NVE_GeneId	Gene ID	Symbol	Gene Name	Protein Class	GO
NVE8371	MOUSE|MGI|MGI:108078||P97299	SFRP2	Secreted frizzled-related protein 2	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE10382	FELCA|Ensembl|ENSFCAG00000025878||M3X1M2	HMCN1	Uncharacterized protein	-	neuron projection (GO:0043005)
NVE19736	BOVIN|Ensembl|ENSBTAG00000020957||F1MGM1	FZD5	Frizzled class receptor 5	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE10381	ANOCA|Ensembl|ENSACAG00000008287||H9GES1	NCAM1	Uncharacterized protein	-	neuron projection (GO:0043005)
NVE6997	BOVIN|Gene|HMCN1||E1BE11	HMCN1	Uncharacterized protein	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE8133	MOUSE|MGI|MGI:2441950||Q80TS3	AGRL3	Adhesion G protein-coupled receptor L3	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE15843	MOUSE|MGI|MGI:1860130||Q924H0	NPFF2	Neuropeptide FF receptor 2	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE23855	HUMAN|HGNC|13800||Q9GZZ6	ACH10	Neuronal acetylcholine receptor subunit alpha-10	ligand-gated ion channel	neuron projection (GO:0043005)
NVE2185	C4EBR|Gene|CBG14491||A8WQK3	ACH1	Acetylcholine receptor subunit alpha-type acr-16	ligand-gated ion channel	neuron projection (GO:0043005)
NVE26112	ANOCA|Ensembl|ENSACAG00000012709||H9GIH9	EPHA5	Uncharacterized protein	-	neuron projection (GO:0043005)
NVE4515	HUMAN|HGNC|14006||Q9H1D0	TRPV6	Transient receptor potential cation channel subfamily V member 6	ion channel	neuron projection (GO:0043005)
NVE22264	DANRE|ZFIN|ZDB-GENE-081022-145||B3DHM6	ADRB1	Adrenergic, beta-1-, receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE4175	BOVIN|Gene|HMCN1||E1BE11	HMCN1	Uncharacterized protein	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE3518	BOVIN|Gene|SCNN1A||P55270	SCNNA	Amiloride-sensitive sodium channel subunit alpha	ion channel	neuron projection (GO:0043005)
NVE5022	HUMAN|HGNC|11048||P23975	NET1	Sodium-dependent noradrenaline transporter	primary active transporter	neuron projection (GO:0043005)
NVE5065	CAEEL|WormBase|WBGene00001519||Q9U7D5	ACM3	Muscarinic acetylcholine receptor gar-3	G-protein coupled receptor	neuron projection (GO:0043005)
NVE7261	DROME|FlyBase|FBgn0053517||Q8R544	DRD2L	Dopamine D2-like receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE15552	ANOCA|Ensembl|ENSACAG00000013826||G1KPD2	SYT1	Uncharacterized protein	membrane trafficking regulatory protein	neuron projection (GO:0043005)
NVE1646	BOVIN|Gene|CHRNA7||P54131	ACHA7	Neuronal acetylcholine receptor subunit alpha-7	ligand-gated ion channel	neuron projection (GO:0043005)
NVE17372	HUMAN|HGNC|5302||P34969	SHT7R	5-hydroxytryptamine receptor 7	G-protein coupled receptor	neuron projection (GO:0043005)
NVE13969	CAEEL|WormBase|WBGene00006765||P48181	ACH2	Acetylcholine receptor subunit beta-type unc-29	ligand-gated ion channel	neuron projection (GO:0043005)
NVE4045	HUMAN|HGNC|13800||Q9GZZ6	ACH10	Neuronal acetylcholine receptor subunit alpha-10	ligand-gated ion channel	neuron projection (GO:0043005)
NVE21238	BOVIN|Gene|HMCN1||E1BE11	HMCN1	Uncharacterized protein	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE10029	BOVIN|Gene|BSG||Q865R3	BASI	Basigin (Fragment)	scaffold/adaptor protein	neuron projection (GO:0043005)
NVE21441	ANOCA|Ensembl|ENSACAG00000011789||G1KLI5	CHRNA9	Uncharacterized protein	ligand-gated ion channel	neuron projection (GO:0043005)
NVE2635	HUMAN|HGNC|1463||Q13555	KCC2G	Calcium/calmodulin-dependent protein kinase type II subunit gamma	non-receptor serine/threonine protein kinase	neuron projection (GO:0043005)
NVE5017	HUMAN|HGNC|1396||Q9P0X4	CAC1I	Voltage-dependent T-type calcium channel subunit alpha-1I	voltage-gated ion channel	neuron projection (GO:0043005)
NVE6180	RAT|RGD|2348||Q05941	ACHA7	Neuronal acetylcholine receptor subunit alpha-7	ligand-gated ion channel	neuron projection (GO:0043005)
NVE13547	MOUSE|MGI|MGI:2441950||Q80TS3	AGRL3	Adhesion G protein-coupled receptor L3	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE14451	CHICK|Ensembl|ENSGALG00000029392||P19019	GBRB3	Gamma-aminobutyric acid receptor subunit beta-3	ligand-gated ion channel	neuron projection (GO:0043005)
NVE1484	DROME|FlyBase|FBgn0004622||P30975	TLR2	Tachykinin-like peptides receptor 99D	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE7617	HUMAN|HGNC|10588||Q99250	NAC2	Sodium channel protein type 2 subunit alpha	voltage-gated ion channel	neuron projection (GO:0043005)
NVE12387	BOVIN|Gene|CAMK2D||Q2HJF7	KCC2D	Calcium/calmodulin-dependent protein kinase type II subunit delta	non-receptor serine/threonine protein kinase	neuron projection (GO:0043005)
NVE13402	CHICK|Ensembl|ENSGALG00000004446||Q75XU5	NPFF1	Neuropeptide FF receptor 1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE23178	DROME|FlyBase|FBgn0004168||P28285	5HT2A	5-hydroxytryptamine receptor 2A	G-protein coupled receptor	somatodendritic compartment (GO:0036477)
NVE25668	DROME|FlyBase|FBgn0000036||P09478	ACH1	Acetylcholine receptor subunit alpha-like 1	ligand-gated ion channel	neuron projection (GO:0043005)
NVE22703	DANRE|ZFIN|ZDB-GENE-040801-92||Q6DC77	MPRGB	Membrane progestin receptor gamma-B	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE24524	HUMAN|HGNC|11018||Q9H598	VIAAT	Vesicular inhibitory amino acid transporter	-	neuron projection (GO:0043005)
NVE7386	DROME|FlyBase|FBgn0038880||Q8N3S	SIFAR	Neuropeptide SIFamide receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE21442	HUMAN|HGNC|15781||Q4W4W8	CRFM7	CHRNA7-FAM7A fusion protein	ligand-gated ion channel	neuron projection (GO:0043005)
