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Summary of a published scientific article

Look On Limb Evolution

This article was written by Kimberly L. Cooper and Clifford J. Tabin who work in the Department of Genetics at Harvard Medical School. It was copyrighted in 2008 and was published by Cold Spring Harbor Laboratory Press. In the article entitled “Understanding of bat wing evolution takes flight,” Cooper and Tabin dig deep the the amazing evolutionary change starting from a quadrupedal ancestor and it's morphology from it's limb into a wing.

They start the article explaining how difficult it is to explain evolutionary changes that are not in the microevolutionary scale. The main reason for this difficulty is because it can only be applied to closely related groups that, when studied, can produce a viable progeny of their hypothesis. But never the less they have taken the task to map out the molecular drift that has taken over millions of years of the long bones on a bat. Using a study known as morphological analysis, they have found that the same genus of mice, when added a long bone elongation over the time the cartilage, does become thicker and stronger which can be the source of a bat forelimb. Based on a mouses orthologous sequence they found a certain conserved enhancer element that is most common in bats and when applied to the mouse a small increase in bone structure was the product. This enhancer for limb growth is called *Prx1*. When deleting *Prx1* to the controlled experiments to the mice, they found that the offspring had no significant difference in limb lengths. This shows that *Prx1* may be essential to bone growth on bats, but it is not an essential enhancer on mice. They would like to reverse the experiment and see how the bats bone development would be if they were able to remove *Prx1* and see the resulting phenotype, but unfortunately we do not have the technology for such a task.

In *The Origin of Species* by Charles Darwin, notes that one of his biggest challenges to his theory of natural selection was the sudden emergence of the species we have today in comparison to the fossilized ancestry, and agreed on the difficulty of the evolutionary scale of bats. They find it very hard to understand how such a drastic change could come about in small changes through long lengths of time. A renowned critic of Darwin, St. George Mivat, addresses this paradox. He asks what good is a small increase in the length of the forelimb bones, if in small doses it would not be sufficient for flight and therefore be another that would not be selected for advancement. When looking at the fossil records, they found bat ancestors, dating back 50 million years ago, with elongated digits and a robust anterior indicating that they had the ability of powered flight. The data in this shows that evolution had to have happened fairly quickly. Or maybe they have been looking at the wrong source all along. They have also uncovered data between a 14 million year gap of a fossilized common ancestor of a quadruped with a distinctive flying bone structure that may have been the link to type of bats we have today.

In closing it is still very unclear if modern bats evolved from their quadrupedal ancestors. By studying the bone structure it is evident that the length and of the limb bones is a process that would have taken over millions of years. Through advancement of technology and specific modifications to the enhancer *Prx1* maybe we can fill in the gaps of the unanswered questions between the fossil records and how a bats wing evolution came to really be.