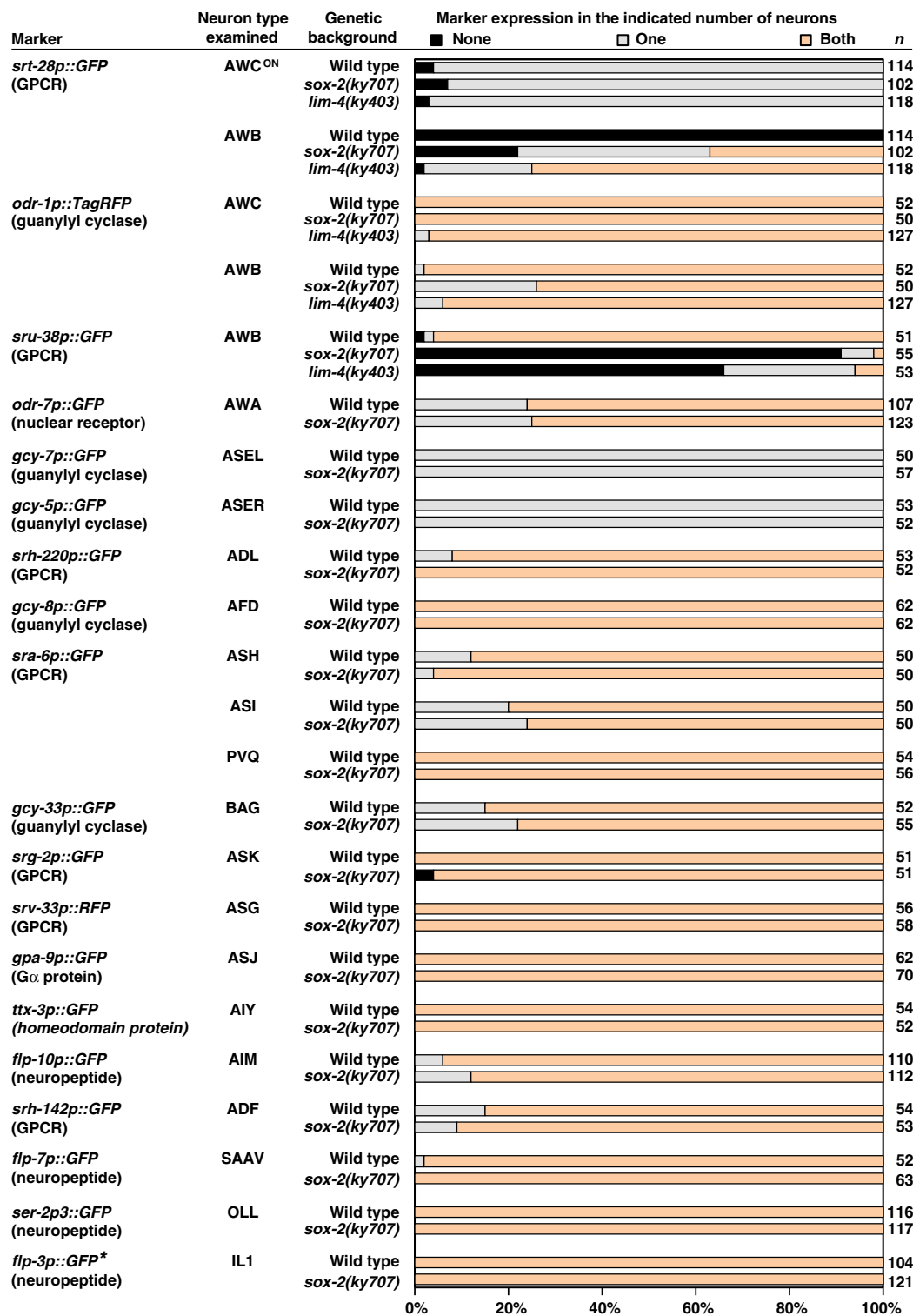


Expanded View Figures

Figure EV1. Expression of additional AWC and AWB markers as well as other neuronal markers in *sox-2(ky707)* mutants.Animals were scored as adults. n, total number of animals scored. **flp-3p::GFP* is expressed in 3 pairs of IL1 cells in both wild-type and *sox-2(ky707)* mutants.

