

Table S1. Ion Channels Used in the Phylogenetic Analysis, Related to Figure 4

Organism	Phylum	Channel	Alternative names	GenBank accession
<i>Aiptasia pallida</i> (sea anemone)	Cnidaria	ApNa _v 1		AAB96953
<i>Anopheles gambiae</i> (African malaria mosquito)	Arthropoda	AgCa _v 1	-	ABQ88369
<i>Aplysia californica</i> (sea hare)	Mollusca	AcNa _v 1	SCAP1	AAC47457
<i>Blatella germanica</i> (German cockroach)	Arthropoda	BgNa _v 1	Para	AAC47483
		BgNa _v 2	BSC1	AAK01090
<i>Branchiostoma floridae</i> (lancelet)	Cephalochordata	BfNa _v 1	-	HQ877456
		BfNa _v 2	-	HQ877455
<i>Cancer borealis</i> (Jonah crab)	Arthropoda	CbNa _v 1	-	ABL10360
<i>Capitella teleta</i> (polychete worm)	Annelida	CtNa _v 1	-	None, JGI protein ID 210954
		CtNa _v 2	-	None, JGI protein ID 134859
<i>Clytia hemisphaerica</i> (hydrozoan jellyfish)	Cnidaria	ChNa _v 2.1	-	JQ066821
		Ch Na _v 2.5	-	JQ066822
<i>Cyanea capillata</i> (lion mane's jellyfish)	Cnidaria	CcNa _v 2.5	-	AAA75572
		CcCa _v 1	-	AAC63050
<i>Danio rerio</i> (zebrafish)	Chordata	DrNa _v 1.6	-	AAG18440
<i>Drosophila melanogaster</i> (fruit fly)	Arthropoda	DmNa _v 1	Para	AAB59195
		DmNa _v 2	DSC1, 60E	Q9W0Y8
		DmCa _v 1	-	AAA81883
<i>Halocynthia roretzi</i> (ascidian)	Chordata	HrNa _v 1	TuNa1	BAA04133
		HrNa _v 2	TuNa2	BAA95896
		HrCa _v 1	-	BAA34927
<i>Homo sapiens</i> (human)	Chordata	hNa _v 1.1	SCN1A, Brain	P35498

			type I channel	
		hNa _v 1.2	SCN2A, Brain type II channel	Q99250
		hNa _v 1.3	SCN3A, Brain type III channel	Q9NY46
		hNa _v 1.4	SCN4A, Skeletal muscle type IV channel	AAO83647
		hNa _v 1.5	SCN5A, Cardiac muscle type V	Q14524
		hNa _v 1.6	SCN8A	Q9UQD0
		hNa _v 1.7	SCN9A, Peripheral sodium channel 1, PN1	Q15858
		hNa _v 1.8	SCN10A	Q9Y5Y9
		hCa _v 1.1	CAC1S, L- type calcium channel	Q13698
<i>Hydra magnipapillata</i>	Cnidaria	HmNa _v 2.1	-	JQ066819
		HmNa _v 2.5	-	JQ066820
<i>Loligo bleekeri</i> (squid)	Mollusca	Lb Na _v 2	-	BAA03398
<i>Loligo opalescens</i> (squid)	Mollusca	LbNa _v 2	-	AAA16202
<i>Mnemiopsis leidyi</i> (comb jelly)	Ctenophora	MINa _v 2a	-	AEF59085
		MINa _v 2b	-	AEF59086
<i>Monosiga brevicollis</i>	Opisthokonta	MbNa _v 2		HQ877454
<i>Mus musculus</i> (mouse)	Chordata	Nax	NaG, SCN6A, SCN7A	AAA66192
<i>Nematostella vectensis</i>	Cnidaria	NvNa _v 2.1	-	HQ877457

(starlet sea anemone)		NvNa _v 2.2	-	HQ877458
		NvNa _v 2.3	-	HQ877459
		NvNa _v 2.4	-	HQ877460
		NvNa _v 2.5	-	HQ877461
		NvCa _v 1	-	XP_001639054
<i>Polyorchis penicillatus</i> (hydrozoan jellyfish)	Cnidaria	PpNa _v 2.5	-	AAC38974
<i>Rattus norvegicus</i> (rat)	Chordata	rNa _v 1.4	SCN4A, Skeletal muscle type IV channel	P15390
		rCa _v 1.2	CAC1S, L- type calcium channel	P22002
<i>Strongylocentrotus purpuratus</i> (purple sea urchin)	Echinodermata	SpuNa _v 2	-	XP_001189610
<i>Stylophora pistillata</i> (stony coral)	Cnidaria	SpiCa _v 1	-	AAD11470
<i>Thalassiosira pseudonana</i> (diatom)	Bacillariophyta	TpCa _v	-	XP_002289136
<i>Thecamonas trahens</i>	Apusozoa	TtNa _v 2	TtrNa _v	None, Broad Institute protein model
<i>Trichoplax adhaerens</i>	Placozoa	TaNa _v 2a	-	HQ877452
<i>Trichoplax adhaerens</i>	Placozoa	TaNa _v 2b	-	HQ877453
<i>Varroa destructor</i>	Arthropoda	VdNa _v 1	-	AAP13992

Table S1. Ion channels used in the phylogenetic analysis. Most channels are derived from cloned transcripts that were deposited in Genbank. Channel transcripts cloned in the present study appear on gray background. Channel obtained from public genome sequencing projects supported by EST data appear in red. The channel protein models of the annelid *Capitella teleta* are from the genome sequencing project performed by the Joint Genome Institute (JGI) available at <http://genome.jgi.doe.gov/Capca1/Capca1.home.html>. The

channel protein model of *Thecamonas trahens* is from the Origins of Multicellularity project by the Broad Institute available at http://broadinstitute.org/annotation/genome/multicellularity_project.