ISFG Short term fellowship 2023

Applicant

Adam Staadig, PhD Student

Department of Forensic Genetics and Forensic Toxicology

National Board of Forensic Medicine, Linköping, Sweden.

Research collaboration visit to the Armed Forces DNA Identification Laboratory (AFDIL) 25th September to 6th October 2023

My PhD project is mainly focusing on massively parallel sequencing (MPS) technologies for kinship predictions. One specific project of my PhD thesis is about hybridization capture techniques for analysis of high-density SNP panels. The main aim of my visit to the Armed Forces DNA Identification Laboratory (AFDIL), Dover, Delaware, USA was to gain new knowledge about hybridization capture methods for SNP analysis and extended kinship predictions. AFDIL has several years of experience with hybridization capture methods and has implemented the method in case work.

During my visit, I had the opportunity to receive both theoretical and hands-on training of the whole process, from sample to data analysis. This included bone sampling and extraction with the modified Dabney protocol [1], followed by Kapa Hyper Prep library preparation (Illumina) and capture enrichment (Arbor Biosciences) [2]. This hands-on training gave me valuable hands-on details specifically for setting up the Capture method. Additionally, I obtained theoretical education on analysis with the NextSeq 550 instrument. I also received valuable teaching on the bioinformatic workflows, focusing on the CLC genomics Workbench (Qiagen) for mitochondrial DNA analysis and the Parabon® Fx™ Forensic Analysis Platform for kinship, phenotype and ancestry predictions. Specific features and detailed settings were discussed in both software. I also got a detailed description of the automated MPS library preparation setup with the Hamilton instrument. I was also able to give a presentation to AFDIL, describing the work at the National Board of Forensic Medicine and provide a more detailed description of my PhD project. Additionally, we exchanged knowledge about the QIAseq targeted DNA panel workflow (Qiagen) and I got the chance to demonstrate the standard operating procedures that we use in Sweden with this workflow.

Besides the hands-on training of the laboratory and bioinformatic workflows, I had the chance to discuss both specific and more general forensic research related topics. The opportunity to visit another research group gave me invaluable knowledge and inspiration for my ongoing PhD research education. I believe that this visit has strengthened the collaboration between the National Board of Forensic Medicine in Sweden and AFDIL. Finally, I would like to thank the ISFG fellowship board for awarding me with this fellowship and enabling this research visit.

References:

1. Dabney, J. & Meyer, M (2019). Extraction of highly degraded DNA from ancient bones and teeth. Ancient DNA: Methods and Protocols, 25-29
2. Gorden EM, Greytak EM, Sturk-Andreaggi K, Cady J, McMahon TP, Armentrout S, Marshall C. (2022). Extended kinship analysis of historical remains using SNP capture. Forensic Sci Int Genet. 2022 Mar;57:102636