SUPPLEMENTARY FIGURE LEGENDS

Figure S1. Predicted isoforms of GRDN-1.

Conserved protein domains and premature termination codons in *grdn-1* alleles are shown. GCV indicates the predicted PDZ-binding motif.

Figure S2. Localization of the presynaptic protein SNB-1 is unaffected in AQR in *grdn-1* mutants.

Images showing localization of *gcy-32*p::SNB-1::tagRFP in adult AQR neurons of wild-type and *grdn-1* mutant animals. AQR was visualized with *gcy-37*p::GFP. Percent of animals showing the depicted SNB-1::tagRFP localization pattern in AQR is indicated. a – axon; d – dendrite; anterior is at left. Scale bar: 10 μm.

Figure S3. Localization and expression of SAX-7 and DYF-7 in AQR neurons.

(A) A subset of optical sections from a confocal *z*-stack showing localization of the endogenously tagged SAX-7::GFP in AQR of wild-type and *grdn-1* mutant larvae. AQR was labeled with *egl-17*p::myr-mCherry. White arrowheads mark dendrites and cell bodies; yellow arrowheads mark axons. In all image panels, anterior is at left; scale bars: 5 μm.

(B) Images of *dyf-7*p::sfGFP::DYF-7 expression in AQR in wild-type larvae. White arrows point to sfGFP::DYF-7 signal in AQR. AQR was labeled with *egl-17*p::myr-mCherry. Proportion of animals with the depicted sfGFP::DYF-7 localization pattern is indicated. Yellow arrows mark presumed sfGFP::DYF-7 expressed in cells other than AQR. sfGFP – superfolder GFP.

(C) Quantification of *gcy-36*p::GRDN-1::GFP localization in AQR in wild-type and *sax-7* animals. Numbers indicate number of AQR neurons examined per genotype. ns – not significantly different from wild-type (Fisher's exact test).

Figure S4. HMR-1 knockdown in AQR does not disrupt neuronal morphology. Quantification of HMR-1::GFP fluorescence intensity in AQR **(A)**, and AQR morphology **(B)** in the indicated experimental conditions. Each dot in **(A)** represents the value from a single AQR neuron; bars are mean ± SD. Numbers in bars in **(B)** indicate the number of AQR neurons examined per genotype. *** indicates different from wild-type at $P<0.001$ (Student t-test with Welch's correction).

Figure S5. UNC-116 does not play a major role in regulating PQR morphology and cilium position but regulates AQR dendritic microtubule polarity.

(A-B) Representative images **(A)** and quantification **(B)** of PQR morphologies in adult wild-type and *unc-116* mutant animals. Images are classified into different phenotypic categories for quantification in **(B)**. P-value in (**B**) derived from Fisher's exact test.

(C) Quantification of dendrite length in adult wild-type and *unc-116* mutant animals. *** indicates different from wild-type at $P<0.001$ (Student t-test with Welch's correction).

(D-E) Images **(D)** and quantification **(E)** of *gcy-32*p::ARL-13::tagRFP localization in PQR of wild-type and *unc-116* mutant animals. PQR was visualized with *gcy-37*p::GFP. ns – not significantly different from wild type (Fisher's exact test).

F) Kymographs of *gcy-36*p::EBP-2::GFP movement in adult AQR dendrites in wild-type and *unc-116* mutant animals. Horizontal scale bars: 5s.

(G) Quantification of microtubule polarity in adult AQR dendrites of wild-type and *unc-116* mutants. Each data point represents measurements from an individual AQR neuron. Only neurites with five or more events were used in the analysis. Errors are mean ± SD. ** indicates different from wild-type at P<0.01 (Student's t-test with Welch's correction). In all image panels, a – axon; d – dendrite; anterior is at left; scale bars: 10 μm. In all bar graphs, numbers indicate number of PQR neurons examined per genotype.

Table S1. Strains used in this work.

