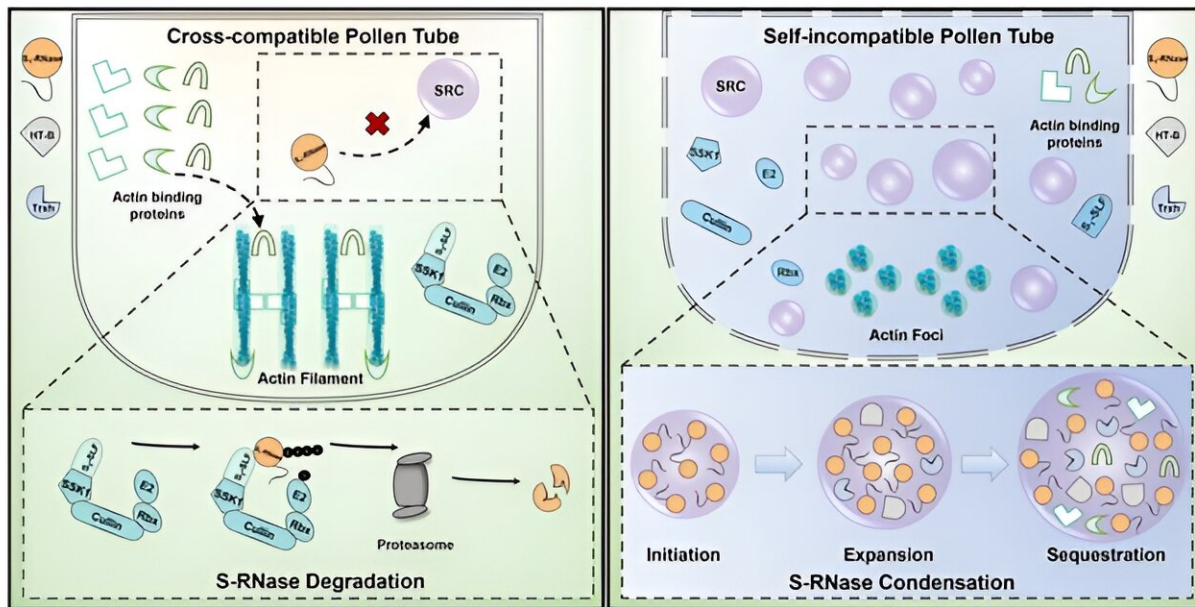


Chinese scientists reveal novel mechanism of angiosperm self-incompatibility

December 5 2023, by Zhang Nannan



Phase separation of S-RNase promotes self-incompatibility in *P. hybrida*. Credit: IGDB

Self-incompatibility (SI) is a widespread intraspecific reproductive barrier in flowering plants, a system for rejecting self-pollen to prevent seed set after self-pollination. In Solanaceae, Plantaginaceae, Rosaceae, and Rutaceae, the SI system is controlled by a single polymorphic S-locus that encodes the linked pollen factor S-locus F-box box proteins

(SLFs) and pistil factor S-RNase components.

Recent studies show that non-self S-RNase is degraded by the SCF^{SLF}-mediated ubiquitin-proteasome system in *Petunia*, but how intact S-RNase functions in the self-pollen tube cytoplasm to elicit the self-incompatibility response remains unclear.

Researchers led by Prof. Xue Yongbiao from the Institute of Genetics and Developmental Biology (IGDB) of the Chinese Academy of Sciences have found that S-RNases form membrane-less puncta structures, called S-RNase condensates (SRCs), by phase separation in the cytoplasm of self- but not non-self-pollen tubes in *Petunia hybrida*. Further transgenic experiments showed that SRCs are required for the self-incompatibility response.

The researchers then confirmed the inhibitory or promoting effects of the pollen compatibility factors, the pistil incompatibility modifying factors HT-B and SSK1, and the redox state of the pollen tube on SRC formation.

In addition, the researchers also identified SRC-interacting components by *in vitro* SRC reconstruction and LC-MS to study SRC functions and found that the SRCs formed in self-pollen tubes mainly assemble and enrich actin-binding proteins such as PhABRACL, a promoter of actin polymerization.

Finally, the researchers found that SRCs indirectly affect the integrity of the self-pollen tube cytoskeleton integrity by sequestering actin-binding proteins.

The work was [published](#) in the *Journal of Integrative Plant Biology*.

Taken together, S-RNase initiates SRC formation by [phase separation](#),

HT-B and Trxh promote its expansion, which in turn sequesters actin-binding proteins, and then drives a self-incompatible response by indirectly interfering with the cytoskeletal organization in *P. hybrida*, uncovering a new mechanistic mode of SI in angiosperms.

More information: Huayang Tian et al, Phase separation of S-RNase promotes self-incompatibility in *Petunia hybrida*., *Journal of Integrative Plant Biology* (2023). [DOI: 10.1111/jipb.13584](https://doi.org/10.1111/jipb.13584)

Provided by Chinese Academy of Sciences

Citation: Chinese scientists reveal novel mechanism of angiosperm self-incompatibility (2023, December 5) retrieved 30 April 2024 from <https://phys.org/news/2023-12-chinese-scientists-reveal-mechanism-angiosperm.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.