

Fur: The Buzz on Fuzz

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A mouse visits the banding station. photo © Anna Marie Saenger

A flash of orange streaks across the meadow – a red fox, like a starburst in the snow.

Its fur shimmers in the early morning light as I stand shivering in my December layers, envious of the fox and its luxurious coat. I wish I were covered head to toe in my own thick and gloriously warm pelt.

At its simplest, fur keeps mammals warm by trapping heat close to the skin. A careful look at winter pelts reveals that not all fur is the same. Long strands of bristle-like fur, known as guard hairs, comprise the outside surface of many species' coats. This fur often gives the animal its color and pattern. Under these guard hairs, thick, wavy underfur increases the coat's surface area and traps warm air against the body.

Fur also repels water. It's made of keratin, the same insoluble protein that forms our fingernails and our own mane of hair. This protein coats each strand of hair, preventing water from soaking the strand. Combined with the underfur's wavy structure, which permits strands to interlock and form

dense mats, fur helps to deflect water from the skin. Think of the guard hairs as the raincoat and the underfur as the long underwear layer.

The Many Benefits of Fur

For semi-aquatic mammals like beavers, fur can be virtually waterproof. These animals have glands near the base of their tails, which produce a special water-resistant oil. The oil is spread across their pelts through consistent and careful grooming, helping to seal their fur from moisture and keep their bodies dry and reasonably warm, even as they swim under the ice.

Most mammals shed their summer coats and grow new winter-worthy fur in the fall. Deer lose their reddish summer coats, which lack underfur, and grow gray-brown pelts with thick, woolly undercoats. Their winter guard hairs are hollow-shafted, which allows each of them to retain warmed air, and deer use special muscles to adjust the direction of these hairs and optimize their insulation.

Other mammals go for a completely new winter look. Snowshoe hares, and most weasels in the Northeast, turn white in the winter, increasing their ability to blend into a snowy landscape. Recent research suggests decreasing snowfall due to climate change will adversely impact these animals; instead of blending into their environment for protection from predators, their winter white will stick out on a brown landscape.

Fur plays other essential roles in most mammals' lives, including visual communication. Think, for instance, of a dog raising its hackles to appear larger when threatened. Whiskers, another type of hair, are specialized for sensory reception. Nerves at the base of each of these unique hairs alert mammals to vibrations and air currents, helping them judge distances, navigate burrows and other dark spaces, find prey and sense danger.

Does Fur Help Small Mammals Detect Predators?

Ian Baker, a wildlife enthusiast and physicist specializing in infrared sensors, noticed when he watched trail cam videos that certain predators, such as owls and cats, hunted in ways that seemed to conceal their body heat.

Cats, he observed, ambushed their prey with their bodies stacked up behind their cold nose, and barn owls twisted their torsos, obscuring the hottest parts of their body – their legs and wing pits. He wondered if predators conceal their body heat because their prey can sense it.

Baker collected guard hairs of mice and examined them under the microscope. He noticed these hairs had evenly spaced bands of pigment, similar to structures he was familiar with from his work with infrared sensors. The pigment bands matched measurements of tools – such as thermal cameras – designed to pick up the heat signature of life. The hair also shared many structural similarities to these heat-sensitive antennae, including such characteristics as stiffness and inability to rotate or spiral, with each hair ending in a long, tapered tip.

Baker looked at other small mammals, including rats, squirrels, shrews and rabbits, which all seemed to share the same guard hair structure. Does fur act as a warm winter coat for these small mammals and a predator detector tuned perfectly to the heat signature of those most likely to eat them?

There is still work to be done to prove if this discovery about fur is valid. But, as Baker notes in a 2021 New York Times interview, “Animals that operate at night have secrets.”

In the early morning light of winter, as I watch the red fox disappear into the woods, I feel the hair on my neck tingle. I lean into this feeling, wondering what that bit of electricity I’m feeling is really trying to tell me. 🐾



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