Strain	Genotype	Source
PY11316	*ials25[gcy-37*p*::gfp, unc-119(+)]; oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11318	*oyEx640[grdn-1*p*::grdn-1a::gfp, gcy-32*p*::mCherry]*	This work
PY11361	*oyEx641[gcy-32*p*::arl-13::tagRFP, gcy-36*p*::grdn-1a::gfp, unc-122*p*::dsRed]*	This work
PY11379	*oyEx642[gcy-32*p*::xbx-1::tagRFP, gcy-36*p*::grdn-1a::gfp, unc-122*p*::dsRed]*	This work
PY11327	*ials25[gcy-37*p*::gfp, unc-119(+)]; oyEx643[gcy-36*p*::dyf-19::tagRFP, unc-122*p*::mCherry]*	This work
PY11340	*casIs165[egl-17*p*::myr-mCherry, pRF4(+)]; oyEx644[gcy-36*p*::grdn-1a::gfp, srg-47*p*::gfp]*	This work
PY11326	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(ns303); oyEx643[gcy-36*p*::dyf-19::tagRFP, unc-122*p*::mCherry]*	This work
PY11350	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx643[gcy-36*p*::dyf-19::tagRFP, unc-122*p*::mCherry]*	This work
PY11342	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(ns303); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11317	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11330	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx646[grdn-1*p*::grdn-1a, unc-122*p*::dsRed]; oyEx647[gcy-32*p*::arl-13::tagRFP, unc-122*p*::gfp]*	This work
PY11359	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]; oyEx669[rab-3*p*::grdn-1DGCV, unc-122*p*::gfp]*	This work
ZG610	*iaIs25[gcy-37*p*::gfp, unc-119(+)]*	CGC
PY9445	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(ns303)*	This work
PY11341	*[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1)*	This work
PY11376	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx653[grdn-1*p*::grdn-1a, unc-122*p*::dsRed]*	This work
PY11378	*ials25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx646[grdn-1*p*::grdn-1a, unc-122*p*::dsRed]*	This work
PY11344	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx670[grdn-1*p*::grdn-1DGCV, unc-122*p*::mCherry]*	This work
PY11321 (derived from GOU812)	*casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]*	A gift of G. Ou (Tsinghua University, PRC)
PY11322	*casIs165[egl-17*p*::myr-mCherry*, pRF4(+)*]; grdn-1(hmn1)*	This work
PY11352	*casIs165[egl-17*p*::myr-mCherry*, pRF4(+)*]; grdn-1(hmn1); oyEx650[rab-3*p*::grdn-1::gfp, srg-47*p*::gfp]*	This work
PY11364	*casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; grdn-1(hmn1); oyEx652[rab-3*p*::grdn-1DGCV, unc-122*p*::gfp]*	This work
PY11377	*casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; grdn-1(hmn1);*	This work

