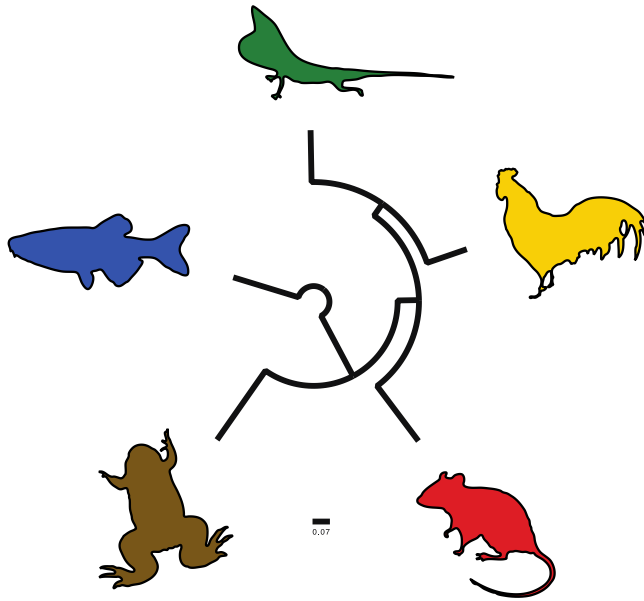


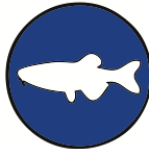
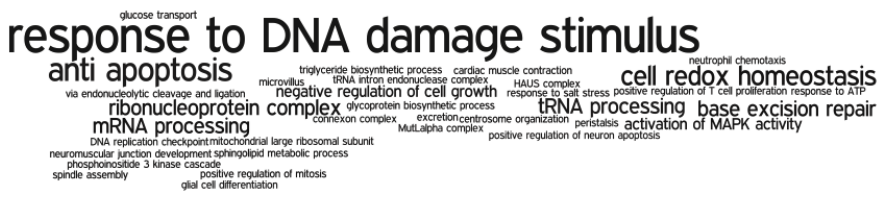
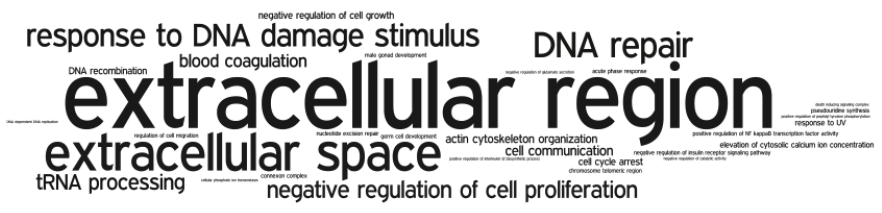
Supplementary Table 1. EST libraries used in this study. ESTs were downloaded from NCBI's dbEST on October 2009. Testis and ovary counts from each species are indicated in grey-scale. All other libraries are classified as non-reproductive in this study.

