

Quantitative Analysis of Chloroplast Protein Targeting Pathways





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Protein targeting is required to move proteins from the site of synthesis to where

they perform their function This is especially important

for chloroplasts, the plant organelles responsible for photosynthesis, because proteins must move across the thylakoid membrane.

We are working on developing in vitro chloroplast import and thylakoid import experiments that allow translocation of a fluorescent protein for fluorescence bioimaging and Western blotting.

The twin-arginine translocation pathway (Tat pathway) is of particular interest

1. Yellow fluorescent protein with **presequence** targeting first to the chloroplast stroma, and then to the thylakoid lumen

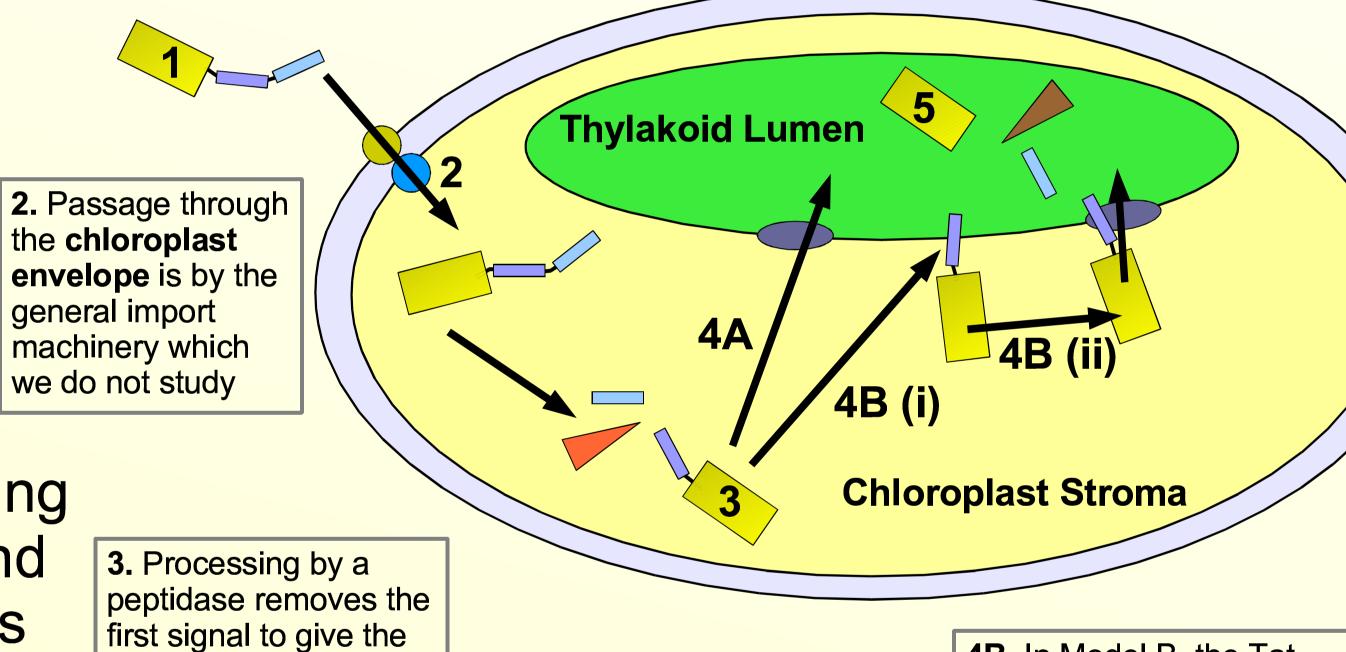
5. Further processing in the thylakoid lumen gives the mature form of the protein

The Tat pathway is able to move tightly folded, cofactor-binding proteins across the thylakoid membrane of chloroplasts.

Spatial simulations will allow a unified analysis of the data available

The first step is to relate the non-spatial localisation data of protein to the spatial data from fluorescence microscopy.

Methods of discretization such as finite difference, finite element, and meshfree methods will be applied, as appropriate, to describe the protein interactions and membrane processes.



signal meeting the Tat

intermediate form of

the protein

4A. Model A has the Tat translocase directly and the substrate is moved across the thylakoid membrane

4B. In Model B, the Tat signal first interacts with the thylakoid membrane before moving laterally to meet the translocase. These models will be distinguished by spatial simulations

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