

Putting light-harvesters on the spot

19 October 2011, by Dr. Julia Weiler

How the light-harvesting complexes required for photosynthesis get to their site of action in the plant cell is reported by RUB biologists in the *Journal of Biological Chemistry*. The team led by Prof. Dr. Danja Schünemann has demonstrated for the first time that a membrane protein interacts with a single soluble protein to anchor the subunits of the light-harvesting complexes in the membrane. The researchers propose a new model that explains the integration into the membrane through the formation of a pore.

Photosynthesis occurs in special areas of the plant cells, the [chloroplasts](#), whereby the energy-converting process takes place in specific protein complexes (photosystems). To capture the [light energy](#) and efficiently transmit it to the photosystems, light-harvesting complexes are required which work like antenna. "The proteins of the light-harvesting complexes are the most abundant [membrane proteins](#) on Earth" says Dr. Beatrix Dünschede of the RUB. "There is a special transport mechanism that conveys them into the chloroplasts and incorporates them into the photosynthetic membrane". Exactly how the various transport proteins interact with each other had, up to now, been unclear.

Several soluble proteins and the membrane protein Alb3 that channels the proteins of the light-harvesting complexes into the membrane are involved in the transport. Bochum's biologists examined intact, isolated plant cells and found that, for this purpose, Alb3 interacts with only a single soluble transport protein (cpSRP43). They confirmed this result in a second experiment with artificial membrane systems. "In a further experiment, we identified the region in Alb3 to which the soluble protein cpSRP43 binds" explains the RUB biologist Dr. Thomas Bals. "It turned out that the binding site is partly within the membrane and thus cannot be freely accessible for cpSRP43."

Schünemann's team explains the data with a new model. The soluble transport proteins bind the

proteins of the light-harvesting complexes and transport them to the membrane. There, the soluble transport protein cpSRP43 interacts with the membrane protein Alb3, which then forms a pore. The proteins of the light-harvesting complexes get into the pore, and from there they are released laterally into the membrane. "There are proteins in other organisms which are very similar to Alb3 and apparently also form pores" says Dünschede. "This supports our model. We are now planning new experiments in order to recreate the entire transport path in an artificial system."

More information: B. Dünschede, T. Bals, S. Funke, D. Schünemann (2011) Interaction studies between the chloroplast signal recognition particle subunit cpSRP43 and the full-length translocase Alb3 reveal a membrane-embedded binding region in Alb3, *Journal of Biological Chemistry*, 286, 35187-35195, [doi: 10.1074/jbc.M111.250746](https://doi.org/10.1074/jbc.M111.250746)

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