

Supplementary Materials

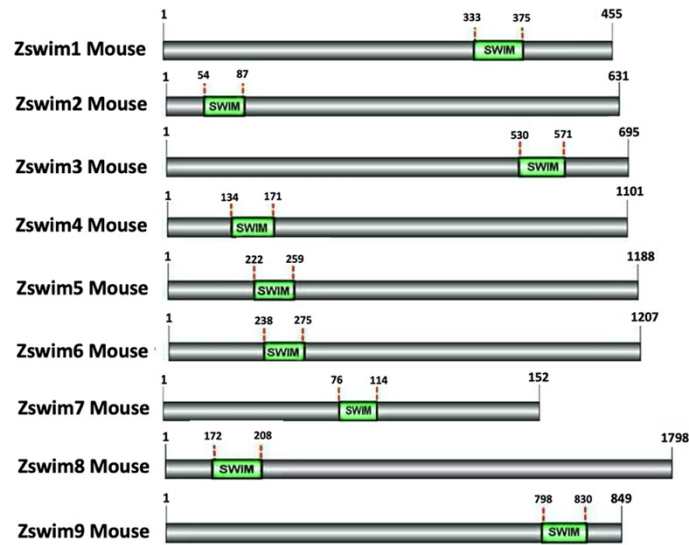
Genome-wide identification and spatiotemporal expression profiling of zinc finger SWIM domain-containing protein family genes

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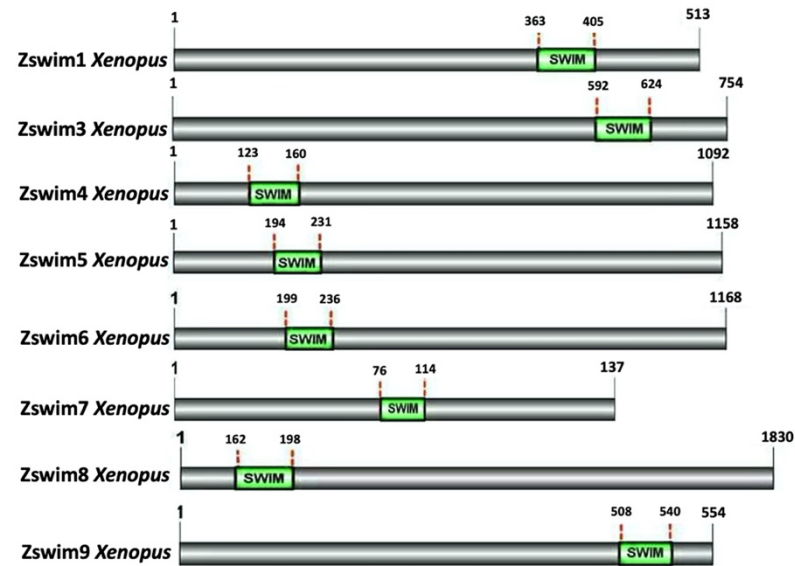
1. Key Laboratory for Regenerative Medicine, Ministry of Education, School of Biomedical Sciences, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China
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(A)



(B)



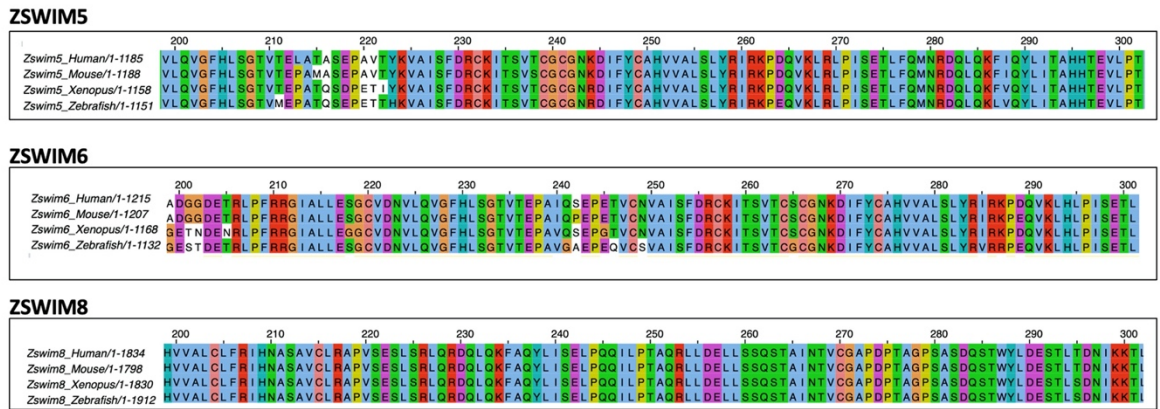
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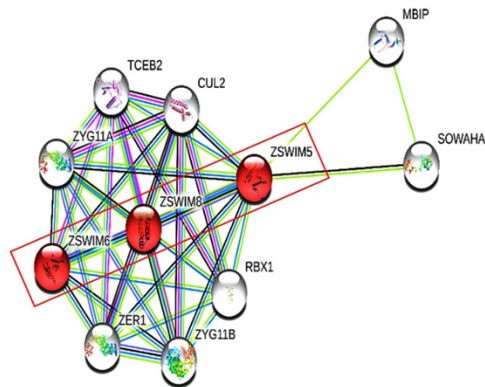
Supplementary Figure S1 Identification of SWIM domains

