CAPTURE

Long sequence DNA capture, plastomes and crops: mastering third generation sequencing for agrobiodiversity studies

ABSTRACT

The third generation sequencing (TGS) will revolutionize the sequencing landscape by allowing sequencing of significantly longer reads. TGS allows long DNA fragments of mean read length of 15kb to be sequenced in real time. Moreover, some TGS technologies have enabled the miniaturization and portability of the sequencing devices becoming as small as a USB key Weighting just 90 g, the MinION of Oxford Nanopore Technologies is the smallest sequencing device available.

CAPTURE aims to apply TGS to the study of higher plant DNA sequencing, thus opening the doors of this technology for agrobiodiversity research.

We shall first test a capture protocol using the well know genome of Oryza sativa in order to develop the protocol. This will be achieved by using low cost in house probes. Once the protocol is validated will shall apply TGS to plastome sequencing of six economically important African and South American monocot species using Mybaits probes.

Members involved in CAPTURE all have excellent experience in molecular biology for NGS sequencing, bioinformatic analyses and have collaborated before. Although theoretically feasible, the project is risky as this technology is very new and to our knowledge rarely been used in higher plants, especially to capture long plastome fragments before sequencing.

Objectives :
The overall objective of capture is to apply TGS to the study of plant DNA sequencing.

For that we have three specific objectives:
• Optimize a long range dna sequence capture protocol for plant plastomes using MinION;
• Design a set of monocot specific nuclear probes for long range capture;
• Sequence plastomes of specific economically important African/South American plant species using TGS/MinION technology.

Outputs :
CAPTURE will have three major outcomes:

• Design a protocol for long range sequence capture applicable to TGS/MinION technology for plants
• Reconstruct high quality reference plastomes of several key crop/economically important plant species based on TGS/MinION technologyImprove/confirm our expertise on TGS applied to plants
• Open the path to TGS sequencing of large nuclear sequences that contain exonic, intronic intergenetic regions useful for the study of crop domestication, selection pressure, and genetic diversity.

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Project leader : Thomas couvreur
Project leader's institution : IRD

Project leader's RU : DIADE

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