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 are now fully operational (after having moved the lab to Copenhagen from Melbourne in 2020), we have hired personnel to maximize outputs and competencies in the lab and have achieved several goals (as outlined below).

Project activities and highlights (DNRF Chair relevant):
- Research activities elucidated the molecular mechanism behind how roots avoid salt patches during their growth. We continue efforts in this direction considering the substantial negative impact soil salinity has on plant productivity (approx 30 billion US dollars loss every year in revenues).
- I was elected member of the Royal Danish Academy of Sciences and Letters (https://www.royalacademy.dk/da/Members/Persson-Staffan)
- Participation in several conferences as keynote speaker and invitations to several institutions for research talks (for example, John Innes Center, VIB Gent, Gordon Research Conference on salinity stress in plant biology, INRA summer school etc).
- Several succesful grants to the lab (Villum Experiment, EMBO postdoc fellowship and NNF grants to members of the lab).
- Co-arranging microscopy workshop with the Center for Advanced Bioimaging (CAB).
- Hosted site visit from two labs from the Max-Planck Institute and University of Potsdam in advanced imaging.

Publication of 15 papers (10 papers associated with the DNRF Chair) in total in the reporting period. Several of these have been providing noteworthy leaps forward in plant biology, including the already mentioned salt avoiding mechanism of plant roots (***Developmental Cell***, 2022*), deciphering how the Target of Rapamycin (TOR) kinase impacts actin organization (***PNAS***, 2022), discovering of cell wall nano-domains during xylem formation (***Nature Plants***, 2022) and writing of an authorative review on the cell biology of plant cell walls (***Plant Cell***, 2022).
*See publication appendix for full references

Preliminary results:
- We have established 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. We aim to publish this method in the coming year and expect this to be a major breakthrough in protein-protein interaction detections in plant biology.
- We have built new types of microscopes that can be used to monitor plant cells without any labels in the cells; so no need for any fluorescent protein tags. 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.
- Identification of several new transcription factors that regulate primary wall synthesis have been characterized, both in the model plant Arabidopsis and in rice. Publications on these are expected in the coming year.
- We have been invited to write a major review on cellulose synthesis in land plants by the leading plant journal, Molecular Plant (JIF: 22).

Conclusion:
In context of the DNRF Chair funds, the reporting period has been used to recruit two postdocs, to build up new imaging systems with the aid of the optics expertise at NBI (one review article on the new systems is accepted 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), hiring of new tenure track Assistant Professor, EMBO fellowship to postdoctoral fellow of the lab, and the election into the Royal Academy