

## DOWN UNDER

In these times of chilly days and chiller nights, it is perhaps appropriate to remind ourselves that many Island residents have no home or shelter to protect them from the wintery blasts. But, due to down and underfur, these residents are doing quite nicely, thank-you.

Our own species, being one of the few unfurred mammals of the world, has been able to inhabit northern areas only because we have diligently copied the insulative techniques used by other mammals and birds. Indeed, the way we construct our winter clothing can be used to illustrate how the birds and mammals, the originators of effective body insulation, dress themselves for cold weather.

There are three basic layers to any insulating system, whether it is designed to retain warmth in a house, in a fox, in a duck, or in you. The outermost layer must be tough and able to resist the abrasive effect of the elements, and depending upon specific requirements, it must be water resistant or waterproof. In a house, this role is fulfilled by the shingles and wall boards; in a mammal, by a layer of long, stiff hairs called guard hairs; in a bird by the contour feathers which are firmly rooted in specific parts of the body called feather tracts; and in a person's coat, by the layer of cotton or nylon that forms the outer covering.

The next layer is the one that actually keeps the heat in. Houses have fiberglass insulation, mammals have fine soft fur called underfur, birds have down feathers, and our own coats may have any insulation the manufacturer cares to stuff them with.

The third layer is of course the inside layer, which prevents the insulation from falling inwards. Plaster walls play this role in houses, as do the

inner lining of coats, but in the case of birds and mammals, the inner lining is the skin itself, which is the living tissue that gives rise to both the middle layer (down or underfur) and the outer layer (contour feathers or guard hairs).

It is worthy of note that even those parts of our bodies that are furred are not very effectively insulated, because all human hair is guard hair of poor insulative quality. On the other hand, the natural insulative system of other warm-blooded animals is highly efficient; indeed, waterfowl down, on a per weight basis, is the most effective barrier to heat transfer known to man.

Birds and mammals that spend a large part of their time in the water have a critical requirement for effective covering, since it is essential that the water be kept away from both the insulative layer and the skin below. This is done by the secretion of oils, either from tiny glands associated with hair roots, or from the "preen gland" on a bird's rump. It is not for vanity that aquatic birds and mammals spend a great deal of time preening and grooming, but rather to ensure that the oils are spread uniformly and the coat is completely waterproofed.

In recent years both down jackets and fur coats have enjoyed exceptional consumer popularity. But even those who are clad in coats of other materials can take comfort in the fact that the principles of coat construction have stood the test of millions of years of evolution on the part of the birds and mammals that originated them.

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