	*oyEx651[rab-3*p*::grdn-1DGCV, unc-122*p*::gfp]*	
PY11337	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; oyEx648[gcy-32*p*::snb-1::tagRFP, unc-122*p*::gfp]*	This work
PY11338	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; grdn-1(hmn1); oyEx648[gcy-32*p*::snb-1::tagRFP, unc-122*p*::gfp]*	This work
PY11324	*cp21[hmr-1::gfp + LoxP]; casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]*	This work
PY11355	*casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; ddIs290[sax-7::TY1::egfp::3xflag(92C12) + unc-119(+)]*	This work
PY11380	*iaIs25[egl-17*p*::myr-mCherry,* pRF4(+)*]; hmnEx146[dyf-7*p*::sfgfp::dyf-7,* pRF4(+)]	This work
PY11349	*casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; dlg-1(cp301[dlg-1::mNG-C1^3xflag])*	This work
PY11346	*cp21[hmr-1::gfp + LoxP]; casIs165[egl-17*p*::myr-mCherry,* pRF4(+)]; *grdn-1(ns303)*	This work
PY11325	*cp21[hmr-1::gfp + LoxP]; casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; grdn-1(hmn1)*	This work
PY11371	*casIs165[egl-17*p*::myr-mCherry*, pRF4(+)*]; ddIs290 [sax-7::TY1::egfp::3xflag(92C12) + unc-119(+)]; grdn-1(hmn1)*	This work
PY11370	*casIs165[egl-17*p*::myr-mCherry*, pRF4(+)*]; sax-7(nj48); oyEx644[gcy-36*p*::grdn-1a::gfp, srg-47*p*::gfp]*	This work
PY11347	*hmr-1(hd37); iaIs25[gcy-37*p*::gfp, unc-119(+)]; oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11372	*hmr-1(oy157[hmr-1::AID+gfp]); oyIs89[gcy-36*p*::myr-tagRFP]; oyEx656[gcy-32*p*::TIR1, unc-122*p*::dsRed]*	This work
PY11368	*hmr-1(oy157[hmr-1::AID+gfp]); casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; oyEx655[gcy-32*p*::TIR1, unc-122*p*::dsRed]*	This work
PY11348	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; sax-7(ky146); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11360	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; sax-7(eq1); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11359	*iaIs25[gcy-37*p*::gfp, unc-119(+)]; sax-7(nj48); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11374	*hmr-1(hd37); iaIs25[gcy-37*p*::gfp, unc-119(+)]; sax-7(nj48); oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11335	*unc-116(e2310); casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; oyEx644[gcy-36*p*::grdn-1a::gfp, srg-47*p*::gfp]*	This work
PY11334	*cp21[hmr-1::gfp + LoxP]; unc-116(e2310); casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]*	This work
PY11345	*unc-116(e2310); iaIs25[gcy-37*p*::gfp, unc-119(+)]; oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
PY11351	*unc-116(ce815); casIs165[egl-17*p*::myr-mCherry;*pRF4(+)]	This work
PY11375	*unc-116(ce815); casIs165[egl-17*p*::myr-mCherry,* pRF4(+)*]; oyEx654[tag-168*p*::Cre, unc-122*p*::gfp]*	This work
STR66	*hrtSi4[gcy-36*p*::ebp-2::gfp]*	(Harterink et al., 2018)
NWM037	*unc-116(e2310); hrtSi4[gcy-36*p*::ebp-2::gfp]*	This work
NWM001	*lin-44(n1792); casIs165[egl-17*p*::myr-mCherry;*pRF4(+)*]; oyEx644[gcy-36*p*::grdn-1a::gfp, srg-47*p*::gfp]*	This work

NWM002	*lin-44(n1792); ials25[gcy-37*p*::gfp, unc-119(+)];* *oyEx645[gcy-32*p*::arl-13::tagRFP, unc-122*p*::mCherry]*	This work
NWM041	*lin-17(n671); casIs165[egl-17*p*::myr-mCherry;*pRF4(+)*];* *oyEx644[gcy-36*p*::grdn-1a::gfp, srg-47*p*::gfp]*	This work

Table S2. Plasmids used in this work.

Plasmid	Description	Source
PSAB1002	*grdn-1*p*::grdn-1a::gfp*	(Nechipurenko et al., 2016)
PSAB1215	*gcy-32*p*::arl-13::tagRFP*	This work
PSAB1217	*gcy-36*p*::grdn-1a::gfp*	This work
PSAB1218	*gcy-32*p*::xbx-1::tagRFP*	This work
PSAB1216	*gcy-36*p*::dyf-19::tagRFP*	This work
PSAB988	*grdn-1p::grdn-1a*	(Nechipurenko et al., 2016)
PSAB1219	*rab-3*p*::grdn-*$1^{\Delta GCV}$	This work
PSAB1220	*grdn-1*p*::grdn-*$1^{\Delta GCV}$	This work
PSAB1221	*rab-3*p*::grdn-1a::gfp*	This work
PSAB1013	*srg-47*p*::gfp*	(Nechipurenko et al., 2016)
PSAB1222	*gcy-32*p*::snb-1::tagRFP*	This work
PSAB1223	*gcy-32*p*::TIR1*	This work
pSF11	*tag-168*p*::Cre (nCre)*	(Flavell et al., 2013)