A-C: Identification of ZSWIM family members and localization of SWIM domain in mice, *Xenopus*, and zebrafish.

A



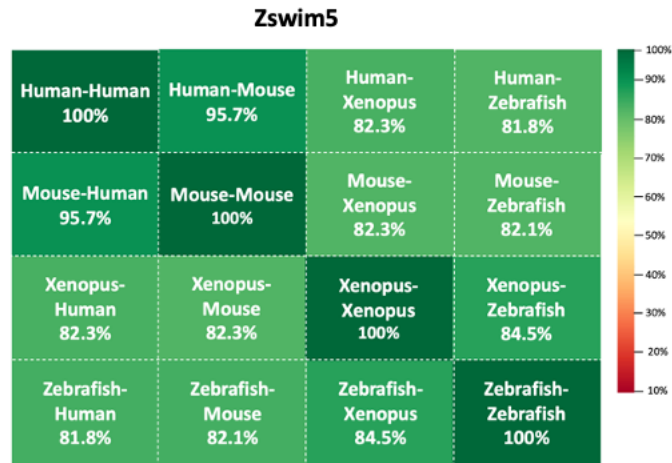
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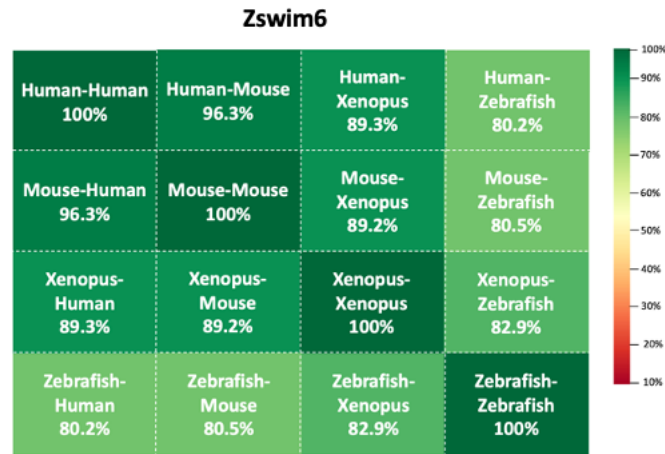
Supplementary Figure S2 Multiple sequence alignment and protein-protein interaction analysis

A: Amino acid sequence alignment of highly identical members. B: Prediction of interactions between ZSWIM family members using the online STRING tool. The red rectangle highlights possible interactions among ZSWIM5, ZSWIM6, and ZSWIM8.

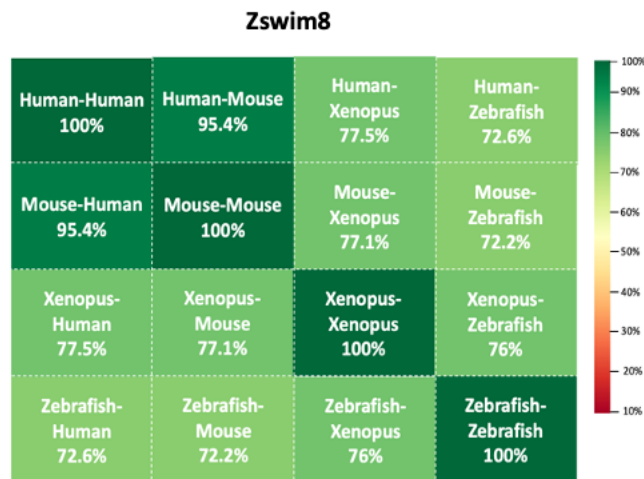
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(B)



