

# Genes that let creepy-crawlies survive a deep freeze

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Arctic springtails (*Megaphorura arctica*) survive freezing temperatures by dehydrating themselves before the coldest weather sets in. Researchers writing in the open access journal *BMC Genomics* have identified a suite of genes involved in controlling this extreme survival mechanism.

Melody Clark led a team of researchers from the [British Antarctic Survey](#) and the University of Novi-Sad, Serbia, who studied the arthropods. She said, "This is the first in-depth molecular study on the underlying cold survival mechanisms in this species. Such information is not only of interest to ecologists, but also to the medical field of cryobiology".

Arctic springtails desiccate themselves in order to survive the worst of polar ice, snow and low temperatures, which can easily reach  $-14^{\circ}\text{C}$ . They shrivel up into small husks until, when conditions become more favorable, they rehydrate themselves and re-emerge. This is the first study to identify the genetic basis for this physiological process. To generate the cold-induced gene expression profile of springtails, Clark and her colleagues compared [gene expression](#) in groups of the animals exposed to different environmental conditions. They showed that genes involved in a number of significant cellular processes, namely the production and mobilisation of a natural anti-freeze called trehalose, protection of cellular systems via small heat shock proteins and tissue/cellular remodeling, were activated during the cold-induced dehydration process. Genes that dominated when the animals were

allowed to recover at a higher temperature, were those involved in energy production, leading to [protein production](#) and cell division.

Speaking about possible implications of this research, Clark said, "This is part of a larger European project called Sleeping Beauty, which is looking at how different animals survive desiccation. Understanding how animals survive harsh cold environments will hopefully provide novel solutions for medical research and preserving tissues for transplant operations".

More information: Surviving the cold: molecular analyses of insect cryoprotective dehydration in the Arctic springtail *Megaphorura arctica* (Tullberg). Melody S Clark, Michael A.S Thorne, Jelena Purac, Gavin Burns, Guy Hillyard, Zeljko D Popovic, Gordana Grubor-Lajsic and M Roger Worland, [BMC Genomics](#) (in press)

Source: BioMed Central ([news](#) : [web](#))

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