sox-2(ky707)

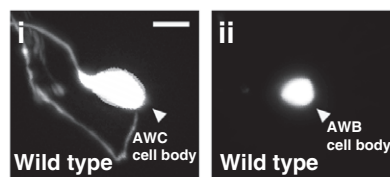
G -> E

*

SOX-2 <i>C. elegans</i>	DRVKRP MNA FMVWSR GQRK KMAL ENPK MHNS EI SKRL GT EWKML SEQEKR PFI DEAKRL RA I HMKEHPDYKYRPRRKTK
Sox2 human	DRVKRP MNA FMVWSR GQRR KMAQENPK MHNS EI SKRL GA EWKL LSET EKRPFI DEAKRL RA L HMKEHPDYKYRPRRKTK
Sox2 mouse	DRVKRP MNA FMVWSR GQRR KMAQENPK MHNS EI SKRL GA EWKL LSET EKRPFI DEAKRL RA L HMKEHPDYKYRPRRKTK
Sry mouse	GHV KRP MNA FMVWSR GERHKL AQQNPS MQNT EI SKQL GCRWKS LT EA EKRPFF QE AQRL KTLHREKY PNYKYQPHRRAK
Sox1 mouse	DRVKRP MNA FMVWSR GQRR KMAQENPK MHNS EI SKRL GA EWKVMSEA EKRPFI DEAKRL RA LHMKEHPDYKYRPRRKTK
Sox3 mouse	DRVKRP MNA FMVWSR GQRR KMAL ENPK MHNS EI SKRL GADWKL LT DA EKRPFI DEAKRL RA VHMKEYPDYKYRPRRKTK
Sox14 mouse	DHI KRP MNA FMVWSR GQRR KMAQENPK MHNS EI SKRL GA EWKL LSEA EKRPYI DEAKRL RA QHMKEHPDYKYRPRRKPK
Sox21 mouse	DHV KRP MNA FMVWSR AQRK KMAQENPK MHNS EI SKRL GA EWKL LT ES EKRPFI DEAKRL RA MHMKEHPDYKYRPRRKPK
Sox4 mouse	GHI KRP MNA FMVWSQ IERRKI MEQSPDMHNA EI SKRL GKRWKLLKDS DK I PFI QE AERL RL KHMADY PDYKYRPRKKVK
Sox11 mouse	GHI KRP MNA FMVWSQ IERRKI MEQSPDMHNA EI SKRL GKRWKMLKDS EK I PFI REAGRL RL KHMADY PDYKYRPRKKPK
Sox12 mouse	GHI KRP MNA FMVWSQ HEERRKI MDQWPD MHNA EI SKRL GRRWQL LQDS EK I PFVRE AERL RL KHMADY PDYKYRPRKKSK
Sox5 mouse	PHI KRP MNA FMVWAK DERRKI LQAF PDMHNS NI SKI L GSRWKA MT NL EK QP YEE QARL SK QHLEKY PDYKYK PRPKRT
Sox6 mouse	PHI KRP MNA FMVWAK DERRKI LQAF PDMHNS NI SKI L GSRWKS MSNQE K QP YEE QARL SKI HLEKY PNYKYK PRPKRT
Sox13 mouse	SHI KRP MNA FMVWAK DERRKI LQAF PDMHNS SI SKI L GSRWKS MT NQE K QP YEE QARL SRQHLEKY PDYKYK PRPKRT
Sox8 mouse	PHV KRP MNA FMVWAQAA RRKL ADQY PHLHNA EL SKTL GK L WRL LSES EK RPFVEE AERL RV QHKK DHPDYKYQPRRRKS
Sox9 mouse	PHV KRP MNA FMVWAQAA RRKL ADQY PHLHNA EL SKTL GK L WRL LNES EK RPFVEE AERL RV QHKK DHPDYKYQPRRRKS
Sox10 mouse	PHV KRP MNA FMVWAQAA RRKL ADQY PHLHNA EL SKTL GK L WRL LNES DK RPF I EE AERL RMQHKK DHPDYKYQPRRRKN
Sox7 mouse	SRI RRP MNA FMVWAK DERKRL AVQNPDLHNA EL SKML GK SWKAL T L SQK RPYV DE AERL RL QHMADY PNYKYRPRRKQ
Sox17 mouse	SRI RRP MNA FMVWAK DERKRL AQQNPDLHNA EL SKML GK SWKAL T LA EK RPFVEE AERL RV QHMADY PNYKYRPRRKQ
Sox18 mouse	LRI RRP MNA FMVWAK DERKRL AQQNPDLHNA VL SKML GK AWKELNTA EK RPFVEE AERL RV QHLRDHPNYKYRPRRKQ
Sox15 mouse	EKV KRP MNA FMVWSS VQRRQMAQQNPK MHNS EI SKRL GA QWKL LGDE EK RPFVEE AKRL RA RHLRDY PDYKYRPRRKSK
Sox30 mouse	GHV KRP MNA FMVWARI HRP AL AKANPA ANNA EI SVQL GL EWNK LSEE QK KP YDE AQKI KE KHREEF PGWYQPRPGKR

