

# A New Pollinating Seed-Consuming Mutualism from High Himalayas

Pollinating seed-consuming mutualisms are regarded as exemplary models for studying co-evolution, but they are extremely rare. In these systems, olfactory cues have been thought to play an important role in facilitating encounters between partners.

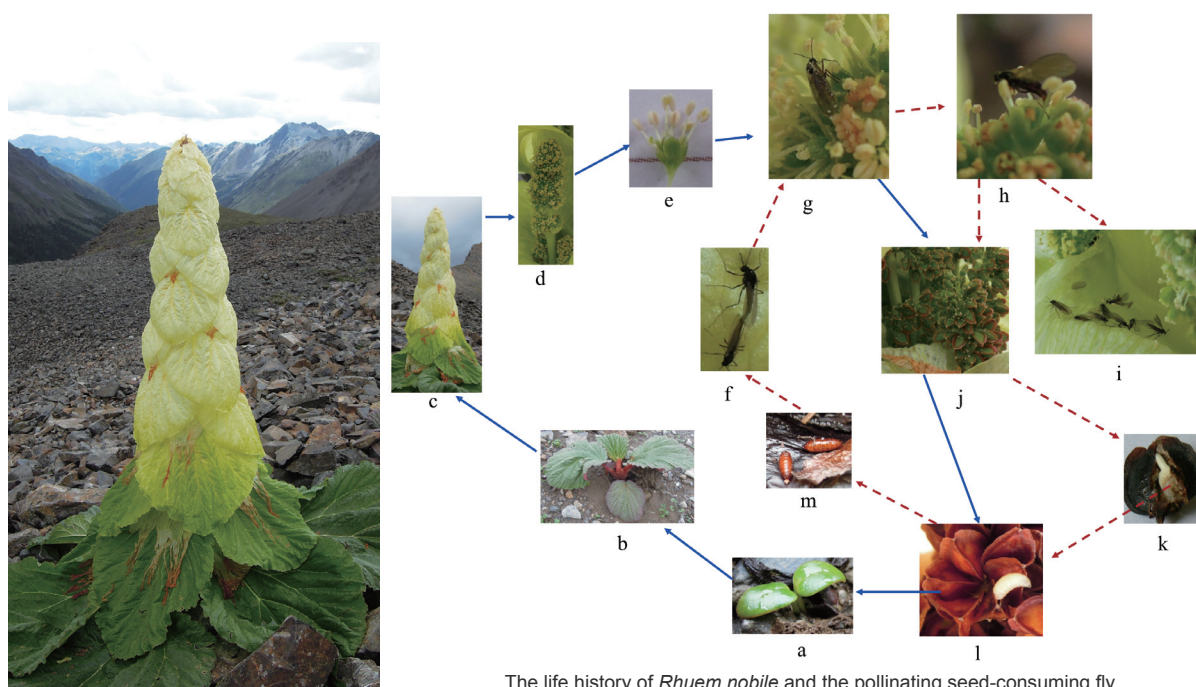
Prof. SUN Hang's research team at the Kunming Institute of Botany, CAS has been working since the 1990s to understand how alpine plants survive and reproduce in harsh alpine environments. Although the plants usually experience pollinator limitation because of the low level of insect diversity, abundance and activity in alpine ecosystems, *Rheum nobile* (Polygonaceae), a perennial monocarpic herb with large and showy translucent bracts concealing the whole compound raceme, has very high fruit set (ca. 98%) in natural populations. Further field observations revealed that flowers of *R. nobile* are frequently visited by seed-parasitic fly fungus gnats that lay their eggs in parts of the flowers.

The scientists measured the seed production resulting

from pollination by *Bradysia* flies and seed consumption by their larvae to determine the outcome of the interaction. They also conducted floral scent analyses and behavioral tests to investigate the role of olfactory cues in pollinator attraction.

The results showed *R. nobile* is self-compatible, but it depends mainly on *Bradysia* sp. females for pollination. Seed production resulting from pollination by adult flies is substantially higher than subsequent seed consumption by their larvae. Behavioral tests demonstrated that an unusual floral compound, 2-methyl butyric acid methyl ester, emitted by plants only during anthesis, was attractive to female flies.

Therefore, the *R. nobile* – *Bradysia* sp. interaction represents a new pollinating seed-consuming mutualism. A single unusual compound is the specific signal in the floral scent of *R. nobile* that plays a key role in attracting its pollinator. (Images by Dr. SONG Bo from the Kunming Institute of Botany)



The life history of *Rheum nobile* and the pollinating seed-consuming fly.