Supplementary Figure 1. The antibodies AbDAF19N and AbDAF19C are specific for DAF-19

(A) Western blot on total worm protein from a mixed stage population. AbDAF19N detects a 120 kDa band in *wild type*, *daf-12* and *daf-19/mnC1* heterozygotes, but not in *daf-19* or *daf-19; daf-12* mutants.

(B-E) Immunocytochemistry stainings of the head regions of wild-type and *daf-19* adult worms. AbDAF19N and AbDAF19C detect DAF-19 in neurons of wild-type worms (B, D). The signal is lost in *daf-19* mutants (C, E). Arrowheads mark the location of the nerve ring and arrows the location of the cell bodies of amphid ciliated sensory neurons.

Supplementary Figure 2. Isoform-specific rescue of *daf-19*

(A-F) Single scan confocal micrographs showing the expression of DAF-19 and its direct targets, cilia proteins BBS-7 and OSM-5 in various transgenic *daf-19* (*m86*) rescue lines.

(A-C) AbDAF19N detects DAF-19 in worms rescued for DAF-19A and for DAF-19A/B/C, but not in worms rescued for DAF-19C.

(D-F) AbDAF19C detects DAF-19 in all three rescue lines.

(C', C'', F', F'') Only DAF-19C is able to rescue the expression of the cilia proteins OSM-5 and BBS-7.

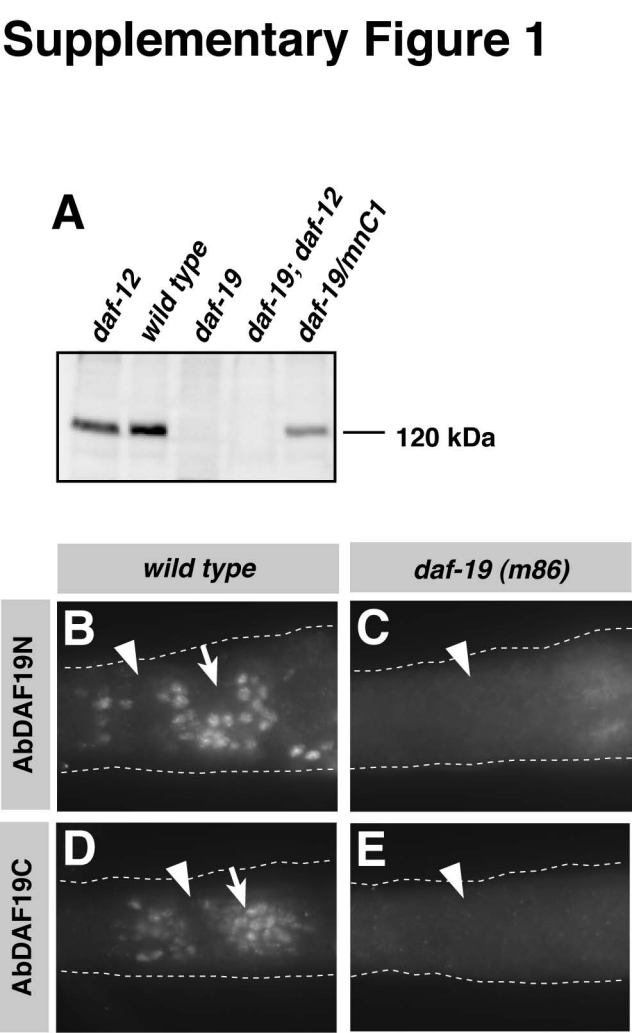
(B', B'', E', E'') DAF-19A, which is specific for non-ciliated neurons, does not rescue OSM-5 and BBS-7.

(A'''-F''') Schematics summarizing the expression of the three proteins DAF-19 (red), BBS-7 (green) and OSM-5 (white) in each transgenic line. Arrowheads depict ciliated sensory neurons, arrows depict non-ciliated neurons.

