SUPPLEMENTAL FIGURES

Supplemental Figure 1: *mec-10(tm1552)* deletion structure and potential deleted translation product. *mec-10(tm1552)* deletes 448 bp and removes exon 5 and part of exon 6, which encode part of the conserved extracellular domain (the amino acids encoded by the deleted nucleotides are indicated by blue underline). Normal translation of the mutant sequence would induce a frameshift with three premature stop codons (the first one is TAA at the end of the sequence below) close to the deletion site (…tctattcatattttt-deletion-TTTATGCAGCAAAAAAAGCTAA) such that if the theoretical transcript were translated, most of the extracellular domain and the pore-forming 2nd transmembrane domain of MEC-10 would be missing. However, an alternatively spliced transcript that joins exon 3 in-frame to exon 7 (detected in RT/PCR experiments with multiple primer sets) would, if translated, encode a MEC-10 protein lacking 153 amino acids from the extracellular domain (indicated by purple underline). Since the deleted region includes highly conserved sequences known to be essential for MEC-4 function, *tm1552* is likely to be a loss-of-function allele. Primers designed to avoid the homologous sequences between *mec-4* and *mec-10* and identify the deletion were: 5'GTAGGGTCTGCAACTAGCTC-3' and 5'-TGGGAGGGAGCTTCATCTTA-3'. Green lines indicate the 1st and 2nd transmembrane domains.

Supplemental Figure 2: Effect of *mec-10(e1515)* on anterior touch response. a. Animals were touched with an eyelash at the indicated positions; escape responses (reversals) were scored as described. *mec-10(e1515)* animals were significantly less responsive than wild-type at all positions (***$p<.001$) according to the Student's t test

(n= 100 for each genotype over five different days). One way analysis of variance (ANOVA) demonstrated a statistically significant difference in the responses of *mec-10(e1515)* animals at different positions along the anteroposterior axis (p<.001).

b. **Averaged calcium response to gentle touch.** Each red trace represents the average percentage change in R/R_0, where R is the fluorescence emission ratio at a given time point and R_0 is its initial value. The number of individual recordings averaged for each trace were n=22 (all positions). Gray shading indicates SEM of the mean response. Scale bars are indicated in upper left. The green bar indicates the time of the stimulus. **c. Scatter plot of peak calcium responses.** Red lines indicate the mean response at each of the four stimulus points; error bars indicate SEM. Each other line indicates the response for a single animal. Half the animals were stimulated from anterior to posterior, and half from posterior to anterior. Wild-type, *mec-10(tm1552)* and *mec-4(u253)* data from Figure 2 are shown for comparison. One way analysis of variance (ANOVA) demonstrated a statistically significant difference in the calcium and behavioral responses of *mec-10(e1515)* animals at different positions along the anteroposterior axis (p<.001).

Supplemental Figure 3: Rescue of *mec-10(tm1552)* by *pmec-10::mec-10(+)*. a. Stimulus positions for imaging experiments. Animals were given a 1 second gentle (buzz) stimulus at the indicated position, as described in Experimental Procedures. **b. Averaged calcium responses of *mec-10(tm1552)* (red trace), and *mec-10(tm1552); Ex[pmec-10::mec-10; pmyo-2::GFP] (green traces) animals.** Each trace represents the average percentage change in R/R_0, where R is the fluorescence emission ratio at a given time point and R_0 is its initial value. The number of individual recordings averaged for

each trace were n=13 (*mec-10(tm1552)*) and n=20 (*pmec-10::mec-10* rescue). Gray

shading indicates SEM of the mean response. Scale bars are indicated in upper right The

green bar indicates the time of the stimulus. **c. Scatter plot of peak calcium responses**

for each genotype. Red lines indicate the mean response at each of the four stimulus

points; error bars indicate SEM. Each other line indicates the response for a single

animal. Statistical significance (*** $p < .0005$; ** $p < .005$) is according to the Mann-

Whitney rank sum test. Half the animals were stimulated from anterior to posterior, and

half from posterior to anterior.