NVE20517	MOUSE|MGI|MGI:1860130||Q924H0	NPFF2	Neuropeptide FF receptor 2	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE2517	DANRE|ZFIN|ZDB-GENE-070705-309||A0A0R4IVA4	CC14A	Dual specificity protein phosphatase CDC14AB	-	neuron projection (GO:0043005)
NVE8357	HUMAN|HGNC|5299||Q13639	5HT4R	5-hydroxytryptamine receptor 4	G-protein coupled receptor	neuron projection (GO:0043005)
NVE23188	ANOCA|Ensembl|ENSACAG00000014117||G1KPI2	SYT4	Uncharacterized protein	membrane trafficking regulatory protein	neuron projection (GO:0043005)
NVE13933	MOUSE|MGI|MGI:2677838||A2AJ76	HMCN2	Hemicentin-2	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE1327	FELCA|Gene|OPN4||Q5YKK9	OPN4	Melanopsin	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE17221	MOUSE|MGI|MGI:1343111||P32240	PE2R4	Prostaglandin E2 receptor EP4 subtype	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE10027	CHICK|Ensembl|ENSGALG00000049848||A0A3Q2TXF0	CNR1	Cannabinoid receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE19228	HUMAN|HGNC|5299||Q13639	5HT4R	5-hydroxytryptamine receptor 4	G-protein coupled receptor	somatodendritic compartment (GO:0036477)
NVE15844	MACMU|Ensembl|ENSMMUG00000020241||Q9GK75	NPY1R	Neuropeptide Y receptor Y1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE17029	MOUSE|MGI|MGI:2429764||P69744	CAT2	Transient receptor potential cation channel subfamily V member 5	ion channel	neuron projection (GO:0043005)
NVE1501	CANLF|Ensembl|ENSCAFG00000013828||P11617	AA2AR	Adenosine receptor A2a	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE12996	RAT|RGD|1308804||Q5XIU9	PGRC2	Membrane-associated progesterone receptor component 2	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE26217	FELCA|Gene|OPN4||Q5YKK10	OPN5	Melanopsin	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE6519	CAEEL|WormBase|WBGene00016610||Q94177	ADRL	Progestin and adipoQ receptor-like protein 1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE10190	DROME|FlyBase|FBgn0038980||Q9VCZ3	OCTB1	Octopamine receptor beta-1R	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE21472	NEMVE|EnsemblGenome|NEMVEDRAFT_v1g248535||A7T1N0	TMP2L	Transient receptor potential cation channel subfamily M member-like 2	ion channel	neuron projection (GO:0043005)
NVE24515	MOUSE|MGI|MGI:892032||P97401	FRITZ	Secreted frizzled-related protein 3	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE25785	MOUSE|MGI|MGI:99456||Q01727	MSHR	Melanocyte-stimulating hormone receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE6925	HUMAN|HGNC|10585||P35498	NAC1	Sodium channel protein type 1 subunit alpha	voltage-gated ion channel	neuron projection (GO:0043005)
NVE14868	MOUSE|MGI|MGI:2664668||Q7TN88	PKL1Z	Polycystic kidney disease protein 1-like 2	ion channel	neuron projection (GO:0043005)
NVE17821	ANOCA|Ensembl|ENSACAG00000005650||G1KEG9	GLRA3	Uncharacterized protein	ligand-gated ion channel	neuron projection (GO:0043005)
NVE12212	BOVIN|Ensembl|ENSBTAG00000003446||E1BIE4	EPHB4	EPH receptor B4	-	neuron projection (GO:0043005)
NVE7681	BOVIN|Gene|HMCN1||E1BE11	HMCN1	Uncharacterized protein	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE24164	BOVIN|Gene|HMCN1||E1BE11	HMCN1	Uncharacterized protein	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE25358	HUMAN|HGNC|11119||Q99835	SMO	Smoothened homolog	transmembrane signal receptor	neuron projection (GO:0043005)
NVE19422	DROME|FlyBase|FBgn0086906||Q9TU4	TITIN	TNK2	tyrosine protein kinase receptor	transmembrane signal receptor (PC00197)
NVE3573	MOUSE|MGI|MGI:97175||P20357	MTAP2	Microtubule-associated protein 2	-	neuron projection (GO:0043005)
NVE21871	MOUSE|MGI|MGI:1196627||Q9R1C8	5HT6R	5-hydroxytryptamine receptor 6	G-protein coupled receptor	neuron projection (GO:0043005)
NVE2492	DANRE|Ensembl|ENSDARG00000013649||F1R4B10	CASR	Calcium-sensing receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE16130	CHICK|Gene|FSHR||P79763	FSHR	Follicle-stimulating hormone receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE11916	HUMAN|HGNC|21293||Q8NDA2	HMCN2	Hemicentin-2	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE19915	CHICK|Ensembl|ENSGALG00000002118||O93393	CO6	Calcium-activated potassium channel beta subunit	voltage-gated ion channel	neuron projection (GO:0043005)
NVE13710	CAEEL|WormBase|T23D8.1b||A0A0K3AWM6	MOMS	Protein mom-5	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE19835	DROME|FlyBase|FBgn0038880||Q8N3S	SIFAR	Neuropeptide SIFamide receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE17972	DANRE|ZFIN|ZDB-GENE-990714-19||Q9W7R4	TENM3	Teneurin-3	-	neuron projection (GO:0043005)
NVE2156	CHICK|Gene|CHRNA10||Q9I8C7	ACH10	Neuronal acetylcholine receptor subunit alpha-10	ligand-gated ion channel	neuron projection (GO:0043005)
NVE20802	DANRE|ZFIN|ZDB-GENE-080221-1||F1QG81	NPY1R	Neuropeptide Y receptor Y1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE8662	HUMAN|HGNC|11049||Q01959	SC6A3	Sodium-dependent dopamine transporter	primary active transporter	neuron projection (GO:0043005)
NVE19257	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE275	RAT|RGD|621570||Q9EP86	NPFF1	Neuropeptide FF receptor 1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE9473	DROME|FlyBase|FBgn0004842||P25931	RYAR	RYamide receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE4599	DROME|FlyBase|FBgn0004841||P30974	TLR1	Tachykinin-like peptides receptor 86C	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE12144	HUMAN|HGNC|14079||Q9UGM1	ACHA9	Neuronal acetylcholine receptor subunit alpha-9	ligand-gated ion channel	neuron projection (GO:0043005)
