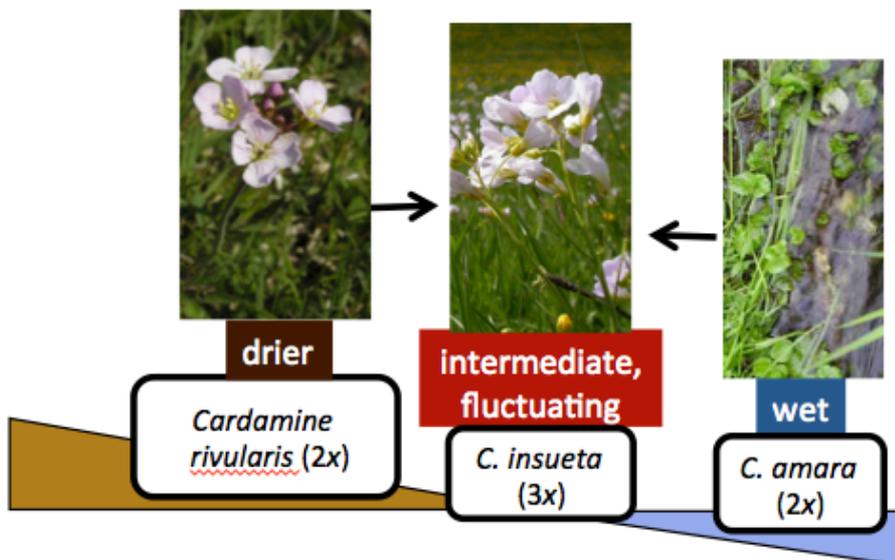


1. Title: Novel species formed by land use change during the past 150 years in Switzerland

Supervisor: Kentaro Shimizu, Reiko Akiyama, Michael Schaepman

Description: Land use change is known to induce the hybridization of different species. In Urnerboden in Switzerland, a textbook example of new species formation in the past 150 years was reported. After farmers cut trees, *Cardamine amara* living in streams and *C. rivularis* in drier habitat encountered and hybridized, and a new hybrid species *C. insueta* exploited man-made hay meadow with fluctuating water availability (submerged occasionally). Moreover, *C. insueta* is closely related to the model plant species *Arabidopsis* and so genetic and genomic resources are available. The project will integrate geographic and biological methods in situ and in laboratories to understand environmental niches and physiological responses of the three species.



Picture: The village Urnerboden and the novel hybrid *Cardamine insueta*

2. Title: Gene flow and genetic structure of dipterocarp trees in Borneo

Supervisors: Ang Cheng Choon, Kentaro Shimizu

Description: In tropical forests in Southeast Asia, community-wide mass flowering and seeding occurs once in several years. It is right now going on in Sabah and is providing a unique opportunity to study the seed dispersal in the local landscapes. The extent of gene flow is a critical issue for understanding population structure and conservation. Using field-collected seeds and genetic markers, the extent of the seed dispersal and genetic structure will be surveyed.



Picture: canopy tree in Sabah, Borneo

3. Title: Species and molecular diversity of tropical ant-plants *Macaranga*

Supervisors: Eri Yamasaki, Kentaro Shimizu

The genus *Macaranga* (Euphorbiaceae) is well known for having amazing mutualisms with ants. In the relationships, plants offer foods and nesting sites for the ants and, in turn, the ants protect the host

plants against herbivores. Because there are considerable interspecific variations in food-producing organs and domatium formation, *Macaranga* is a good model to examine how the mutualisms between plants and ants have evolved. In addition, some species flower synchronously with dominant dipterocarp trees but others do not. However, no reliable phylogeny has been constructed so far to study character evolution. In this study, we plan to sequence DNA markers from many species from Borneo and New Caledonia to analyze the phylogeny. Moreover, ongoing genome assembly will be valuable for phylogenetic and functional studies.



Picture: *Macaranga*