Supplemental Figure 4: Effect of *mec-10(u20)* on posterior touch response. a, b.

Animals were touched with an eyelash at the indicated positions; escape responses

(forward accelerations) were scored as described. *mec-10(e1515)* animals were

significantly less responsive than wild-type at all positions (*** $p<.001$, ** $p<.01$)

according to the Student's t test (n= 100 for each genotype). One way analysis of

variance (ANOVA) demonstrated a statistically significant difference in the responses of

mec-10(u20) animals at different positions along the anteroposterior axis ($p<.001$). **c.**

Scatter plot of peak calcium responses. Red lines indicate the mean response at each of

the four stimulus points; error bars indicate SEM. Each other line indicates the response

for a single animal. Half the animals were stimulated from anterior to posterior, and half

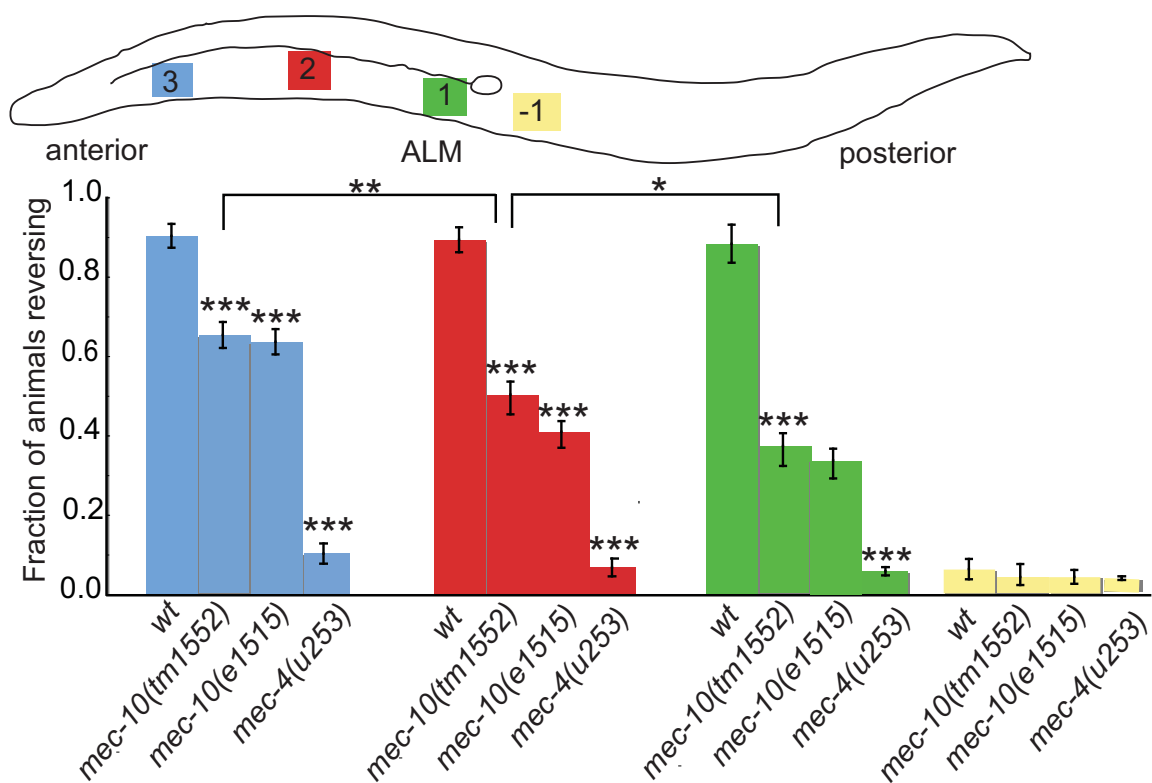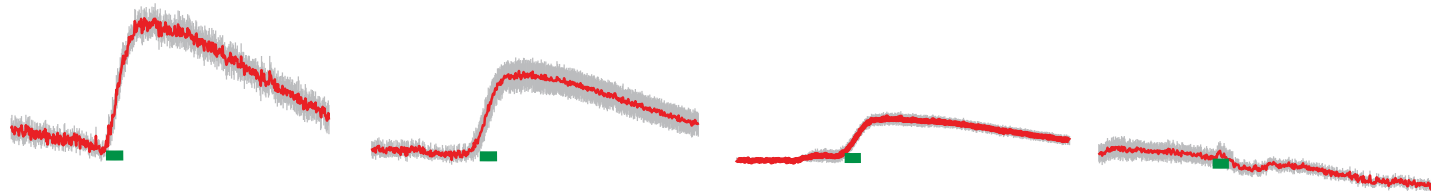from posterior to anterior. Wild-type data from Figure 6 are shown for comparison.

