

Project status

The DNRF Chair project aims to use advanced imaging in plant biology and to build new imaging capacities with the NBI. To summarize, the last year has been successful in several different areas. We have implemented ROCS (Rotating Coherent Scattering) microscopy and are currently preparing data and analyses to write up a main publication. In addition, several studies have used other types of advanced microscopy associated with the project.

Project activities and highlights (DNRF Chair relevant):

- Research activities elucidated a pectin synthesis protein complex associated with the synthesis of a major polysaccharide in plants.
- We wrote a major review in plant cell wall synthesis.
- Participation in several conferences as keynote speaker and invitations to several institutions for research talks (for example, Plant Cell Wall conference, Malaga, Spain; 11th conference of the polish society in experimental plant biology, Poznan, Poland ; PhD school conference, Dresden, germany etc).
- Several succesful grants to the lab (Villum Experiment, and NNF grants to members of the lab).
- Hired a tenure track Assistant Professor

Publication of 11 papers in total in the reporting period. Several of these have been providing noteworthy leaps forward in plant biology, including the already mentioned pectin synthesis protein complex (***PNAS***, 2024*). We outlined how cellulose synthesis trafficking is regulated (***Nature Comm***, 2023), and reviewed cellulose synthesis across land plants (***Molecular Plant***, 2023).

*See publication appendix for full references

Preliminary results:

- We have concluded a new system to detect protein-protein interactions in plants. This is based on proximity labelling of proteins, i.e. one protein is tagged with an enzyme that puts a tag on neighboring proteins inside a cell. These proteins can then be precipitated and identified. The work is in revision for ***Nature Comm***.
- We have concluded the ROCS system and are currently performing several last experiments to publish this mehtod on plant cell biology. We envision that this system will be very helpful in long-term imaging experiments as there is no bleaching of fluorophores and that it may be used also for crop plants that are difficult to transform.
- We have identified how roots expand their roots when exposed to compacted soil condiutions ; a major agricultural problem. This work is in revision for ***Nature***.
- We have submitted several other papers during the last six motnhs and so, 2024 is going to be very productive.

Conclusion:

In context of the DNRF Chair funds, the reporting period has been used to maintain postdoc positions and to hire a PhD student in physics (this student will be maintained on other funds after the DNRF grant ends), to conclude new imaging systems with the aid of optics expertise at NBI (one review article on the new systems was published in 2023 in ***Frontiers in Plant Science***) and to perform advanced imaging of different types of plants to resolve longstanding biological questions. Apart from this, the year resulted in many noteworthy outputs and prizes/grants. Stand-outs were several publications in excellent journals, several new successful grants within the group (indicating that the people hired will be able to secure their own research), and the implementation of the new tenure track Assistant Professor.