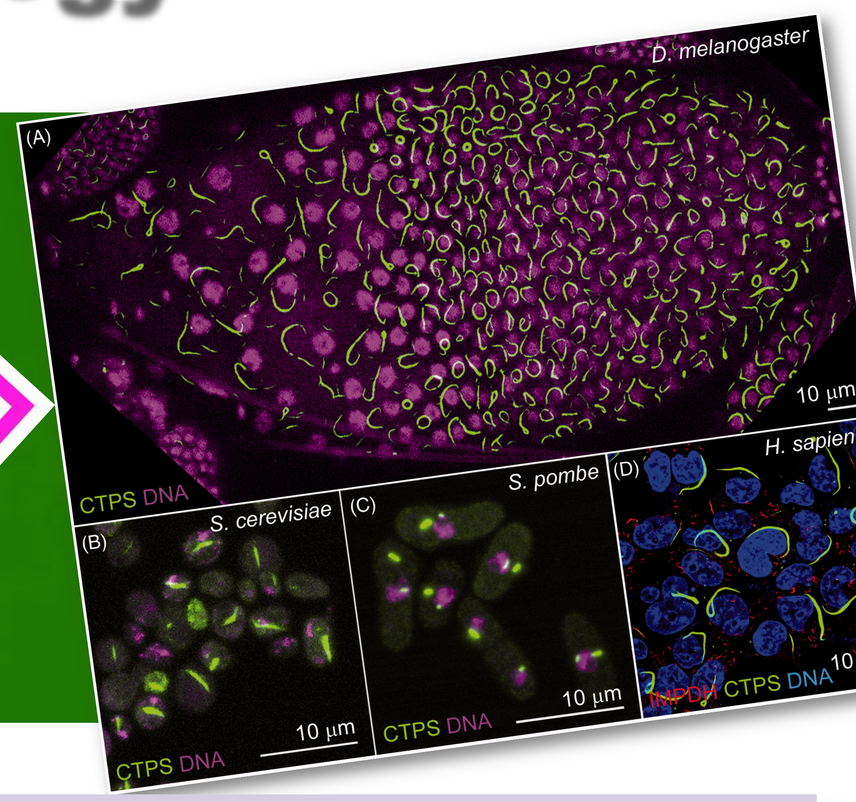
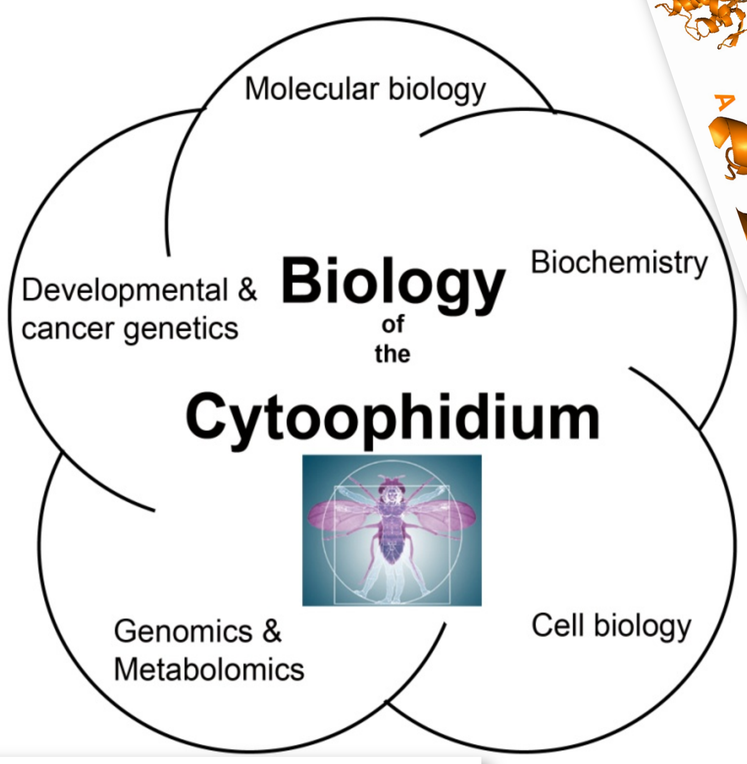
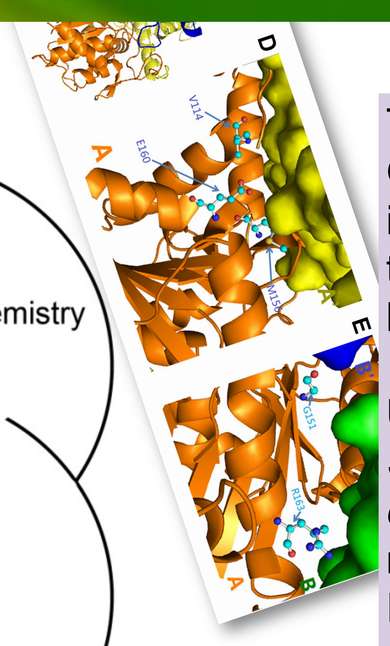
JI-LONG LIU LAB