Supplemental Figure 5: Rescue of *mec-10(tm1552)* gentle touch defects by *mec-

10::gfp*. Animals were touched with an eyelash at the indicated positions. Escape

responses to anterior (reversals, A) or posterior (forward accelerations, B) were scored as described. *pmec-4::mec-10::gfp* animals were significantly more responsive than non-rescued *mec-10(tm1552)* animals at all positions (***p<.001, **p<.01) according to the Student's t test (n= 100 for each genotype).
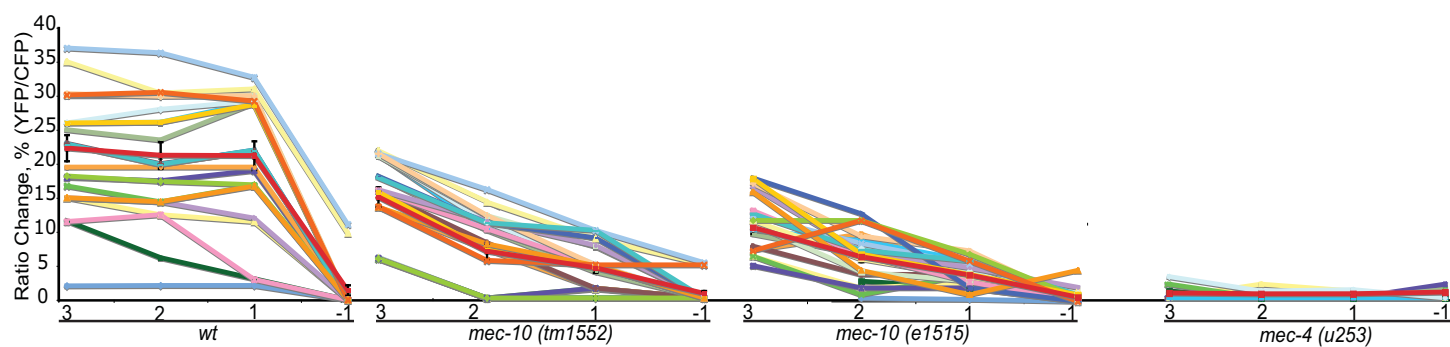
Supplemental Figure 6: Effects of *degt-1::RNAi* and *mec-10(tm1552)* on localization of MEC-10 protein fusions in body touch