Figure S1 GCY-4 and GCY-22 do not show chloride, bromide, or sodium activation upon ectopic expression in CHO cells. Membrane preparations from CHO cells were treated with 100 mM NaCl, NaBr, NaPO$_4$, or NH$_4$Ac. cGMP levels were measured as pmol cGMP per mg of total membrane proteins. Comparing with the control (NH$_4$Ac), treatments with NaCl, NaBr or NaPO$_4$ did not produce a statistically significant stimulation of GC activity under the current experimental conditions. We also tested 100 mM NaI and observed no stimulation of GC activity. Protein expression was confirmed by Western Blotting, but we cannot be certain that proteins were transported to the cell surface.
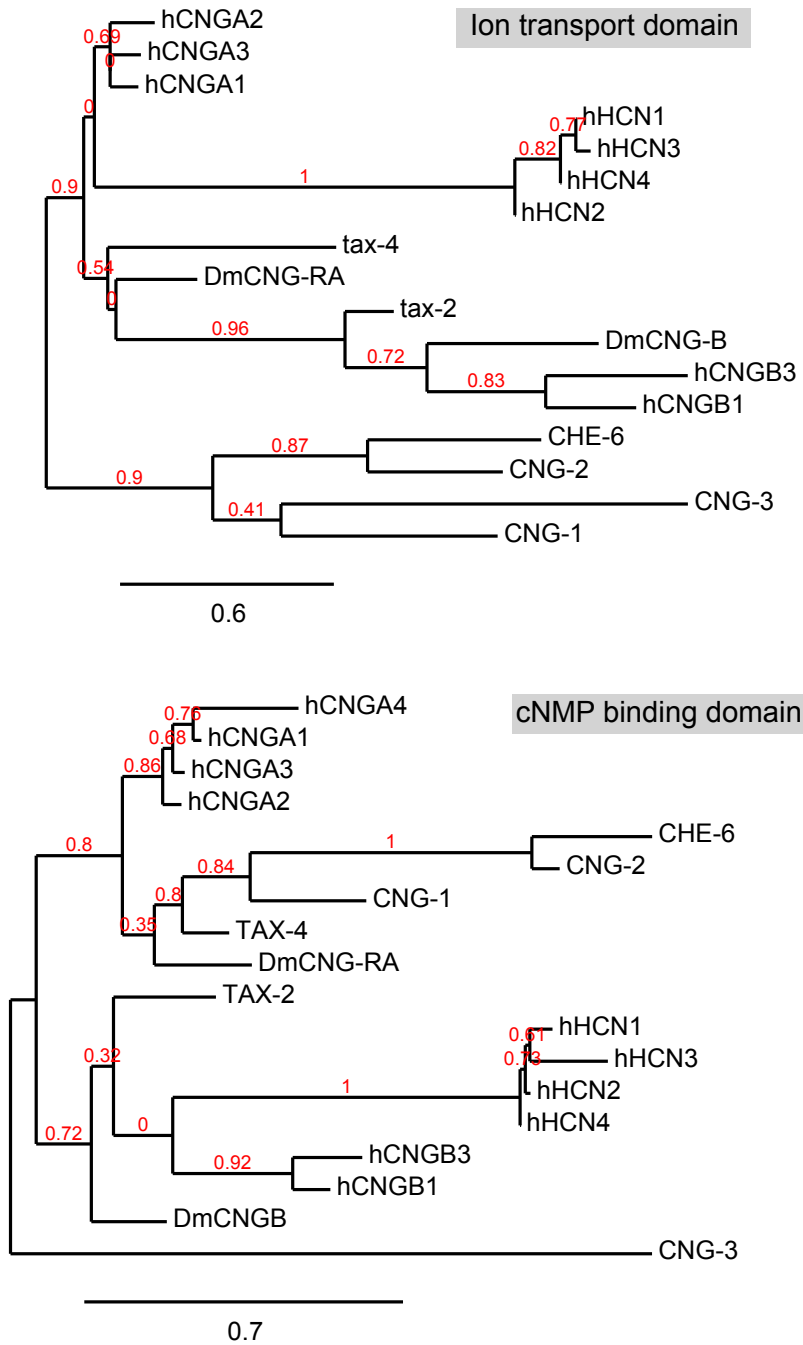