CYTOOPHIDIA.org

Metabolic Cell Biology



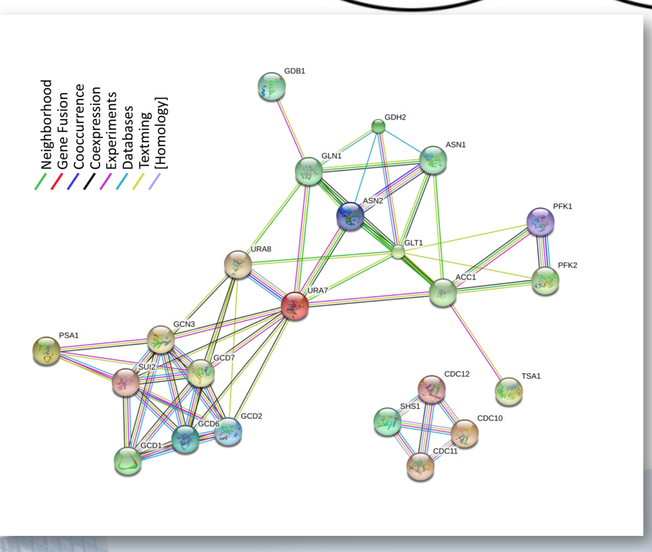




The cytoophidium (plural “cytoophidia”), meaning the cellular snake in Greek, represents a novel type of organelles. In 2010, three groups including us discovered that CTP synthase is compartmentalised into the cytoophidium. Cytoophidia have existed on our planet for at least 3 billion years and are evolutionarily conserved from bacteria to human.

Using the fruitfly *Drosophila melanogaster*, the fission yeast *Schizosaccharomyces pombe*, the budding yeast *Saccharomyces cerevisiae* and human cells as prime model systems, we will study the mechanisms by which metabolic enzymes such as CTP synthase and IMP dehydrogenase are compartmentalised within a cell.

CTP synthase and IMP dehydrogenase have been attractive targets for developing agents against cancer, virus and parasites. We will investigate how various metabolic enzymes are assembled into cytoophidia and how the cytoophidium and its kind are linked to metabolic regulation and cancer biology.