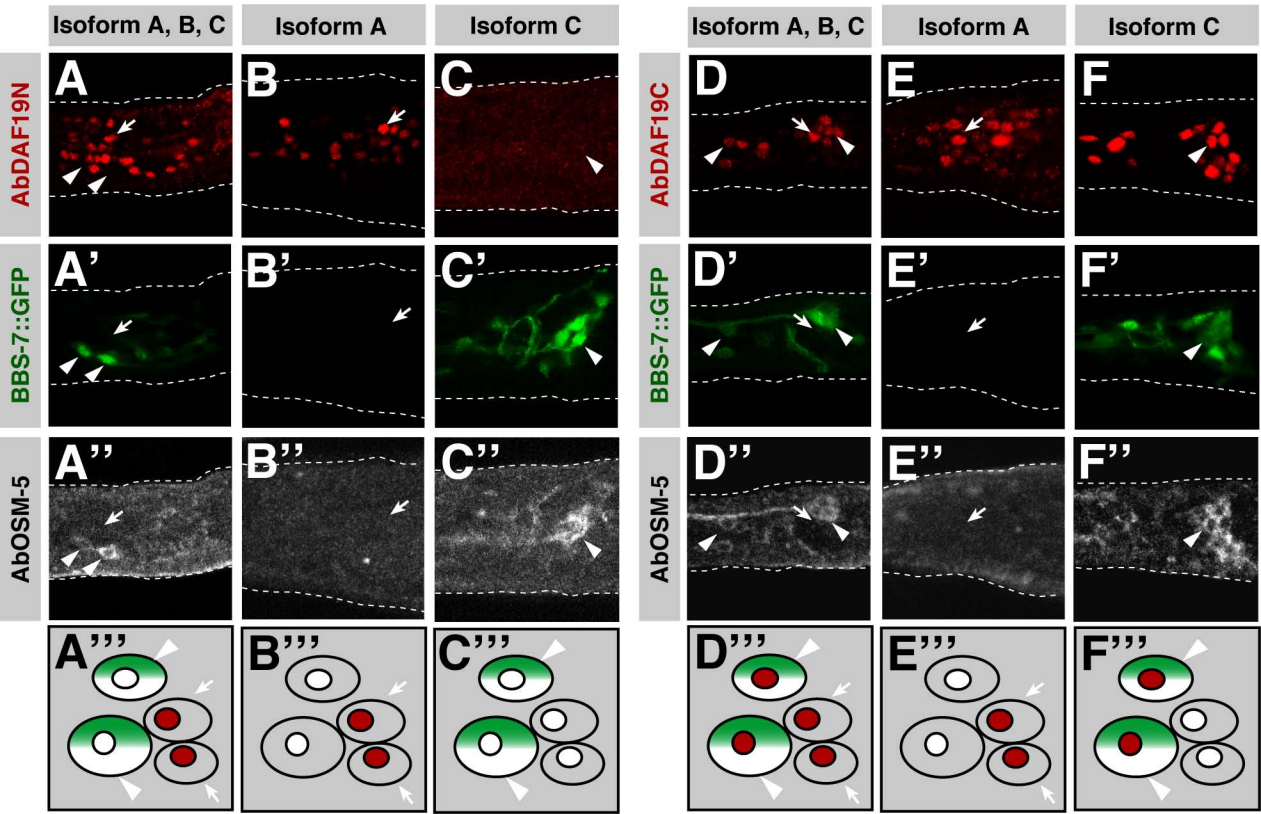
Supplementary Figure 3. Paralysis assays examining different cilia mutants and the effect of ectopic *daf-19a* expression in muscles

(A) The lack of sensory input (cilia mutants *che-13* and *osm-5*) does not cause resistance to aldicarb. (B) Ectopic expression of *daf-19a* in muscles (from the *unc-54* promoter) does not alter the paralysis phenotype of *daf-19*. Three independent transgenic lines (line 1-3) were tested.

