第 38 回岩手大学 COEフォーラム

岩手大学 21 世紀 COE プログラム「熱ー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、カナダ・サスカチェワン大学から Karen Tanino 博士をお招きし、樹木の短日・低温に対する応答やサスカチェワン大学にある最先端のシンクロトロン装置を用いた細胞内の水分、及び、適合溶質の解析に関するお話をしていただきます。

お忙しいとは思いますが、万障繰り合わせの上、ぜひご参加いただきますようお願い申し上げます。

第 38 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 11 月 20 日（月）10:45～12:15
場所：岩手大学農学部４番教室

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Plant Responses to Temperature: from hybrid poplar trees to single cells

In Canada over the next 75 years, temperatures during autumn (when trees are in transition to a dormant state) are predicted to increase between 3-5ºC. Dormancy is a pre-requisite for cold hardiness and is also a continuum in which factors affecting dormancy induction and acclimation may affect bud break and deacclimation. Four different poplar clones (‘Walker’, ‘WP-69’, ‘Katepwa’ and ‘Prairie Sky’) were placed in controlled environment growth chambers under short days with six different temperature regimes to simulate future climate change (16ºC day/ 6ºC night, 18.5ºC/ 3.5ºC, 21ºC/ 11ºC, 23.5ºC/ 8.5ºC, 26ºC/ 16ºC and 28.5ºC/ 13.5ºC). Endodormancy and cold acclimation acquisition and release were measured. NMR imaging will also be performed to identify differences in water status, water mobility and metabolic activity. Hopefully, a better understanding of the effect of variations in temperature during dormancy induction on dormancy and cold hardiness profiles of hybrid poplar will be gained.

Although the importance of water in dormancy and cold hardiness research has been generally recognized for quite some time, the vast majority of research to date (including our own!) has focused on demonstrating active change in various organic compounds. This conventional path of research was likely the result of the availability of technology adaptable to many labs as well as the demonstration that these compounds are indeed important in stress resistance. However, the question why these hydrophilic substances increase during cold acclimation still remains to be answered. Our most recent project aims to expand our knowledge of the mechanism of abiotic stress tolerance by following a novel path using a more water-centered approach. *Hypothesis: irreversible injury under extracellular freeze-induced dehydration stress is caused by intracellular ice nucleation in hardy plant cells.* It will use freezing stress in intact hardy onion epithelial layers as the model system and localize the occurrence of freezing within single cells of unacclimated and acclimated onion under high resolution synchrotron light. The distribution of the OH-stretch, hydrophilic (e.g. alpha helices, carbonyl, phosphate groups), hydrophobic (e.g. C=C, beta pleated sheets, etc.) substances across the cell during acclimation will also be mapped on a single cell basis under a Mid-IR synchrotron source.