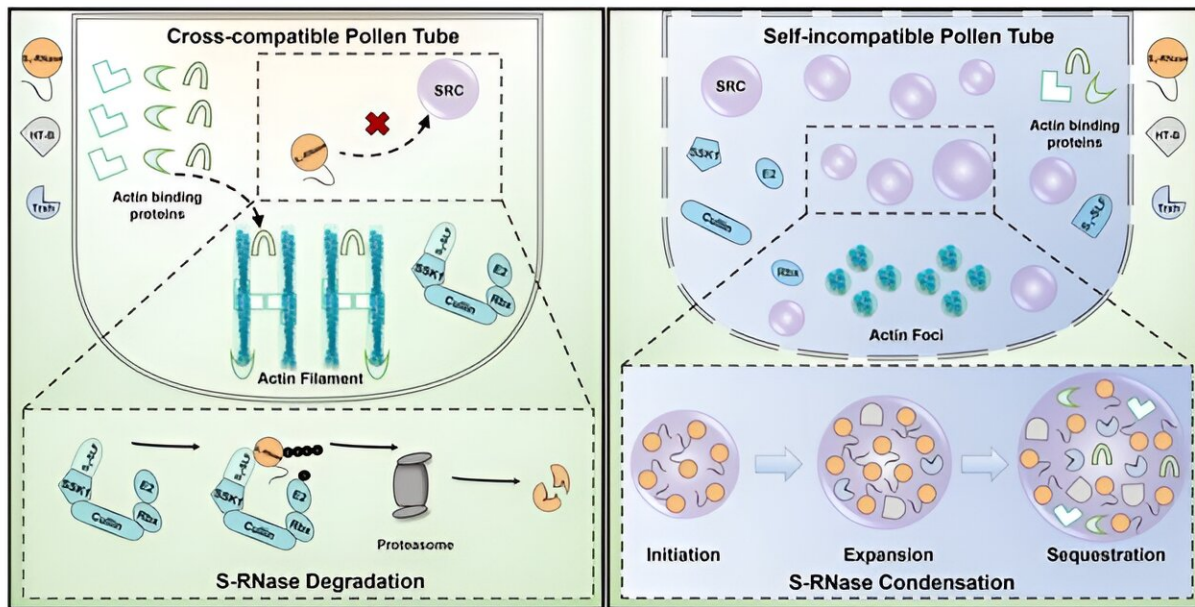


Chinese scientists reveal novel mechanism of angiosperm self-incompatibility

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)

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