

1 **Supplementary Tables:**

2 Supplementary Table S1: List of Metazoa, Phyla, Common Names, Data Types, and Genome

3 Sizes

	Species Name	Phylum	Common Name	Data Type	Genome Size (bp)
Early-Diverging	<i>Amphimedon queenslandica</i>	Porifera		Whole Genome	136,920,000
	<i>Anemonia viridis</i>	Cnidaria	Snakelocks Anemone	GenBank EST	NA
	<i>Aurelia aurita</i>	Cnidaria	Moon Jellyfish	GenBank Protein	713,940,000
	<i>Buddenbrockia plumatellae</i>	Cnidaria		GenBank EST	NA
	<i>Carteriospongia foliascens</i>	Porifera		GenBank EST	NA
	<i>Crateromorpha meyeri</i>	Porifera		GenBank EST	NA
	<i>Ephydatia muelleri</i>	Porifera	Mueller's Freshwater Sponge	GenBank EST	332,520,000
	<i>Heterochone calyx</i>	Porifera	Reef Building Sponge	GenBank EST	NA
	<i>Hydra vulgaris</i>	Cnidaria	Freshwater Polyp	Whole Genome	1,154,040,000
	<i>Hydractinia echinata</i>	Cnidaria	Snail Fur	GenBank EST	NA
	<i>Leucetta chagosensis</i>	Porifera	Lemon Sponge	GenBank EST	NA
	<i>Lubomirskia baicalensis</i>	Porifera		GenBank EST	NA
	<i>Mnemiopsis leidyi</i>	Ctenophora	Sea Walnut	GenBank EST	303,180,000
	<i>Nematostella vectensis</i>	Cnidaria	Starlet Sea Anemone	OrthoMCL (genome)	224,940,000
	<i>Opsacas minuta</i>	Porifera		GenBank EST	NA

	<i>Oscarella carmela</i>	Porifera	Slime Sponge	GenBank EST	NA
	<i>Oscarella lobularis</i>	Porifera	Flesh Sponge	GenBank EST	NA
	<i>Pachydictyum globosum</i>	Porifera		GenBank EST	NA
	<i>Pleurobrachia bachei</i>	Ctenophora	Sea Gooseberry	GenBank EST	NA
	<i>Pleurobrachia pileus</i>	Ctenophora	Sea Gooseberry	GenBank EST	NA
	<i>Podocoryna carnea</i>	Cnidaria		GenBank EST	NA
	<i>Suberites domucula</i>	Porifera		GenBank Protein	1,564,800,000
	<i>Sycon raphanus</i>	Porifera		GenBank EST	127,140,000
	<i>Tetracapsuloides bryosalmonae</i>	Cnidaria		GenBank EST	NA
	<i>Trichoplax adhaerens</i>	Placozoa		OrthoMCL (genome)	39,120,000
Protostomes	<i>Acyrtosiphon pisum</i>	Arthropoda	Pea Aphid	OrthoMCL (genome)	303,180,000
	<i>Aedes aegypti</i>	Arthropoda	Yellow Fever Mosquito	OrthoMCL (genome)	811,740,000
	<i>Anopheles gambiae</i> str. PEST	Arthropoda	Malaria Mosquito	OrthoMCL (genome)	264,060,000
	<i>Apis mellifera</i>	Arthropoda	Western Honey Bee	OrthoMCL (genome)	234,720,000
	<i>Aplysia californica</i>	Mollusca	California Sea Slug	Whole Genome	1,760,400,000
	<i>Bombyx mori</i>	Arthropoda	Silk Worm	OrthoMCL (genome)	518,340,000
	<i>Brugia malayi</i>	Nematoda		OrthoMCL (genome)	107,580,000
	<i>Caenorhabditis briggsae</i> AF16	Nematoda		OrthoMCL (genome)	107,580,000
	<i>Caenorhabditis elegans</i>	Nematoda		OrthoMCL (genome)	97,800,000
	<i>Capitella teleta</i>	Annelida		Whole Genome	234,720,000
	<i>Crassostrea gigas</i>	Mollusca	Pacific Oyster	Whole Genome	889,980,000