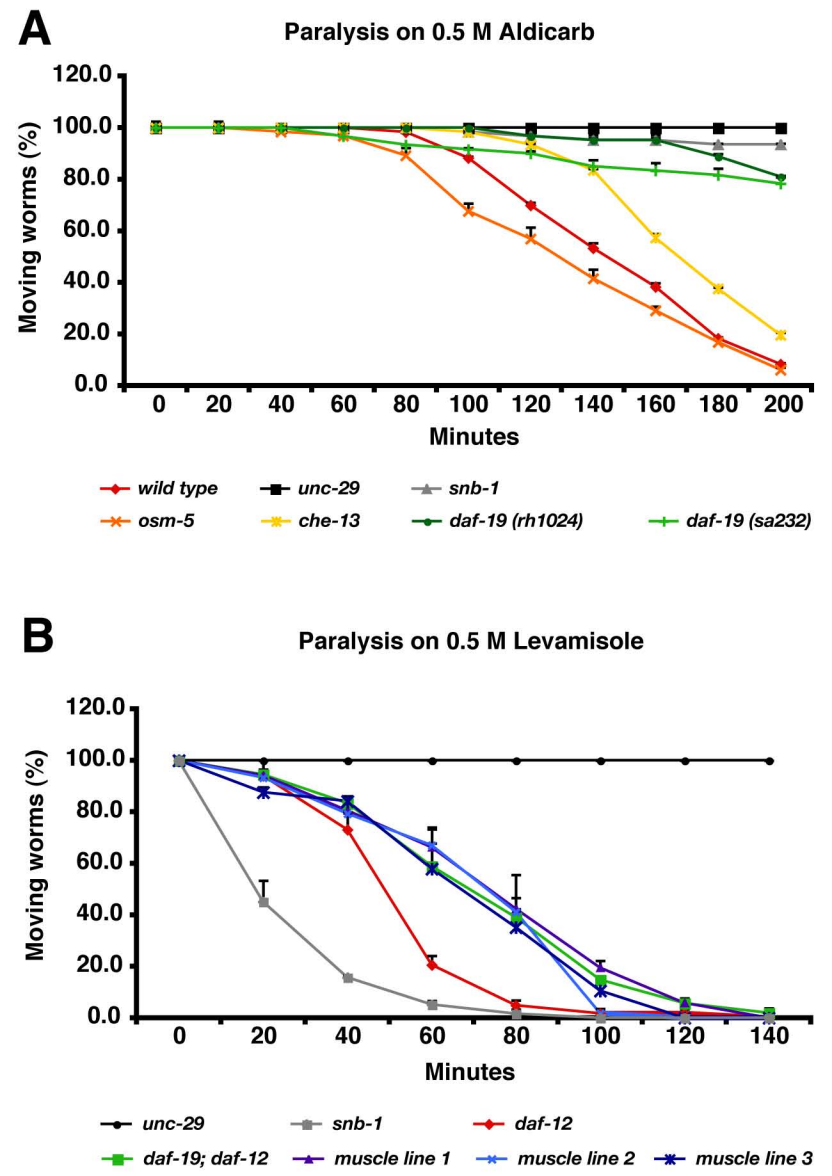
Supplementary Figure 1



Supplementary Figure 2



Supplementary Figure 3



Supplementary Table 1. Co-expression analysis of DAF-19 A/B in *gfp* reporter lines
Worm strains that express *gfp* in specific subsets of neurons were stained with AbDAF19N, the antibody specific for DAF-19A/B, which specifically labels non-ciliated neurons. The only exceptions are FLP neurons, which can be considered as hybrid neurons since they bear characteristics of both ciliated sensory neurons as well as non-ciliated touch sensory neurons (Wu et al. (2001), Genes Dev 15, 789-802). In the neurons HSN, AVJ or AIN and AIM or RIH none of the DAF-19 isoforms was detected. We cannot rule out, that DAF-19 expression in those neurons is below detection level. Note that AVJ or AIN (marked with *adIs1240*), AIM or RIH (marked with *mgIs42*) and RIR (marked with *akEx51*) have not been clearly identified in the original publications.