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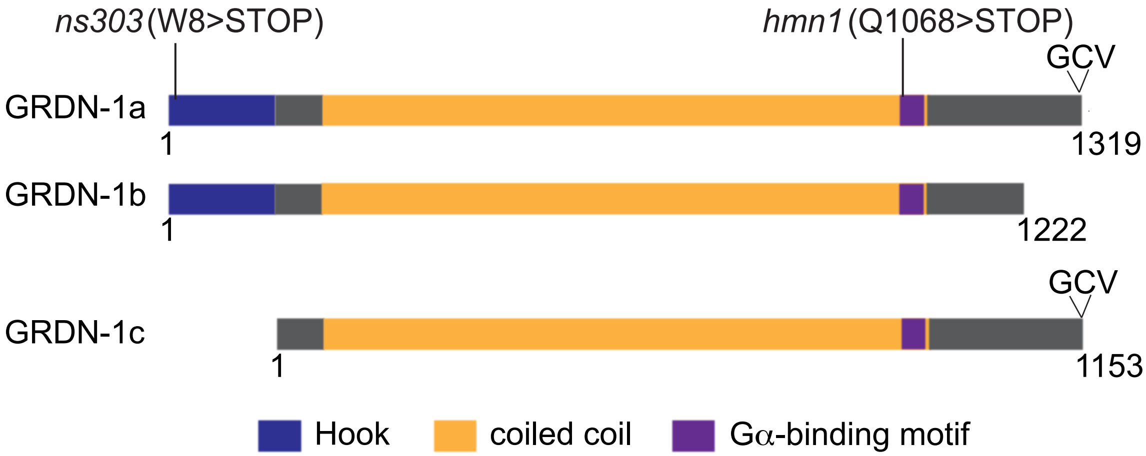