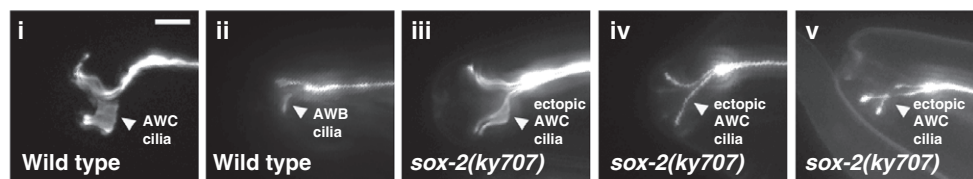
Figure EV2. Sequence alignment of the HMG domain of *Caenorhabditis elegans* SOX-2 with HMG domains of human and mouse Sox proteins. Identical amino acids among *C. elegans* SOX-2, human Sox2, and mouse Sox2 proteins are highlighted in yellow.

A Cell body



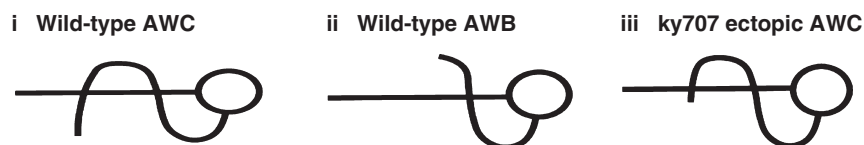
	Oval shape	Round shape	<i>n</i>
Wild-type AWC	100%	0%	57
Wild-type AWB	0%	100%	78
<i>sox-2(ky707)</i> ectopic AWC ^{ON}	0%	100%	58

B Cilia morphology



	i	ii	iii	iv	v	<i>n</i>
Wild-type AWC	100%	0%	0%	0%	0%	53
Wild-type AWB	0%	100%	0%	0%	0%	50
<i>sox-2(ky707)</i> ectopic AWC ^{ON}	0%	17%	14%	38%	31%	58

C Axon morphology



	S-shaped	U-shaped	Other	<i>n</i>
Wild-type AWC	100%	0%	0%	57
Wild-type AWB	0%	100%	0%	78
<i>sox-2(ky707)</i> ectopic AWC ^{ON}	0%	55%	45%	58

Figure EV3. Ectopic AWC^{ON} cells adopt native AWC-like axon morphology in *sox-2(ky707)* mutants.

A Wild-type animals have oval-shaped AWC cell bodies (Ai) and small, round AWB cell bodies (Aii). Ectopic AWC^{ON} cell bodies are small and round in *sox-2(ky707)* mutants, similar to native AWB neurons. Scale bar, 5 μ m.

B Wild-type AWC cilia have thick, butterfly-shaped morphology (Bi), while AWB cilia are thinner and resemble a tuning fork (Bii). Ectopic AWC^{ON} cilia in *sox-2(ky707)* mutants have either thickened cilia (Biii), prongs that are spread wide apart (Biv), or ciliary prongs that appear to cross over each other (Bv). Scale bar, 5 μ m.