neurons. Shown are images of MEC-10::GFP fluorescence in the ALM neurons of *pmec-4::degt-1RNAi* (A) and *mec-10(tm1552)* (B) animals. MEC-10::GFP fluorescence only in the cell body in about 65% of observations; in the rest some staining can be observed in the posterior-projecting dendrite. The *pmec-4::degt-1RNAi* array (*ljEx240*) was described previously (Chatzigeorgiou et al., 2010).
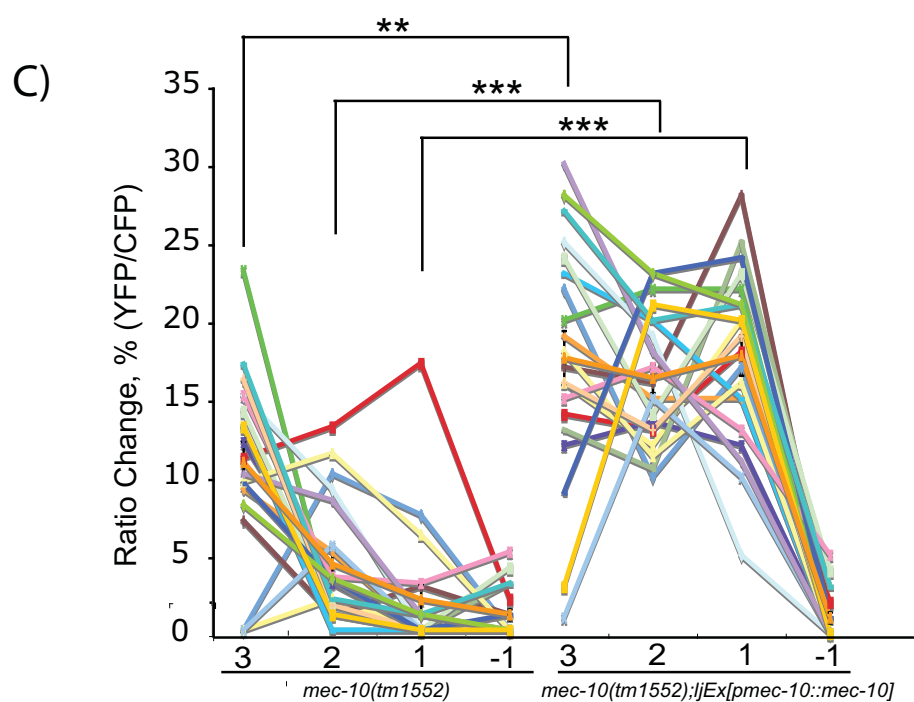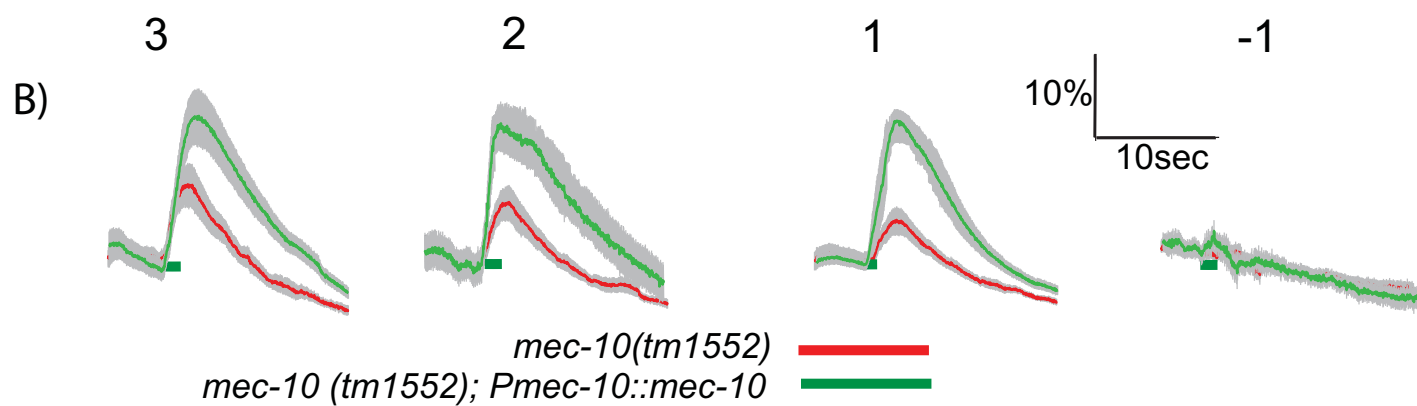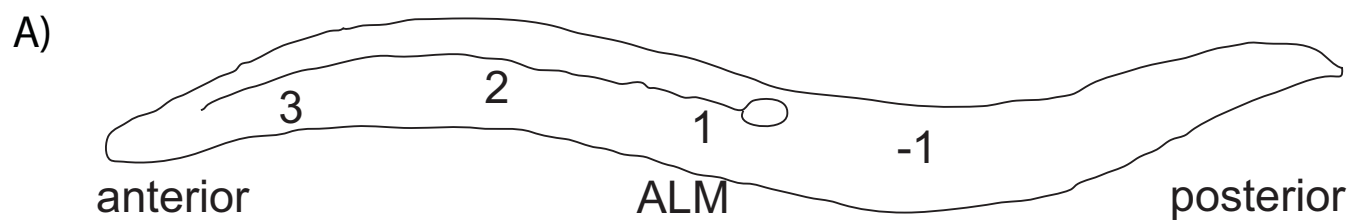
MEC-4	1	------MSWMQ-NLKNYQHLRDPSEY--MSQVYGDPLAYIQETTKFVTEREYYEDFGYGE
MEC-10	1	MNRNPRMSKFQPNPRSRSRFQDETLLRSLRSFKTDFSNYIASDTNFLNVAEIMTSYAYGE