NVE14952	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE8663	MOUSE|MGI|MGI:96285||Q60857	SC6A4	Sodium-dependent serotonin transporter	primary active transporter	neuron projection (GO:0043005)
NVE19358	DANRE|ZFIN|ZDB-GENE-991117-1||O93430	GLRA1	Glycine receptor subunit alphaZ1	ligand-gated ion channel	neuron projection (GO:0043005)
NVE24392	HUMAN|HGNC|9967||P07949	RET	Proto-oncogene tyrosine-protein kinase receptor Ret	-	neuron projection (GO:0043005)
NVE4207	CHICK|Ensembl|ENSGALG00000042626||A0A1D5PCG4	SYT4	Uncharacterized protein	membrane trafficking regulatory protein	neuron projection (GO:0043005)
NVE9028	DROME|FlyBase|FBgn0034476||Q76NN0	TOLL7	Toll-like receptor 7	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE1388	CHICK|Gene|MC1R||P55167	MSHR	Melanocyte-stimulating hormone receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE25364	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE21855	MOUSE|MGI|MGI:98328||P30875	SSR2	Somatostatin receptor type 2	G-protein coupled receptor	neuron projection (GO:0043005)
NVE21136	DANRE|Ensembl|ENSDARG00000013649||F1R4B8	CASR	Calcium-sensing receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE23050	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE20106	DANRE|Ensembl|ENSDARG00000013649||F1R4B9	CASR	Calcium-sensing receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE2371	CHICK|Ensembl|ENSGALG00000002118||O93393	CO6	Calcium-activated potassium channel beta subunit	voltage-gated ion channel	neuron projection (GO:0043005)
NVE7629	DROME|FlyBase|FBgn0004622||P30975	TLR2	Tachykinin-like peptides receptor 99D	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE141	MOUSE|MGI|MGI:3041203||Q80T32	AGRD1	Adhesion G-protein coupled receptor D1	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE11735	MOUSE|MGI|MGI:95749||Q91XP5	GLRA3	Glycine receptor subunit alpha-3	ligand-gated ion channel	neuron projection (GO:0043005)
NVE2876	RAT|RGD|628837||P60711	ACTB	Actin, cytoplasmic 1	actin and actin related protein	neuron projection (GO:0043005)
NVE25008	CHICK|Ensembl|ENSGALG00000006130||O93388	NPC2	Stathmin-3	-	neuron projection (GO:0043005)
NVE4080	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE5966	MOUSE|MGI|MGI:95749||Q91XP5	GLRA3	Glycine receptor subunit alpha-3	ligand-gated ion channel	neuron projection (GO:0043005)
NVE9440	RAT|RGD|1305841||D4A6L0	GP15R	Probable G-protein coupled receptor 15R	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE18296	MOUSE|MGI|MGI:97281||P13595	NCAM1	Neural cell adhesion molecule 1	-	neuron projection (GO:0043005)
NVE17393	MOUSE|MGI|MGI:1347520||Q8C139	ROR1	Inactive tyrosine-protein kinase transmembrane receptor ROR1	-	neuron projection (GO:0043005)
NVE9727	MOUSE|MGI|MGI:99402||Q60613	AA2AR	Adenosine receptor A2a	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE20788	HUMAN|HGNC|3039||O60469	DSCAM	Down syndrome cell adhesion molecule	scaffold/adaptor protein	neuron projection (GO:0043005)
NVE4643	DROME|FlyBase|FBgn0038880||Q8IN36	SIFAR	Neuropeptide SIFamide receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE13212	RAT|RGD|2353||P09660	ACHE	Acetylcholine receptor subunit epsilon	ligand-gated ion channel	neuron projection (GO:0043005)
NVE26151	MOUSE|MGI|MGI:1347095||Q9ZOM6	CD97	CD97 antigen	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE6241	HUMAN|HGNC|11333||P31391	SSR4	Somatostatin receptor type 4	G-protein coupled receptor	neuron projection (GO:0043005)
NVE7440	HUMAN|HGNC|18992||Q8IZF6	AGRG4	Adhesion G-protein coupled receptor G4	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE8550	RAT|RGD|619891||Q8VHD7	GPR83	G protein-coupled receptor 83	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE2244	CHICK|Ensembl|ENSGALG00000015126||A0A1D5PAY3	TRPM3	Uncharacterized protein	ion channel	neuron projection (GO:0043005)
NVE3729	HUMAN|HGNC|10450||O14718	OPSX	Visual pigment-like receptor peropsin	G-protein coupled receptor	neuron projection (GO:0043005)
NVE12143	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE16819	DANRE|ZFIN|ZDB-GENE-050913-90||A0T2N3	APJR	Apelin receptor B	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE12516	MOUSE|MGI|MGI:1333877||O88495	MTR1L	Melatonin-related receptor	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE13879	DANRE|ZFIN|ZDB-GENE-060427-5||E7FCE4	ROR2	Receptor tyrosine kinase-like orphan receptor 2	-	neuron projection (GO:0043005)
NVE24406	HUMAN|HGNC|21293||Q8NDA2	HMCN2	Hemicentin-2	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE19889	HUMAN|HGNC|4600||O00222	GRM8	Metabotropic glutamate receptor 8	G-protein coupled receptor	transmembrane signal receptor (PC00197)
NVE16011	MOUSE|MGI|MGI:104295||Q60898	SLAP1	Src-like-adapter	-	neuron projection (GO:0043005)
NVE21548	MOUSE|MGI|MGI:99779||P49582	ACHA7	Neuronal acetylcholine receptor subunit alpha-7	ligand-gated ion channel	neuron projection (GO:0043005)
NVE10021	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE2362	CHICK|Ensembl|ENSGALG00000002118||O93393	CO6	Calcium-activated potassium channel beta subunit	voltage-gated ion channel	neuron projection (GO:0043005)
NVE1835	HUMAN|HGNC|4039||Q9ULW2	FZD10	Frizzled-10	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE15043	DANRE|ZFIN|ZDB-GENE-070705-262||A5WWA0	ZNRF3	E3 ubiquitin-protein ligase znrf3	transmembrane signal receptor	transmembrane signal receptor (PC00197)
NVE5945	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)
NVE7065	RAT|RGD|1564772||F1M4Q3	HMCN1	Hemicentin 1	-	neuron projection (GO:0043005)

