

Long-tongued Fly for Pollinating Long Corolla-tubed Alpine Ginger

The genus *Roscoea* is an alpine ginger group endemic to the Himalayan regions. It exhibits the suites of floral traits that would fit pollination by long tongued insects. However, previous studies revealed that the original long-tongued insect pollinators of *Roscoea* have been lost from North Indochina due to recent climate change in the Chinese Himalayas. The absence of specialized pollinator has become a big threat to the Himalayan endemic alpine gingers.

Prof. LI Qingjun and his team from the Xishuangbanna Tropical Botanical Garden studied the pollination biology of Himalayan *Roscoea* in the Nepalese Himalayas for four consecutive years (from 2012 to 2015). They aimed to find the effective pollinator of *Roscoea purpurea* at the center of evolution of *Roscoea*.

The researchers broadly investigated the floral visitors of *R. purpurea* and the behavior of *P. Longirostris* and evaluated the pollination efficiency of *P. longirostris*. They also conducted artificial pollination experiments to see how *R. purpurea* reproduced in natural condition. They tested whether long-tongued fly acted as effective pollinator of the alpine ginger in Nepal Himalayas. They finally asked whether *R. purpurea* and *P. longirostris* showed obligate mutualism for their co-occurrence, survival and/or reproduction.

They found that the partnership between *R. purpurea* and *P. longirostris* was an extremely obligate win-win situation in which plant gets reliable pollination service while fly gets secure reward. *R. purpurea* was exclusively pollinated by *P. Longirostris*, while *P. longirostris* did not get any alternative food source and thus exclusively relied upon *R. purpurea*.

The results showed that *R. purpurea* was not capable of autonomous self-pollination and apomixis, and completely relied on pollinators for pollination success. The natural fruit set in *R. purpurea* was severely affected by pollen limitation, but seed set had no effect of pollen limitation. The finding of *P. longirostris* as an obligate and extremely specialized pollinator of *Roscoea* at its evolutionary center indicated that selection by long-tongued fly was one of the major factors of evolution/speciation of *Roscoea* in the Himalayas.

Their paper, entitled “Out of Africa: evidence of the obligate mutualism between long corolla tubed plant and long tongued fly in the Himalayas”, has been featured as the cover story of *Ecology and Evolution* in November. The editorial board considered the finding as “a great example of how intricate relationship exists between plants and their pollinators in the natural ecosystems”. (Text by Babu Ram Paude)



Philoliche longirostris, an obligate pollinator of *R. purpurea*, sipping nectar from the flower of *R. purpurea*.