Figure S1

Nechipurenko *et al.*

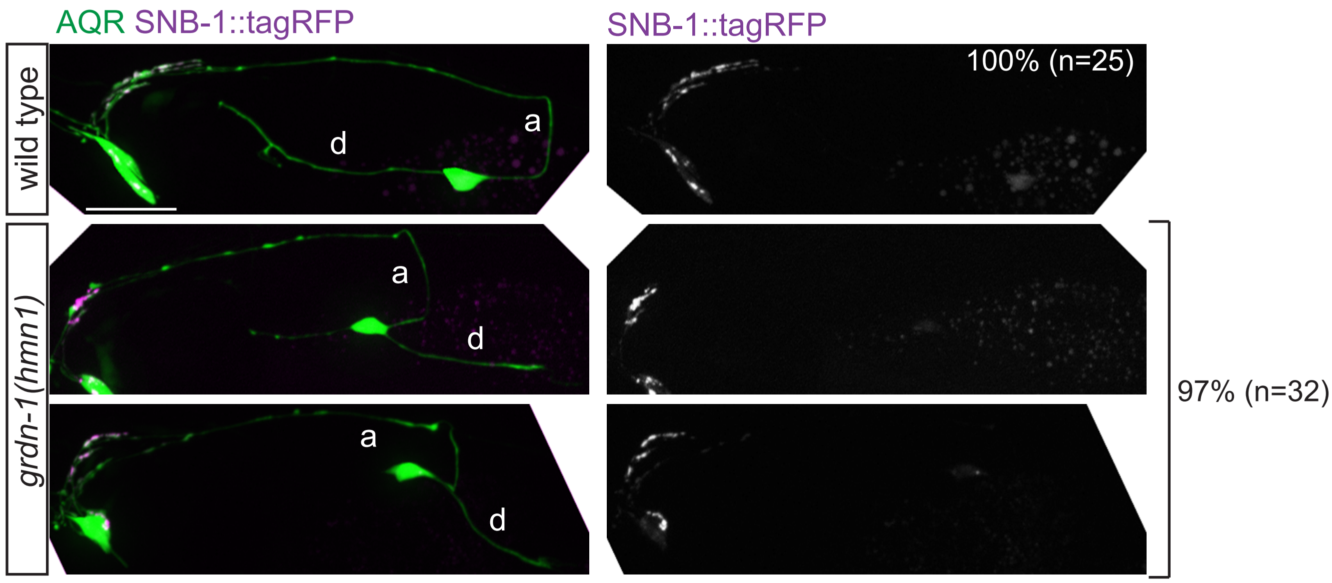


Figure S2