Fig. S1. Additional neuronal associated genes DE between the apical and oral regions.
Heatmap shows the relative expression of neuronal associated genes among oral or apical region of *Nematostella* larvae. The gene id and additional details are shown on the right.

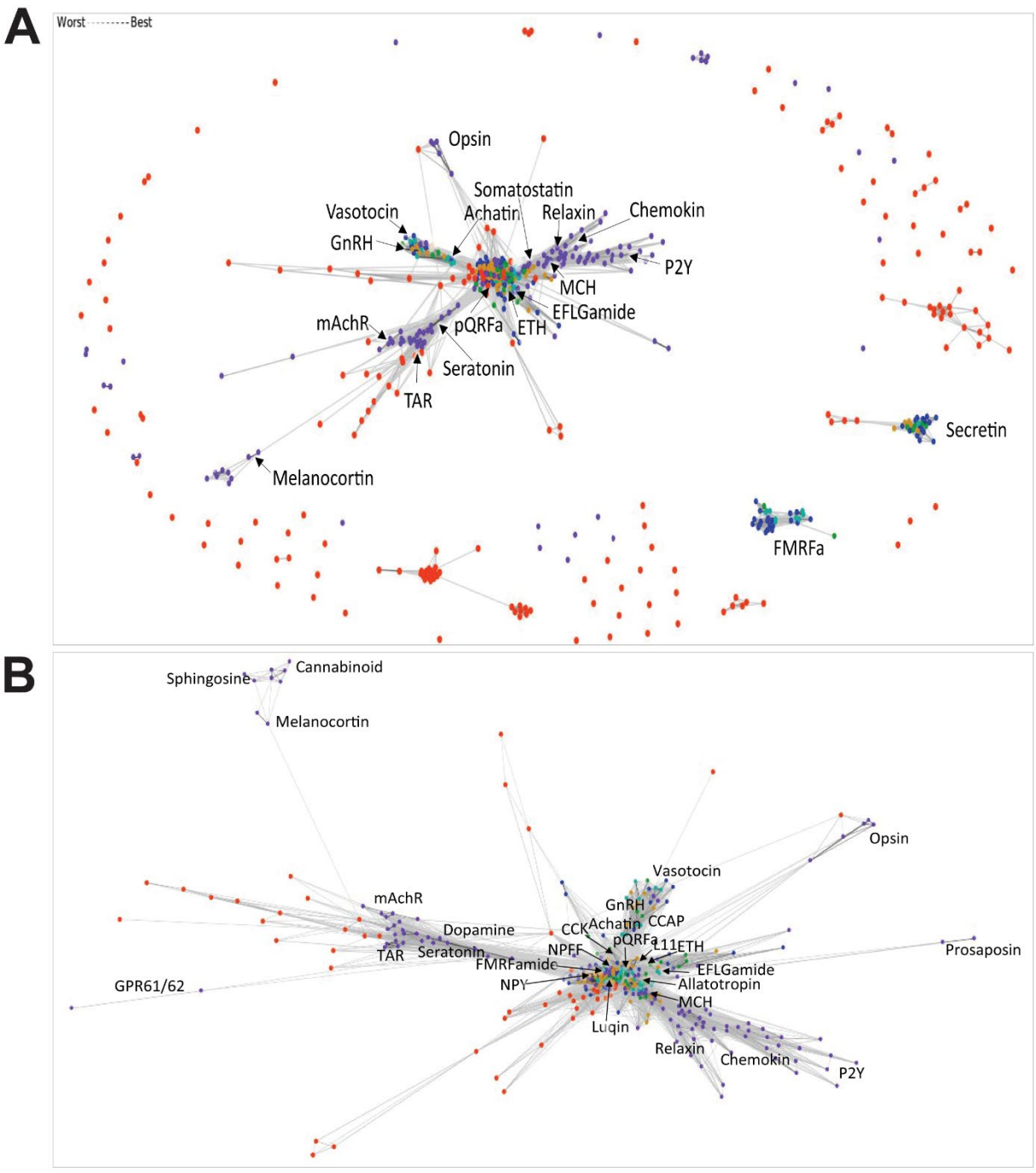


Fig.S2. (A) Sequence-similarity-based clustering of all *Nematostella* apical enriched GPCRs. Forty-six *Nematostella* GPCRs clustered with a large group of Rhodopsin and four clustered with Secretin. **(B)** Cluster map of the Rhodopsin cluster presented in A.

