**Title: One Century of Discovery in Mendel's Pea Genes**

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**Abstract:**Pea, Pisum sativum, is an excellent model system that enabled the establishment of the foundational principles of inheritance by Gregor Mendel through the studies in seven pairs of contrasting traits. However, the molecular nature of the genetic differences underlying Mendel’s pea traits remains incompletely understood, as indeed is the case for many agronomic traits which are targets in today’s pea breeding. In this talk, I will present a genomic and phenotypic variation map coupled with an extensive haplotype-phenotype association analyses across a wide range of traits in a widely-used Pisum diversity panel. I will focus on the genomic and genetic dissection of each of the seven traits that Mendel studied in detail, revealing significant genetic loci and many previously undescribed alleles particularly for the three remaining uncharacterized pea genes. I will also look back into the research history of Pea and genetics in the past one century, and share a vision on the genomics-driven '21st-century modern synthesis' to understand traits and genes both for fundamental research and for applied practices in crop breeding. (this is a collaborative project (Mendel Pea G2P) between CAAS and JIC, between I with Noel Ellis).