MEC-4	52	CFNSTESEVQCLITG----EFDPKLIPYDKRIAWHFKEFCYKTSAHGIPMIGEAPNVYY
MEC-10	61	SNNAHEKETQCDLITENGGIEIDPTRLSYRERIRWHLQQFCYKTSSHGIPMLGQAPNSLY

MEC-4	108	RAWWVVLFLGCMIMLYLNAQSVLDKYNRNEKIVDIQLKFDTAPFPAITLCNLNPYKASIA
MEC-10	121	RAAWVFLLLICAIQFINQAVAVIQKYQKMDKITDIQLKFDTAPFPAITLCNLNPYKDSVI

MEC-4	168	TSVDLVKRTLSAFDGAMGKAGGNKDHEEREVVTEPPTTPAPTTKPARRRGKRLLSGAFE
MEC-10	181	RSHDSISKILGVEKSVMKKAGDSSSEALEEEETEYDMNGITIQAKRKKRGAGEKG--TE

MEC-4	228	EPGFARCLCGSQ-GSSEQEDKDEEKEEELLETTTKKVFNINDADEEWDGMEEYDNEHYEN
MEC-10	239	EPANSACECDEEDGSNECEERSTEK------------------------------------

MEC-4	287	YDVEATTGMNMMEECQSERTKFDEPIGFDDRCICAFDRSTHDAWPCFLNGTWETTFCDTC
MEC-10	264	--------------------------PSGDNDMCICAFDRQTNDAWPCHRKEQWTNTTCQTC

MEC-4	347	NEHAFCTKDNKTTKG----HRSPCICAP-SRFCVAYNGKTPPIEIWTYLQGG--TPTEDP
MEC-10	300	DEHYLCSKKAKKCTKRSELKKEPCICESKGLFCIKHEHAAMVPNLWEYFGDSEDFSEIST

MEC-4	400	NFLEAMGFQGMTDEVAIVTKAKENIMFAMATLSMQDRERLSTTKRELVHKCSFNGKACDI
MEC-10	360	EEREALGFGNMTDEVAIVTKAKENIIFAMSALSEEQRILMSQAKHNLIHKCSFNGKPCDI

MEC-4	460	EADFLTHIDPAFGSCFTFNHNRTVNLTSIRAGPMYGLRMLVYVNASDYMPTTEATGVRLT
MEC-10	420	LQDFELVADPTFGNCFVFNHDREIFKSSVRAGPCYGLRVMLFVNASDYLPTSEAVGIRLT

MEC-4	520	IHDKEDFPFPDTFGYSAPTGYVSSFGIRLRKMSRLPAPYGDCVPDGKTSDYIYSNYEYSV
MEC-10	480	IHDKDDFPFPDTFGYSAPTGYISSFGMRMKKMSRLPAPYGDCVEDGATSNYIYKGYAYST

MEC-4	580	EGCYRSCFQQLVIKECRCGDPRFPVPENARHCDAADPIARKCLEARMNDIGGLHGSFRCR
MEC-10	540	EGCYRTCFQELIIDRCGCSDPRFPSIGGVQPCQVFNKNHRECLEKHTHQIGEIHGSFKCR