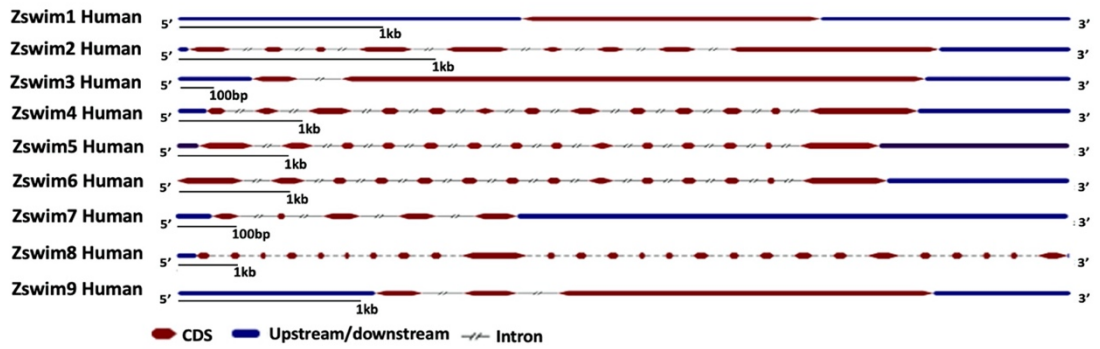
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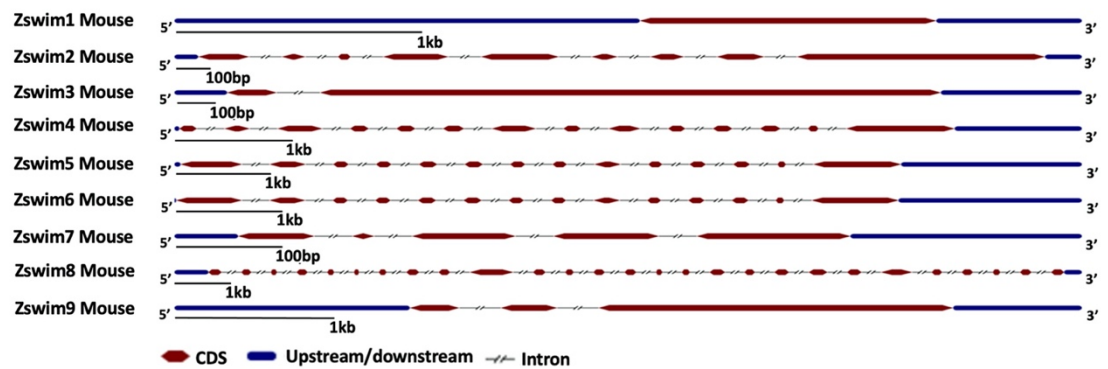
Supplementary Figure S3 Percentage of sequence identity of aligned ZSWIM family members

A-C: Heatmap representing percentage identity of highly identical members of the ZSWIM family i.e., ZSWIM5, ZSWIM6, and ZSWIM8.

