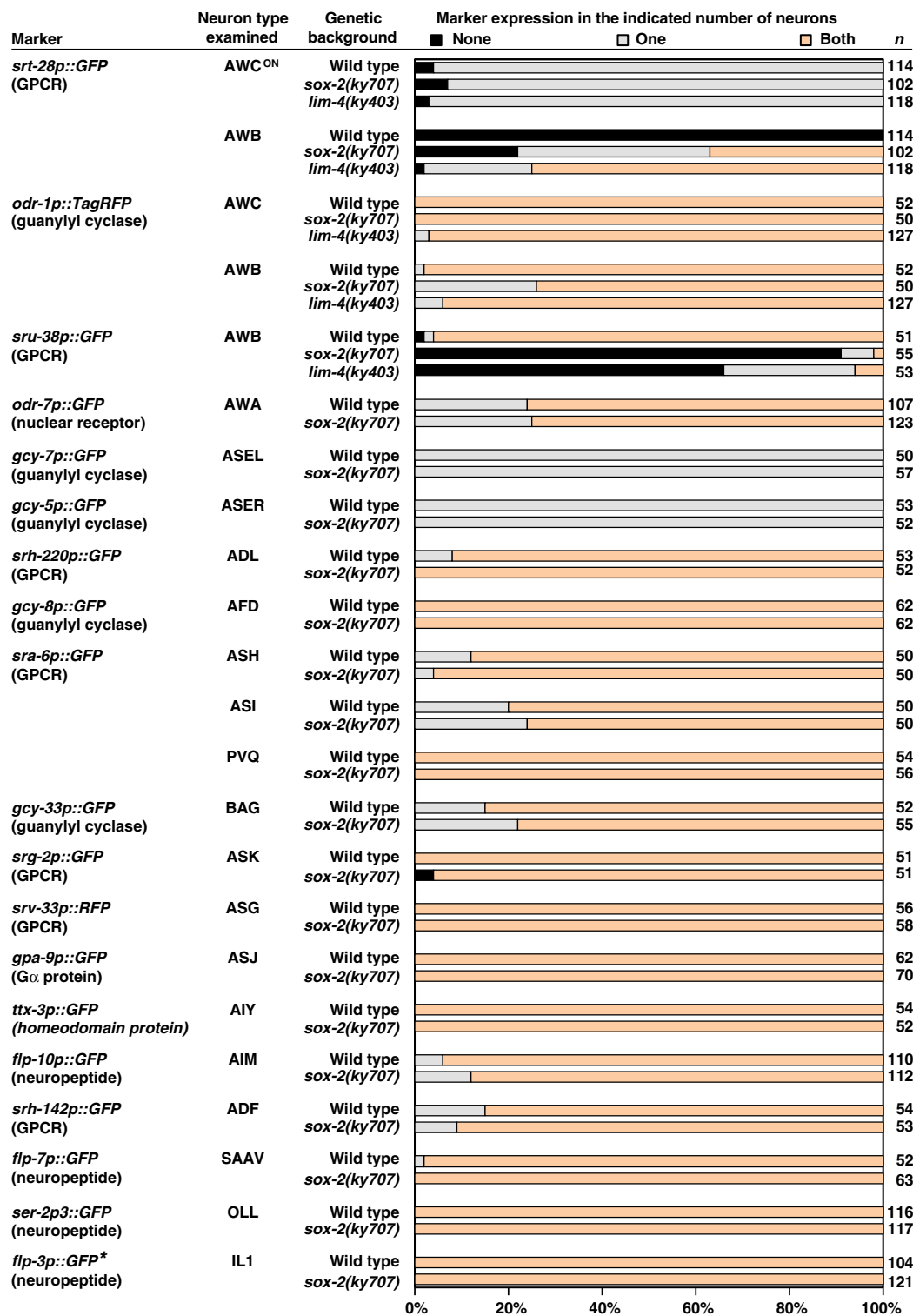


Expanded View Figures

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)