MEC-4	640	CQQPCRQSIYSVIYSPAKWPSLSLQTQLGSCNGTAVECNKHYKENGAMVEVFYEQLNFEM
MEC-10	600	CQQPCNQTIYTTSYSFAIWPSQALNISLGQCEKEAFECNEFYKENAAMLEVFYEALNFEV

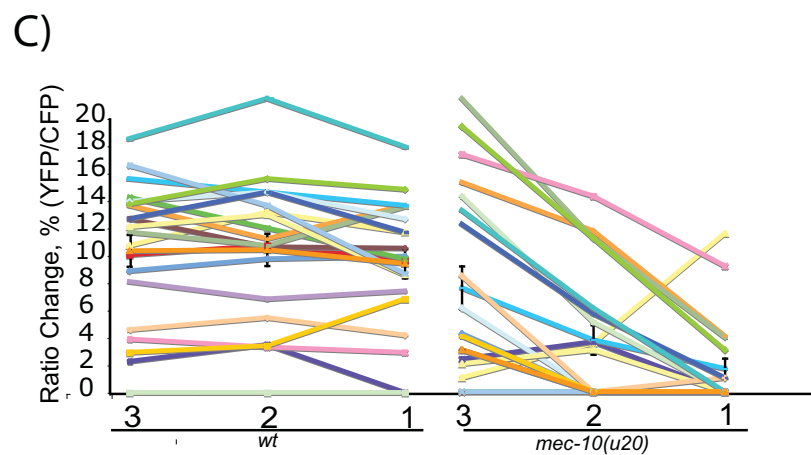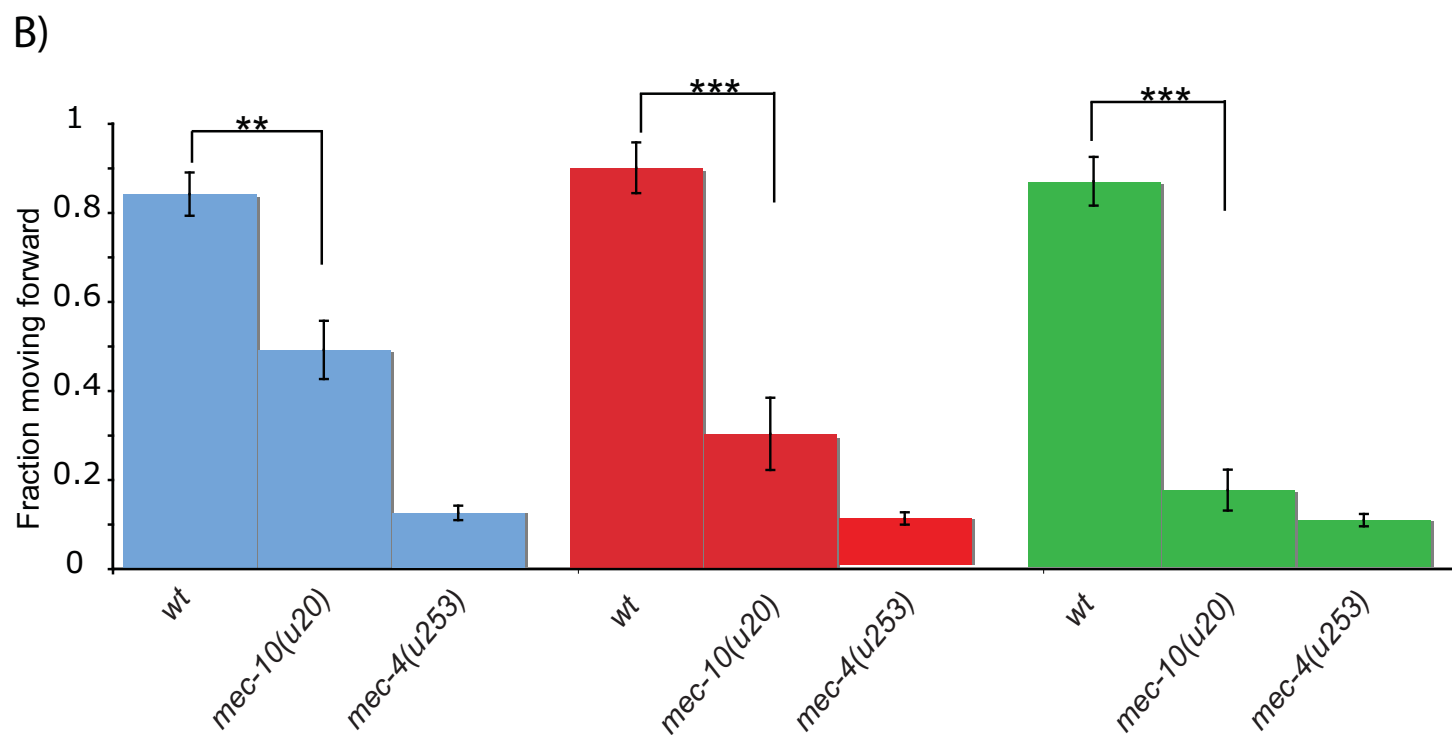|		
MEC-4	700	LTESEAYGFVNLIADFGGQLGLWCGISFLTCCEFVFLFLFTAYMSAFHNYSLYKKKAFK
MEC-10	660	LSESEAYGIVKMMADFGGHLGLWSGVSVMTCCEFVCLAFLIYMAIAHHINQQRIRRREN