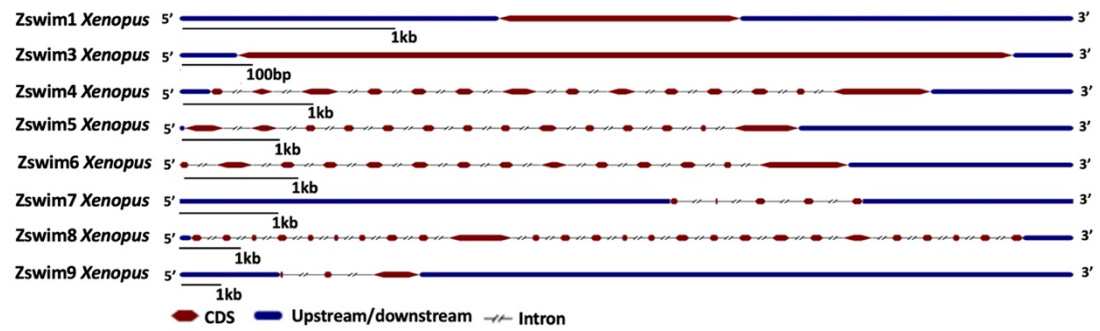
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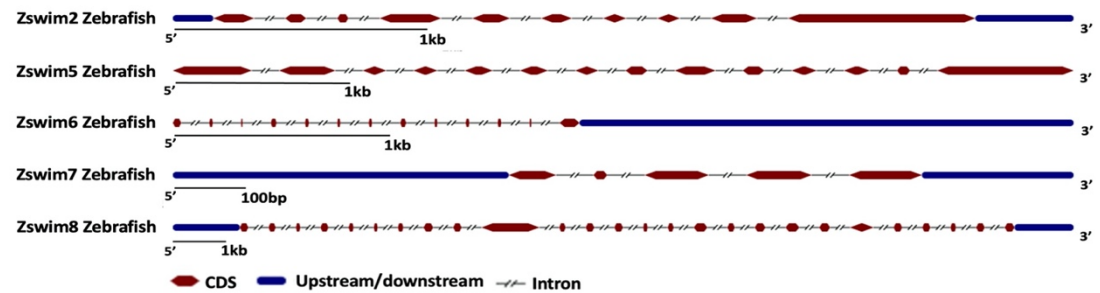
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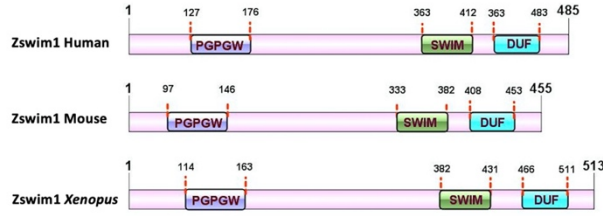


Supplementary Figure S4 Gene structure analysis

Exon-intron structure of *ZSWIM* genes in humans (A), mice (B), *Xenopus* (C), and

zebrafish (D).

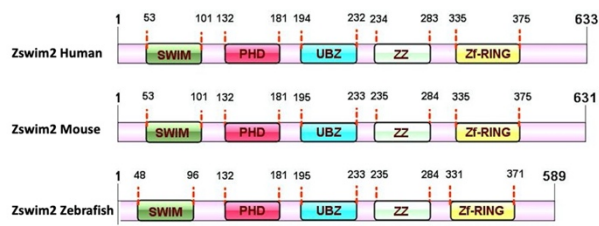
(A)



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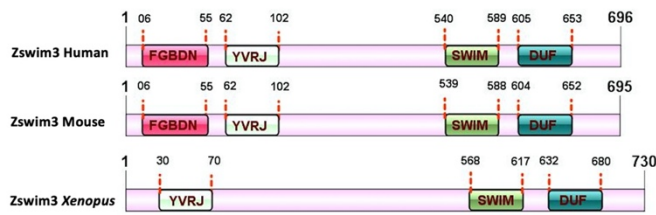
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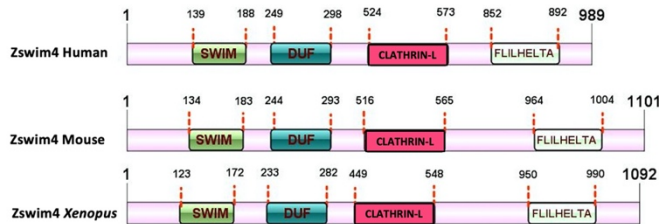
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(F)