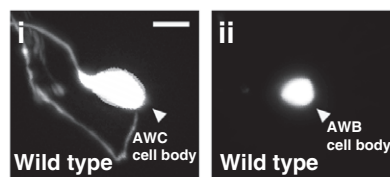
G -> E

*

SOX-2 <i>C. elegans</i>	DRVKRP MNA FMVWSR GQRK KMAL ENPK MHNS EI SKRL GT EWKML SEQEK RPF I DEAKRL RA I HMKEHPDYKYRPRRKTK
Sox2 human	DRVKRP MNA FMVWSR GQRK KMAQENPK MHNS EI SKRL GA EWKL LSET EK RPF I DEAKRL RA L HMKEHPDYKYRPRRKTK
Sox2 mouse	DRVKRP MNA FMVWSR GQRK KMAQENPK MHNS EI SKRL GA EWKL LSET EK RPF I DEAKRL RA L HMKEHPDYKYRPRRKTK
Sry mouse	GHVKRP MNA FMVWSR GERHKL AQQNPS MQNT EI SKQL GCRWKS LT EA EK RPF F QE AQRL KT L HRE KY PNYKYQPHRRAK
Sox1 mouse	DRVKRP MNA FMVWSR GQRK KMAQENPK MHNS EI SKRL GA EWKVM SEAEK RPF I DEAKRL RA L HMKEHPDYKYRPRRKTK
Sox3 mouse	DRVKRP MNA FMVWSR GQRK KMAL ENPK MHNS EI SKRL GADWKL LT DA EK RPF I DEAKRL RA VHMKEYPDYKYRPRRKTK
Sox14 mouse	DHI KRP MNA FMVWSR GQRK KMAQENPK MHNS EI SKRL GA EWKL LSEAEK RPF YI DEAKRL RA QHMKEHPDYKYRPRRKPK
Sox21 mouse	DHVKRP MNA FMVWSR AQRK KMAQENPK MHNS EI SKRL GA EWKL LTES EK RPF I DEAKRL RA MHMKEHPDYKYRPRRKPK
Sox4 mouse	GHI KRP MNA FMVWSQ IERRKI MEQSPDMHNA EI SKRL GKRWKML KDS DK I PFI QE AERL RL KHMADY PDYKYRPRKKVK
Sox11 mouse	GHI KRP MNA FMVWSQ IERRKI MEQSPDMHNA EI SKRL GKRWKML KDS EK I PFI REAGRL RL KHMADY PDYKYRPRKKPK
Sox12 mouse	GHI KRP MNA FMVWSQ IERRKI MDQWPD MHNA EI SKRL GRRWQL LQDS EK I P FVRE AERL RL KHMADY PDYKYRPRKKSK
Sox5 mouse	PHI KRP MNA FMVWAK DERRKI LQAF PDMHNS NI SKI L GSRWKA MT NL EK QP Y Y EE QARL SK QHLEKY PDYKYK PRPKRT
Sox6 mouse	PHI KRP MNA FMVWAK DERRKI LQAF PDMHNS NI SKI L GSRWKS MSNQE KQP Y Y EE QARL SKI HLEKY PNYKYK PRPKRT
Sox13 mouse	SHI KRP MNA FMVWAK DERRKI LQAF PDMHNS SI SKI L GSRWKS MT NQE KQP Y Y EE QARL SRQHLEKY PDYKYK PRPKRT
Sox8 mouse	PHVKRP MNA FMVWAQAA RRKL ADQY PHLHNA EL SKTL GK L WRL LSESEK RPF VEEAE RL RV QHKK DHPDYKYQPRRRKS
Sox9 mouse	PHVKRP MNA FMVWAQAA RRKL ADQY PHLHNA EL SKTL GK L WRL LNES EK RPF VEEAE RL RV QHKK DHPDYKYQPRRRKS
Sox10 mouse	PHVKRP 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 RPYVDE AERL RL QHMADY PNYKYRPRRKQ
Sox17 mouse	SRI RRP MNA FMVWAK DERKRL AQQNPDLHNA EL SKML GK SWKAL T LA EK RPF VEEAE RL RV QHMADHPNYKYRPRRKQ
Sox18 mouse	LRI RRP MNA FMVWAK DERKRL AQQNPDLHNA VL SKML GK AWKELNTA EK RPF VEEAE RL RV QHLRDHPNYKYRPRRKQ
Sox15 mouse	EKV KRP MNA FMVWSS VQRRQMAQQNPK MHNS EI SKRL GA QWKL LGDE EK RPF VEEAK RL RA RHLRDY PDYKYRPRRKSK
Sox30 mouse	GHVKRP MNA FMVWARI HRPAL AKANPA ANNA EI SVQL GL EWNK LSEEQK KPY YDEAQKI KEKHREEF PGWYQPRPGKR