	<i>Culex pipiens</i>	Arthropoda	Common House Mosquito	OrthoMCL (genome)	528,120,000
	<i>Daphnia pulex</i>	Arthropoda	Water Flea	Whole Genome	224,940,000
	<i>Drosophila melanogaster</i>	Arthropoda	Fruit Fly	OrthoMCL (genome)	176,040,000
	<i>Helobdella robusta</i>	Annelida	Leech	Whole Genome	342,300,000
	<i>Ixodes scapularis</i>	Arthropoda	Deer Tick	OrthoMCL (genome)	2,445,000,000
	<i>Pediculus humanus</i>	Arthropoda	Human Body Lice	OrthoMCL (genome)	107,580,000
	<i>Schistosoma mansoni</i>	Platyhelminthes		OrthoMCL (genome)	254,280,000
	<i>Trichinella spiralis</i>	Nematoda		Whole Genome	254,280,000
Deuterostomes	<i>Branchiostoma floridae</i>	Chordata		GenBank TSA	577,020,000
	<i>Canis lupus familiaris</i>	Chordata	Domestic Dog	OrthoMCL (genome)	2,816,640,000
	<i>Ciona intestinalis</i>	Chordata	Vase Tunicate	OrthoMCL (genome)	195,600,000
	<i>Danio rerio</i>	Chordata	Zebrafish	OrthoMCL (genome)	1,643,040,000
	<i>Equus caballus</i>	Chordata	Horse	OrthoMCL (genome)	3,139,380,000
	<i>Gallus gallus</i>	Chordata	Red Jungle Fowl (Chicken)	OrthoMCL (genome)	1,222,500,000
	<i>Homo sapiens</i>	Chordata	Human	OrthoMCL (genome)	3,423,000,000
	<i>Macaca mulatta</i>	Chordata	Rhesus Macaque	OrthoMCL (genome)	3,511,020,000
	<i>Monodelphis domestica</i>	Chordata	Grey short-tailed opossum	OrthoMCL (genome)	4,078,260,000
	<i>Mus musculus</i>	Chordata	House Mouse	OrthoMCL (genome)	3,276,300,000
	<i>Oikopleura dioica</i>	Chordata	Sea Squirt	Whole Genome	68,460,000
	<i>Ornithorhynchus anatinus</i>	Chordata	Platypus	OrthoMCL (genome)	2,992,680,000
	<i>Pan troglodytes</i>	Chordata	Chimpanzee	OrthoMCL (genome)	3,383,880,000

<i>Rattus norvegicus</i>	Chordata	Brown Rat	OrthoMCL (genome)	2,982,900,000
<i>Saccoglossus kowalevskii</i>	Hemichordata	Acorn Worm	Whole Genome	NA
<i>Takifugu rubripes</i>	Chordata	Pufferfish	OrthoMCL (genome)	391,200,000
<i>Tetraodon nigroviridis</i>	Chordata	Green Spotted Pufferfish	OrthoMCL (genome)	498,780,000

5 Supplementary Table S2: Gene and protein name, functional category, and approximate time of
6 transfer. Grey shading is used to group and differentiate events from one another. It alternates
7 between events.

Position on Metazoan Tree of Life (Figure 3)	Protein Abbrev.	Protein Full Name	Function
A	RENBP	N-acylglucosamine 2-epimerase	Metabolism (carbohydrate)
B	HHIPL1	Hedgehog interacting protein-like 1	Unknown
B	SGSH	N-sulphoglucosamine sulphohydrolase	Metabolism (carbohydrate)
B	CYB5RL	NADH-cytochrome b5 reductase-like	Unknown
B	IscW_ISCW 019650	adenylate cyclase family	Unknown
B	LOC100181 453	UDP-glucose epimerase YtcB-like	Unknown
B	CpipJ_CPIJ 014936	Cationic amino acid transporter	Unknown
B	Smp_12993 0	sodium-dependent neurotransmitter transporter	Transporter
C	MGME1	Mitochondrial genome maintenance exonuclease 1	DNA repair
C	Picot	putative inorganic phosphate cotransporter	Unknown
C	ABHD8	Abhydrolase domain-containing protein 8	Unknown
C	LOC100178	renilla-luciferan 2-monooxygenase-like (predicted)	Unknown