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Figure S2 Phylogeny of CNG channels. (A) Phylogram of cNMP domain. (B) Phylogram of PF00520 Ion transport domain. The domains were defined by SMART database search and the phylogenetic tree was built with default parameters at the www.phylogeny.fr suite (DEREEPER *et al.* 2008).
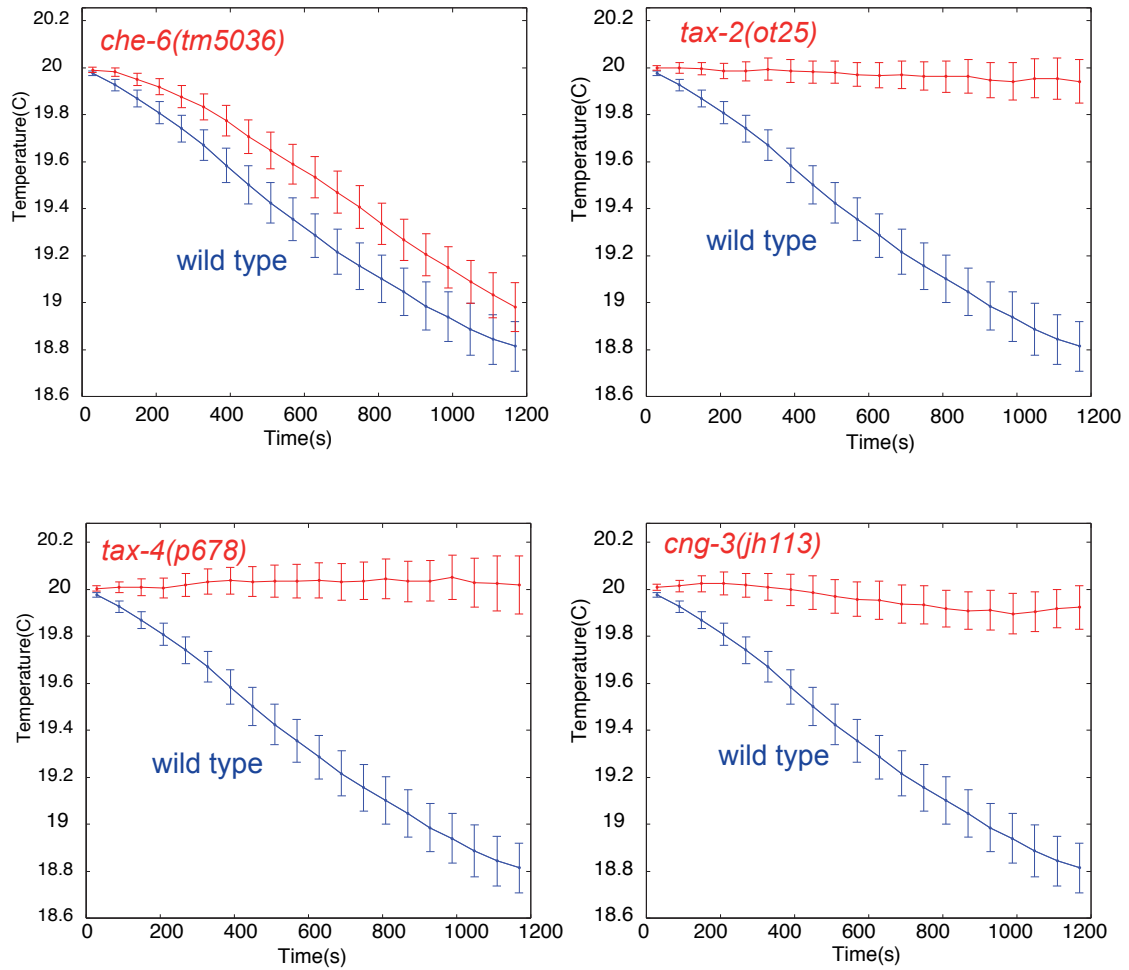
Figure S3 Alternative representation of thermotaxis data. Average horizontal positions for animals navigating the linear 0.2^{0}C/cm thermal gradients as described in Figure 9. Worms grown at 15˚C were started at 20˚C. Solid lines and error bars indicate the mean ±1 SEM of horizontal displacement from the start point over time measured over the trajectories of individual worms.

