DATE: Day 30 Month 5 Year 2019

SUMMARY of
2018 RESEARCH RESULTS REPORT
For International Collaborative Research with IPR, Osaka University

Research Title		Characterization of FEA1 from *Chlamydomonas reinhardtii*
Applicant	**Name**	Hippler, Michael
	Affiliation	University of Muenster (Germany)
	Present Title	Crystallization of the FEA1 protein from *Chlamydomonas reinhardtii*
Research Collaborator (Host PI)		Prof. Genji Kurisu

Summary

Iron is essential nutrient for all living organisms and iron deficiency is one of the most common human nutritional problems in the world. Iron is present in heme-, iron-sulfur and other proteins that function in respiratory and photosynthetic energy transducing pathway and these cells require high levels of iron. In eukaryotic cells, the mitochondrion is a main iron utilizing organelle. Even though iron is one of the most abundant elements on earth, it is the third most limiting nutrient for plant growth because of the low solubility of ferric iron.

The FEA1 protein is the most abundant protein in iron-deficient *C. reinhardtii* cells but the exact role of this protein in iron homeostasis is still unclear. Microscale Thermophoresis experiments showed that FEA1 protein can binds to ferrous form of iron (dissociation constant of 356+/-21.8 nM) (unpublished data). Previous results indicated that FEA1 protein is present in the periplasm, but immunocytochemistry (IC) experiments performed in the Hippler laboratory showed that FEA1 is taken up inside the cell after prolonged iron deficiency (unpublished data). In regard to our unpublished data and placement of FEA1 in phytotransferrin family (McQuaid, 2018), solving the FEA1 crystal structure will be a crucial step for an in-depth understanding of how the FEA1 proteins binds to iron. The visit and work performed in the Kurisu laboratory, allowed FEA1 purification and crystallization. The crystals obtained, diffracted well at 2Å. In the next step, the final protein structure will be determined. Determination of the FEA1 structure will contribute to overall understanding of FEA1 function and will be crucial to elucidate the molecular details of iron binding to FEA1.

Reference

McQuaid JB, Kustka AB, Obornik M, Horak A, McCrow JP, Karas BJ, Zheng H, Kindeberg T, Ander AJ, Barbeau KA, Allen AE (2018) Carbonate-sensitive phytotransferrin controls high-affinity iron upt diatoms. *Nature* **555:** 534-537