



第28回岩手大学 COE フォーラム

岩手大学 21 世紀 COE プログラム「熱-生命システム相関学拠点創成」では、関連分野において国内外で活発に研究をされている方をお招きしてフォーラム（セミナー）を開催しています。今回は、カリフォルニア大学デービス校で研究室を主宰されている井上健太郎先生をお招きして Chloroplast Biogenesis についてお話していただけることになりました。お忙しいこととは思いますが、万障繰り合わせの上、是非ご参加いただきますようお願い申し上げます。

第 28 回担当・農学部附属寒冷バイオシステム研究センター
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日時：2006 年 6 月 9 日（金）17:00~18:30

場所：岩手大学農学部 2 番講義室（本セミナーは英語で行われます）

Dr. Kentaro Inoue

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Chloroplast biogenesis - targeting and maturation of the protein translocation channel in the outer envelope of chloroplasts

The biogenesis of organelles is an important and as yet unsolved problem in cell biology. The chloroplast of higher plants provides an excellent system to study this problem. It houses photosynthetic activity as well as the biosynthesis of numerous important compounds such as amino acids and lipids, supporting the life of all organisms on earth. Most chloroplastic proteins are encoded by the nuclear genome and are targeted to the organelle posttranslationally. Thus, protein import is a prerequisite for the biogenesis of chloroplasts. Several proteinaceous components of the protein import apparatus have been identified in the chloroplastic envelope membranes. However, the mechanism of their targeting and assembly into the import apparatus remains largely unknown. The seminar will describe our recent findings on the mechanisms of targeting and maturation of Toc75, the protein translocation channel in the outer envelope of chloroplasts. Unlike other outer membrane proteins of chloroplasts and mitochondria, Toc75 requires an N-terminal extension called a transit peptide for its targeting to the organelle membrane. By various mutations and *in vitro* import assays, a unique polyglycine stretch within the transit peptide was found to be necessary for proper targeting of Toc75 to the chloroplastic outer envelope. Furthermore, the similarity of the cleavage site of the Toc75 transit peptide to the processing sites of type I signal peptidase (SPase I) substrates led to a hypothesis that an SPase I-like protein is responsible for maturation of Toc75. By biochemical and genetic approaches, Plsp1 (plastidic SPase I 1) was identified as the enzyme involved in this process. Based on the phenotypes of the mutant plants, Plsp1 has been suggested to be involved in maturation of not only Toc75 but also thylakoidal proteins. Interestingly, Toc75 and its paralog named Toc75-V/OEP80 appear to use completely different mechanisms to be targeted to the chloroplastic envelope.

Selected references:

Inoue K, Keegstra K (2003) *Plant J* 34: 661-669

Inoue K, Potter D (2004) *Plant J* 39: 354-365

Inoue K, Baldwin AJ, Shipman RL, Matsui K, Theg SM, Ohme-Takagi M (2005) *J Cell Biol* 171: 425-430

Baldwin AJ, Inoue K (2006) *FEBS J* 273:1547-1555