

# FY2015 Annual Report

## Molecular Cryo-Electron Microscopy Unit

Assistant Professor Matthias Wolf



### Abstract

The highlight of this year were the delivery and installation of game-changing equipment: The world's first Talos Arctica cryo-TEM, a K2 detector and phase plate for the Titan Krios, and the TeneoVS for serial blockface imaging. A second cryo-TEM was important to offload sample screening and data collection from the Titan Krios. Two additional researchers were added with Alan Maigne and Yoshimasa Takizawa towards the end of the year. Dr. Sugita obtained Kakenhi and IMSUT grants for research on influenza virus.

### 1. Staff

- Dr. Matthias Wolf, Professor
- Dr. Shun-Yen Yang, Researcher
- Dr. Vladimir A. Meshcheryakov, Researcher
- Dr. Yukihiro Sugita, Researcher
- Dr. Alan Maigne
- Izaak Coleman, intern student
- Rika Yoshizawa, Research Administrator

Rotation students:

- Ruth Mary Thompson

### 2. Collaborations

Theme: Structure of Poliovirus isoforms

- Type of collaboration: Joint research
- Researchers:
  - Professor James M. Hogle, Harvard Medical School, Boston, MA, USA

Theme: Structure of Papilloma- and Polyomaviruses

- Type of collaboration: Joint research
- Researchers:
  - Professor Robert L. Garcea, University of Colorado at Boulder, Bio Frontiers Institute, USA

Theme: Structure of Rosettasome Variants and Sulfolobus Cell Morphology

- Type of collaboration: Joint research
- Researchers:
  - Professor Jonathan Trent, NASA Ames Research Center, Mountain View, CA, USA

Theme: 30S Ribosome – Methyltransferase Complex

- Type of collaboration: Joint research
- Researchers:
  - Professor Petr Sergiev, Belozersky Institute, Moscow State University, Russian Federation

Project: Ion Channel Structure:

- Researcher: Dr. Vladimir Meshcheryakov

Project: Structure of Flagellar Proteins in Thermophiles

- Researcher: Dr. Vladimir Meshcheryakov

Project: Novel Methods for Determining Drosophila Brain Structure

- Researcher: Dr. Shun-Jen Yang
- Techniques: SEM, Correlative Light- and EM (CLEM), High Pressure Freezing

Project: Structure of Ebolavirus VLP and Nucleocapsid

- Type of collaboration: Joint research

- Researchers:
  - Dr. Yukihiro Sugita
  - Prof. Takeshi Noda, Prof. Yoshihiro Kawaoka, IMSUT, Japan; University of Wisconsin-Madison, USA
- Techniques: cryo-EM

Project: Structure of Influenzavirus RNPs

- Type of collaboration: Joint research
- Researchers:
  - Dr. Yukihiro Sugita
  - Prof. Takeshi Noda, Prof. Yoshihiro Kawaoka, IMSUT, Japan; University of Wisconsin-Madison, USA
- Techniques: cryo-EM, CLEM

OIST-internal collaborations:

- Prof. Samatey: Campylobacter polyhook

### **3. Activities and Findings**

Nothing to report

### **4. Publications**

#### 4.1 Journals

Meshcheryakov VA, Yoon YH, Matsunami H, Wolf M, Purification, crystallization and preliminary X-ray crystallographic analysis of the flagellar accessory protein FlaH from methanogenic archaeon Methanocaldococcus jannaschii, Acta Cryst Sec F Struct Biol Comm

#### 4.2 Books and Other One-Time Publications

Nothing to report

#### 4.3 Oral and Poster Presentations

- OIST internal seminar, Wolf M, 2014/9/19, "A High Throughput Pipeline for Cryo-EM"
- The 87th annual meeting of the Japanese Biochemical Society, Kyoto, 2014/10/16, Wolf M, invited speaker, "Molecular Cryo-Electron Microscopy for Viruses"
- 4th Negative Strand Virus-Japan Symposium, 2015/1/19, Ginowan, Okinawa, Sugita Y, "Cryo-electron microscopic analysis of Ebola viral nucleocapsid"

### **5. Intellectual Property Rights and Other Specific Achievements**

Nothing to report

### **6. Meetings and Events**

## 6.1 Research Visit

Nothing to report

## 6.2 Invited Seminar Speakers

- Dr. Chen Xu  
Advanced Control for Modern TEM Operation  
Date: 8/3/2014
- Prof. Jonathan Trent  
Lecture 1: Sustainability on a resource-limited planet  
Lecture 2: Inside story on the structure and function of a living nano-machine  
Date: Nov 11/12, 2014, C209
- Dr. Yoshihiro Kawaoka  
Discussion of joint collaboration on Influenzavirus Project  
Date: Jan 21, 2014, OIST
- Dr. Alan Maigne  
Lecture on EELS Spectroscopy  
Date: 4/11/2014

## 7. Others

Nothing to report