

Table S1. List of CatSper Proteins Used for Analyses

Name	Organism	Common Name	Identifier	Database
Invertebrates - Cnidarians				
NveCatS-1	<i>Nematostella vectensis</i>	starlet sea anemone	XP_001641973.1	GenBank
NveCatS-2	<i>Nematostella vectensis</i>	starlet sea anemone	XP_001629309.1	GenBank
*NveCatS-3	<i>Nematostella vectensis</i>	starlet sea anemone	XP_001629965.1	GenBank
*NveCatS-4	<i>Nematostella vectensis</i>	starlet sea anemone	XP_001631669.1	GenBank
NveCatS-β	<i>Nematostella vectensis</i>	starlet sea anemone	EDO49139.1	GenBank
Invertebrates – Ctenophora				
PpiCatS-1	<i>Pleurobrachia pileus</i>	sea gooseberry	CU423497.1 (nt)	GenBank
PpiCatS-2	<i>Pleurobrachia pileus</i>	sea gooseberry	CU417395.1 (nt) CU422181.1 (nt)	GenBank
Invertebrates - Echinoderms				
SpuCatS-1	<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin	NW_001347864.1 (nt)	GenBank
SpuCatS-2	<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin	XP_001193971.1	GenBank
SpuCatS-3	<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin	NW_001320541.1 (nt)	GenBank
SpuCatS-4	<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin	NW_001312374.1 (nt)	GenBank
*SpuCatS-β	<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin	NW_001356100.1 (nt)	GenBank
Invertebrates – Cephalochordates (Amphioxus)				
BflCatS-1	<i>Branchiostoma floridae</i>	Florida Lancelet	scaffold_42 (nt)	JGI
BflCatS-2	<i>Branchiostoma floridae</i>	Florida Lncelet	scaffold_346 (nt)	JGI
BflCatS-3	<i>Branchiostoma floridae</i>	Florida Lancelet	scaffold_92 (nt)	JGI
BflCatS-4	<i>Branchiostoma floridae</i>	Florida Lancelet	scaffold_135 (nt)	JGI
*BflCatS-β	<i>Branchiostoma floridae</i>	Florida Lancelet	scaffold_62 (nt)	JGI
Invertebrates – Urochodates (Tunicates)				
CsaCatS-1	<i>Ciona savignyi</i>	Sea Squirt	Reftig_44 (nt)	Ensembl
CsaCatS-2	<i>Ciona savignyi</i>	Sea Squirt	Reftig_464 (nt)	Ensembl
CsaCatS-3	<i>Ciona savignyi</i>	Sea Squirt	Reftig_19 (nt)	Ensembl
CsaCatS-4	<i>Ciona savignyi</i>	Sea Squirt	Reftig_17 (nt)	Ensembl
*CsaCatS-β	<i>Ciona savignyi</i>	Sea Squirt	Reftig_4 (nt)	Ensembl
CinCatS-1	<i>Ciona intestinalis</i>	Sea Squirt	Cioin2: 221463	JGI
CinCatS-2	<i>Ciona intestinalis</i>	Sea Squirt	Chunk scaffold_215 (nt)	JGI
*CinCatS-3	<i>Ciona intestinalis</i>	Sea Squirt	Chunk 2q_165 (nt)	JGI
CinCatS-4	<i>Ciona intestinalis</i>	Sea Squirt	Chunk 2q_460 (nt)	JGI
CinCatS-β	<i>Ciona intestinalis</i>	Sea Squirt	Chunk 9q_416 (nt)	JGI
Vertebrates – Chondrichthyes (Cartilaginous Fishes)				
*CmiCatS-2	<i>Callorhynchus milii</i>	Elephant Shark	AAVX01047343.1 (nt)	GenBank
*CmiCatS-3	<i>Callorhynchus milii</i>	Elephant Shark	AAVX01241861.1 (nt)	GenBank
*CmiCatS-4	<i>Callorhynchus milii</i>	Elephant Shark	AAVX01198782.1 (nt)	GenBank
			AAVX01295261.1 (nt)	
			AAVX01583470.1 (nt)	
			AAVX01099504.1 (nt)	
*CmiCatS-β	<i>Callorhynchus milii</i>	Elephant Shark	AAVX01468406.1 (nt)	GenBank
			AAVX01191566.1 (nt)	
			AAVX01360901.1 (nt)	
			AAVX01416650.1 (nt)	
*LerCatS-2	<i>Leucoraja erinacea</i>	Little Skate	CO050315.1 (nt)	GenBank
Vertebrates – Reptiles				
AcaCatS-1	<i>Anolis carolinensis</i>	Anole Lizard	GENSCAN00000056132	Ensembl
AcaCatS-2	<i>Anolis carolinensis</i>	Anole Lizard	GENSCAN00000067675	Ensembl
*AcaCatS-3	<i>Anolis carolinensis</i>	Anole Lizard	GENSCAN00000120241	Ensembl
*AcaCatS-4	<i>Anolis carolinensis</i>	Anole Lizard	GENSCAN00000121458	Ensembl
AcaCatS-β	<i>Anolis carolinensis</i>	Anole Lizard	GENSCAN00000081873	Ensembl
Vertebrates – Mammals				
MusCatS-1	<i>Mus musculus</i>	House Mouse	NP_647462.1	GenBank