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File S1

List of transgenic lines

Chimeric GCY receptor experiments:

OH11250 *gcy-1(tm2669)II; otEx5076* [FL *gcy-1; elt-2::gfp*]

OH11251 *gcy-1(tm2669)II; otEx5077* [pHKS019; *elt-2::gfp*], line #1

OH11252 *gcy-1(tm2669)II; otEx5078* [pHKS019; *elt-2::gfp*], line #2

OH11253 *gcy-1(tm2669)II; otEx5079* [pHKS019; *elt-2::gfp*], line #3

OH11254 *gcy-1(tm2669)II; otEx5080* [pHKS020; *elt-2::gfp*], line #1

OH11255 *gcy-1(tm2669)II; otEx5081* [pHKS020; *elt-2::gfp*], line #2

OH11256 *gcy-1(tm2669)II; otEx5082* [pHKS020; *elt-2::gfp*], line #3

OH11257 *gcy-1(tm2669)II; otEx5083* [pHKS018; *elt-2::gfp*], line #1

OH11258 *gcy-1(tm2669)II; otEx5084* [pHKS018; *elt-2::gfp*], line #2

OH11259 *gcy-1(tm2669)II; otEx5085* [pHKS018; *elt-2::gfp*], line #3

OH11260 *gcy-1(tm2669)II; otEx5086* [pHKS017; *elt-2::gfp*], line #1

OH11261 *gcy-1(tm2669)II; otEx5087* [pHKS017; *elt-2::gfp*], line #2

OH11262 *gcy-1(tm2669)II; otEx5088* [pHKS017*; elt-2::gfp*], line #3

OH11286 *gcy-4(tm1653)II; otEx5101* [FL *gcy-4; elt-2::gfp*]

OH11287 *gcy-4(tm1653)II; otEx5102* [pHKS015; *elt-2::gfp*], line #1

OH11288 *gcy-4(tm1653)II; otEx5103* [pHKS015; *elt-2::gfp*], line #2

OH11289 *gcy-4(tm1653)II; otEx5104* [pHKS015; *elt-2::gfp*], line #3

OH11290 *gcy-4(tm1653)II; otEx5105* [pHKS016; *elt-2::gfp*], line #1

OH11291 *gcy-4(tm1653)II; otEx5106* [pHKS016; *elt-2::gfp*], line #2

OH11292 *gcy-4(tm1653)II; otEx5107* [pHKS016; *elt-2::gfp*], line #3

OH11293 *gcy-4(tm1653)II; otEx5086* [pHKS017; *elt-2::gfp*], line #1

OH11294 *gcy-4(tm1653)II; otEx5087* [pHKS017; *elt-2::gfp*], line #2

OH11295 *gcy-4(tm1653)II; otEx5088* [pHKS017; *elt-2::gfp*], line #3

OH11296 *gcy-4(tm1653)II; otEx5083* [pHKS018; *elt-2::gfp*], line #1

OH11297 *gcy-4(tm1653)II; otEx5084* [pHKS018; *elt-2::gfp*], line #2

OH11298 *gcy-4(tm1653)II; otEx5085* [pHKS018; *elt-2::gfp*], line #3

OH11324 *gcy-22(tm2364)V; otEx5210* [FL *gcy-22; elt-2::gfp*]

