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TEMASEK LIFESCIENCES LABORATORY

20 January 2020 (Monday), 4pm
The Auditorium (Level 1)

Hosted by: Dr Yin Zhongchao and Dr Urano Daisuke

Vegetative reproduction in the liverwort *Marchantia polymopha*

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In 2003, I got PhD in Graduate School of Agriculture, Kyoto University in plant molecular biology for a thesis entitled "Gene identification and characterization of sex chromosome Y in the liverwort, *Marchantia polymorpha*", supervised by Prof. Dr. Kanji Ohyama. Then I did my postdoc from 2003 to 2006 in Prof. Christopher J. Leaver's lab in University of Oxford, focusing on plant mitochondria using *Arabidopsis thaliana* as a model. In Nov. 2006, I returned to Kyoto University in Prof. Takayuki Kohchi's lab as an assistant professor. I started Marchantia research as a side project, but soon after the success of *Agrobacterium*-mediated transformation in Marchantia, it has become my main project. In Apr. 2013, I moved to Kobe University as a PI (associate professor), and try to expand plant EvoDevo study using Marchantia as a model.

Many plants have an ability to reproduce asexually via vegetative propagation, in which clonal propagules are generated directly from vegetative organs. However, little is known about the molecular mechanisms. A basal land plant *Marchantia polymorpha* propagates asexually via gemmae generated in the gemma cup formed on the dorsal side of the gametophyte thallus. The mechanism of gemma cup and gemma development involves proliferation of undifferentiated cells, and a series of asymmetric cell divisions. Development of gemma cup initiates at the dorsal epidermis close to the apical cell of thallus, where periclinal cell divisions to generate the protodermal and sub-protodermal cell layers are suppressed, and form a single layered basal epidermis of gemma cup. Each gemma originates from an epidermal cell which divide transversely to form an initial cell of gemma. The gemma initial undergo an asymmetric cell division to generate an apical cell which develops into the body of gemma, and a basal cell which differentiates into a stalk cell. In this talk, I would like to introduce Marchantia polymorpha as an emerging model basal plant, and also our latest data about the development of gemma-cup and gemma in *M. polymorpha*, which turned out to share, at least partially, some regulatory mechanisms in common with axillary meristem formation in angiosperms.

Recent Publications:

1. *Yasui, Y., *Tsukamoto, S., Sugaya, T., Nishihama, R., Wang, Q., Kato, H., Yamato, K.T., Fukaki, H., Mimura, T., Kubo, H., Theres, K., Kohchi, T. and **Ishizaki, K.** (2019) GEMMA CUP-ASSOCIATED MYB1, an ortholog of axillary meristem regulator, is essential for vegetative reproduction in a liverwort *Marchantia polymorpha*. ***Curr. Biol.*** in press. *Equal Contribution

2. Hiwatashi, H., Goh, H., Yasui, Y., Koh, L.Q., Takami, H., Kajikawa, M., Kirita, H., Kanazawa, T., Minamino, N., Togawa, T., Sato, M., Wakazaki, M., Shigenobu, S., Fukaki, H., Mimira, T., Toyooka, K., Sawa, S., Yamato, K.T., Ueda, T., Urano, D., Kohchi, T. and **Ishizaki, K.** (2019) The RopGEF KARAPPO is essential for the initiation of vegetative reproduction in *Marchantia polymorpha*. ***Curr. Biol.*** in press.

3.**Ishizaki, K.**, Nishihama, R., Yamato, K.T. and Kohchi, T. (2016) Molecular genetic tools and techniques for *Marchantia polymorpha* research. ***Plant Cell Physiol.*** 57: 262-270.