

Tiny UAVs and hummingbirds are put to test

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Green Violetear at a flower. Image: Wikipedia.

Hummingbirds in nature exhibit expert engineering skills, the only birds capable of sustained hovering. A team from the US, British Columbia, and the Netherlands have completed tests to learn more about the hummingbird's flight expertise and how their skills measure up to helicopter rotors. They compared the hummingbird's flight performance with a micro-drone called the Black Hornet, a 16-gram helicopter used by troops for surveillance.

Their study was published by the Royal Society in its journal, *Interface*. The study is "Hummingbird wing efficacy depends on aspect ratio and compares with helicopter rotors." The verdict: They found the Hornet's rotor to be about as efficient as the wing performance of the [hummingbird](#). The BBC carried a video where Professor David Lentink from Stanford University commented on the slowed-down video that enabled the study team to see the exact movements of the wing. He said

the key finding of their study was that the current micro-helicopter on the market performs equal to the average hummingbird. The similar aerodynamic performance is remarkable, he said, something the team did not expect. (The authors wrote, "A side-by-side aerodynamic performance comparison of hummingbird wings and an advanced micro helicopter rotor shows that they are remarkably similar.")

The authors' experiments involved lab tests and videos. To make the laboratory measurements, they used wings from hummingbird specimens kept in museums. They put the detached wings into a wing [spinner](#) to get exact measurements of how much flapping power was needed to lift the bird's weight. Colleagues at the University of British Columbia made recordings of hummingbirds in flight. In measuring the birds' wing movements, they found the wings beat up to 80 times per second.-"By combining the wings' motion with the drag [that we measured in the lab], we were able to calculate the aerodynamic power hummingbird muscles need to provide to sustain hover," said Prof. Lentink, in the BBC report. The birds' hovering performance on average was on par with the helicopter.

He said that "if we design the wings well, we can build drones that hover as efficiently, if not more efficiently, as hummingbirds," said Prof Lentink. As of now, he stated, "we are not even close to hummingbirds in many other design metrics, such as wind gust tolerance, visual flight control through clutter, to name a few." Nonetheless, he said, with a particular focus on aerodynamic efficiency, "we are closer than we perhaps ever imagined possible."

The hummingbird observations and comparison with the Black Hornet are one more instance of scientists' keen interest in what can happen when exploring how biology and engineering can intersect. Scientists are humbled by engineering skills of animals and seek to translate those skills using technology. "There is still a ton we can [learn](#) from nature,"

Lentink said in Canada.com

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