

Abstract Submitted
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The Effect of Wing Scales on Monarch Butterfly Flight Characteristics¹ ANGELA SHAW, Northridge High School, ROBERT JONES, AMY LANG, University of Alabama — Recent research has shown that the highly flexible wings of butterflies in flapping flight develop vortices along their leading and trailing edges. Butterfly scales (approximately 100 microns in length) have a shingled pattern and extend into the boundary layer. These scales, which make up approximately 3% of the body weight or less, could play a part in controlling separation and vortex formation in this unsteady, three-dimensional complex flow field. A better understanding of this mechanism may lead to bio-inspired applications for flapping wing micro-air vehicles. In this study, the flight performance of Monarch (*Danaus plexippus*) butterflies with and without scales was analyzed. Scales were removed from the upper and lower wing surfaces and specimens were videotaped at 600 frames per second. Variation in flapping patterns and flight fitness were observed.

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