	Promoter	**Cilia**	**AbDAF19N**
Dopaminergic neurons (*egIs1*)	***dat-1***		
ADEL/R, CEPD (2), CEPV (2), PDE (2)		√	—
Serotonergic neurons (*mgIs42*)	***tph-1***		
NSM		—	√
ADFL/R		√	—
GABAergic neurons (*oxIs12*)	***unc-47***		
AVL, D motorneurons (19), DVB, RMEV (2), RMEL/R, RMED (2), RIS		—	√
Glutamatergic neurons (*adIs1240*)	***eat-4***		
ADAL/R, ALML/R, AUAL/R, AVM, LUAL/R, PLML/R, PVDL/R, PVR		—	√
FLPL/R		√	√
ASHL/R, ASKL/R, IL1 (6), OLQD (2), OLQV (2)		√	—
Ciliated neurons (*kyIs4*)	***ceh-23***		
ADFL/R, ADLL/R, AFDL/R, ASEL/R, ASGL/R, ASHL/R, AWCL/R,		√	—
BAGL/R, PHAL/R, PHBL/R		√	—
AIYL/R, CANL/R		—	√
Interneurons (*akIs3*)	***nmr-1***		
AVAL/R, AVDL/R, AVEL/R, AVG, PVCL/R, RIML/R		—	√
Interneurons (*akEx130*)	***glr-1***		
AIBL/R, AVAL/R, AVBL/R, AVDL/R, AVEL/R, AVG, PVCL/R,		—	√
RIML/R, RMDL/R, RMDD (2), RMDV (2), SMDD (2), SMDV (2),		—	√
URYD (2), URYV (2)		—	√
Interneurons (*akEx51*)	***glr-2***		
AIAL/R, AIBL/R, AVAL/R, AVDL/R, AVEL/R, AVG, M1, PVCL/R,		—	√
RIAL/R, RIGL/R, RIR, RMDD (2), RMDV (2)		—	√
XXX cell (*dhIs64*)	***daf-9***		
XXXL/R		—	—

Supplementary Table 2. Quantification of signals in antibody stainings against SNB-1 and UNC-64 in *wild type*, *daf-19* mutant and rescue worms, and two different cilia mutants, *che-11* and *che-13* (see also Figure 6). Numbers are given in percentage as strong / medium / weak staining when compared to UNC-10, which was used as a co-marker since it is unchanged in *wild type* and *daf-19*. At least 40 animals were scored for each genotype and developmental stage.

SNB-1 expression	**L1/L2**			**L3/L4**			**Adults**		
	strong	**medium**	**weak**	**strong**	**medium**	**weak**	**strong**	**medium**	**weak**
wild type	68	32	0	30	67	3	65	35	0
che-13 (e1805)	63	37	0	23	75	7	63	37	0
che-11 (e1810)	43	52	5	13	85	2	60	40	0
daf-19 (m86)	20	77	3	10	88	2	17	63	20
daf-19 (rh1024)	25	68	7	12	80	8	12	75	13
daf-19 (sa232)	20	73	7	8	85	7	10	60	30
daf-19 (m86)* + *daf-19a	52	41	7	22	73	5	67	24	9

UNC-64 expression	**L1/L2**			**L3/L4**			**Adults**		
	strong	**medium**	**weak**	**strong**	**medium**	**weak**	**strong**	**medium**	**weak**
wild type	40	57	3	33	67	0	69	27	5
che-13 (e1805)	30	70	0	28	72	0	76	22	2
che-11 (e1810)	23	75	2	28	70	2	66	32	2
daf-19 (m86)	28	65	7	20	75	5	22	40	38
daf-19 (rh1024)	30	63	7	28	57	15	10	47	43
daf-19 (sa232)	30	65	5	23	67	10	15	34	51
daf-19 (m86)* + *daf-19a	24	67	9	22	69	9	57	38	5

Supplementary Table 3. Published lists of predicted x-box genes (Blacque et al., 2005 [OB], Chen et al., 2006 [NC], Efimenko et al., 2005 [EE]) were searched for potential functions at synapses or in vesicles as summarized in this Table. Genes marked in grey were investigated in detail in this study.