Nechipurenko *et al.*

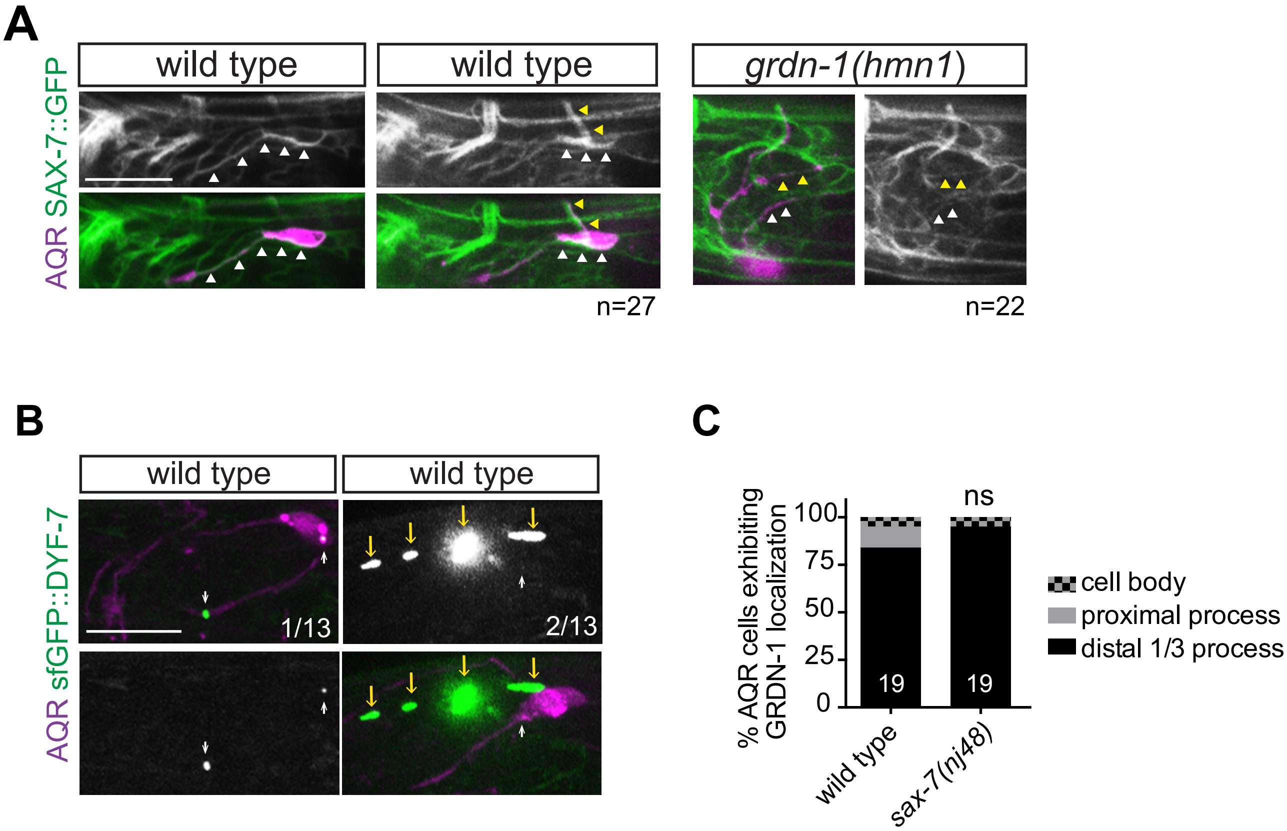
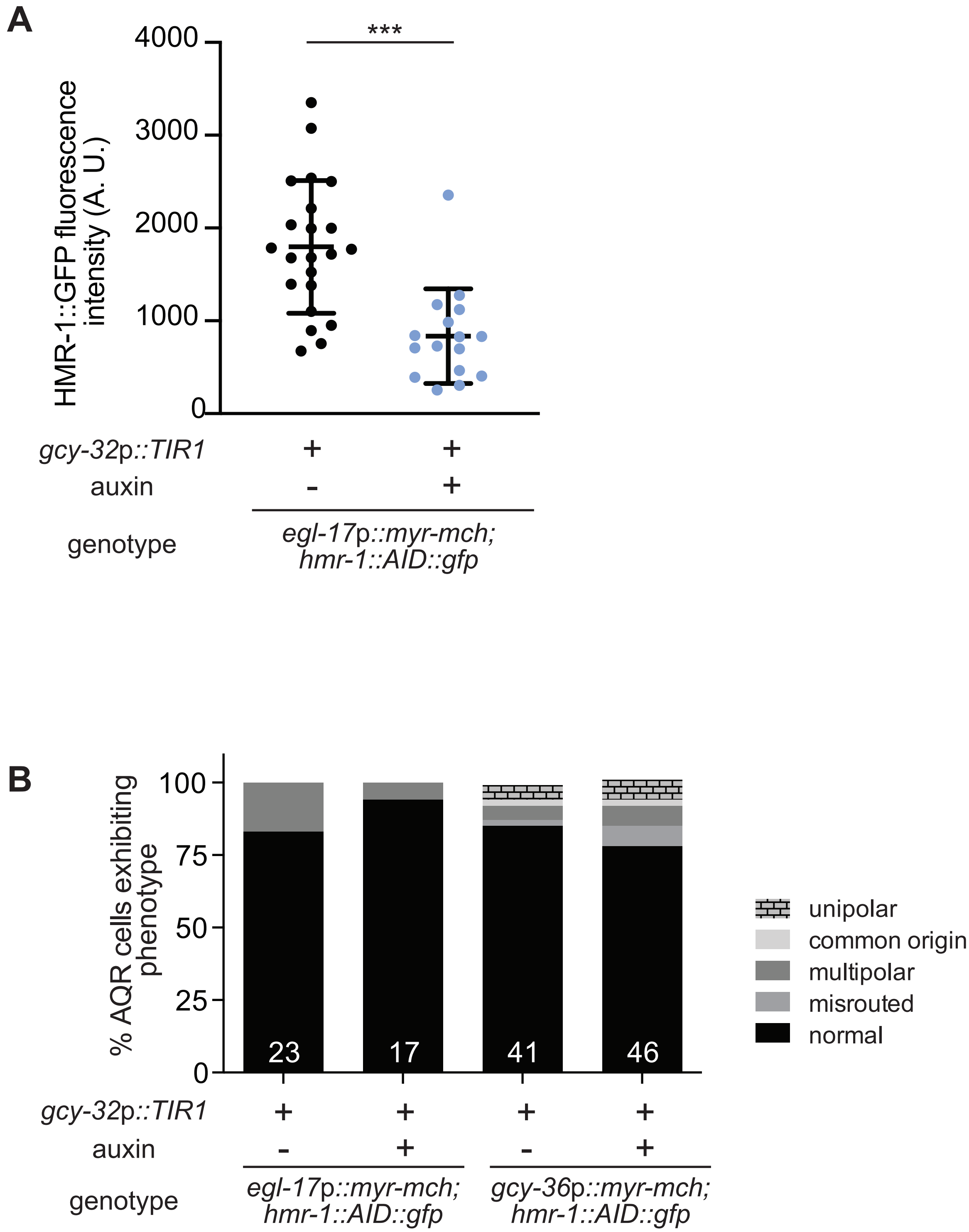