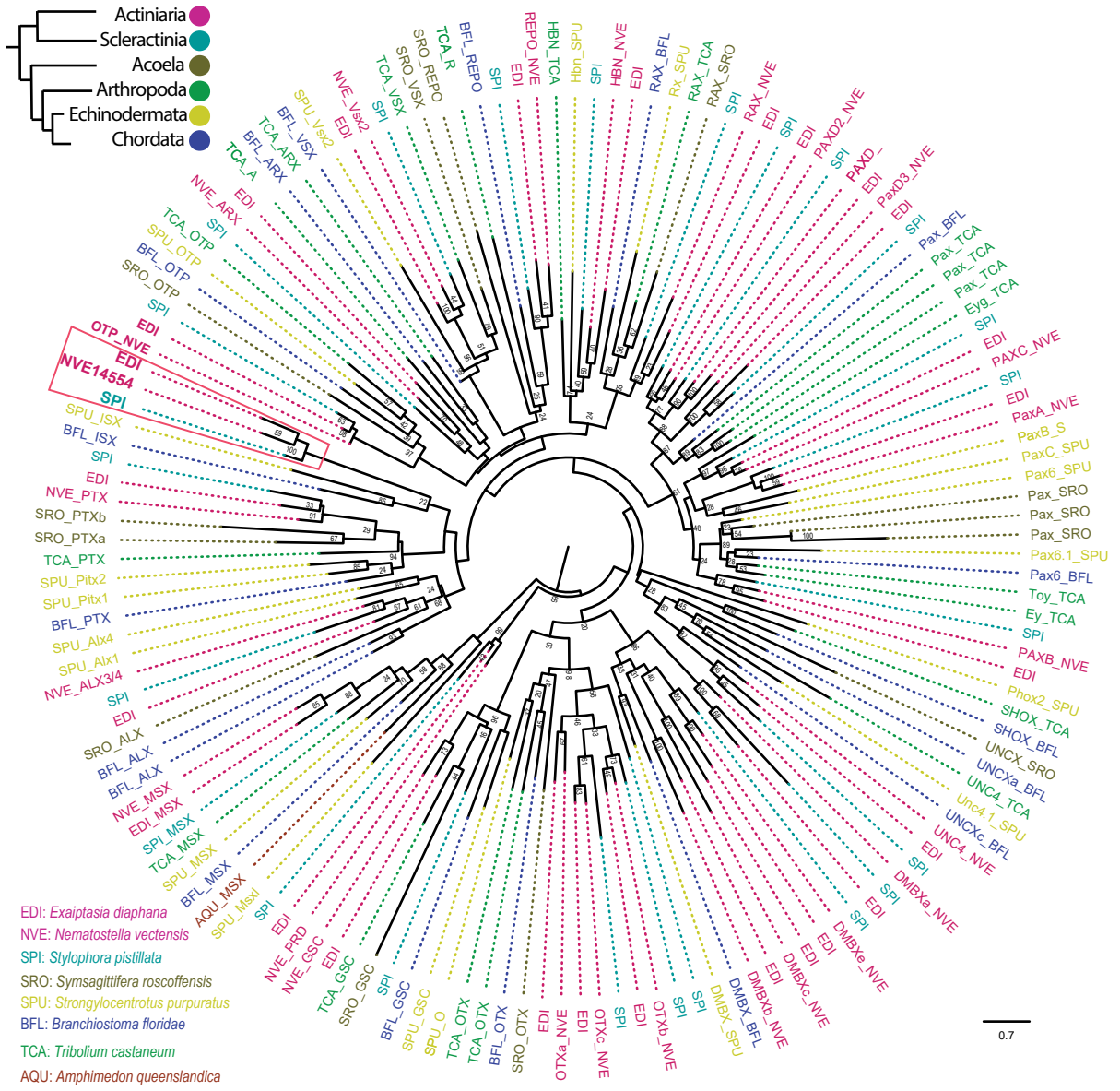


Fig. S3. Maximum likelihood phylogenetic tree of PRD class homeobox of selected animals. The homeobox sequences of a representative selection of Cnidarians and bilaterian lineages **(Supplementary Table 1)** were aligned with MUSCLE algorithm [77] in the SeaView program [78]. The SMS: Smart Model Selection in PhyML [79] was used to determine the best-fitting model for the Phylogenic reconstruction VT model (+G+F). The maximum-likelihood (ML) phylogenetic trees were constructed using PhyML v3.0 with 100 bootstrap [76]. Only bootstrap values of at least 20 at nodes are shown. The MSX family of ANTP class homeobox was used as an outgroup.

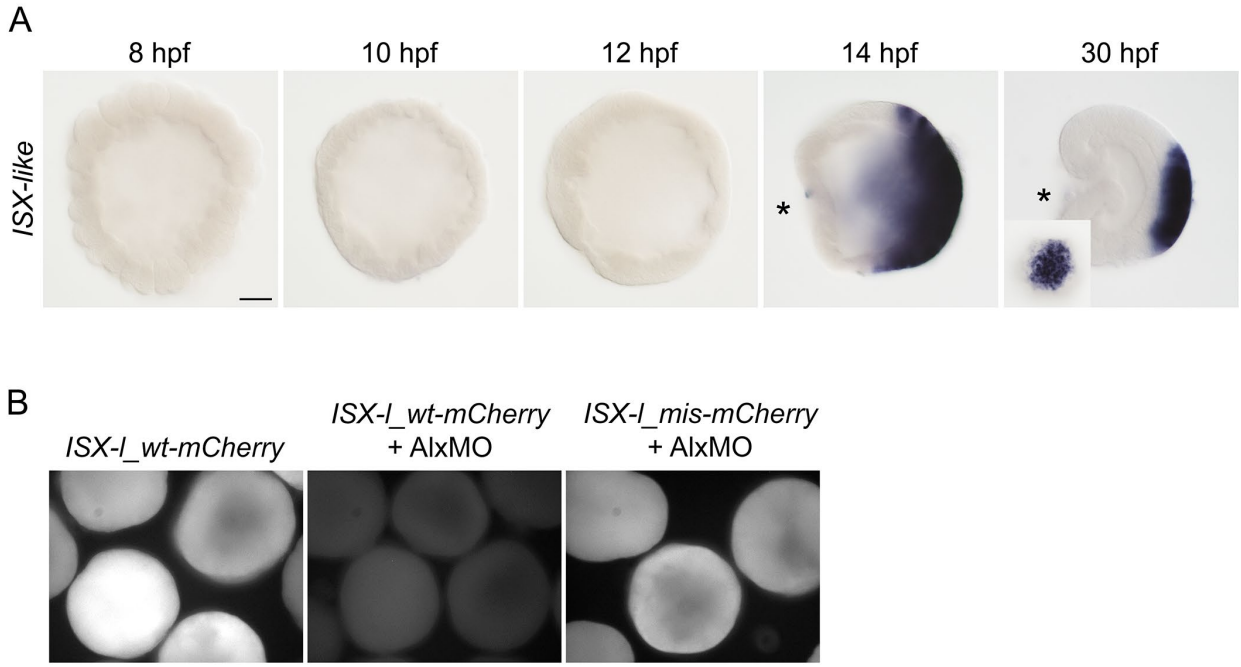


Fig. S4. RNAi and morpholino efficiency. (A) Early expression of ISX-like in *Nematostella* embryos. Inset on the 30 hpf gastrula image shows the aboral view. **(B)** Translation of the *mCherry* mRNA carrying the wild type recognition site of the ISX-like MO fused to it is efficiently suppressed by co-injecting ISX-like MO. In contrast, *mCherry* mRNA carrying the recognition site of the ISX-like MO with five introduced mismatches is efficiently translated in the presence of ISX-like MO. Lateral and aboral views, on lateral views, asterisk denotes the oral end. Scale bars 50 µm.

