

D 2.4.5 INTERNATIONAL EXCHANGE OF STUDENTS

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1. TRAINING DESCRIPTION (Trieste)

Within the framework of AdSWiM and in particular of Activity 4.5 IAMD_Survey of emerging pathogens the National Institute of Oceanography and Applied Geophysics – OGS (PP3) organized a short training course addressed to young investigators of the Institute of Public Health Zadar (IPH - PP7). This activity apart fulfill D 2.4.5 (it was supposed to have more of this occasion, stopped however because of COVID pandemic event) have a motivation behind: the event was based on the fact that PP7 is proficient in the detection of fecal indicator bacteria through classical, standard procedures, whereas Activity 4.5, carried out prevalently by PP3, aimed at implementing the classical culture-based analyses utilizing molecular-based methods. Furthermore, IPH is already equipped with the required instrumentation, therefore a short training course would be sufficient for IPH specialists to carry out independently the next-generation kind of analyses performed by OGS in the framework of the project. On a scientific point of view, there is a general need to implement the classical methods of detection of microbial pollutants, that is currently based on the cultivation and subsequent enumeration of few, highly characterized organisms such as Enterococci, *Escherichia coli*, *Salmonella* spp., *Clostridium* spores, etc. For doing this, in order to identify a broad spectrum of potential pathogens, the characterization of the whole bacterial community within a given environmental sample (e.g. water or sediment aliquots) is needed, and current technologies allow the detection of even very rare organisms. Once the whole community is characterized, potential pathogenic genera are identified and selected with the utilization of specific databases. To get to this final outcome the laboratory procedures involve DNA extraction, amplification, sequencing and analyses of the obtained sequences via bioinformatic tools. During the two-day course IPH personnel was guided through the steps of extraction, amplification and pre-sequencing sample preparation as well as through the post-processing of sequence data. Since the sequencing procedure is usually carried out by specialized companies, this step was not practically developed.

During the course, another important topic has been treated: the detection and quantification of antibiotic-resistance genes. Nowadays the spread of antibiotic-resistant bacteria (bearing antibiotic-resistance genes) is of utmost concern and although the problem is well known and its threat globally recognized, dedicated environmental monitoring programs are generally lacking. The detection and quantification of specific genes is carried out by quantitative PCR, where the target DNA sequence is detected through several cycles of amplification. The technical aspect of sample preparation, running and data analyses have been taught during the course.

In sum, the overview of these specific methods and the transfer of the knowledge from PP3 to PP7 will allow the young investigators who attended the course to run the same procedures at their own Institution.



Figure 1: The trainer Viviana Fonti and the trainee Katarina Kurić and Tonči Vukić during the procedure of DNA extraction from marine microbes collected on membrane filters.

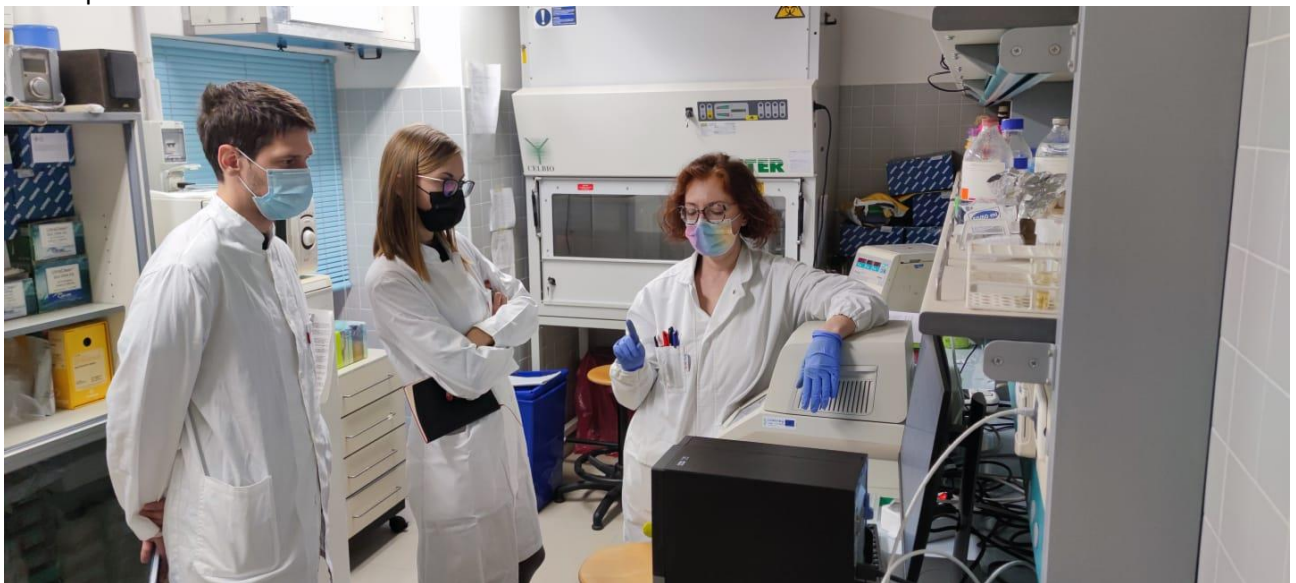


Figure 1: The trainer Viviana Fonti explaining the procedure of DNA amplification to the trainee Katarina Kurić and Tonči Vukić

2. VISIT for MEASUREMENTS and teaching (Rome)

Even if not international, the exchange involved UniUD and IC-CNR with the aim of share the knowledge and the use of an instrumentation circular dichroism (CD) instrumentation purchased in the framework of the Adswim project.

As a strategic partner, the research group led by Dr. Viviana Scognamiglio in the institute of crystallography (Roma) has invited Dr. Sondes Ben Aissa from the UNIUD to perform optical characterisations taking advantage of the mentioned instrumentation.



Circular Dichroism instrumentation

During one week of experimentation, this collaboration allowed us to investigate the reactivity of octamolybdate tetrabutylammonium (POM) as a key chemical in the sensor's fabrication with the periodic mesoporous silica (PMO) in THF solutions, along with and without the orthophosphate nutrient. These characterisations aim to understand better the affinity between POM and PMO chemicals and their behaviour inside the electrode's formulation. These results complement the electrochemical characterisation to have more insights into the detection system. However, the measurements were limited by the poor solubility of silica particles as well as the volatility of THF solvent within the CD signal recording. Some UV-visible spectrophotometric analyses were also performed during this mission.

ViViana and Sondes
Not just measurements,
Sushi for lunch in Rome