Species	Tissue Library	No. of ESTs
<i>Anolis carolinensis</i>	Brain	1597
<i>Anolis carolinensis</i>	Dewlap	2316
<i>Anolis carolinensis</i>	Ovary	3599
<i>Anolis carolinensis</i>	Regenerating tail	2504
<i>Anolis carolinensis</i>	Testis	2091
<i>Danio rerio</i>	Bone	602
<i>Danio rerio</i>	Brain	12069
<i>Danio rerio</i>	Eye	5149
<i>Danio rerio</i>	Eye and brain	1014
<i>Danio rerio</i>	Fin	3964
<i>Danio rerio</i>	Gill	1458
<i>Danio rerio</i>	Gut	2424
<i>Danio rerio</i>	Gut and internal organs	7366
<i>Danio rerio</i>	Heart	3646
<i>Danio rerio</i>	Kidney	8461
<i>Danio rerio</i>	Liver	3314
<i>Danio rerio</i>	Olfactory	4218
<i>Danio rerio</i>	Ovary	18743
<i>Danio rerio</i>	Testis	11229
<i>Gallus gallus</i>	Abdominal fat pad	412
<i>Gallus gallus</i>	Brain	9203
<i>Gallus gallus</i>	Chondrocytes	5134
<i>Gallus gallus</i>	Heart	1898
<i>Gallus gallus</i>	Kidney and adrenal	3881
<i>Gallus gallus</i>	Liver	3412
<i>Gallus gallus</i>	Muscle	1674
<i>Gallus gallus</i>	Ovary	4424
<i>Gallus gallus</i>	Pancreas	1006
<i>Gallus gallus</i>	Small Intestine	3490
<i>Gallus gallus</i>	Testis	1985
<i>Mus musculus</i>	Bone	530
<i>Mus musculus</i>	Brain and spinal cord	24799
<i>Mus musculus</i>	Diaphragm	756
<i>Mus musculus</i>	Eye	5113
<i>Mus musculus</i>	Heart and aorta vein	1186
<i>Mus musculus</i>	Inner ear	3185
<i>Mus musculus</i>	Kidney	7975

<i>Mus musculus</i>	Liver	4178
<i>Mus musculus</i>	Lung	1458
<i>Mus musculus</i>	Mid and hind gut	2048
<i>Mus musculus</i>	Olfactory turbinates	39
<i>Mus musculus</i>	Ovary	531
<i>Mus musculus</i>	Pancreas	3868
<i>Mus musculus</i>	Pituitary	479
<i>Mus musculus</i>	Stomach	936
<i>Mus musculus</i>	Testis	5725
<i>Mus musculus</i>	Thymus	979
<i>Mus musculus</i>	Tongue	2002
<i>Xenopus tropicalis</i>	Bone	1230
<i>Xenopus tropicalis</i>	Brain	8274
<i>Xenopus tropicalis</i>	Eye	2342
<i>Xenopus tropicalis</i>	Fat body	1533
<i>Xenopus tropicalis</i>	Heart	2786
<i>Xenopus tropicalis</i>	Intestine	1965
<i>Xenopus tropicalis</i>	Kidney	1140
<i>Xenopus tropicalis</i>	Liver	2975
<i>Xenopus tropicalis</i>	Lung	3683
<i>Xenopus tropicalis</i>	Ovary	5677
<i>Xenopus tropicalis</i>	Pancreas	104
<i>Xenopus tropicalis</i>	Skeletal muscle	2530
<i>Xenopus tropicalis</i>	Skin	2393
<i>Xenopus tropicalis</i>	Small intestine	3125
<i>Xenopus tropicalis</i>	Spleen	3564
<i>Xenopus tropicalis</i>	Stomach	1483
<i>Xenopus tropicalis</i>	Testis	16854
<i>Xenopus tropicalis</i>	Thymus	1724



Supplementary Figure 1. Five-species vertebrate phylogeny. Unrooted maximum likelihood species tree based on concatenated CDS sequences from orthologs. Each internal node has 100% bootstrap support using 1000 replicates (Stamatakis 2006, Ott *et al.* 2007). A congruent maximum likelihood tree that uses concatenated protein sequences from all 4,986 orthologs also has 100% bootstrap support (not shown). Branch lengths are scaled in terms of expected number of substitutions (Felsenstein 2005).



Supplementary Figure 2. Word-size frequency distribution of Gene Ontology (GO) terms for the most diverged orthologs in *M. musculus*, *G. gallus*, and *D. rerio*. Associated GO terms for the top 10% diverged ortholog subset are displayed according to size, based on the frequency of that term. GO terms from Biological Process (BP) and Cellular Component (CC) were used. The word-size frequency for *A. carolinensis* (with the largest GO term repertoire out of the five species) is shown in Figure 4, in the manuscript. *X. tropicalis* was omitted from the analysis due to low GO term coverage.