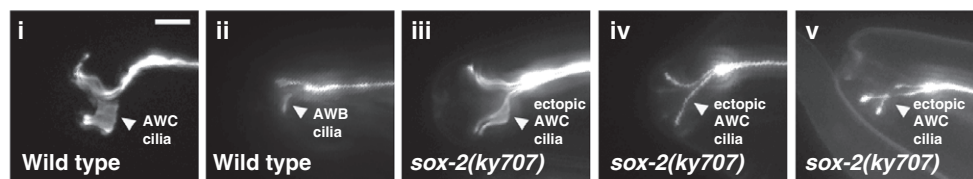
Figure EV2. Sequence alignment of the HMG domain of *Caenorhabditis elegans* SOX-2 with HMG domains of human and mouse Sox proteins. Identical amino acids among *C. elegans* SOX-2, human Sox2, and mouse Sox2 proteins are highlighted in yellow.

A Cell body



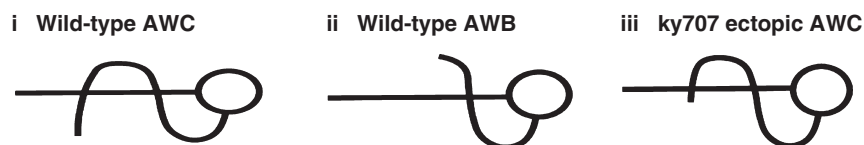
	Oval shape	Round shape	<i>n</i>
Wild-type AWC	100%	0%	57
Wild-type AWB	0%	100%	78
<i>sox-2(ky707)</i> ectopic AWC ^{ON}	0%	100%	58

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.