C AWC axons are S-shaped (Ci), while AWB axons are U-shaped (Cii) in wild-type animals. Ectopic AWC^{ON} cells in *sox-2(ky707)* mutants display native AWC-like axons, which extend beyond the typical AWB U shape but do not continue to form the complete S-shaped morphology of wild-type AWC axons (Ciii). To ensure accuracy, axon and cilia morphology of ectopic AWC^{ON} was analyzed in the *nsy-5(ky634lf); sox-2(ky707)* mutants that lost native AWC^{ON} and had a single ectopic AWC^{ON} neuron.

Data information: Anterior is left and ventral is down.

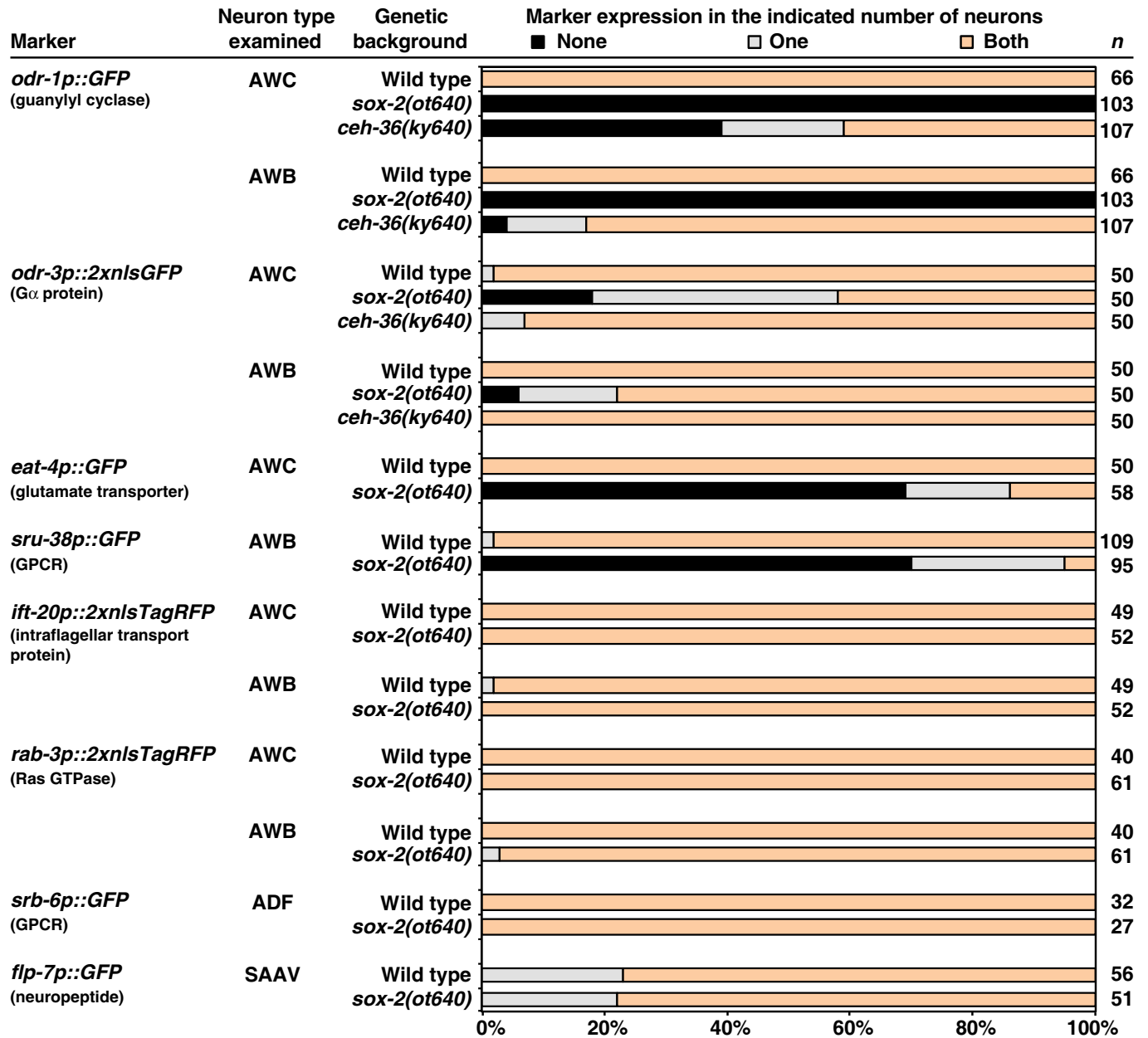


Figure EV4. Expression of AWC, AWB, pan-neuronal, ADF, and SAAV markers in *sox-2(ot640)* and *ceh-36(ky640lf)* mutants. Animals were scored in the first larval stage. n, total number of animals scored.