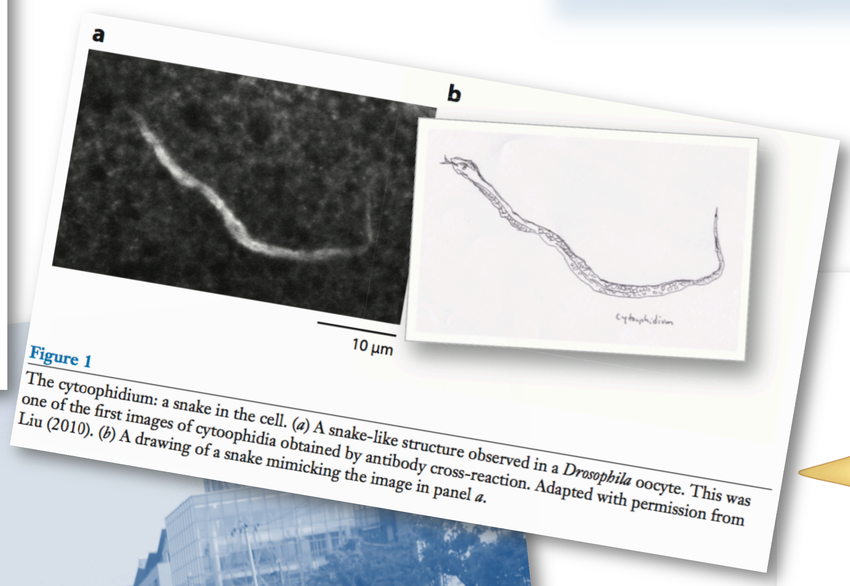


Figure 1
The cytoophidium: a snake in the cell. (*a*) A snake-like structure observed in a *Drosophila* oocyte. This was one of the first images of cytoophidia obtained by antibody cross-reaction. Adapted with permission from Liu (2010). (*b*) A drawing of a snake mimicking the image in panel *a*.

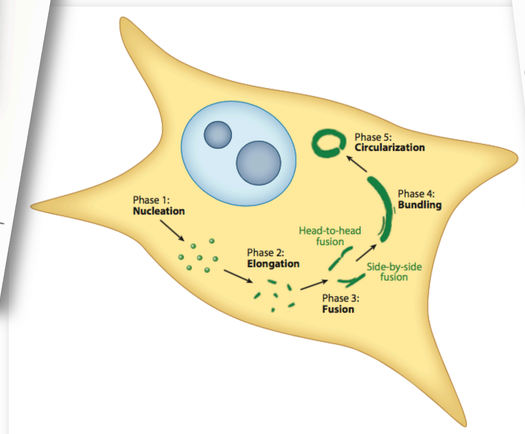


Figure 2
The five phases of cytoophidium assembly: (*1*) nucleation, (*2*) elongation, (*3*) fusion, (*4*) bundling, and (*5*) circularization. Modified from Gou et al. (2014).

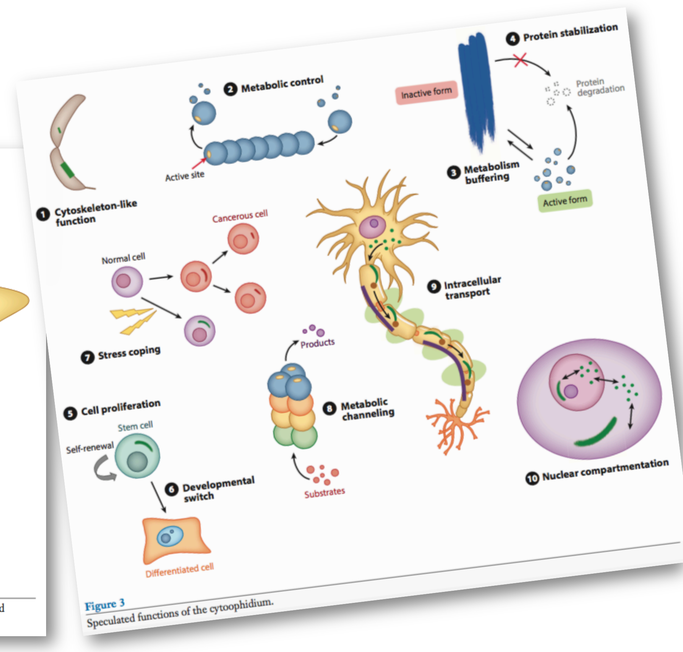


Figure 3
Speculated functions of the cytoophidium.