

**Date: Mon, Feb 8, 2010 at 6:07 PM**

**Subject: Scholes Cabin 5 (p): Moulting**

Dear Stirling,

As a reminder that the brief Antarctic summer is drawing to a close, the penguins and the seals are moulting. Yesterday, while on the ice shelf, we wandered off (stomped off, actually - it is hard to move lightly in snow-boots and several layers of protective clothing) to visit a colony of Adelie penguins. We got quite close - the rule is no nearer than 5 m. They did not look their usual dapper selves, with great tufts of downy feathers being shed. Neither were they as inquisitive and alert as usual. While moulting they do not go out to feed, and lose a lot of body weight. They just stand around looking sleepy.

Survival in Antarctica, particularly in the dark, windy and bitterly cold winter months, absolutely requires top-quality insulation and waterproofing. In penguins the insulation is both under the skin, in the form of thick layers of fat built up during the summer months and burned off during the winter; and outside the skin, in the form of feathers. Not just any old feathers, but the finest, fluffiest down and the sleekest outer feathers. The skin itself is waterproof, but the crucial layer is the outer one, which must keep the wind and water from robbing the down of its air-trapping insulating qualities. To achieve this, the outer feathers must be undamaged and lightly coated in oil.

Take a look at a bird feather under the microscope. It is a wonderful piece of engineering. Not only is it light and strong (it uses a foam-core constructing technique, just like our house at Wakkerstroom), but it is self-repairing too. Every individual plume of the feather has a series of hooks on each side that connect to the hooks on the plume next door like a zipper, forming a flexible, continuous surface. Try it out - find a feather, split a section and then zip it up again by smoothing it gently with your finger. That is what the birds are doing when they preen. They are also adding a coating of oil that keeps the feathery armour shiny and water-repellent.

The under-feathers (down) are just as well-adapted to their job. Humans have not yet developed insulation as light and warm, which is why mountaineers and Antarctic explorers still wear down-filled jackets. The down consists of fine, crush-resistant hollow fibres that trap air among them. All that standing around after a swim is the penguins drying out and fluffing up the down.

But no matter how carefully they look after their plumage, after a year of wearing the same coat every day it starts to get tatty, and must be replaced before winter. That involves growing a whole new set, which pushes out the old one in great clumps. The change in metabolism needed to achieve this is quite extreme - rather like a snake shedding its skin - so the penguins become lethargic and vulnerable for the several

weeks it takes. When it is over I imagine they pop out to sea in their new suits to stuff themselves with fish and krill one last time.

We are in an easterly gale, with blowing snow.

Love,

Dad