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[Society for Experimental Biology](#)

Hard as nails!

Most people know that their nails always go soft and bendy when they immerse them in hot water for any length of time. Conversely when you cut your nails they dry up and become hard and brittle. But why is this? Biologists working with material scientists at the University of Manchester have worked out the best conditions for our nails which may ultimately help the cosmetic industry to mimic the real thing and refine their false nail and varnish products.

Dr Roland Ennos and his colleagues have found that our nails are at their best at a humidity of around 60%, which is the natural humidity of the fingernail bed in which the nail sits at the ends of our fingers. The bed supplies water at this humidity to the underside of the nail giving it maximum toughness and stopping the nail from breaking lengthways towards the quick of the fingernail (which would be a very painful and dangerous experience). Postgraduate researcher, Laura Farran, will present these findings at the Society for Experimental Biology's Annual Main Meeting in Glasgow on Sunday 1st April 2007.

Weighing tests show that the relative humidity of the nail is around 55-60%, kept up by being held next to the damp nail bed. At this relative humidity, cutting tests (with nail clippers) show that the nail is safest from breaking into the nail bed because the energy needed to cut into the nail is much larger than to cut across the nail. Using scanning electron microscopy the scientists have found that the nail is made up of three distinct layers with the middle layer protecting the delicate bottom layer from breaking towards the quick. At higher and lower humidities (such as that experienced in hot baths or on cold dry days) these protective properties change and the nails lose their qualities.

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