MusCatS-2	<i>Mus musculus</i>	House Mouse	NP_694715.2	GenBank
MusCatS-3	<i>Mus musculus</i>	House Mouse	Q80W99.2	GenBank
MusCatS-4	<i>Mus musculus</i>	House Mouse	NP_808534.1	GenBank
MusCatS-β	<i>Mus musculus</i>	House Mouse	NP_766611.1	GenBank
RnoCatS-1	<i>Rattus norvegicus</i>	Norway rat	XP_001070492.1	GenBank
RnoCatS-2	<i>Rattus norvegicus</i>	Norway rat	NP_001012220.1	GenBank
RnoCatS-3	<i>Rattus norvegicus</i>	Norway rat	NP_001099571.1	GenBank
RnoCatS-4	<i>Rattus norvegicus</i>	Norway rat	XP_001066739.1	GenBank
RnoCatS-β	<i>Rattus norvegicus</i>	Norway rat	XP_001065501.1	GenBank
MdoCatS-1	<i>Monodelphis domestica</i>	Gray Short-tailed Opossum	XP_001379458.1	GenBank
MdoCatS-2	<i>Monodelphis domestica</i>	Gray Short-tailed Opossum	NW_001581835.1 (nt)	GenBank
MdoCatS-3	<i>Monodelphis domestica</i>	Gray Short-tailed Opossum	XP_001375484.1	GenBank
MdoCatS-4	<i>Monodelphis domestica</i>	Gray Short-tailed Opossum	XP_001369666.1	GenBank
MdoCatS-β	<i>Monodelphis domestica</i>	Gray Short-tailed Opossum	XP_001369855.1	GenBank
OanCatS-1	<i>Ornithorhynchus anatinus</i>	Platypus	NW_001630702.1 (nt)	GenBank
OanCatS-2	<i>Ornithorhynchus anatinus</i>	Platypus	XP_001521786.1	GenBank
OanCatS-3	<i>Ornithorhynchus anatinus</i>	Platypus	NW_001748254.1 (nt)	GenBank
OanCatS-4	<i>Ornithorhynchus anatinus</i>	Platypus	XP_001518227.1	GenBank
OanCatS-β	<i>Ornithorhynchus anatinus</i>	Platypus	XP_001514501.1	GenBank
EcaCatS-1	<i>Equus caballus</i>	Horse	XP_001491183.1	GenBank
EcaCatS-2	<i>Equus caballus</i>	Horse	NW_001799682.1 (nt)	GenBank
EcaCatS-3	<i>Equus caballus</i>	Horse	XP_001502783.1	GenBank
EcaCatS-4	<i>Equus caballus</i>	Horse	NW_001799705.1	GenBank
EcaCatS-β	<i>Equus caballus</i>	Horse	XP_001494623.1	GenBank
BtaCatS-1	<i>Bos taurus</i>	Cattle	XP_601857.3	GenBank
BtaCatS-2	<i>Bos taurus</i>	Cattle	XP_595874.3	GenBank
BtaCatS-3	<i>Bos taurus</i>	Cattle	XP_613302.2	GenBank
BtaCatS-4	<i>Bos taurus</i>	Cattle	XP_599038.3	GenBank
BtaCatS-β	<i>Bos taurus</i>	Cattle	NW_001494053.1 (nt)	GenBank
CfaCatS-1	<i>Canis familiaris</i>	Dog	XP_533225.2	GenBank
CfaCatS-2	<i>Canis familiaris</i>	Dog	XP_851279.1	GenBank
CfaCatS-3	<i>Canis familiaris</i>	Dog	XP_538633.2	GenBank
CfaCatS-4	<i>Canis familiaris</i>	Dog	XP_544484.2	GenBank
CfaCatS-β	<i>Canis familiaris</i>	Dog	XP_848876.1	GenBank
*ScrCatS-4	<i>Sus scrofa</i>	Pig	CAQ34765.1	GenBank
CpoCatS-β	<i>Cavia porcellus</i>	Guinea Pig	AAKN02025631.1 (nt)	GenBank