Gene Model	Gene	x-box	Distance to the ATG	Reference	Predicted function/Homolog
F42G8.11	*sph-1*	GTTTCT AC AGTAAC	- 13	OB	Synaptophysin
F41B4.4b	*glr-6*	GTTTTT TT AAAAAC	- 28	EE	Glutamate receptor
T12A2.15b		GTTTCC AT AACTAC	- 51	EE	C2 domain vesicle protein
C18E9.10		GTTTCT AT GATAAC	- 53	EE	SFT-2 domain protein, membrane protein involved in Golgi to ER transport
F17E9.8		GTTACT GT AGAAAC	- 68	OB	Neuronal acetylcholine receptor protein, alpha-6 chain precursor
B0395.3		ATCACT AT AGTAAC	- 88	EE/OB	Splice isoform 1 of P43155 Carnitine O-acetyltransferase
F23H12.1	*snb-2*	GTCTCC AT ATCAAA	- 154	OB/NC	Vesicle-associated membrane protein 2
T12A2.15a		GTTTCC AT AACTAC	- 187	OB	C2 domain vesicle protein
M03E7.5		ATTATT TT AAAAAC	- 195	EE	Golgi SNAP complex vSNARE
C40C9.2	*acr-9*	TTTTCA AT AGCAAC	- 211	OB/NC	Neuronal acetylcholine receptor protein, alpha-7 chain precursor
C31H5.3	*acr-19*	GTTTCA AT AGAAAT	- 280	OB/NC	Neuronal acetylcholine receptor protein, alpha-7 chain precursor
Y57A10A.16		GTTTTA AT GACACA	- 312	NC	Trafficking protein particle complex 5
Y69A2AR.2a	*ric-8*	GTTTCG AT GCAAAT	- 377	NC	Synembryn
C09E8.1		GTTGCC AT GATAAC	- 411	EE/NC	Sodium neurotransmitter symporter
F59E12.8		GTATTT AT AAAAAC	- 420	EE	NMDA receptor subunit
ZK455.3		GTTTCG TT CGCAAC	- 448	EE/OB	Galanin receptor type 2, cationе/carnitine transporter
F37A4.7d	*rbf-1*	GTCTCC AA GGAAAC	- 478	EE/NC	Rabphilin-3A
H35N03.1	*exp-1*	GTTTTT AT GGCCAC	- 481	EE/OB	Splice isoform 1 of GABA receptor beta-3 subunit precursor
T05C12.2	*acr-14*	GTAACT AC GGTAAC	- 496	EE	Neuronal acetylcholine receptor protein, alpha-7 chain precursor
F35D2.5a	*syd-1*	GTCACT AT AACAAC	- 530	EE/OB/NC	7h3 protein
F48E3.7	*acr-22*	GTCTAC AT GCCAAC	- 534	OB	Neuronal acetylcholine receptor protein, alpha-9 chain precursor
F08F8.8		ATTTCT TT GAAAAC	- 540	EE	Golgi vSNARE
ZK1098.5		TTCTCC AT GGCAAG	- 598	OB	Trafficking protein particle complex subunit 3
T01B11.3	*syn-4*	GTGTCC AT GACAAC	- 676	OB/NC	Syntaxin 1B2
F37A4.7a	*rbf-1*	GTAACC AC GATAAC	- 804	OB	Rabphilin-3A
Y58G8A.1		GTTTCC GT AGTAAT	- 822	OB	Acetylcholine receptor protein, beta chain precursor
F55A4.1		GTTTTT TT AAAAAC	- 862	EE	Vesicle protein sec-22
F12F6.6	*sec-24.1*	ATATTT AT AGGAAC	- 868	EE	COPII protein
T22F7.3		GTTACT GT AGCAAT	- 934	OB	Splice isoform Alpha of P10646 Tissue factor pathway inhibitor precursor
T22F7.1		GTTATC TT GGTAAC	- 966	EE/NC	Carrier protein (synaptic vesicle protein)
C08G5.4	*snt-6*	GTTTCT AT GCCAAT	- 967	OB	Synaptotagmin VII
C18E9.2		GTTATC AT AGAAAC	- 991	OB	Translocation protein-1
F55A4.4		GTAACA AT AGTAAC	- 1026	OB	39k3 protein
T23H2.2	*snt-4*	ATTACC TT GCCAAC	- 1226	OB	Synaptotagmin IV
F09E8.7	*lev-1*	GCTTCC AT AGAAAT	- 1399	OB/NC	Neuronal acetylcholine receptor protein, alpha-4 chain precursor