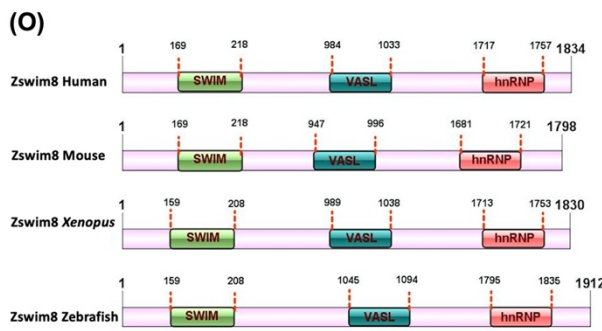
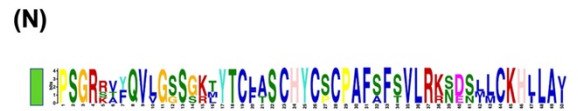
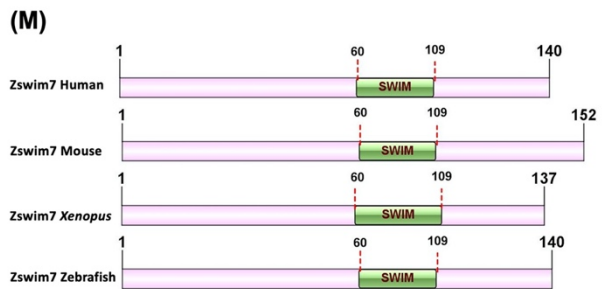
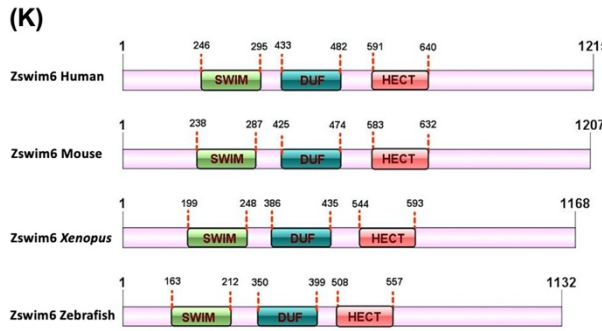
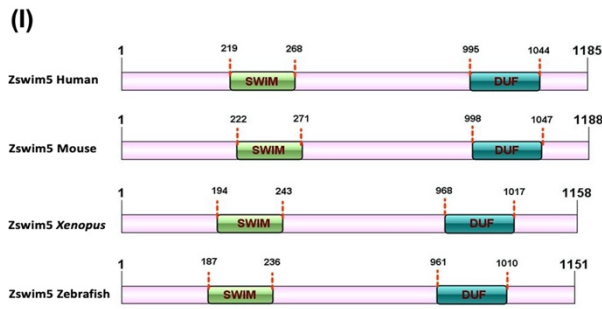


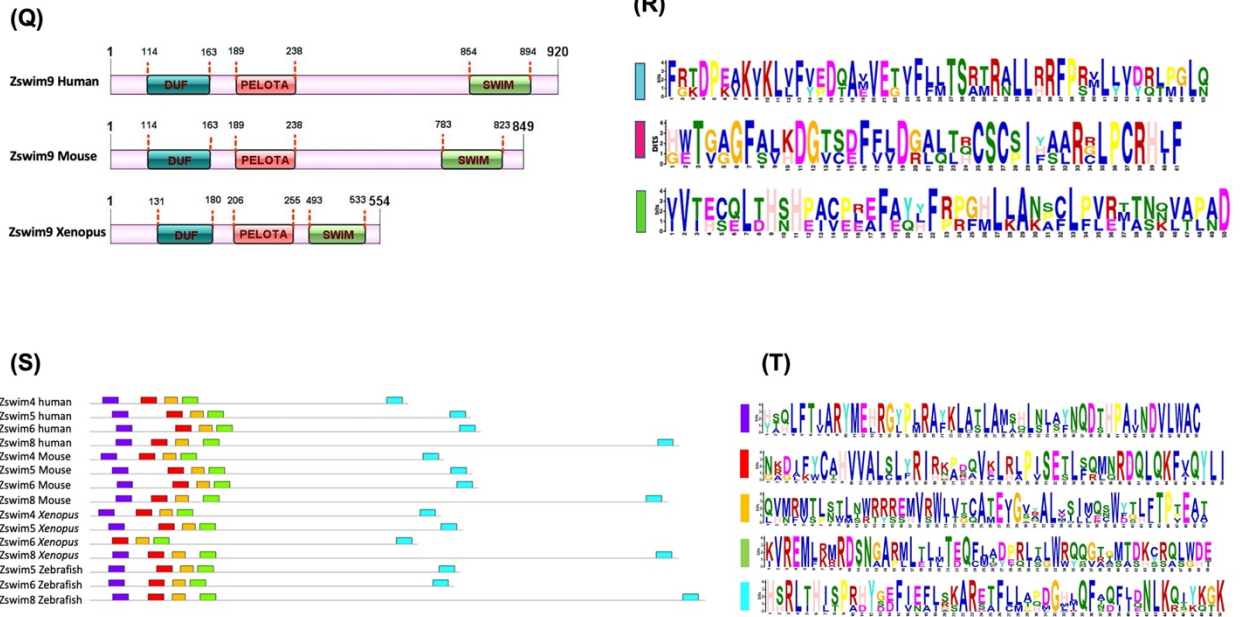
(G)



(H)