Vertebrates – Mammals (Primates)

MmuCatS-1	<i>Macaca mulatta</i>	Rhesus Monkey	XP_001118063.1	GenBank
MmuCatS-2	<i>Macaca mulatta</i>	Rhesus Monkey	XP_001108563.1	GenBank
MmuCatS-3	<i>Macaca mulatta</i>	Rhesus Monkey	XP_001103397.1	GenBank
MmuCatS-4	<i>Macaca mulatta</i>	Rhesus Monkey	XP_001108634.1	GenBank
*MmuCatS-β	<i>Macaca mulatta</i>	Rhesus Monkey	BAE00646.1	GenBank
PtrCatS-1	<i>Pan troglodytes</i>	Chimpanzee	NW_001222291.1 (nt)	GenBank
PtrCatS-2	<i>Pan troglodytes</i>	Chimpanzee	XP_001159071.1	GenBank
PtrCatS-3	<i>Pan troglodytes</i>	Chimpanzee	XP_527015.2	GenBank
PtrCatS-4	<i>Pan troglodytes</i>	Chimpanzee	XP_001139244.1	GenBank
PtrCatS-β	<i>Pan troglodytes</i>	Chimpanzee	XP_001144834.1	GenBank
HsaCatS-1	<i>Homo sapiens</i>	Human	NP_444282.2	GenBank
HsaCatS-2	<i>Homo sapiens</i>	Human	Q96P56.2	GenBank
HsaCatS-3	<i>Homo sapiens</i>	Human	NP_821138.1	GenBank
HsaCatS-4	<i>Homo sapiens</i>	Human	NP_937770.1	GenBank
HsaCatS-β	<i>Homo sapiens</i>	Human	NP_079040.2	GenBank
*AgeCatS-1	<i>Ateles geoffroyi</i>	Black-handed Spider Monkey	AAQ95774.1	GenBank
*AtrCatS-1	<i>Aotus trivirgatus</i>	Douroucouli	AAQ95776.1	GenBank
*CaeCatS-1	<i>Cercopithecus aethiops</i>	African Green Monkey	AAQ95780.1	GenBank

*CguCatS-1	<i>Colobus guereza</i>	Guereza	AAQ95782.1	GenBank
*GgoCatS-1	<i>Gorilla gorilla</i>	Western Gorilla	AAQ95786.1	GenBank
*LcaCatS-1	<i>Lemur catta</i>	Ring-tailed lemur	AAQ95788.1	GenBank
*LlaCatS-1	<i>Lagothrix lagotricha</i>	Common Woolly Monkey	AAQ95773.1	GenBank
*MtaCatS-1	<i>Miopithecus talapoin</i>	talapoin	AAQ95778.1	GenBank
*PhaCatS-1	<i>Papio hamadryas</i>	Hamadryas Baboon	AAQ95781.1	GenBank
*PpaCatS-1	<i>Pan paniscus</i>	Pygmy Chimpanzee	AAQ95784.1	GenBank
*PpyCatS-1	<i>Pongo pygmaeus</i>	Bornean Orangutan	AAQ95787.1	GenBank
*SoeCatS-1	<i>Saguinus oedipus</i>	Cotton-top Tamarin	AAQ95775.1	GenBank
*SscCatS-1	<i>Saimiri sciureus</i>	Common Squirrel Monkey	AAQ95777.1	GenBank
CjaCatS-2	<i>Callithrix jacchus</i>	white-tufted-ear marmoset	ABY84144.1	GenBank
*MfaCatS-2	<i>Macaca fascicularis</i>	Crab-eating Macaque	BAE01081.1	GenBank
PanCatS-2	<i>Papio anubis</i>	Olive Baboon	ABY40813.1	GenBank
*MfaCatS-3	<i>Macaca fascicularis</i>	Crab-eating Macaque	XP_001118991.1	GenBank

NOTE — Naming of sequences: we describe all CatSper and CatSper- β proteins in this study using an abbreviation of genus and species name, followed by names after their phylogenetic relationship with characterized human counterparts. Abbreviations: *nt*, nucleotides.

Database: GenBank, National Center for Biotechnology Information, <http://www.ncbi.nlm.nih.gov/Genbank/>; Ensembl, <http://www.ensembl.org/>; JGI, Joint Genome Institute, <http://www.jgi.doe.gov/>.

*Sequences that failed in the chi-square test in Tree-Puzzle or contained more than 15% gaps in the refined alignments.