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D	SLC5A6	Sodium-dependent multivitamin transporter	Transporter (solute carrier family)
D	ACOT1	Acyl-CoA thioesterase 1	Metabolism (lipid)
D	LACC1/O3Y_03315	Laccase domain-containing protein 1/Multicopper polyphenol oxidase	Unknown
D	URAD	Putative 2-oxo-4-hydroxy-4-carboxy-5-ureidoimidazoline decarboxylase	Metabolism (nucleotide)
D	NT5CC1A	Cytosolic 5'-nucleotidase 1A	Metabolism (nucleotide)
D	AAMDC	Adipogenesis associated Mth938 domain-containing protein	Unknown
D	TEX30	testis-expressed sequence 30	Unknown
D	SLC39A6	Zinc transporter ZIP6	Transporter (solute carrier family)
D	pyrR	Bifunctional protein [pyrimidine operon regulatory protein uracil phosphoribosyltransferase]	Metabolism (nucleotide)
D	GPX5	Epididymal secretory glutathione peroxidase	Metabolism (lipid)
D	NEMVEDR AFT_v1g20	Predicted Protein	Metabolism (carbohydrate)
D	Kir6.3	Potassium inwardly-rectifying channel, subfamily J, member 11, like	Unknown
D	NEMVE_v1 g214498	Uncharacterized Protein	Unknown
E	PSTS	phosphate ABC transporter substrate-binding	Transporter (ABC)

protein			
E	NEMVE_v1 g197755	Unknown Nematostella vectensis protein	Unknown
F	PGLYRP2	Peptidoglycan recognition protein 2	Unknown
F	TH	Tyrosine 3-monooxygenase	Metabolism (amino acid)
F	abch1	novel ABC transporter domain containing protein	Unknown
F	SLC7A11	Cystine/glutamate transporter	Transporter (solute carrier family)
F	HSD17B11	Estradiol 17-beta-dehydrogenase 11	Unknown
F	SLC5A5	Sodium/iodide cotransporter	Transporter (solute carrier family)
F	LOC101070 543	ADP-ribosylation factor 4-like	Unknown
G	TMEM86B	transmembrane protein 86B	Unknown
H	NUDT18	nudix (nucleoside diphosphate linked moiety X)- type motif 18	DNA repair
H	SLC41A3	Solute carrier family 41 member 3	Transporter (solute carrier family)
H	SLC2A11	Solute carrier family 2, facilitated glucose transporter member 11	Transporter (solute carrier family)
H	HNRNPA0	heterogenous nuclear ribonucleoprotein a0	Spliceosome-associated
H	LRAT	Lecithin retinol acyltransferase	Metabolism (cofactors and

			vitamins)
H	PRKAG3	5'-AMP-activated protein kinase subunit gamma-3	Signal transduction
H	RBP3	Retinol-binding protein 3	Unknown
I	SLC22A12	Solute carrier family 22 member 12	Transporter (solute carrier family)
I	PSMB10	Proteasome subunit beta type-10	Genetic information processing
J	CG13833	short-chain dehydrogenase	Unknown
K	SLC17A	solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter)	Transporter (solute carrier family)
K	Cht2	Chitinase 2	Metabolism (carbohydrate)
L	Bm1_28395	Pyridoxal-phosphate dependent enzyme family protein	Unknown
L	lact-6	???	Unknown
M	GstE11	Glutathione S transferase E11	Metabolism (amino acid)
N	CG7720	???	Unknown
N	MFS17	major facilitator superfamily transporter 17	Transporters
N	CpipJ_CPIJ 002296	Major facilitator superfamily (MFS) transporter	Transporters
N	Dmel_CG63 56	???	Unknown
N	LOC551957	facilitated trehalose transporter Tret1-like	Transporters
N	bw,	(predicted protein) protein brown-like	Unknown

	GB14822		
O	CG8303	Putative fatty acyl-CoA reductase	Unknown
P	CpipJ_CPIJ 020300	short-chain dehydrogenase	Unknown

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