Touchy Feely Flying

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Touchy feely flying reported in an article in ScienceNOW, 14 November 2005. Bats are well known for their ability to fly in the dark using echolocation, a type of aerial sonar, to find their way around obstacles and capture prey on the wing, but they also need to be able to detect airflow and turbulence in order to make the right wing movements for complex manoeuvring. John Zook, a biologist at Ohio University has studied a network of tiny bumps on the surface of bat wings and found they contain cells similar to a type of touch sensor called Merckel cells. He also found these had tiny hairs projecting from the surface. He then recorded electrical signals from the bumps and found they were sensitive to air flowing over the surface. He proposed that movement of the hairs enable the bat to detect changes in airflow patterns over the bats wings and help it fly more efficiently.

To test this theory he treated two bats with a cream that dissolves hair and then filmed them flying. The bats managed to fly normally in a straight line but had problems making turns to avoid obstacles. When the hairs re-grew the bats were able to make complex aerial movements again. Greg Miller, who wrote the ScienceNOW article commented that Georges Cuvier, an eighteenth century French scientist, proposed back in the 1780's that bats use their sense of touch to fly in the dark. It seems he was partly right.

Editorial Comment: This study is a good challenge to the usual evolutionary story of bats evolving from a non-flying mammal by growing long fingers with skin stretched over them because it shows there is more to flying that just having wings. In order to fly an animal must be able to sense where it is in three dimensional space, and be able to sense whether the air can hold it up at any one moment. Both of these functions require complex systems of sensors and the brain power to interpret the information and make the necessary movements of the wings. (Ref. aerodynamics, design, bats)