odr-1 promoter

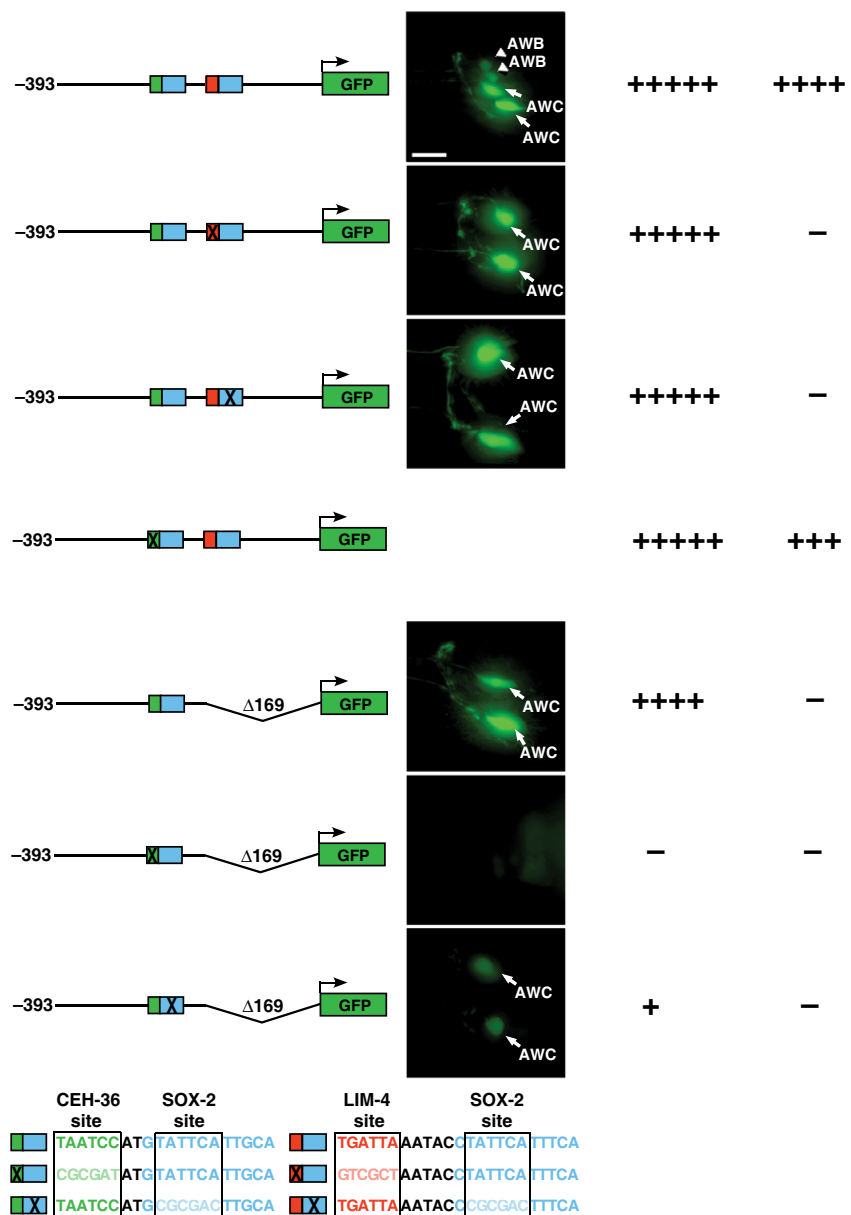


Figure EV5. *odr-1* promoter GFP reporter constructs and their expression levels in AWB and AWC cells.

Increased number of (+) indicates higher intensity of GFP expression; (-) indicates lack of expression. Consensus binding sites of CEH-36, SOX-2, and LIM-4 are boxed. Green, CEH-36 site; blue, SOX-2 site; red, LIM-4 site. Lighter shades of green, blue, and red as well as X represent mutated sites. Scale bar, 10 μm.