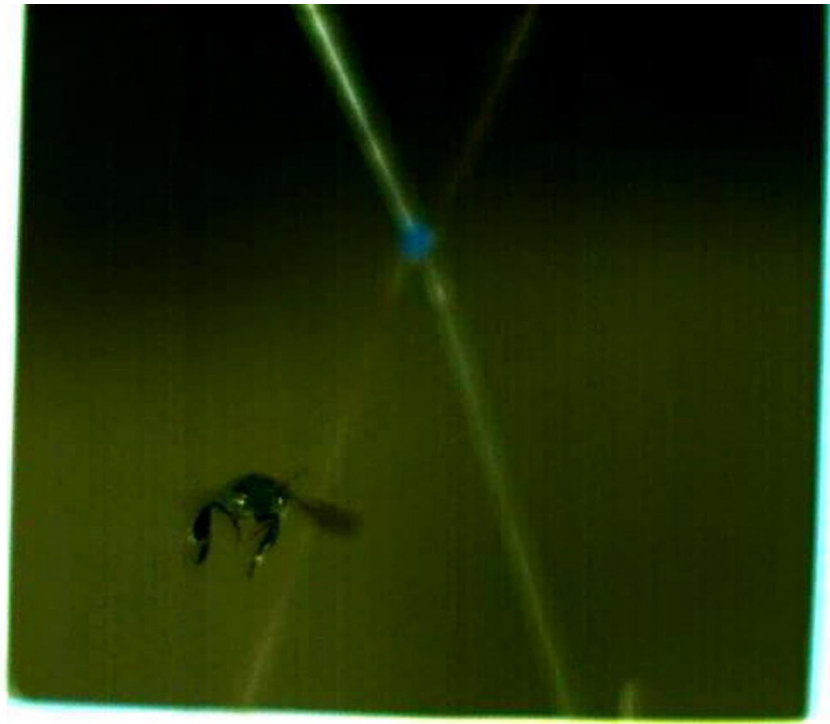
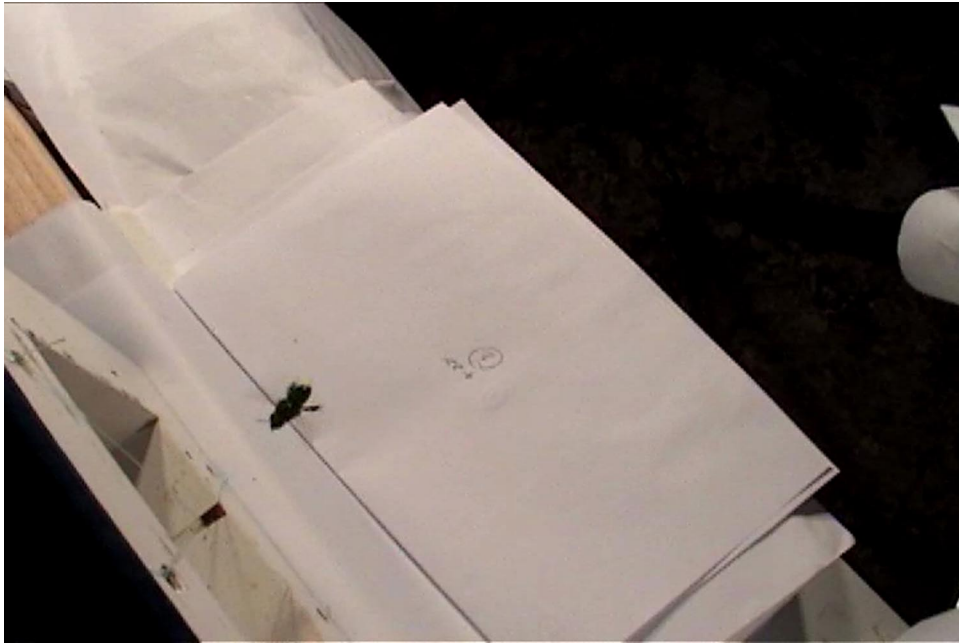


Fig. S2. Power spectral density analysis of lateral air velocity in front of the outdoor air jet and in the natural environment. Spectra were calculated from the same samples as in Fig. S1. (a) Power spectral density of flow in front of the air jet as a function of forward air velocity. Data for the honeycomb grid are shown; results from the square grid were similar, and normalized power spectra (for frequencies ≥ 1 Hz) were not significantly different between the 2 grids (see text for statistics). Power spectra for forward velocities of 1.0, 1.9, 2.8, 3.6, 4.5, 5.3, 6.2, and 7.1 ms^{-1} are shown by red, orange, yellow, green, aqua, blue, purple, and black lines, respectively. (b) Power spectral density of flow in the natural environment as a function of height above the forest floor. Power spectra for heights of 5.6, 11.1, 22.1, 33.1, 40.7, and 47.8 m are shown by red, orange, yellow, green, aqua, and blue lines, respectively.



Movie S1. Rear view of an orchid bee (*Euglossa imperialis*) rolling during fast forward flight in a turbulent air stream. Flight speed was 5.4 ms^{-1} ; movie was shot at $1,000 \text{ fs}^{-1}$ with a Fastec Troubleshooter camera (QuickTime; 1.8 MB).

[Movie S1 \(MOV\)](#)



Movie S2. Dorsal view of an orchid bee (*Euglossa imperialis*) flying in a turbulent air stream at its maximum flight speed, the speed at which flight instabilities eventually cause the bee to crash. Movie was shot at 30 fs^{-1} with a Sony DCR-SR300 digital video camera (QuickTime; 3.4 MB).

[Movie S2 \(MOV\)](#)



Movie S3. Lateral view of an orchid bee (*Euglossa imperialis*) with its hind legs tucked against its body during slow forward flight in a turbulent air stream. Flight speed was 1.5 ms^{-1} ; movie was shot at $1,000 \text{ fs}^{-1}$ with a Fastec Troubleshooter camera (QuickTime; 4.8 MB).

[Movie S3 \(MOV\)](#)



Movie S4. Lateral view of an orchid bee (*Euglossa imperialis*) with its hind legs extended during fast forward flight in a turbulent air stream. Flight speed was 5.6 ms^{-1} ; movie was shot at $1,000 \text{ fs}^{-1}$ with a Fastec Troubleshooter camera (QuickTime; 4.8 MB).

[Movie S4 \(MOV\)](#)