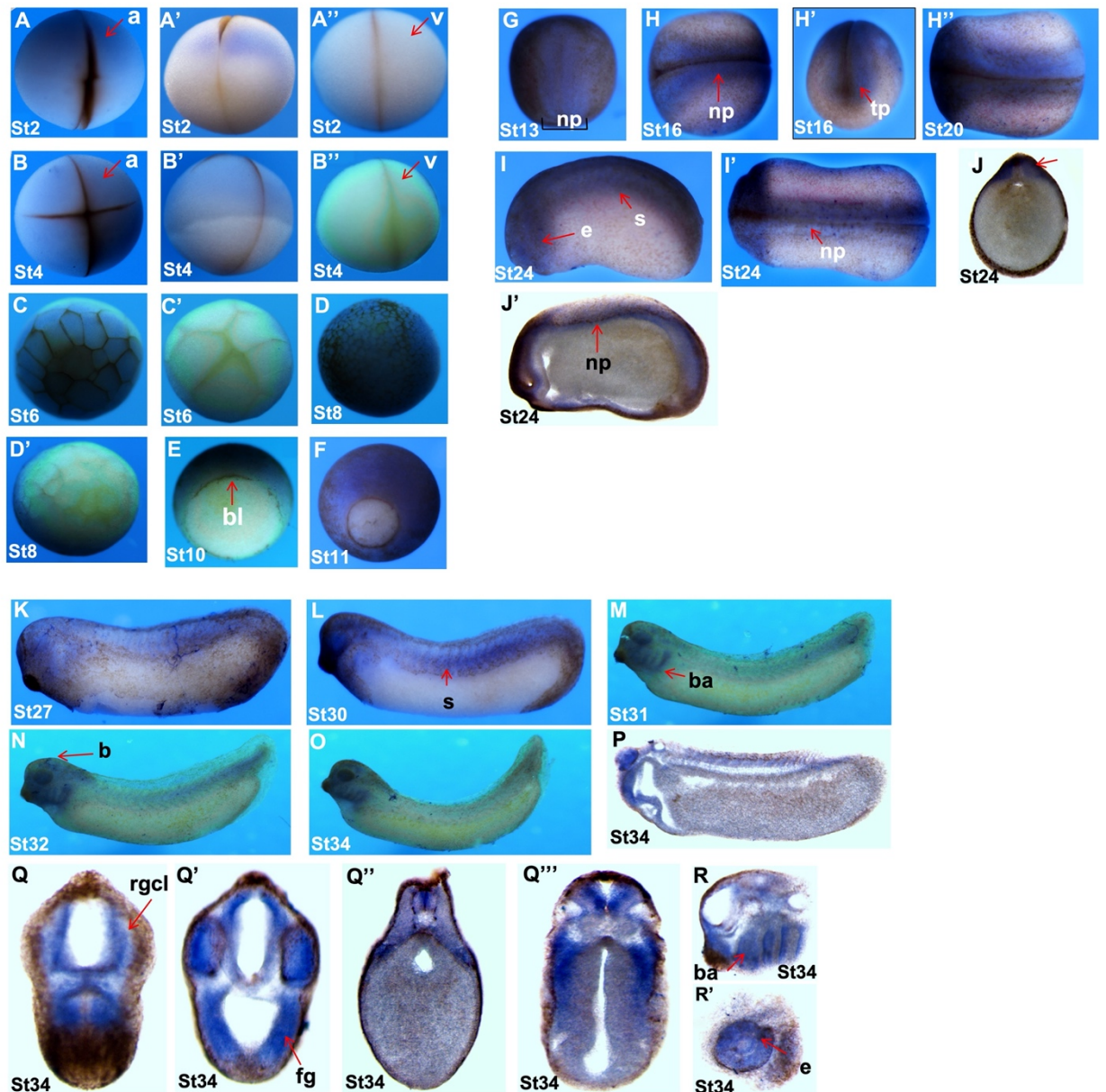




Supplementary Figure S5 Identification of conserved motifs in ZSWIM family members

