

Whiskers marked milestone in evolution of mammals from reptiles

November 10 2011

Research from the University of Sheffield comparing rats and mice with their distance relatives the marsupial, suggests that moveable whiskers were an important milestone in the evolution of mammals from reptiles.

Using high-speed digital video recording and automatic tracking, the research team, which was led by Professor Tony Prescott from the University's Department of Psychology, have shed light on how rodents such as mice and rats move their [whiskers](#) back-and-forth at high speed and in varying ways to actively sense the environment around them in a behaviour known as whisking. Whisking allows mice or rats to accurately determine the position, shape and texture of objects, make rapid and accurate decisions about objects, and then use the information to build environmental maps.

When running in a straight line, rats and mice move their whiskers back-and-forth the same amount on both sides. However when turning, they bias their whisker movements in the direction of the turn, and when the whiskers on one side of the head contact an object, those on the opposite side sweep round to gather more information. These active sensing strategies boost the information gained by the whiskers helping the animals to better understand their world through touch.

In their latest research, the team have shown that whisking like that of rodents, using these active sensing strategies, is also seen in a small South American marsupial - the grey short-tailed [opossum](#). This animal has many similarities to an early mammal that would have lived more

than 125 million years ago; that is, around the same time that the evolutionary lines leading to modern rodents and [marsupials](#) diverged.

This evidence suggests that some of the first [mammals](#) may also have whiskered like a modern mouse or rat, and that the appearance of moveable whiskers was pivotal in the evolution of mammals from reptiles. The research is published in *Philosophical Transactions of the Royal Society B* on 12 November 2011 and will also be presented on the same day at the Society for Neuroscience conference.

The earliest mammals were nocturnal, and tree-living. In order to successfully move around and thrive in this challenging environment these animals needed to effectively integrate information from multiple senses -- sight, sound, smell, and touch. Facial whiskers provided mammals with a new tactile sense not available to reptiles that could help them to get around in the dark.

In addition to continuing to investigate the similarities and differences between rodents and marsupials, the team is also using these insights from biological whisker sensing to develop animal-like robots that can use artificial whiskers to navigate without vision. These robots could have applications in search-and-rescue, particularly in environments, such as disaster sites, where vision is compromised by smoke or dust.

Professor Tony Prescott said: "This latest research suggests that alongside becoming warm-blooded, giving birth to live young, and having an enlarged brain, the emergence of a new tactile sense based on moveable facial whiskers was an important step along the evolutionary path to modern mammals. Although humans no longer have moveable whiskers they were a critical feature of our early mammalian ancestors."

More information: The paper entitled 'Active vibrissal sensing in rodents and marsupials' will be available to read in full in *Philosophical*

Transactions of the Royal Society B on Saturday 12 November 2011.

Provided by University of Sheffield

Citation: Whiskers marked milestone in evolution of mammals from reptiles (2011, November 10) retrieved 26 April 2024 from <https://phys.org/news/2011-11-whiskers-milestone-evolution-mammals-reptiles.html>

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