Figure S3 **Nechipurenko *et al.***


A
***
4000
3000
2000
1000
0
HMR-1::GFP fluorescence intensity (A. U.)
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+
+
auxin
-
+
genotype
egl-17p::myr-mch; hmr-1::AID::gfp
B
100
75
50
25
0
% AQR cells exhibiting phenotype
23
17
41
46
unipolar
common origin
multipolar
misrouted
normal
gcy-32p::TIR1
+
+
+
+
auxin
-
+
-
+
genotype
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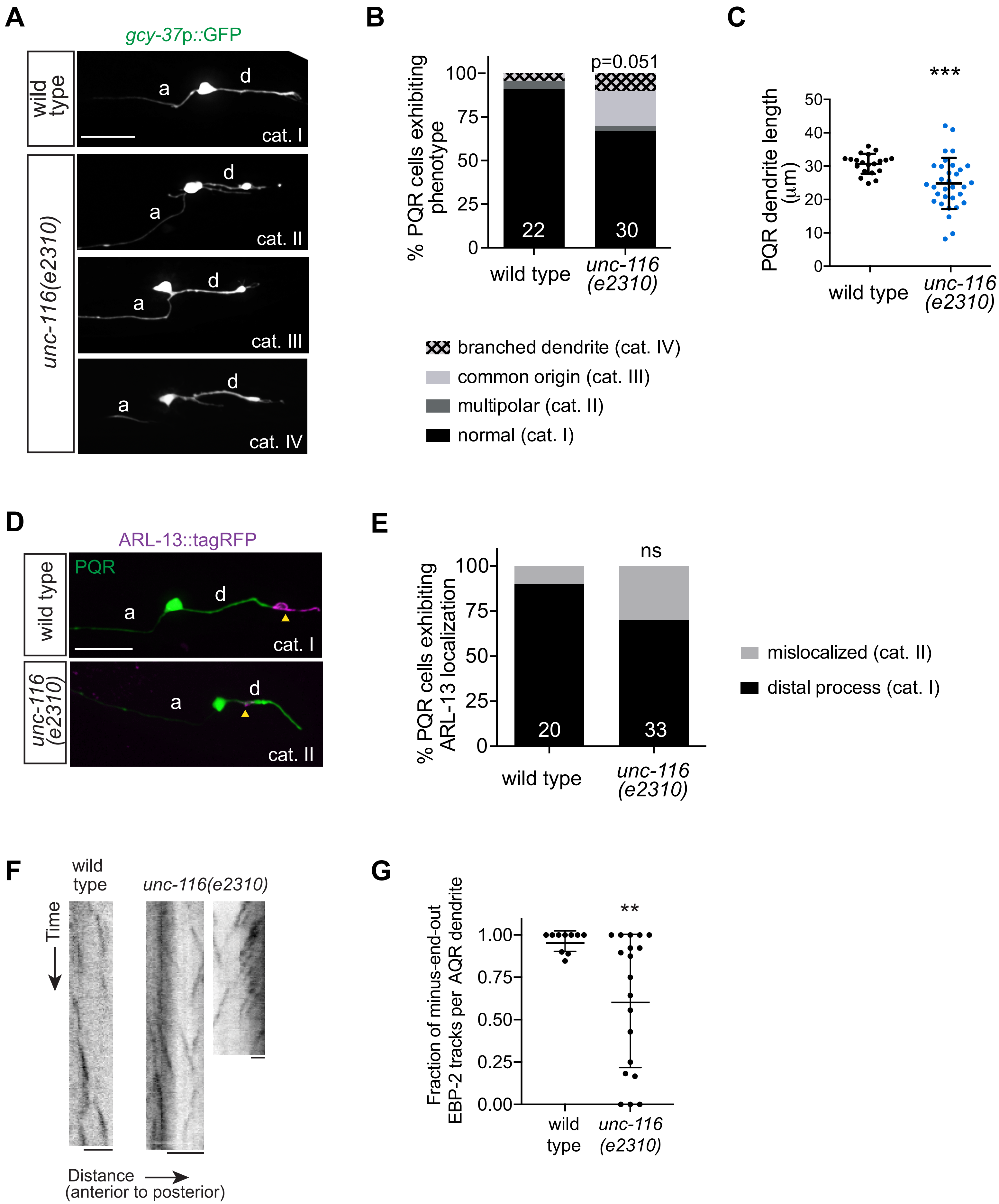

Figure S5 Nechipurenko *et al.*