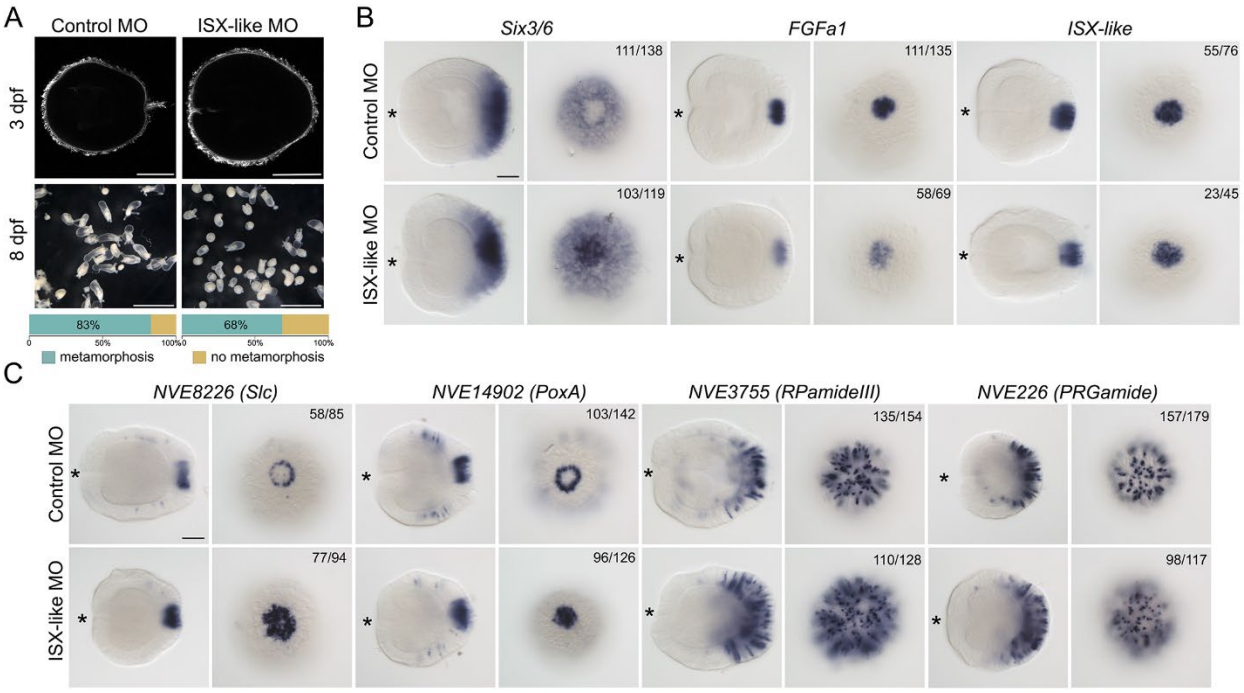


Fig. S5. Effect of the morpholino-mediated knockdown of *ISX-like* phenocopies *ISX-like* RNAi. **(A)** Morpholino knockdown of *ISX-like* leads to a loss of the apical tuft (anti-acetylated tubulin staining, top row) and a mild reduction in the metamorphosis rate. **(B)** In ISX-like morphants, Six3/6 expression expands into the apical domain, however, *FGFa1* and *ISX-like* are not strongly affected. **(C)** In ISX-like morphants, the expression of the ring genes extends into the pot domain, but the expression of the aborally enriched *PRGamide* (*NVE226*), and *RPamide III* (*NVE3775*) does not appear to be strongly affected. Lateral and aboral views, on lateral views, asterisk denotes the oral end. Scale bars on **(A)** 100 µm, on **(B)** and **(C)** 50 µm.

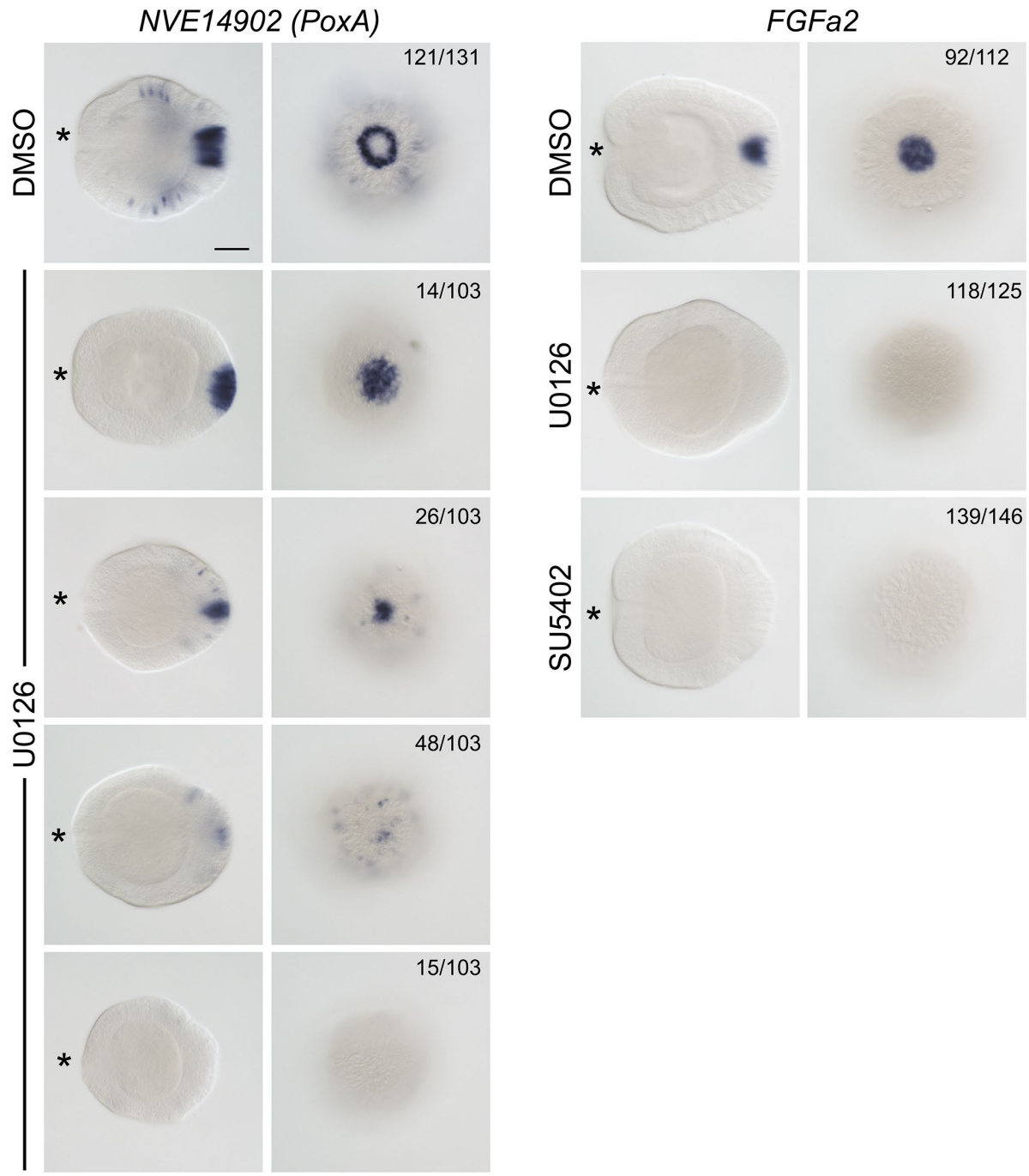
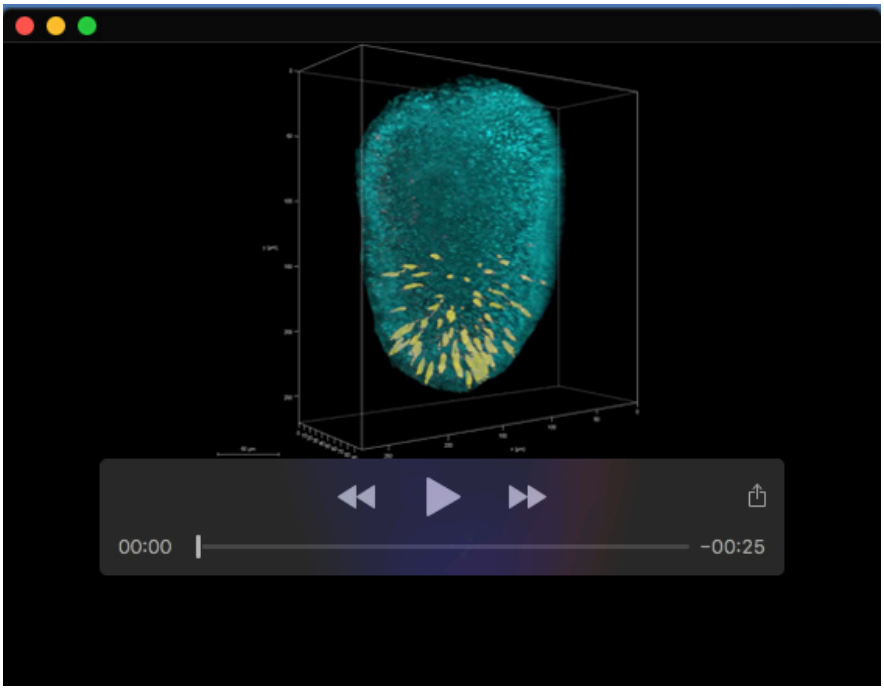