MEC-4	760	AKKIASGSF
MEC-10	720	AANEY----

A)

B) *mec-10 (e1515)*

C)

A)

3 2 1 -1

anterior   ALM   posterior

B)

3   2   1   -1

10%

10sec

mec-10(tm1552) ———
mec-10 (tm1552); Pmec-10::mec-10 ———

C)

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Ratio Change, % (YFP/CFP)

35
30
25
20
15
10
5
0

3   2   1   -1   3   2   1   -1
mec-10(tm1552)   mec-10(tm1552);ljEx[pmec-10::mec-10]

A)

B)

C)

A

anterior   ALM   posterior

Fraction of animals reversing

mec-10(tm1552)
mec-10(tm1552); pmec-4:: mec-10::gfp

B

anterior   PLM   posterior

Fraction moving forward
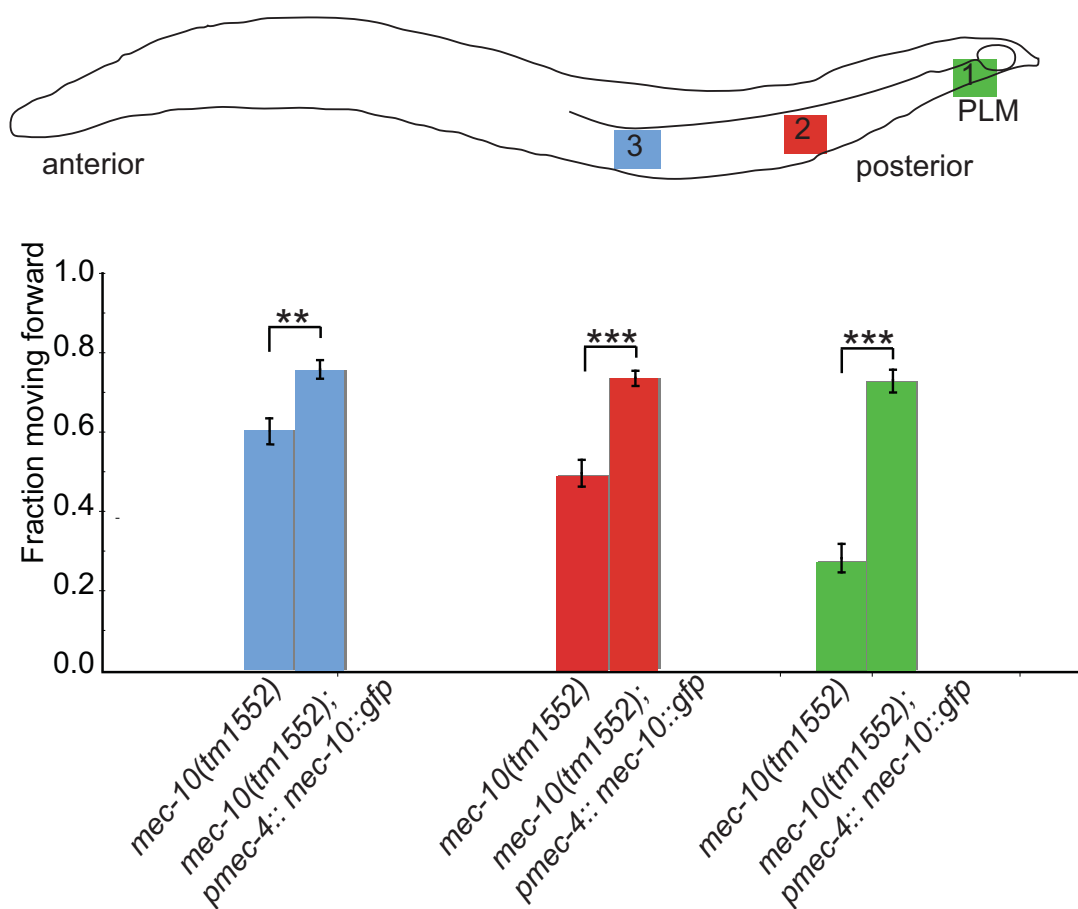
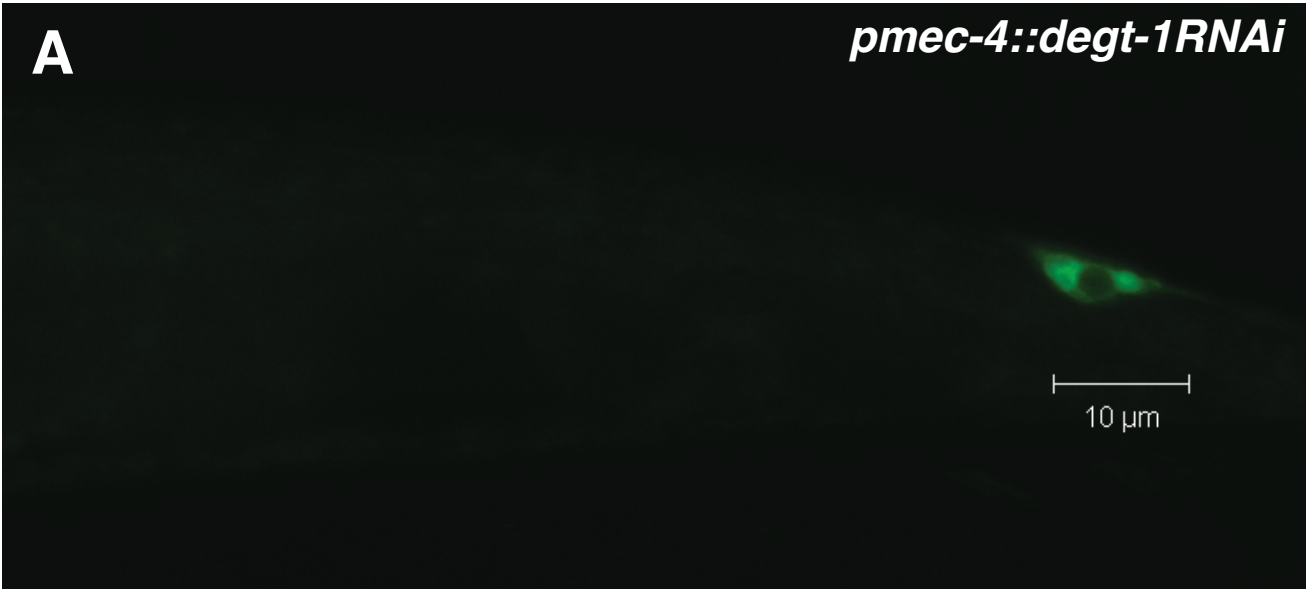mec-10(tm1552)
mec-10(tm1552); pmec-4:: mec-10::gfp

A *pmec-4::degt-1RNAi*

10 μm

B *mec-10(tm1552)*

10 μm