A, C, E, G, I, K, M, O, Q: Schematic representations of ZSWIM1, ZSWIM2, ZSWIM3, ZSWIM4, ZSWIM5, ZSWIM6, ZSWIM7, ZSWIM8, and ZSWIM9 showing different conserved motifs in humans, mice, and *Xenopus*. Motif abbreviations: PGPGW, putative transmembrane protein family; SWIM, zinc finger SWIM-type domain; DUF, domain of unknown function; FGBDN, formin N-terminal GTPase binding domain; YVRJ, YvrJ protein family; CLATHRIN-L, clathrin heavy chain linker; FLILHELTA, hypothetical protein family; HECT, ubiquitin transferase domain; VASL, type VI secretion system protein family; hnRNP, heterogenous nuclear ribonuclear protein family. B, D, F, H, J, L, N, P, R: Sequence logos of each identified domains in the corresponding ZSWIM members. S: ZSWIM4, ZSWIM5, ZSWIM6, and ZSWIM8 contained conserved motifs in all four organisms, as indicated by sequence logos in (T).

Zswim9



Supplementary Figure S6 Faint expression of *zswim9* throughout embryogenesis

Spatial expression levels of *zswim9* were analyzed by whole-mount *in situ* hybridization. (A-A'') Stage 2 embryo, animal view (A), lateral view (A'), vegetal view (A''). (B-B'') Stage 3 embryo, animal view (B), lateral view (B'), vegetal view (B''). (C) Embryo at blastula stage (stage 6), animal view (C), vegetal view (C'). (D, D') Blastula stage (stage 8), animal view (D), vegetal view (D'). (E) Gastrula stage (stage 10). Blastopore lip is indicated by red arrow. (F) Mid gastrula stage (stage 11), dorsal view. (G) Early neurula stage (13), dorsal view. (H-H') Mid neurula stage (stage 16) lateral view (H), anterior (H') view. (H'') Late neurula stage (stage 20), dorsal view. (I-J') Mid tailbud stage (stage 24) lateral view (I), dorsal view (I'). Longitudinal (J) and

transverse sections (J'). (K-O) Late tailbud stages (stages 27 to 34), lateral view. (P) Late tailbud stage (stage 34). (P-R') Sections of stage 34 embryos. (P) Longitudinal section. (Q-Q''') Transverse sections (R-R'). (R, R') Longitudinal sections crossing head region. Abbreviations: a, animal; b, brain; br, branchial arch; bl: blastopore lip; e, eye; fg, foregut; np, neural plate; nt, neural tube; s, somites; tp, trigeminal placode; v, vegetal.

Supplementary Table S1 List of *Zswim* gene accession numbers used in this study.

Gene Name	Organism	Accession No#
ZSWIM1	Human	NM_080603.5
ZSWIM2	Human	NM_182521.3
ZSWIM3	Human	NM_080752.4
ZSWIM4	Human	NM_001367834.3
ZSWIM5	Human	NM_020883.2
ZSWIM6	Human	NM_020928.2
ZSWIM7	Human	NM_001042697.2
ZSWIM8	Human	NM_001242487.2
ZSWIM9	Human	NM_199341.4
ZSWIM1	Mouse	NM_028028.3
ZSWIM2	Mouse	NM_027964.2
ZSWIM3	Mouse	NM_178375.2
ZSWIM4	Mouse	NM_172503.3
ZSWIM5	Mouse	NM_001029912.3
ZSWIM6	Mouse	NM_145456.3
ZSWIM7	Mouse	NM_027198.1
ZSWIM8	Mouse	NM_001252081.2
ZSWIM9	Mouse	NM_177312.4
ZSWIM1	<i>Xenopus tropicalis</i>	NM_001004917.1
ZSWIM3	<i>Xenopus tropicalis</i>	XM_031894541.1
ZSWIM4	<i>Xenopus tropicalis</i>	XM_002941011.5
ZSWIM5	<i>Xenopus tropicalis</i>	NM_001097236.1
ZSWIM6	<i>Xenopus tropicalis</i>	XM_031894058.1
ZSWIM7	<i>Xenopus tropicalis</i>	XM_004911686.4
ZSWIM8	<i>Xenopus tropicalis</i>	XM_012966846.3
ZSWIM9	<i>Xenopus tropicalis</i>	XM_004916203.4
ZSWIM2	Zebrafish	NM_001100143.1
ZSWIM5	Zebrafish	NM_001144819.1
ZSWIM6	Zebrafish	NM_001136487.1
ZSWIM7	Zebrafish	NM_001083540.1
ZSWIM8	Zebrafish	NM_001145707.1

Supplementary Table S2 List of all ZSWIM family members identified in four well-characterized model organisms, including humans, mice, *X. tropicalis*, and zebrafish.

