

Lab exercise 2

After practicing lab exercise 1, you have learned a gene called *pen-2* existing in *D. melanogaster*, *C. elegans*, mouse and human. In this exercise, you are going to do the following:

1. List amino acid sequences of Pen-2 protein in *D. melanogaster*, *C. elegans*, mouse and human.
2. List cDNA sequences of *pen-2* in *D. melanogaster*, *C. elegans*, mouse and human. Explain how you find these sequences.
3. List genomic DNA sequences of *pen-2* in *D. melanogaster*, *C. elegans*, mouse and human, each with clear indication of exon/intron structure, and positions of start codon and stop codon. Do these four species have same number of exons? Explain how you find these sequences.
4. Compose the homology comparison of the Pen-2 proteins of *D. melanogaster*, *C. elegans*, mouse and human, and Identify the conserved region(s) among these orthologs. Overall, what is the percentage of homology among these four? How about between *D. melanogaster*, and human, and between mouse and human?
5. Compose the homology comparison of the *pen-2* cDNAs of *D. melanogaster*, *C. elegans*, mouse and human, and Identify the conserved region(s), if any, among these orthologs.
6. In the case of *pen-2* gene, does the conservation among all orthologs mentioned above exist in the protein level or DNA level? What about for other genes?