Time: Monday, October 19, 2015　13:30-15:10 Place : NIG B202 (Library 2F)

Title: Developmental Biology IV / Integrated Brain Science I,II
Topic: Probing autonomy and beyond: The art of mosaic analysis in genetics
Lecturer: Shu Kondo

Article:
Hotta Y, Benzer S.
Genetic dissection of the Drosophila nervous system by means of mosaics.
Proc. Natl. Acad. Sci. U S A. 1970; 67: 1156-63.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC283331/

One morning you wake up with a sudden stinging pain in your stomach.
The seemingly interminable and unrelenting pain makes you decide to call in sick and rush to the hospital. You start tinkering with possibilities of all deadly disease. -- Is it colon cancer? Or perhaps Ebola virus attacking my bowels? -- You fear for life. The doctor's verdict, to your relief, proves you wrong, yet leaving you in total perplexity. You are told that it is a passing symptom caused by overwork and mental stress. So, the problem was not in your digestive system that hurt but, in actuality, it was in your brain... As you can see in this case, immediate symptoms often hide where the true cause of the problem lies. Geneticists are also faced with similar quandaries when analyzing mutant phenotypes in multicellular organisms. Gene defect in one tissue may be "non-autonomously" causing the observed drastic phenotype in another. Thus geneticists have developed methods to determine autonomy of gene function in vivo, arguably the most famous being the "conditional knockout mouse". In this class you are first introduced to the pioneering work by Yoshiki Hotta, former Director of NIG, in which he addressed tissue autonomy using fly gynandromorphs: mosaic animals in which gene function is lost in a large segment -- for instance, only the left side -- of the body. Then we go on to visit the more recent developments of versatile methods to generate mosaic animals with mutant cells only in specific tissues using recombinases such as Cre and FLP. We will discuss the expanding applications as well as the limitations of these technologies.

本レクチャーでは、元遺伝研所長・堀田凱樹先生のユニークな研究を紹介致します。遺伝学研究では、突然変異体の表現形解析から実験がスタートすることが多いと思います。面白いことに、遺伝子の働いている組織と、表現形が観察される組織が一致するとは限りません。表現形の根本的な原因を突き止めるためには、その遺伝子が働いている組織の同定が不可欠になります。堀田先生は、体の一部だけを変異体になったモザイク変異体を用いて、ショウジョウバエの特定行動が、脳のどの領域で制御されているのかを解析する手法を開発しました。レクチャー後半では、その発展形である、コンディショナル・ノックアウト等の現代分子生物学のツールの解説も行います。