NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

School of Biological Sciences
College of Science

Seminar Announcement

Comparison of two-chain state of plant and human legumains relate to their physiological functions

Date: 11 December 2019
Time: 3 p.m.
Venue: Classroom 2, SBS
Hosted By: Prof James P Tam

Speaker:
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Plant legumains, also known as vacuolar processing enzymes (VPEs), have attracted broad interest due to their important physiological functions such as plant programmed cell death and due to their intriguing dual protease and ligase activities. These complementary activities render plant legumains highly efficient peptide ligases and cyclases. However, the mechanistic understanding of plant legumains remains incomplete and partly intriguing. Here we present the crystal structures of plant legumain from Arabidopsis thaliana, activated to a unique two chain form. We also show that AtLEGβ and γ are efficient peptide ligases. Contrasting the peptidase domain, the two-chain state can reversibly switch on and off enzymatic activity by pH changes, as it remains stable at neutral pH, where legumain preferentially acts as a peptide ligase rather than a protease. The enzymatic latency of dimeric AtLEGγ has implications for its efficient storage in ER-bodies. The two-chain state is stable over a broad pH range, and we will discuss how this property primes plant legumains for additional (patho)physiological functions for example after stress induced vacuole rupture, with the translocation of AtLEGγ to more neutral pH. The comparison of molecular properties helps to rationalize different functions in plant and human legumains.