

A Survey of TRP Channels for Function in *C. elegans* Temperature-regulated Behaviors

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C. elegans has several behaviors regulated by temperature. In a spatial thermal gradient, *C. elegans* can migrate toward and then isothermally track near its cultivation temperature. *C. elegans* also responds to an acute heat stimulus with a reflexive withdrawal reaction. A similar nociceptive response is seen in many other organisms, including flies, mice and humans.

In *C. elegans*, thermotaxis and the heat nociceptive response appear to use separate neural circuits and require different sets of genes for their execution. The molecules responsible for temperature sensing in *C. elegans* have not been identified. In mammals and *Drosophila*, temperature has been recently shown to activate specific members of the transient receptor potential (TRP) family of cation channels, with different channels exhibiting distinct thermal activation thresholds. The *C. elegans* genome contains 23 genes predicted to encode TRP channels. We are testing strains containing mutations in 19 of these channels for defects in thermotaxis and heat nociception and seeking deletions in two additional genes (*ocr-4* and *Y31C1AB.2/6*). (We are not currently investigating the two remaining predicted TRP channels, because available mutations result in lethality or sterility (*gtl-2*) or maternal-effect lethality (*cup- 5*.) We have also generated strains with extrachromosomal arrays containing genomic regions encoding 15 of the *C. elegans* TRP channels. We will test these strains for effects of TRP protein overexpression on thermotaxis and heat nociception. We hope that identification of *C. elegans* thermoreceptors will provide the basis for further molecular and cellular investigations of temperature-modulated behaviors.

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