先端国際共同研究推進事業
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エンジニアリングバイオロジー

2024 年度
年次報告書（公開版）

研究課題名　農業応用可能なセンチネル植物を作成するためのバイオエンジニアリングプラットフォーム

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相手側研究代表者　Karen Sarkisyan, Group Leader, Institute of Clinical Sciences, Imperial College London

研究期間　2024 年 12 月 1 日～2028 年 3 月 31 日

1.　研究成果の概要

①　研究構想にかかる成果

＜実施したこと＞

Within the confines of the project, three teams, two from Japan and one from the UK, are working together to create plants that can report on their inner molecular physiology using light. To achieve this, we are pursuing three major research themes. First, we are creating a synthetic construct that merges a light-emitting protein, luciferase, that emits green light with a fluorescent protein that absorbs the green photon and emits red light. This is one way to create a two-colour system that is needed for our ultimate goal of creating plants that emit two colours, which would allow scientists to accurately measure the physiology of the plant. The second way we are pursuing is to take the green-emitting luciferase and create a large number of mutants of it, learning which mutations can shift the colour of the emitted light from green to red. In FY2024, we have advanced towards the completion of these two goals primarily through a series of preparation steps. We made complex DNA constructs that express the studied genes in the right molecular framework. These DNA constructs will be used throughout the remainder of the project to achieve two other main goals. First, to establish the two-colour system and, second, to express this system in live plants.

＜得られた成果＞

We created the first system that transfers green light to red light. We then created the DNA constructs that are needed to express this two-colour system in plants.

②　国際ネットワーク構築・拡大に関する成果

＜実施したこと＞

We held the kick-off meeting in Japan between the three labs, with the UK lab traveling to Japan for the meeting. The meeting was used to build the network, build new synergies between members of the labs and discuss specific research directions being pursued in the project.

＜得られた成果＞

The kick-off meeting solidified the research theme plans, leading to better plasmid construct design and faster implementation.

③ 国際頭脳循環の促進に資する若手研究者の人材育成に関する成果

＜実施したこと＞

The main goal for FY2024 was for the young scientists in Japan and UK to meet each-other, establish connections and rapport to be able to structure the international team working on the three research themes.

＜得られた成果＞

Synergies between UK and Japanese young researchers were established, which led to unexpected exchange opportunities for FY2025.

2．研究実施体制

研究テーマ	中心となる研究者氏名	所属機関・部署・役職名
研究テーマ1	Karen Sarkisyan	Group Leader, Institute of Clinical Sciences, Imperial College London
研究テーマ2	Fyodor Kondrashov	Professor, Evolutionary and Synthetic Biology Unit, Okinawa Institute of Science and Technology
研究テーマ3	Karen Sarkisyan/Fyodor Kondrashov/Hidetoshi Saze	Group Leader, Imperial College London and Professor, Okinawa Institute of Science and Technology

3．代表的な業績（原著論文、プレスリリース、表彰など）

None yet