

09810LS 444100

## Model organisms used in molecular biological research

模式生物在分子生物研究中的應用

### Abstract

A sequenced human genome allows for the identification of all the proteins in humans but this does not provide sufficient information to identify the pathways and structures in which these proteins function. Researchers now need to find out a gene's function and role of its encoding protein in cellular processes. To answer these questions researchers need to rely on small organisms which are: easy to cultivate, genome is sequenced, mutants are available, easy to be transformed, suitable for microscopy, mutant screen with speed and precision, rapid development with short life cycle and encountering fewer ethical constraints upon using them.

Even though most of the tiny model organisms have nothing in common with humans a broad range of genes are highly conserved. In many cases genes from certain model organisms have been successfully replaced by human genes without losing its cellular function. Model organisms are now widely used to study human diseases while studying diseases in simpler organisms reduces ethical concerns.

In this course we will introduce a broad number of frequently used model organisms well established in a vast number of labs around the world including Mouse, Zebrafish, Plants, *Drosophila*, *C. elegans*, Yeast and *E. coli*. We will discuss selected topics on anatomy, development (embryology), neurobiology (neuroanatomy, behaviour, mechanosensation, electrophysiology), genetics (genome projects), handling and maintenance of the organism, transformation/gene expression, mating/sex determination and fertilization, making mutants (microinjection, gene gun, EMS), mapping genes (SNP mapping), RNAi and using transposons for gene manipulation, microscopy, disease models, toxicology and pharmacology, evolution and ecology, research highlights and literature/web sites.

We will also offer students to take advantage on participating in selected laboratory demonstrations. Students will learn how to handle and maintain selected model organisms as well as using microscopes to screen for GFP-expression and anatomic variations.

### Syllabus:

Yeast by **Dr. C-Y Lan**: Sept 15<sup>th</sup>, Sept 22<sup>nd</sup> and Sept 29<sup>th</sup>

Plants by **Dr. T-Y Lin**: Oct. 6<sup>th</sup> and Oct. 13<sup>th</sup>

Midterm-Quiz: Oct. 20<sup>th</sup>

C. elegans by **Dr. O. Wagner**: Oct. 27<sup>th</sup>, Nov. 3<sup>rd</sup> and Nov. 10<sup>th</sup>

Drosophila by **Dr. T-K Sang**: Nov. 17<sup>th</sup>, Nov. 24<sup>th</sup> and Dec. 1<sup>st</sup>

Zebrafish & Mouse by **Dr. W-Y Chow**: Dec. 8<sup>th</sup>, Dec. 15<sup>th</sup> and Dec. 22<sup>nd</sup>

Final-Quiz: Dec. 29<sup>th</sup>

**Language:** The course will be offered in English

**Credits:** 2, **Time:** T3T4, **Class room:** LSB II Room 217

**Student evaluation:** The quiz are based on 2 questions from each teacher and 10 points per question (Midterm-Quiz = 4 questions, Final-Quiz = 6 questions, total 100 points)