Supplementary Table 4. Strains and transgenes (extra-chromosomal and integrated arrays) used for this study

A. STRAINS

Strain	Relevant transgene	Genotype
AA277	*daf-9::gfp*	[*lin-15 (n765); dhIs64*]
BZ555	*dat-1::gfp*	[*egIs1*]
CB1072		[*unc-29* (*e1072*)]
CX2565	*ceh-23::gfp*	[*lin-15 (n765); kyIs4*]
DA1240	*eat-4::gfp*	[*lin-15 (n765); adIs1240*]
EG1285	*unc-47::gfp*	[*lin-15 (n765); oxIs12*]
GR1366	*tph-1::gfp*	[*mgIs42*]
JT204		[*daf-12* (*sa204*)]
JT5010		(wild-type N2 Bristol)
JT6924		[*daf-19* (*m86*); *daf-12* (*sa204*)]
JT8651		[*daf-19* (*m86*)/mnC1; *lin-15* (*n765*)]
MT1642		[*lin-15* (*n765*)]
NM467		[*snb-1* (*md247*)]
OE3000		[*che-13* (*n1520*); *him-8* (*e1489*)]
OE3035		[*daf-19* (*sa232*); 6x outcrossed]
OE3059		[*daf-19* (*rh1024*); 6x outcrossed]
OE3063		[*daf-19* (*m86*); 6x outcrossed]
VM182	*glr-2::gfp*	[*lin-15 (n765); akEx51*]
VM484	*nmr-1::gfp*	[*akIs3*]
VM763	*glr-1::gfp*	[*lin-15 (n765); akEx130*]

B. EXTRA-CHROMOSOMAL AND INTEGRATED ARRAYS

Relevant transgene	Type of construct	Genotype
B0395.3::gfp	promoter *gfp* fusion	*ofEx301*, *ofEx302*
C18E9.10::gfp	promoter *gfp* fusion	*ofEx333*, *ofEx338*
F17E9.8::gfp	promoter *gfp* fusion	*ofEx324*, *ofEx325*
glr-1::gfp	translational *gfp* fusion	*akEx130*
ida-1::gfp	translational *gfp* fusion	*ofEx260*, *ofEx261*
jnk-1::gfp	translational *gfp* fusion	*ofEx61*, *ofEx62*
pGG20	*daf-19* intron 3-*gfp* fusion	*ofEx308*, *ofEx309*
pGG21	*daf-19* intron 4-*gfp* fusion	*ofEx310*, *ofEx311*
pGG14	genomic *daf-19* construct	*ofEx27*, *ofEx42*
pGG18	genomic *daf-19* construct	*ofEx375*, *ofEx376*
pGG67	*daf-19a* rescue construct	*ofEx316*, *ofEx165*
pTJ786	genomic *daf-19* construct	*ofEx168*, *ofEx169*
pTJ803	*daf-19c* rescue construct	*ofEx163*, *ofEx164*
snb-1::gfp	translational *gfp* fusion	*ofEx304*, *ofEx305*
sng-1::gfp	translational *gfp* fusion	*jsIs219*
syd-1::gfp	translational *gfp* fusion	*juIs40*
unc-43::gfp	translational *gfp* fusion	*ofEx263*, *ofEx297*
unc-104::gfp	translational *gfp* fusion	*ofEx305*, *ofEx306*
unc-54::daf-19a	muscle-specific *daf-19* expression	*ofEx585* to 587