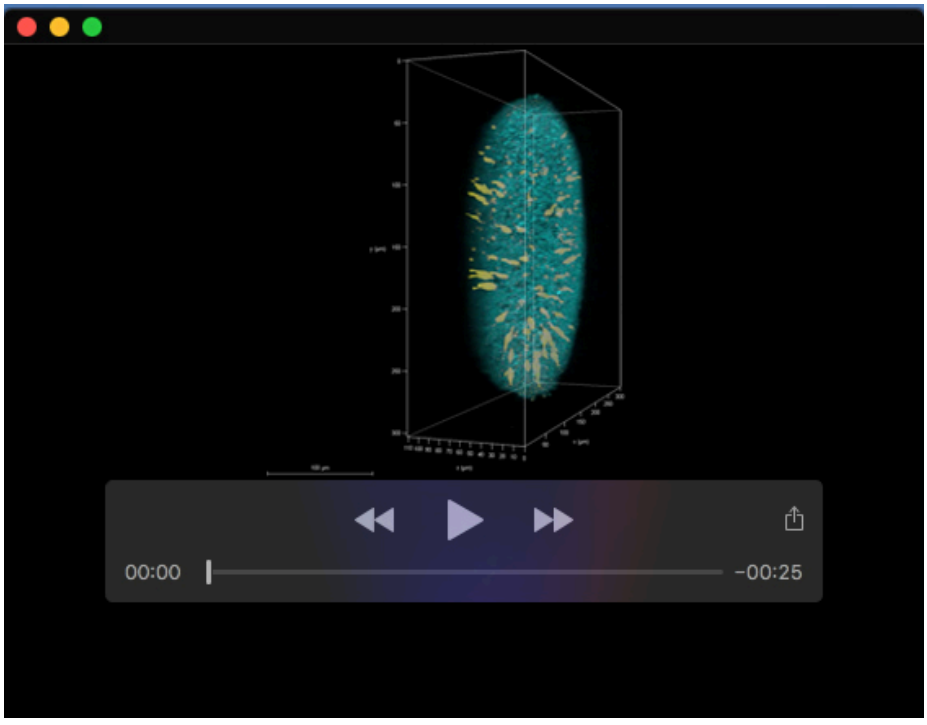
Fig. S6. Variability of the effect of the U0126 treatment on NVE14902 expression and the effect of U0126 and SU5402 on FGFa2 expression. Scale bar 50 μm.

Table S1. Data relevant to figures 2, 3, 4, S1, S2 and S3.

