Study on a novel *trans*-Golgi/TGN-localized protein family in *Arabidopsis thaliana*

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This study focuses on a novel family of proteins in *Arabidopsis thaliana* localized to *trans*-Golgi and *trans*-Golgi network (TGN).

Members of SNARE family of proteins play an important role in the process of membrane trafficking by facilitating the fusion between transport vesicles and the membrane of the destination organelle. In the present study, I investigated the subcellular localization of an uncharacterized *Arabidopsis thaliana* protein reported to interact with a TGN-localized Qa-SNARE, SYP43, which based on the similarity of its amino acid sequence to metazoan glycosyltransferases, I have named AtGTLP1 (*Arabidopsis thaliana* **G**lycosyl**T**ransferase-**L**ike **P**rotein). Additionally, four paralogues of AtGTLP1 were found in Arabidopsis genome, which together with AtGTLP1, in this research are considered to be members of the same novel protein family – the AtGTLP family.

Members of AtGTLP family are membrane-anchored proteins, which exhibit a type II-like topology, with a single transmembrane helix and a globular domain in the C-terminal part of the amino acid sequence. Based on the comparison of three-dimensional structures of AtGTLP family members to human protein *O*-fucosyltransferases and known, as well, as putative Arabidopsis protein *O*-fucosyltransferases, I predict that AtGTLP family is a yet uncharacterized family of Arabidopsis fucosyltransferases, as AtGTLPs possess a *O*-FUT-like domain but show no significant sequence similarity to fucosyltransferases previously identified in Arabidopsis. The colocalization data suggest that members of AtGTLP family localize mainly to Golgi apparatus, especially to certain zones of *trans*-Golgi, and partially to TGN.

Single *atgtlp1*, *atgtlp2*, *atgtlp3* and *atgtlp5* mutants, as well as triple *atgtlp1atgtlp2atgtlp3* and quadruple *atgtlp1atgtlp2atgtlp3atgtlp5* mutants show no obvious difference in phenotype compared to wild type. In *atgtlp4* mutant line, however, almost complete male sterility, caused by severe impairment of pollen tubes' ability to elongate, was observed. Based on these results, I predict AtGTLP4 to play a crucial role for maintaining the integrity of pollen tubes and re-named this protein as POTI (**PO**LLEN **T**UBE **I**NTEGRITY).