OH11325 *gcy-22(tm2364)V; otEx5080* [pHKS020; *elt-2::gfp*], line #1

OH11326 *gcy-22(tm2364)V; otEx5081* [pHKS020; *elt-2::gfp*], line #2

OH11327 *gcy-22(tm2364)V; otEx5082* [pHKS020; *elt-2::gfp*], line #3

OH11328 *gcy-22(tm2364)V; otEx5077* [pHKS019; *elt-2::gfp*], line #1

OH11329 *gcy-22(tm2364)V; otEx5078* [pHKS019; *elt-2::gfp*], line #2

OH11330 *gcy-22(tm2364)V; otEx5079* [pHKS019; *elt-2::gfp*], line #3

OH11331 *gcy-22(tm2364)V; otEx5105* [pHKS016; *elt-2::gfp*], line #1

OH11332 *gcy-22(tm2364)V; otEx5106* [pHKS016; *elt-2::gfp*], line #2

OH11333 *gcy-22(tm2364)V; otEx5107* [pHKS016; *elt-2::gfp*], line #3

OH11334 *gcy-22(tm2364)V; otEx5102* [pHKS015; *elt-2::gfp*], line #1

OH11335 *gcy-22(tm2364)V; otEx5103* [pHKS015; *elt-2::gfp*], line #2

OH11336 *gcy-22(tm2364)V; otEx5104* [pHKS015; *elt-2::gfp*], line #3

Pansensory heterologous expression:

OH11231 *gcy-4(tm1653)II; otEx5067* [pHKS013; *elt-2::DsRed*], line #1

OH11232 *gcy-4(tm1653)II; otEx5068* [pHKS013; *elt-2::DsRed*], line #2

OH11233 *gcy-4(tm1653)II; otEx5069* [pHKS013; *elt-2::DsRed*], line #3

OH11230 *gcy-4(tm1653)II; otIs398* [pHKS013; *elt-2::DsRed*]

OH11234 *gcy-22(tm2364)V; otEx5070* [pHKS014; *elt-2::gfp*],line #1

OH11235 *gcy-22(tm2364)V; otEx5071* [pHKS014; *elt-2::gfp*], line #2

OH11236 *gcy-22(tm2364)V; otEx5072* [pHKS014; *elt-2::gfp*], line#3

OH11237 *che-1(ot66)I; otIs398* (integrated *otEx5068*) [pHKS013; *elt-2::DsRed*]

OH11239 *che-1(ot66)I; otEx5071* [pHKS014; *elt-2::gfp*]

OH11242 *che-1(ot66)I; otIs398 otEx5071*

ASI heterologous expression:

OH11783 *che-1(ot66)I; otEx5349 [pHKS031; myo-2::gfp],* line #1

OH11785 *che-1(ot66)I; otEx5351 [pHKS031; myo-2::gfp],* line #2

OH11786 *che-1(ot66)I; otEx5352 [pHKS031; myo-2::gfp],* line #3

OH11787 *che-1(ot66)I; otEx5353 [pHKS032; myo-2::gfp],* line #1

OH11788 *che-1(ot66)I; otEx5354 [pHKS032; myo-2::gfp],* line #2

OH11789 *che-1(ot66)I; otEx5355 [pHKS032; myo-2::gfp],* line #3

OH11793 *che-1(ot66)I; otEx5359 [pHKS031,pHKS032; myo-2::gfp],* line #1

OH11794 *che-1(ot66)I; otEx5360 [pHKS031,pHKS032; myo-2::gfp],* line #2

OH11795 *che-1(ot66)I; otEx5361 [pHKS031,pHKS032; myo-2::gfp],* line #3

***che-7* mutant analysis**

OH11226 *che-7(e1128)V; otEx5063* [*che-7^{fosmid}; elt-2::gfp*]

***che-6* mutant analysis**

OH11227 *che-6(e1126)IV; otEx5064* [FL *che-6; elt-2::gfp*], line #1

OH1128 *che-6(e1126)IV; otEx5065* [FL *che-6 ; elt-2::gfp*], line #2

OH1129 *che-6(e1126)IV; otEx5066* [FL *che-6; elt-2::gfp*], line #3

OH11380 *che-6(e1126)IV; otEx5154* [pHKS021; *elt-2::gfp*], line #1

OH11381 *che-6(e1126)IV; otEx5155* [pHKS021; *elt-2::gfp*], line #2

OH11382 *che-6(e1126)IV; otEx5156* [pHKS021; *elt-2::gfp*], line #3