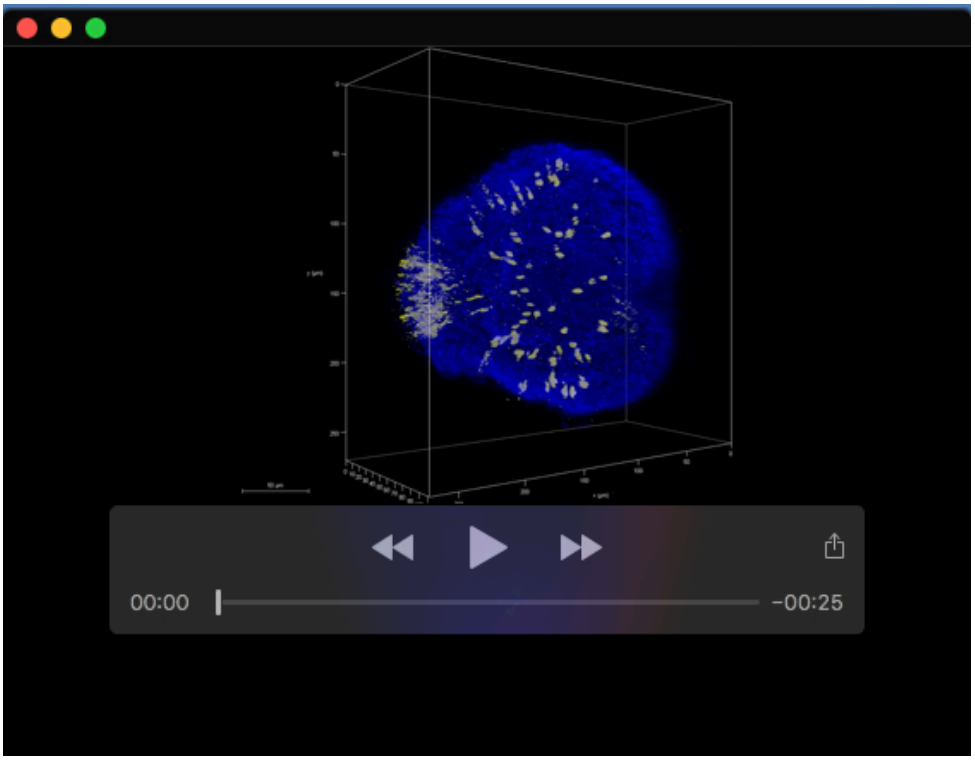
Click here to download Table S1



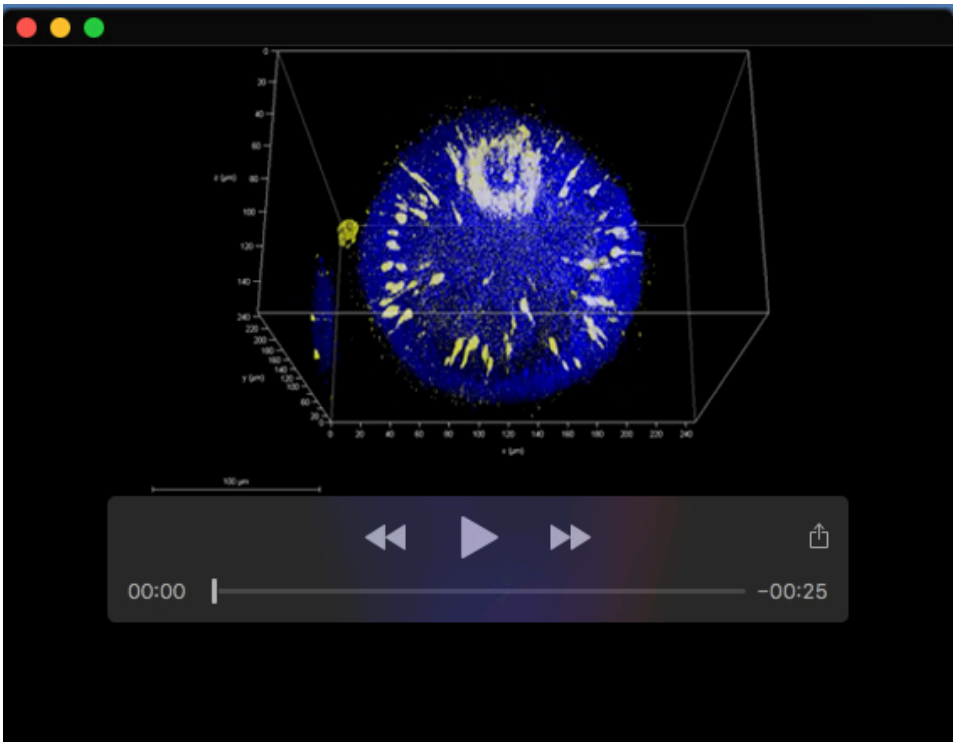
Movie 1. 3D view of fluorescence in situ hybridisation for gland/secretory cells type 1, related to Figure 5B&C. gland/secretory cells type 1 marker NVE22589 (yellow) and DAPI in cyan.



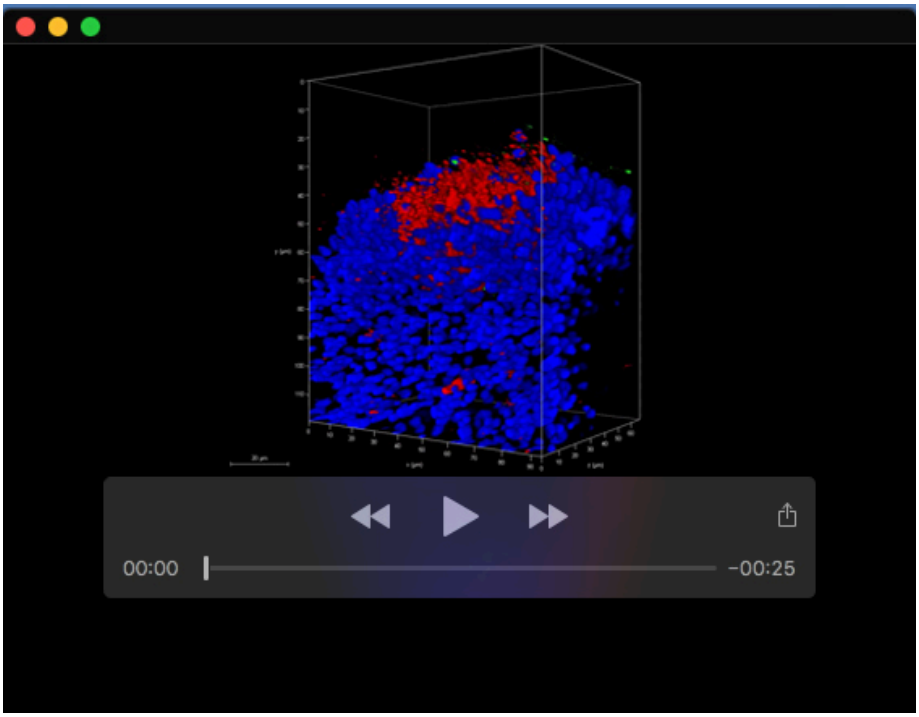
Movie 2. 3D view of fluorescence in situ hybridisation for gland/secretory cells type 3, related to Figure 5F. Gland/secretory cells type 3 marker NVE23674 (yellow) and DAPI in cyan.



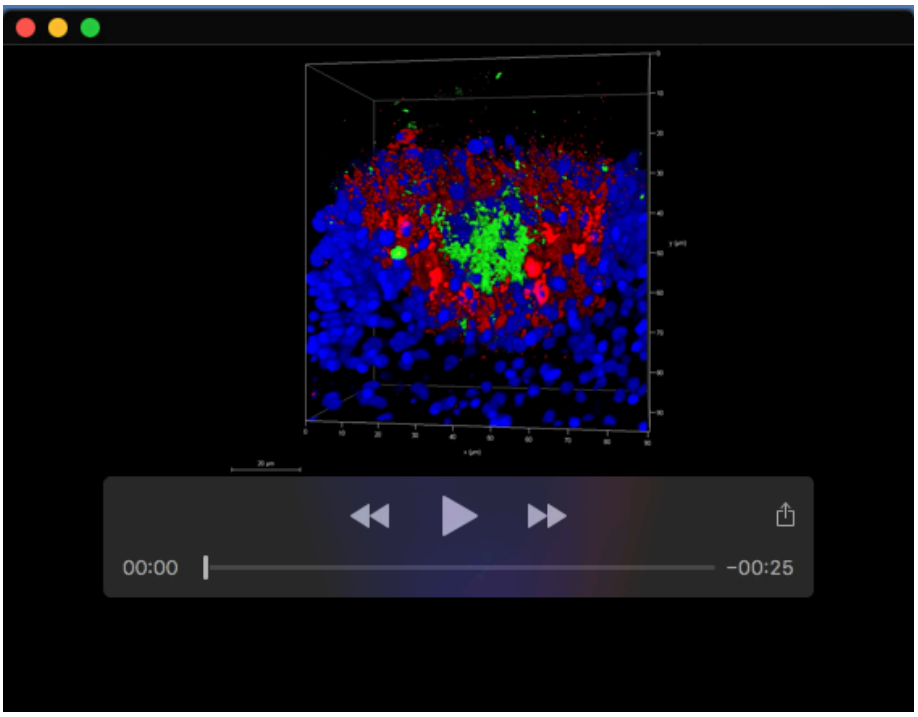
Movie 3. 3D view of fluorescence in situ hybridisation for larval-specific neuron gene, related to Figure 6A. *NVE8226* mRNA probe (yellow) and DAPI in Blue.



Movie 4. 3D view of fluorescence in situ hybridisation for larval-specific neuron gene, related to Figure 6E. *NVE14902* mRNA probe (yellow) and DAPI in Blue.



Movie 5. 3D view of Double fluorescence in situ hybridisation for spot probe *NVE14554* (green) and rind NVE8226 (red) mRNA probes, related to Figure 6L. DAPI in Blue.



Movie 6. 3D view of Double fluorescence in situ hybridisation for spot probe *NVE14554* (green) and rind *NVE14902* (red) mRNA probes, related to Figure 6M. DAPI in Blue.