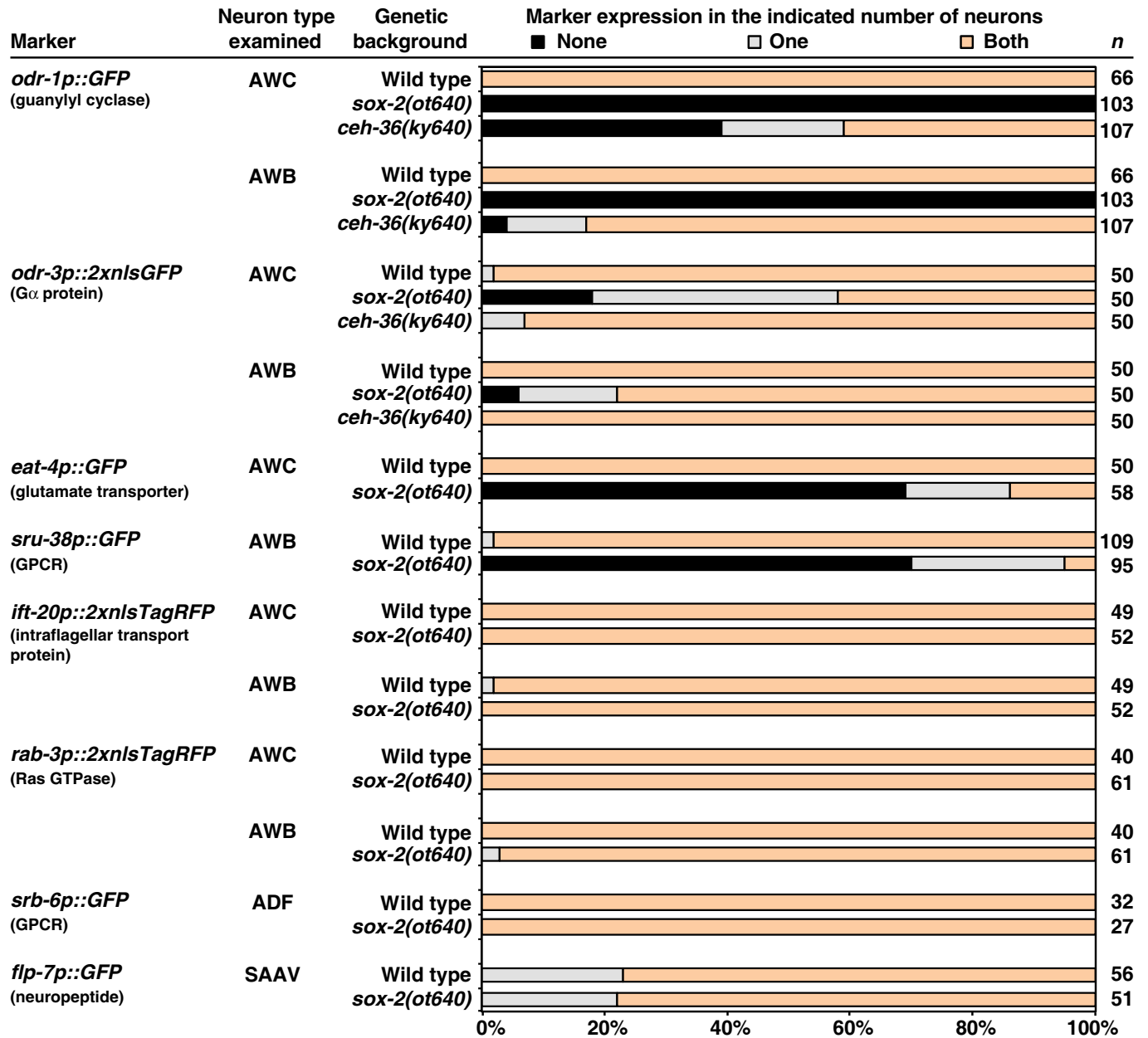
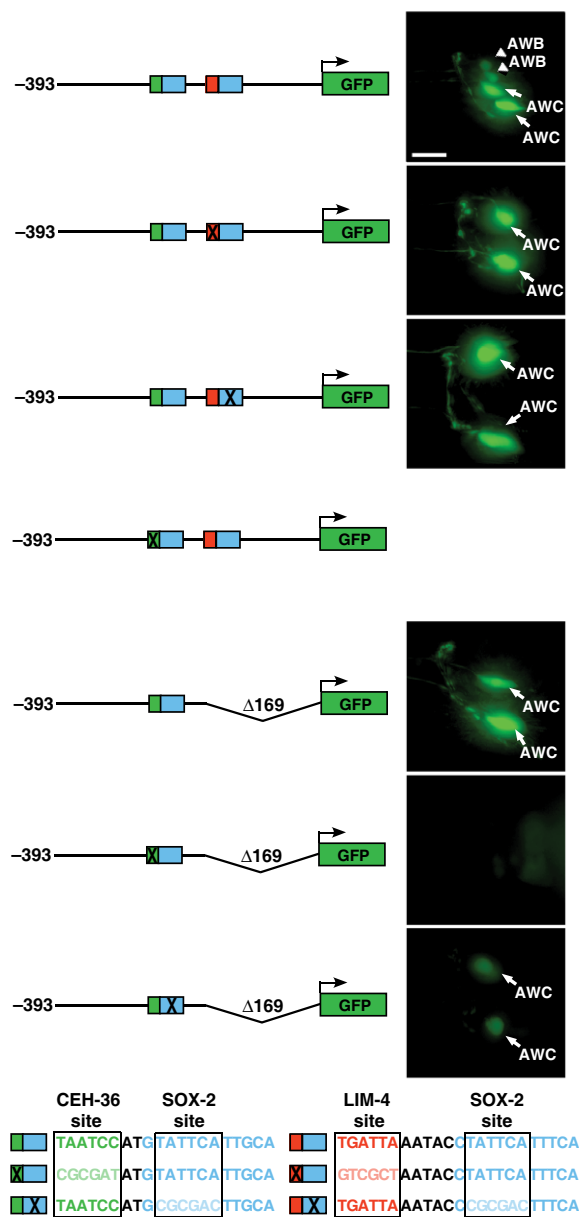


Figure EV4. Expression of AWC, AWB, pan-neuronal, ADF, and SAAV markers in *sox-2(ot640)* and *ceh-36(ky640lf)* mutants. Animals were scored in the first larval stage. n, total number of animals scored.

odr-1 promoter



Expression in
AWC AWB

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.