

Form B-5

Date (日付) 17/06/2012

(Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): CHUNLEI WANG (ID No. P 10094)

- Participating school (学校名): Ishikawa Prefectural Nanao High School

- Date (実施日時): 11/06/2012 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Pollen Tube Growth

(in Japanese)

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

China is located in East Asia. It is the third largest country in the world in area. The population of China is over 1.3 billion. There are 56 different nationalities living in China. The majority are Han Chinese. The other groups include Tibetans, Mongolians, Uyghurs, Zhuang, Li, and Miao. China has two of the world's longest rivers, Yellow River and Changjiang River. China has the world's highest mountain, Qomolangma Feng. Beijing is the capital of China, Shanghai is one of the most modern cities in China and Guangzhou is one of the most open cities.

Pollen tubes show strictly polar cell expansion called tip growth. The speed of pollen tube growth is not uniform. It is marked by periods of rapid and slow growth phases. A free cytosolic calcium gradient has been monitored in pollen tube. This calcium gradient has a crucial role in modulating polar elongation. When pollen tube growth is stopped, the calcium gradient is dissipated.

In addition of calcium gradient, growing pollen tubes also exhibit a pH gradient in which the tip is slightly acidic. The polarized cytoplasmic H⁺ distribution is maintained by H⁺ influx at the apex and efflux along the subapical membrane.

Pollen tube growth is fast. In some plant species, pollen tube growth rate can reach micrometers per second. To achieve extremely fast growth, pollen tubes have a high energy and rapid oxygen uptake requirement. It is clear that a tip-localized reactive oxygen species (ROS) exist in pollen tube. Recent evidences show that ROS production and distribution most likely regulate pollen tube growth.

F-actin cables are the main tracks along which organelles travel within pollen tube. F-actin is organized into different filamentous structures at different region of pollen tubes. In the shank, the F-actin cables are long and extend longitudinally through the tubes, but in the apical region, the cables are short, and always show a mesh structure.

The levels of short actin cables in the apical region, apical calcium and H⁺, tip-localized ROS are not unchanged. They all oscillate with growth periods but show variant phase relationships with growth.

The control of reproduction is a crucial process in flowering plants. A pollen grain land on the receptive (compatible) stigma, hydrates, and germinates. The pollen tube then elongates from the stigma, through the style transmitting tissue, to the ovary to deliver the male gametes for fertilization. In plants with a self-incompatibility system, self- or genetically identical pollen is inhibited during this process. This self-incompatibility system is a genetic mechanism employed by flowering plants to prevent inbreeding and to promote outcrossing.

Pear possesses such self-incompatibility system. It is clear that S-RNase, a kind of protein, is the self-incompatibility determinant in the pistil. This protein can inhibit self- or genetically identical pollen tube growth in pistil. My research found that S-RNase could specifically decrease the calcium current, disrupt tip-localized ROS, destroy mitochondria, depolymerized actin cytoskeleton, and finally degrade nuclear DNA. These changes will inhibit pollen tube growth.

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 110 min (分), Q&A time (質疑応答時間) 40 min (分)

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Used projector, conducted experiments

◆Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

Assistance by accompanied person

◆Name and title of accompanied person (同行者 職・氏名)

Kanazawa Hiroake, Master Student

◆Other note worthy information (その他特筆すべき事項):

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。): He is very helpful for my lecture. It is easier for students to understand the lecture content with his translation.