Gene Name	Gene ID	Chromosome			UniProtKB/Swiss-Pro	Length (aa)	SWIM position	Molecular Weight (Average Mass)	PI	Organism
		No	Start	End						
ZSWIM1	90204	C20	45880920	45885266	Q9BR11	485	363-405	55070.55	7.05	Homo sapiens
ZSWIM2	151112	C2	186827475	186849170	Q8NEG5	633	54-88	72732.01	8.95	Homo sapiens
ZSWIM3	140831	C20	45857581	45879131	Q96MP5	696	571-572	79454.06	7.27	Homo sapiens
ZSWIM4	65249	C19	13795424	13832254	Q9H7M6	989	139-176	110138.02	6.63	Homo sapiens
ZSWIM5	57643	C1	45016399	45206605	Q9P217	1185	219-256	130633.51	6.78	Homo sapiens
ZSWIM6	57688	C5	61332258	61546172	Q9HCJ5	1215	246-283	133470.37	7.01	Homo sapiens
ZSWIM7	125150	C17	15976560	15999704	Q19AV6	140	66-114	15385.92	6.7	Homo sapiens
ZSWIM8	23053	C10	73785577	73801798	A7E2V4	1837	172-208	197297.34	6.35	Homo sapiens
ZSWIM9	374920	C19	48170662	48197621	Q86X18-2	920	869-901	101681.49	8.51	Homo sapiens
ZSWIM1	71971	C2	164822686	164826867	Q9CWX7	455	333-375	51481.16	6.49	Mus musculus
ZSWIM2	71861	C2	83915079	83941226	Q9D9X6	631	54-87	71792.83	9.25	Mus musculus
ZSWIM3	67538	C2	164805114	164822127	Q8CFL8	695	530-571	79132.45	6.42	Mus musculus
ZSWIM4	212168	C8	84210942	84237042	Q8C7B8	1101	134-171	122444.84	6.89	Mus musculus
ZSWIM5	74464	C4	116877402	116989105	Q80TC6	1188	222-259	130926.95	7.09	Mus musculus
ZSWIM6	67263	C13	107724617	107890064	Q80TB7	1207	238-275	132775.53	7.03	Mus musculus
ZSWIM7	69747	C11	62267224	62281395	Q9CWX2	152	76-114	16658.21	5.89	Mus musculus
ZSWIM8	268721	C14	20706277	20723619	Q3UHH1	1798	172-208	193566.37	6.54	Mus musculus
ZSWIM9	321008	C7	13258967	13278721	Q6D192	849	798-830	95097.88	8.9	Mus musculus
ZSWIM1	448297	C10	19762900	19768378	Q6DJ16	513	363-405	58364.57	6.11	Xenopus tropicalis
ZSWIM3	100485421	C10	19754927	19758964	F6WZM1	754	592-624	85895.36	7.98	Xenopus tropicalis
ZSWIM4	100497232	C3	141215234	141229480	L7N366	1092	123-160	121813.14	7.88	Xenopus tropicalis
ZSWIM5	100036685	C4	90490121	90539947	A1A5F7	1158	194-231	129150.78	7.19	Xenopus tropicalis
ZSWIM6	100490710	C1	1189114940	189187303	F6ZPJ5	1168	199-236	130398.21	7.04	Xenopus tropicalis
ZSWIM7	101735140	C2	31208761	31255982	AOA5G3HR40	137	76-114	15342.76	5.52	Xenopus tropicalis
ZSWIM8	100144740	C7	44456662	44517241	F6Z2T5	1830	162-198	200214.63	6.2	Xenopus tropicalis
ZSWIM9	100145494	C7	103496998	103525861	AOA810R3C6	554	508-540	63971.08	8.06	Xenopus tropicalis
ZSWIM2	561301	C6	11760783	11764335	A6H8U0	589	49-82	66843.41	9.15	Danio rerio
ZSWIM5	100149522	C2	27491101	27541205	B8JLP8	1151	187-236	128457.69	7.2	Danio rerio
ZSWIM6	403057	C10	44275588	44337752	Q4VBG8	1132	163-212	127022.4	7.8	Danio rerio
ZSWIM7	325530	C5	62726352	62771251	A4FV10	140	76-114	15440.88	6.87	Danio rerio
ZSWIM8	100148379	C13	21824967	21885562	B8A5T6	1912	162-198	205870.84	6.35	Danio rerio